HOW TO USE THIS MANUAL

IN01O–10

GENERAL INFORMATION

1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

2. GENERAL DESCRIPTION

At the beginning of each section, a General Description that pertains to all repair operations contained in that section is given.

Read these precautions before starting any repair task.

3. TROUBLESHOOTING

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN–24.

Be sure to read this before performing troubleshooting.

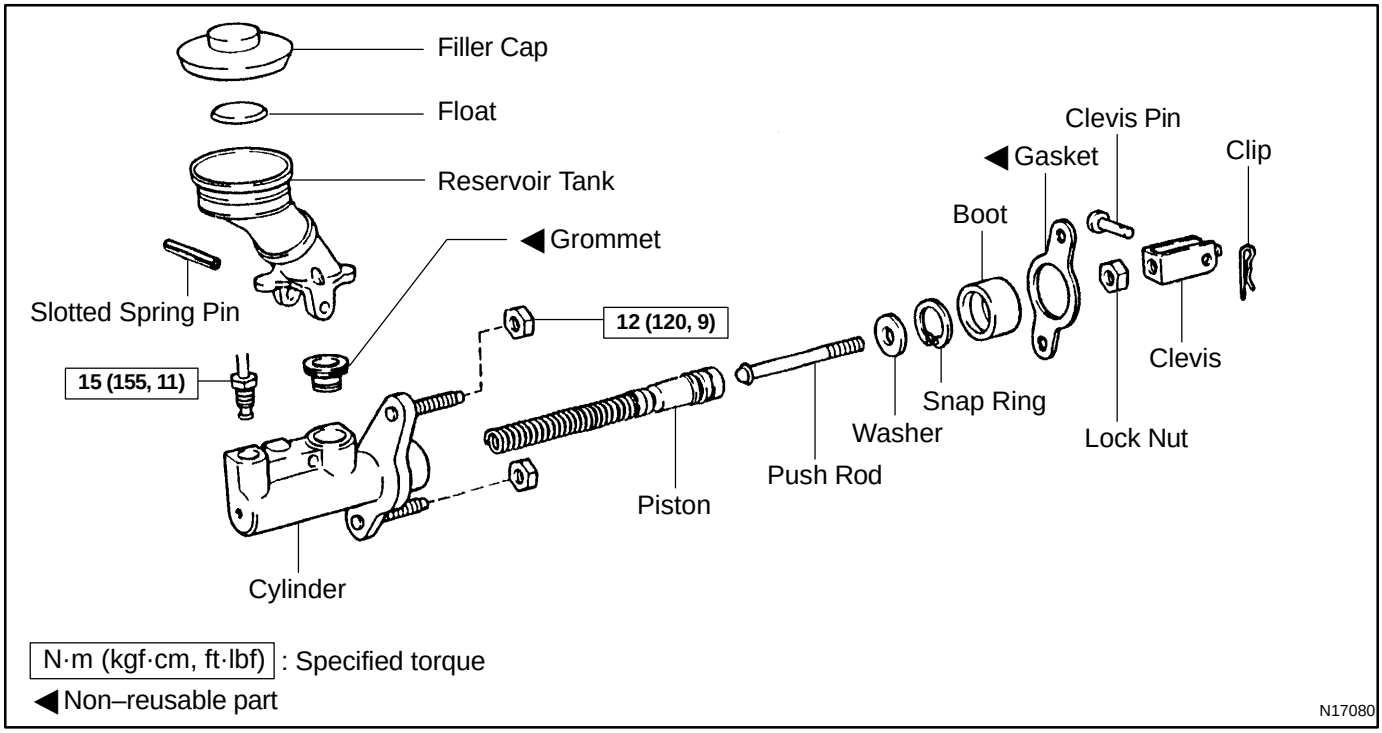
4. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

5. REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

Example:



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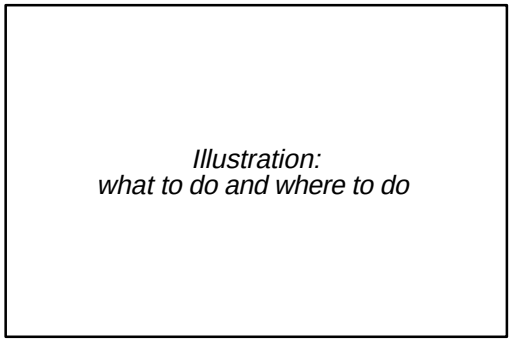
The procedures are presented in a step–by–step format:

- The illustration shows what to do and where to do.
- The task heading tells what to do.
- The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:



Task heading : what to do

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

SST 09350–30020 (09350–06120)

Set part No. *Component part No.*

Detailed text : how to do task

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm^2 or 57 — 114 psi) as shown in the illustration.

Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)

Specification

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

6. REFERENCES

References have been kept to a minimum. However, when they are required, you are given the page to refer to.

7. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section for quick reference.

8. CAUTIONS, NOTICES, HINTS:

- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

9. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.

Example:

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

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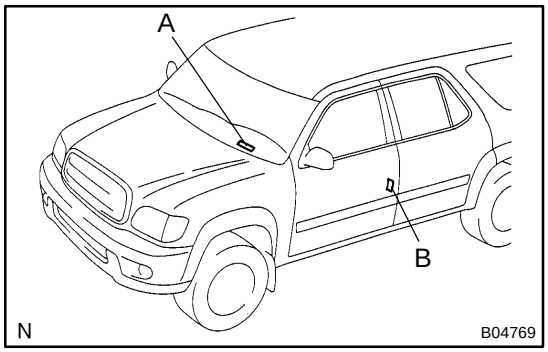
IDENTIFICATION INFORMATION

IN0IF–02

VEHICLE IDENTIFICATION AND ENGINE SERIAL NUMBER



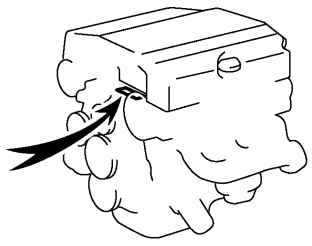
1. VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is stamped on the vehicle identification number plate and certification label.

A: Vehicle Identification Number Plate

B: Certification Label

2UZ–FE Engine:



2. ENGINE SERIAL NUMBER

The engine serial number is stamped on the engine block, as shown in the illustration.

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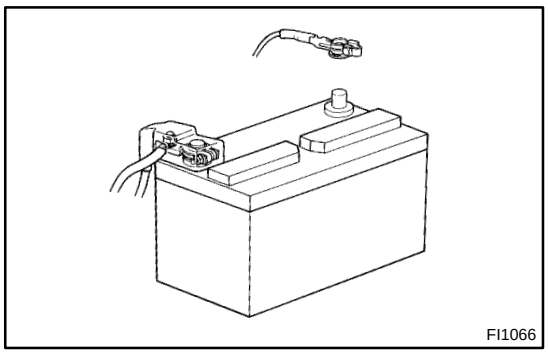
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REPAIR INSTRUCTIONS

GENERAL INFORMATION

IN0D9–03

BASIC REPAIR HINT

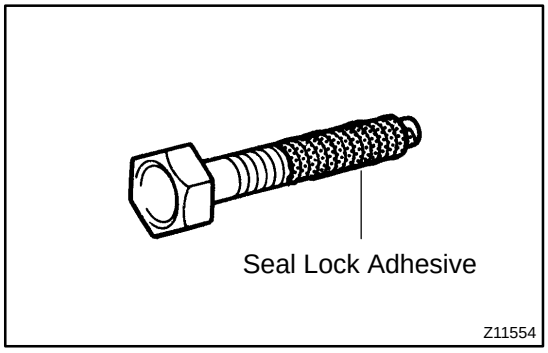
(a) Prevent damage and maintain vehicle cleanliness by protective covering on the fender, seat and floor.

(b) During disassembly, keep parts in the appropriate order to facilitate reassembly.

(c) Installation and removal of battery terminal:
  (1) Before performing electrical work, disconnect the negative (–) terminal cable from the battery.
  (2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (–) terminal cable.
  (3) When disconnecting the terminal cable, to prevent damage to battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.
  (4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.
  (5) Install the cable ends to the battery terminals after loosening the nut and tighten the nut. Do not use a hammer to tap the cable ends onto the terminals.
  (6) Be sure the cover for the positive (+) terminal is properly in place.

(d) Check hose and wiring connectors to make sure that they are connected securely and correctly.

(e) Non–reusable parts
  (1) Always replace cotter pins, gaskets, O–rings, oil seals, etc. with new ones.
  (2) Non–reusable parts are indicated in the component illustrations by the "○" symbol.



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(f) Precoated parts
Precoated parts are bolts, nuts, etc. that are coated with a seal lock adhesive at the factory.
  (1) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.
  (2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

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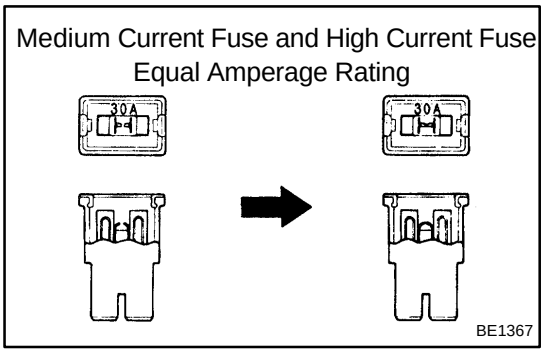
(3) Precoated parts are indicated in the component illustrations by the "▶" symbol.

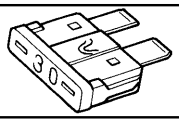
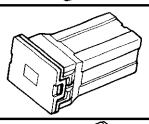
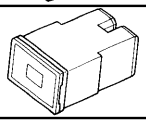
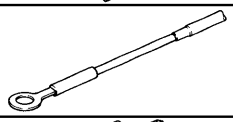
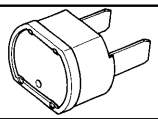
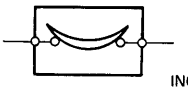
(g) When necessary, use a sealer on gaskets to prevent leaks.

(h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

(i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in the Preparation section in this manual.



(j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

Illustration	Symbol	Part Name	Abbreviation
 BE5594	IN0365	FUSE	FUSE
 BE5595	IN0366	MEDIUM CURRENT FUSE	M–FUSE
 BE5596	IN0367	HIGH CURRENT FUSE	H–FUSE
 BE5597	IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

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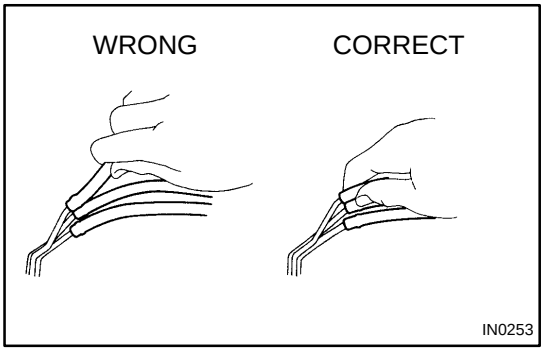
(k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN–8).

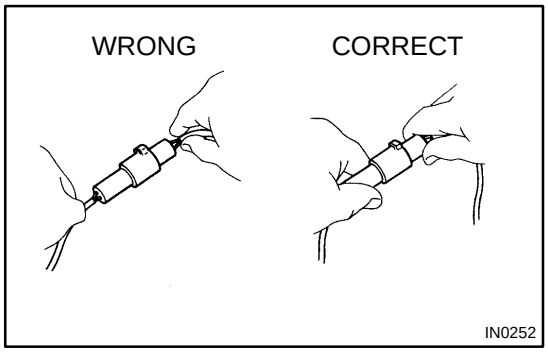
- ◀ Cancel the parking brake on the level place and shift the transmission in N position.
- ◀ When jacking up the front wheels of the vehicle, first place stoppers behind the rear wheels.
- ◀ When jacking up the rear wheels of the vehicle, first place stoppers before the front wheels.
- ◀ When either the front or rear wheels only should be jacked up, set rigid racks and place stoppers in front and behind of the other wheels on the ground.
- ◀ After the vehicle is jacked up, be sure to support it on rigid racks. It is extremely dangerous to do any work on a vehicle raised on a jack, even for a job that can be finished quickly.

(l) Observe the following precautions to avoid damage to the following parts:

(1) Do not open the cover or case of the ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)



(2) To disconnect vacuum hoses, pull off the end, not the middle of the hose.



(3) To pull apart electrical connectors, pull on the connector itself, not the wires.

(4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.

(5) When steam cleaning an engine, protect the electronic components, air filter and emission–related components from water.

(6) Never use an impact wrench to remove or install temperature switches or temperature sensors.

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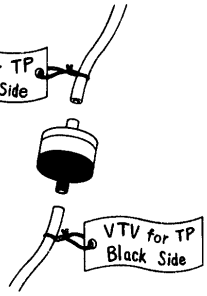
(7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

(8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step–down adapter for adjustment. Once the hose has been stretched, it may leak air.

Example



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(m) Installation and removal of vacuum hose:

(1) When disconnecting vacuum hoses, use tags to identify where they should be reconnected to.

(2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

(n) Bleeding of hydraulic brake booster system.

When repairing the hydraulic brake booster or ABS, TRAC, VSC system, bleed the air out of the hydraulic brake booster(See page BR–4).

(o) Unless otherwise stated, all resistance is measured at an ambient temperature of 20˚C (68˚F). Because the resistance may be outside specifications if measured at high temperatures immediately after the vehicle has been running. Measurement should be made when the engine has cooled down.

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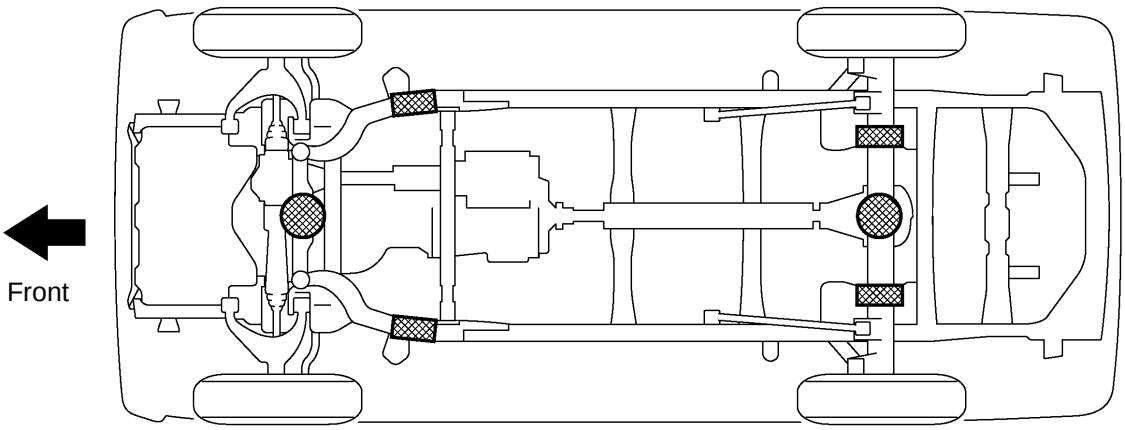
IN0DY–04

VEHICLE LIFT AND SUPPORT LOCATIONS



CAUTION: Do not use the swing arm type lift and plate type lift.

JACK POSITION ..... ⬤

Front ..... Center of cross member

Rear ..... Center of rear axle housing

SUPPORT POSITION

Safety stand ..... ▨

CAUTION: When jacking–up the front and rear, make sure the vehicle is not carrying any extra weight.

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FOR ALL OF VEHICLES

IN0IG–04

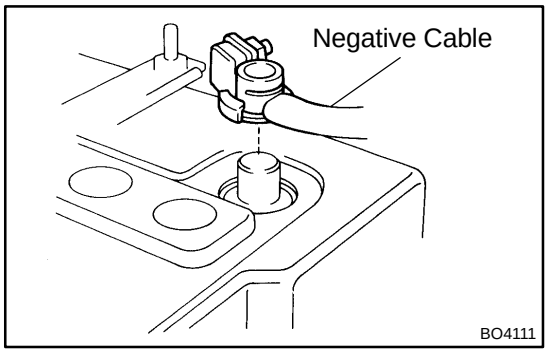
PRECAUTION

1. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

(a) The SEQUOIA is equipped with an SRS (Supplemental Restraint System), such as the driver airbag, front passenger airbag, side airbag assembly, curtain shield airbag assembly and seat belt pretensioner.

Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.

Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in this manual.



(b) GENERAL NOTICE

(1) Malfunction symptoms of the supplemental restraint system are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always inspect the diagnostic trouble codes before disconnecting the battery (See page DI–1118).

(2) Work must be started after 90 seconds from the time the ignition switch is turned to the ”LOCK” position and the negative (–) terminal cable is disconnected from the battery.

(The supplemental restraint system is equipped with a back–up power source because if work is started within 90 seconds of disconnecting the negative (–) terminal cable from the battery, the SRS may deploy.)

When the negative (–) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized in each memory system. When work is finished, reset the clock and audio systems as before. To avoid erasing the memory of each memory system, never use a back–up power supply from another battery.

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(3) Even in case of a minor collision where the SRS does not deploy, the steering wheel pad, the passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, seat belt pretensioner, airbag sensor assembly, front airbag sensor, side airbag sensor assembly and curtain shield airbag sensor assembly should be inspected.

Parts of reference	See page
Steering wheel pad	See page RS–22
Passenger side airbag assembly	See page RS–35
Side airbag assembly Power adjuster type Manual adjuster type	 See page RS–49 See page RS–64
Curtain shield airbag assembly	See page RS–72
Seat belt pretensioner	See page BO–165
Airbag sensor assembly	See page RS–83
Front airbag sensor assembly	See page RS–88
Side airbag sensor assembly	See page RS–93
Curtain shield airbag sensor assembly	See page RS–98

(4) Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.

(5) Before repairs, remove the airbag sensor because shocks are likely to be applied to the sensor during repairs.

(6) Never disassemble or repair the steering wheel pad, front passenger airbag assembly, airbag sensor assembly and front airbag sensor.

(7) If the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, seat belt pretensioner, airbag sensor assembly and front airbag sensor have been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.

(8) Do not expose the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, seat belt pretensioner, airbag sensor assembly and front airbag sensor directly to hot air or flames.

(9) Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the electrical circuit.

(10) Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.

(11) After work on the supplemental restraint system is completed, check the SRS warning light (See page DI–1118).

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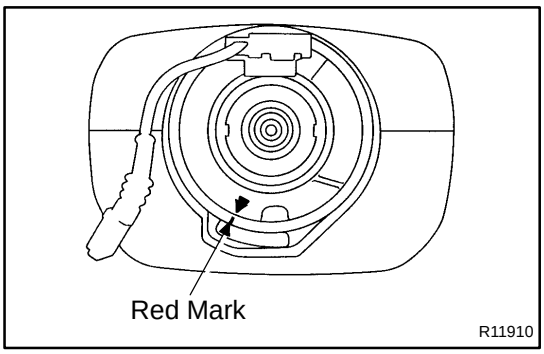

(c) SPIRAL CABLE (in Combination Switch)
The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to DI–1118 concerning correct steering wheel installation.

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(d) STEERING WHEEL PAD (with Airbag)

(1) When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up.
Storing the pad with its metallic surface upward may lead to a serious accident if the airbag inflates for some reason. In addition do not store a steering wheel pad on top of another one.

(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

(3) Grease should not be applied to the steering wheel pad and the pad should not be cleaned with any kind of detergents.

(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the air-bag connector (yellow color and 2 pins) under the steering column near the combination switch connector before starting work.

(6) When disposing of a vehicle or the steering wheel pad alone, the airbag should be deployed using an SST before disposal (See page RS–23).
Carry out the operation in a safe place away from electrical noise.

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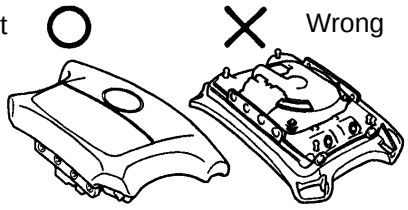
Example:



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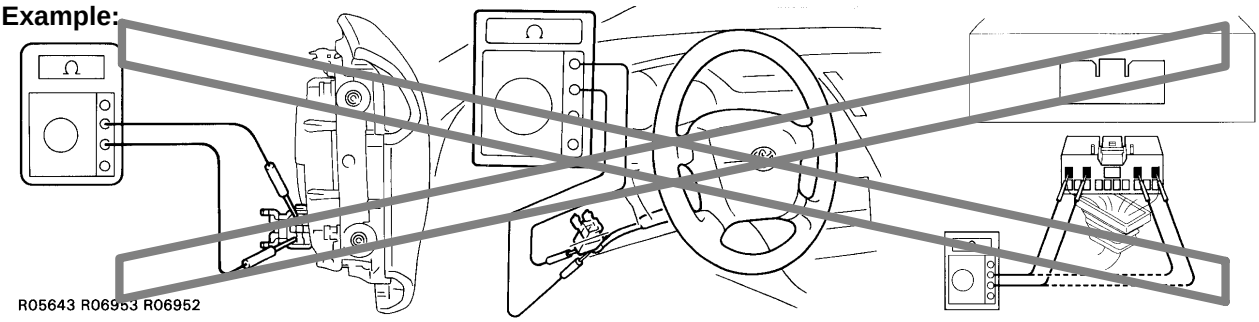
Example:



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(e) FRONT PASSENGER AIRBAG ASSEMBLY

(1) Always store a removed or new front passenger airbag assembly with the airbag deployment side facing up.
Storing the airbag assembly with the airbag deployment side facing down could cause a serious accident if the airbag deploys.

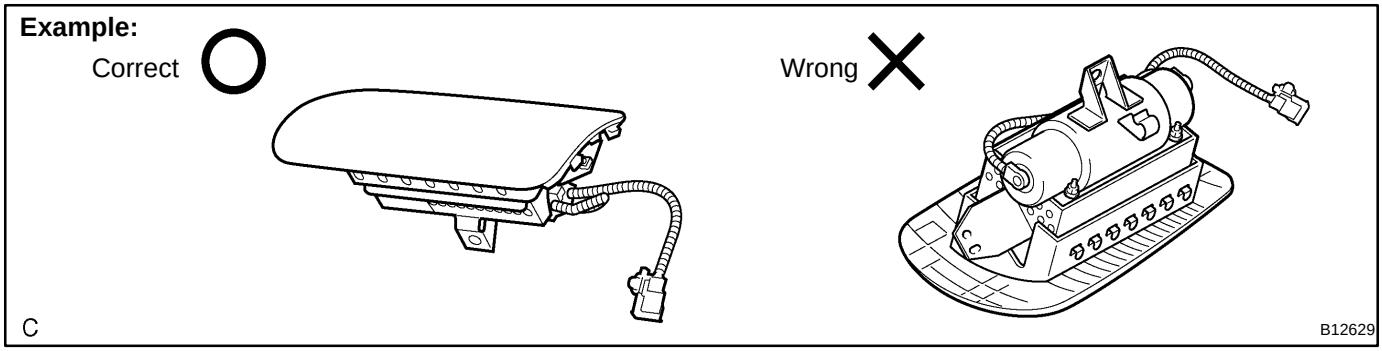
(2) Never measure the resistance of the airbag squib (This may cause the airbag to deploy, which is very dangerous.).

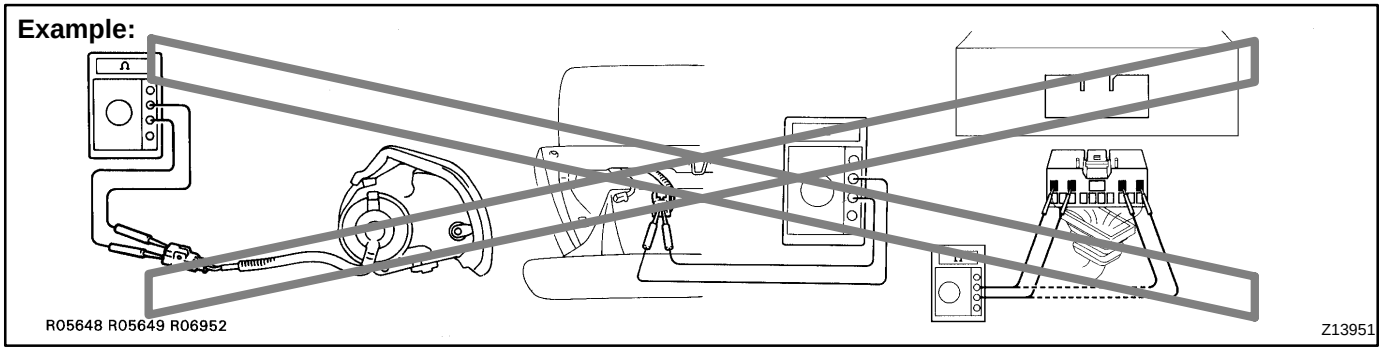
(3) Grease should not be applied to the front passenger airbag assembly and the airbag door should not be cleaned with any kind of detergents.

(4) Store the airbag assembly where the ambient temperature remains below 93˚C (200˚F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) installed on assembly before starting work.

(6) When disposing of a vehicle or the airbag assembly alone, the airbag should be deployed using an SST before disposal (See page RS–36).
Perform the operation in a safe place away from electrical noise.





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(f) SIDE AIRBAG ASSEMBLY

(1) Always store a removed or new side airbag assembly with the airbag deployment side facing up.
Storing the airbag assembly with the airbag deployment side facing down could cause a serious accident if the airbag inflates.

(2) Never measure the resistance of the airbag squib (This may cause the airbag to deploy, which is very dangerous.).

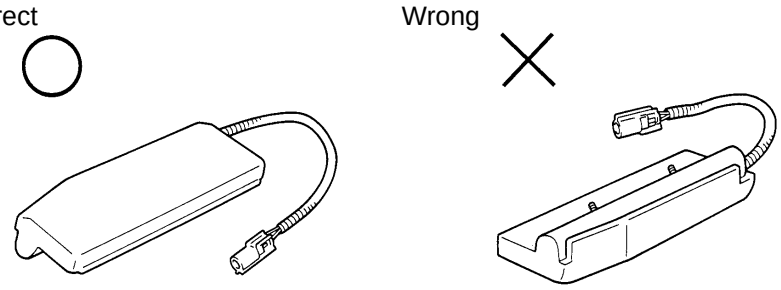
(3) Grease should not be attached to the side airbag assembly and the surface should not be cleaned with any kind of detergents.

(4) Store the airbag assembly where the ambient temperature remains below 93˚C (200˚F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) under the seat before starting work.

(6) When disposing of a vehicle or the side airbag assembly alone, the airbag should be deployed using an SST before disposal (See page RS–50 or RS–65).
Perform the operation in a safe place away from electrical noise.

Example:



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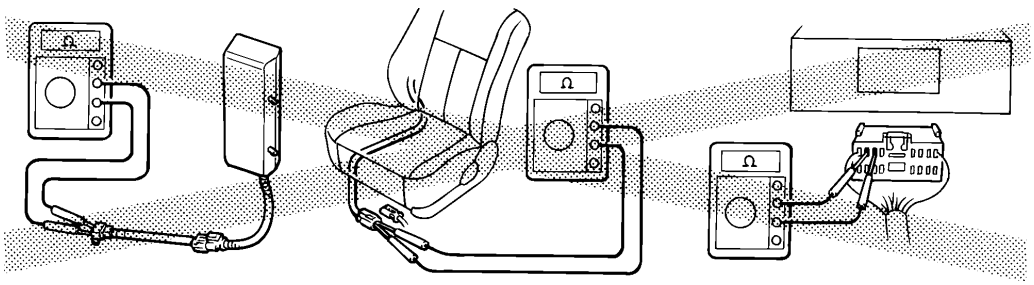
Example:



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(g) CURTAIN SHIELD AIRBAG ASSEMBLY

(1) Always store a removed or new curtain shield airbag assembly in a clear plastic bag, and keep it in a safe place.

NOTICE:

Protection bag is not reused.

CAUTION:

Never disassemble the curtain shield airbag assembly

(2) Never measure the resistance of the airbag squib (This may cause the airbag to deploy, which is very dangerous.).

(3) Grease should not be attached to the curtain shield airbag assembly and the surface should not be cleaned with any kind of detergents.

(4) Store the airbag assembly where the ambient temperature remains below 93˚C (200˚F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) into the instrument panel before starting work.

(6) When disposing of a vehicle or the curtain shield airbag assembly alone, the airbag should be deployed using an SST before disposal (See page RS–73). Perform the operation in a safe place away from electrical noise.

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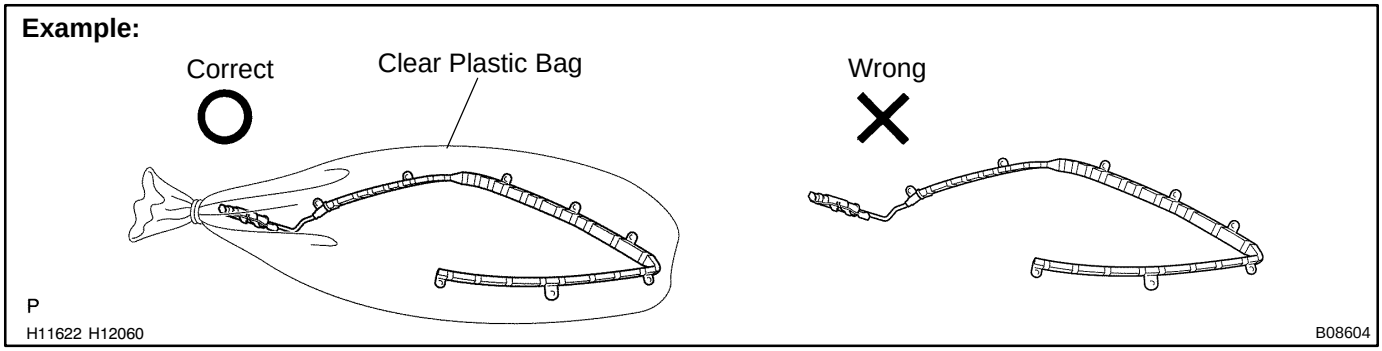
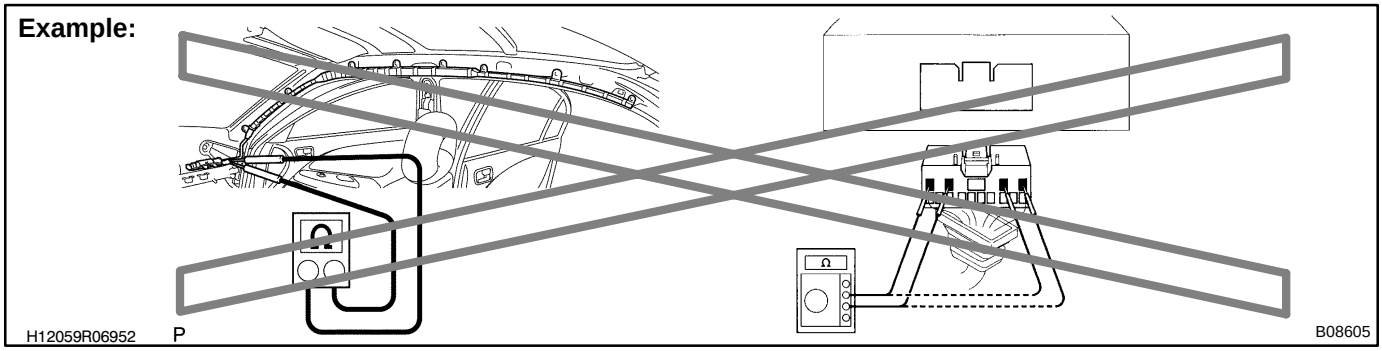




(h) SEAT BELT PRETENSIONER

(1) Never measure the resistance of the seat belt pretensioner (This may cause the seat belt pretensioner activation which is very dangerous.).

(2) Never disassemble the seat belt pretensioner.

(3) Never install the seat belt pretensioner in another vehicle.

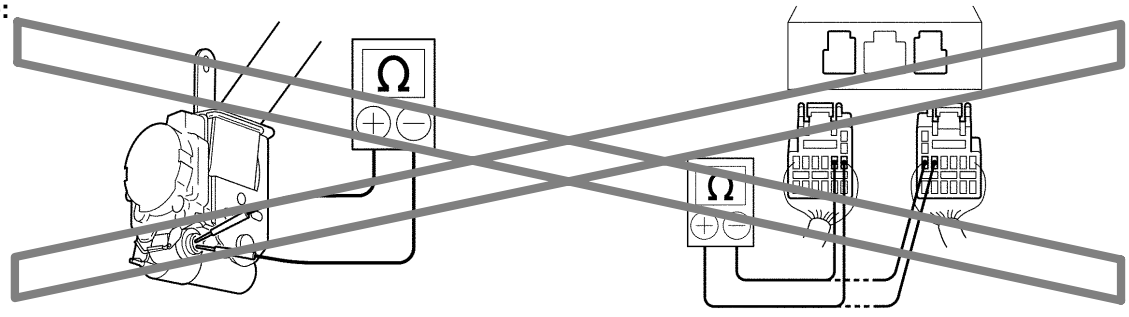
(4) Store the seat belt pretensioner where the ambient temperature remains below 80°C (176°F) and away from electrical noise without high humidity.

(5) When using electric welding, first disconnect the connector (yellow color and 2 pins) before starting work.

(6) When disposing of a vehicle or the seat belt pretensioner alone, the seat belt pretensioner should be activated before disposal (See page BO–166). Perform the operation in a safe place away from electrical noise.

(7) The seat belt pretensioner is hot after activation, so let it cool down sufficiently before the disposal. However never apply water to the seat belt pretensioner.

Example:



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(i) AIRBAG SENSOR ASSEMBLY

(1) Never reuse the airbag sensor assembly involved in a collision when the SRS has deployed.

(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not mounted to the floor, it could cause undesired ignition of the supplemental restraint system.

(3) Work must be started after 90 seconds from the time the ignition switch is turned to the ”LOCK” position and the negative (–) terminal cable is disconnected from the battery, even if only loosening the set bolts of the airbag sensor assembly.

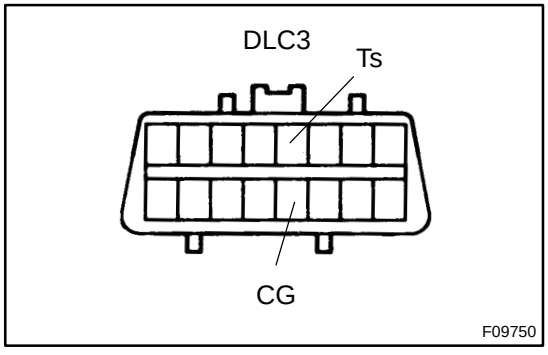
(j) WIRE HARNESS AND CONNECTOR

The SRS wire harness is integrated with the cowl wire harness assembly and floor wire harness assembly. All the connectors for the system are also a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken due to an accident, etc., repair or replace it.

2. FOR VEHICLES EQUIPPED WITH VEHICLE SKID CONTROL (VSC) SYSTEM

NOTICE:

- **Even if TRAC is initially OFF, it automatically becomes ON when the vehicle speed becomes about 30 km/h (19 mh) or more. Therefore, please drive in the test mode to avoid dangerous situations caused by the TRAC control.**
- **VSC/ABS may be failed when the vehicle is driven on the two–wheel chassis dynamo. Therefore, after driving on the chassis dynamo, please clear DTC before normal driving. Please refer to the page DI–899 for the method of clearing DTC.**
- **Fasten the vehicle with the lock chain.**



(a) Confirm VSC system is OFF.

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and CG of DLC3.

SST 09843–18040

(3) Start the engine.

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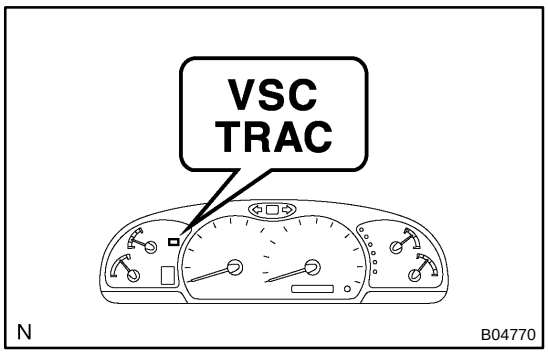

(4) Check that the VSC TRAC warning light blinks.
(5) After the measurement, remove the SST and restart the engine. At this time, make sure that the VSC TRAC warning light is off.

(b) Notice in VSC operation.
(1) Removal and reinstallation of VSC–related components may cause misadjustment of them. Do not remove or reinstall them unless necessary.
(2) When conducting VSC–related operations, do not fail to make sure that the preparation and the finishing of the operation are all performed in accordance with the direction in this text.

3. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

CAUTION:

If a large amount of unburned gasoline flows into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

(a) Use only unleaded gasoline.
(b) Avoid prolonged idling.
Avoid running the engine at idle speed for more than 20 minutes.
(c) Avoid spark jump test.
(1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
(2) While testing, never race the engine.
(d) Avoid prolonged engine compression measurement.
Engine compression tests must be done as rapidly as possible.
(e) Do not run engine when fuel tank is nearly empty.
This may cause the engine to misfire and create an extra load on the converter.
(f) Avoid coasting with ignition turned off.
(g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

4. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

For vehicles with mobile communication systems such as two–way radios and cellular telephones, observe the following precautions.

(1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.
(2) Install the antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle's electronic systems. For details about ECU and sensor locations, refer to the section on the applicable component.
(3) Do not wind the antenna feeder together with the other wiring as much as possible, also avoid running the antenna feeder parallel with other wire harness.
(4) Check that the antenna and feeder are correctly adjusted.
(5) Do not install powerful mobile communication system.

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5. FOR USING OBD II SCAN TOOL OR TOYOTA HAND–HELD TESTER

CAUTION:

Observe the following for safety reasons:

- **Before using the OBD II scan tool or TOYOTA hand–held tester, the OBD II scan tool's instruction book or TOYOTA hand–held tester's operator manual should be read thoroughly.**
- **Be sure to route all cables securely when driving with the OBD II scan tool or TOYOTA hand–held tester connected to the vehicle. (i.e. Keep cables away from feet, pedals, steering wheel and shift lever.)**
- **Two persons are required when test driving with the OBD II scan tool or TOYOTA hand–held tester, one person to drive the vehicle and one person to operate the OBD II scan tool or TOYOTA hand–held tester.**

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IN0KK–01

INITIALIZATION

NOTICE:

When disconnecting the battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See Step No.
Back Door Power Window Control System	Step 1

INITIALIZE BACK DOOR POWER WINDOW CONTROL SYSTEM

NOTICE:

Resetting the power window regulator motor (initializing the pulse sensor) is necessary if: 1) the battery terminal cable is disconnected; 2) the back door ECU, wire harness, power window regulator switch, power window regulator assembly and power window regulator motor are replaced or removed/installed; or 3) the P/W fuse is replaced or removed. If resetting is not performed, the master switch assembly will not be able to operate the AUTO operation function, jam protection function and remote operation function.

(a) Turn the ignition switch ON.
(b) Open the power window halfway by pressing the power window switch.
(c) Fully pull up on the switch until the power window is fully closed and continue to hold the switch for at least 1 second.
(d) Check that the AUTO UP/DOWN function operates normally.

If the AUTO UP/DOWN function operates normally, reset operations are complete. If abnormal, follow the steps (e) to (g) below.

(e) Disconnect the negative battery terminal cable for 10 seconds.
(f) Connect the battery terminal cable.
(g) Perform the steps (a) to (d) again.

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IN0KL–01

CUSTOMIZE PARAMETERS

HINT:

The following items can be customized.

NOTICE:

- **When a customer requests a change in a function, first make sure that customization of the function(s) is/are possible.**
- **Be sure to make a note of the current setting before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**
- **When troubleshooting, pay attention as there is a possibility that the function has been set to SMALL through customizing (Example: In case of the symptom in which "The key reminder buzzer operation does not function" is displayed, check that the key reminder buzzer operation is not set to SMALL, then perform troubleshooting).**

METER:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
KEY REMND VOLUM (Key reminder buzzer volume)	LARGE	Function that changes the volume of key reminder buzzer.	LARGE/MEDIUM/SMALL

WIRELESS DOOR LOCK:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
WIRELESS OPER	ON	Turns wireless door lock function ON/OFF.	ON/OFF
OPEN DOOR WARN	ON	Sounds buzzer for 10 seconds when door is not completely closed and transmitter LOCK switch is pressed.	ON/OFF
AUTO LOCK DELAY	30S	Controls amount of time from when doors are unlocked until they are locked by automatic lock function.	60S/30S
UNLOCK/2OPER	ON	When UNLOCK switch is pressed once, this function unlocks only the designated door. When unlock switch is pressed again within 3 seconds, all doors unlock. If setting is OFF, pressing UNLOCK switch once unlocks all doors.	ON/OFF
LNT/LGT ON/UNLK	ON	Turns on room light when wireless door lock system is operated.	ON/OFF
ALARM FUNCTION	ON	Operates theft deterrent system when transmitter LOCK (PANIC) switch is held for 3 seconds.	ON/OFF
AUTO LOCK	OFF	Locks doors when the vehicle speed reaches a certain level.	ON/OFF
UNLK/KEY TWICE	ON	Unlocks only driver's door when driver's door key cylinder is turned to unlock once, and unlocks all doors when it is turned to unlock twice. In OFF setting, unlocks all doors when the cylinder is turned to unlock once.	ON/OFF
ALL UNLK/OPN–CL	OFF	Function that unlocks all doors when the driver door is opened after turning the ignition switch off.	ON/OFF
UNLOCK/PARK	OFF	Unlocks doors when shift lever is moved to P position from any position other than P while the ignition switch is ON.	ON/OFF

THEFT:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
WARNING TIME	15S	Changes warning time for PASSIVE MODE.	5S/15S/27.5S/60S
PASSIVE MODE	OFF	Switches theft deterrent system from arming preparation state to armed state 30 seconds after key is removed from ignition key cylinder and driver side door is closed, even if doors are not locked by wireless or door key lock operation.	ON/OFF
WARN BY GLS SEN	ON	Function that switches the alarm warning on/off when glass breakage is detected.	ON/OFF

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DOOR LOCK:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
AUTO LOCK/SHIFT	ON	Locks doors when shift lever is moved from P to another position.	ON/OFF

ILLUMINATED ENTRY:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
I/L ON/UNLOCK	ON	Illuminates interior light when ignition switch is turned from ACC to LOCK position.	ON/OFF
LIGHTING TIME	15S	Changes lighting time after closing doors (light quickly fades out when ignition switch is turned on).	15S/7.5S/30S

LIGHT CONTROL:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
SENSITIVITY	NORMAL	Sensitivity adjustment is difficult to confirm. Check by driving the customer's vehicle.	NORMAL/DARK2/DARK1/ LIGHT1/LIGHT2
LIGHT OFF DELAY	30S	Keeps headlights on for a certain period of time after closing all doors with ignition switch on, light control switch in HEAD or AUTO position, and headlights on.	OFF/30S/60S/90S
DISP EX ON SEN	NORMAL	Changes brightness of lights such as combination meter indicator light, A/C indicator lamp, and clock lamp.	NORMAL/DARK2/DARK1/ LIGHT1/LIGHT2
DISP OFF SEN	NORMAL	Changes brightness of lights such as combination meter indicator light, A/C indicator lamp, and clock lamp.	NORMAL/DARK2/DARK1/ LIGHT1/LIGHT2

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HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

IN01T–18

GENERAL INFORMATION

A large number of ECU controlled systems are used in the SEQUOIA. In general, the ECU controlled system is considered to be a very intricate system requiring a high level of technical knowledge and expert skill to troubleshoot. However, the fact is that if you proceed to inspect the circuits one by one, troubleshooting of these systems is not complex. If you have adequate understanding of the system and a basic knowledge of electricity, accurate diagnosis and necessary repair can be performed to locate and fix the problem. This manual is designed through emphasis of the above standpoint to help service technicians perform accurate and effective troubleshooting, and is compiled for the following major ECU controlled systems:
The troubleshooting procedure and how to make use of it are described on the following pages.

System	Page
1. Engine	DI–1
2. Automatic Transmission	DI–515
3. Air Suspension Control System	DI–695
4. Tire Pressure Warning System	DI–796
5. ABS with EBD & BA & TRAC & VSC System	DI–891
6. Can Communication System	DI–1060
7. Supplemental Restraint System	DI–1118
8. Power Seat Control System w/ Driving Position Memory	DI–1501
9. Cruise Control System	DI–1536
10.Engine Immobilizer System	DI–1570
11.Combination Meter System	DI–1601
12.Sliding Roof System	DI–1661
13.Body Control System	DI–1678
14.Driver Door Control System	DI–1778
15.Passenger Door Control System	DI–1814
16.Back Door Control System	DI–1850
17.Multiplex Communication System	DI–1887
18.Audio System	DI–1955
19.Rear Seat Audio System	DI–2044
20.Rear Seat Entertainment System	DI–2078
21.Navigation System	DI–2159
22.Air Conditioning System	DI–2297

FOR USING OBD II SCAN TOOL OR TOYOTA HAND–HELD TESTER

- ▶ Before using the scan tool or tester, the scan tool's instruction book or tester's operator manual should be read thoroughly.
- ▶ If the scan tool or tester cannot communicate with ECU controlled systems when you have connected the cable of the scan tool or tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.
  - (1) If communication is normal when the tool is connected to another vehicle, inspect the diagnosis data link line (Bus≧line) or ECU power circuit of the vehicle.
  - (2) If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so perform the Self Test procedures outline in the Tester Operator's Manual.

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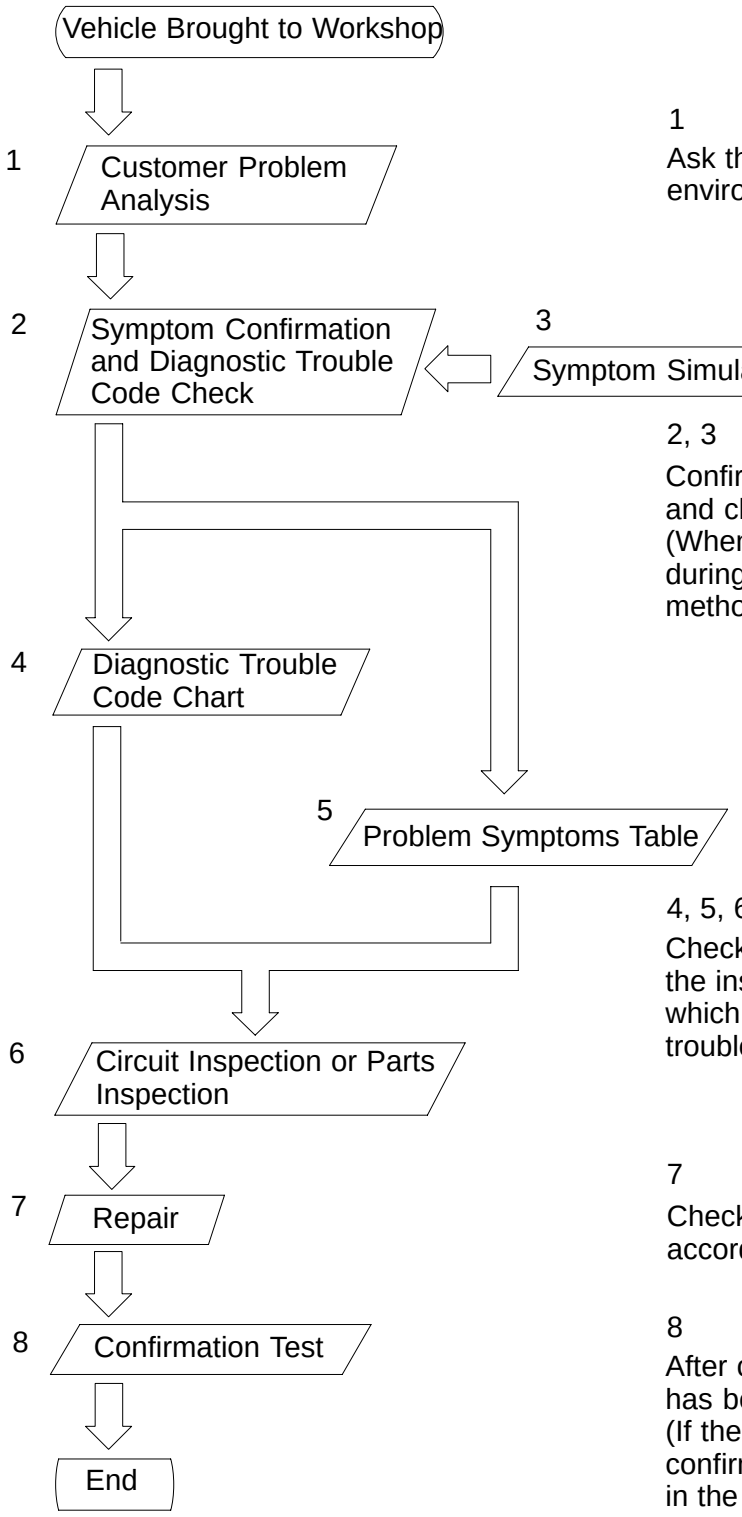
IN01U–14

HOW TO PROCEED WITH TROUBLESHOOTING

Carry out troubleshooting in accordance with the procedure on the following page. Here, only the basic procedure is shown. Details are provided in Diagnostics section, showing the most effective methods for each circuit. Confirm the troubleshooting procedures first for the relevant circuit before beginning troubleshooting of that circuit.



1

Ask the customer about the conditions and the environment when the problem occurred.

2, 3

Confirm the symptoms and the problem conditions, and check the diagnostic trouble codes.
(When the problem symptoms do not appear during confirmation, use the symptom simulation method described later.)

4, 5, 6

Check the results obtained in Step 2, then confirm the inspection procedure for the system or the part which should be checked using the diagnostic trouble code chart or the problem symptoms table.

7

Check and repair the affected system or part in accordance with the instructions in Step 6.

8

After completing repairs, confirm that the problem has been eliminated.
(If the problem is not reproduced, perform the confirmation test under the same conditions and in the same environment as when it occurred for the first time.)

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1. CUSTOMER PROBLEM ANALYSIS

In troubleshooting, the problem symptoms must be confirmed accurately and all preconceptions must be cleared away in order to give an accurate judgment. To ascertain just what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time it occurred.

Important Point in the Problem Analysis:

The following 5 items are important points in the problem analysis. Past problems which are thought to be unrelated and the repair history, etc. may also help in some cases, so as much information as possible should be gathered and its relationship with the problem symptoms should be correctly ascertained for reference in troubleshooting. A customer problem analysis table is provided in Diagnostics section for each system for your use.

Important Points in the Customer Problem Analysis

- ◀What ——— Vehicle model, system name
- ◀When ——— Date, time, occurrence frequency
- ◀Where ——— Road conditions
- ◀Under what conditions? ——— Running conditions, driving conditions, weather conditions
- ◀How did it happen? ——— Problem symptoms

(Sample) Engine control system check sheet.

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		**Model and Model Year**	
Driver's Name		**Frame No.**	
Data Vehicle Brought in		**Engine Model**	
License No.		**Odometer Reading**	km miles

Problem Symptoms	☐ **Engine does not Start**	☐ **Engine does not crank** ☐ **No initial combustion** ☐ **No complete combustion**
	☐ **Difficult to Start**	☐ **Engine cranks slowly** ☐ **Other** _____
	☐ **Poor Idling**	☐ **Incorrect first idle** ☐ **Idling rpm is abnormal** ☐ **High (rpm)** ☐ **Low (rpm)** ☐ **Rough idling** ☐ **Other** _____
	☐ **Poor Drive ability**	☐ **Hesitation** ☐ **Back fire** ☐ **Muffler explosion (after–fire)** ☐ **Surging** ☐ **Knocking** ☐ **Other** _____
	☐ **Engine Stall**	☐ **Soon after starting** ☐ **After accelerator pedal depressed** ☐ **After accelerator pedal released** ☐ **During A/C operation** ☐ **Shifting from N to D** ☐ **Other** _____
	☐ **Others**	

☐ **Constant** ☐ **Sometimes (times per day/month)**

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2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the SEQUOIA fulfills various functions. The first function is the Diagnostic Trouble Code Check in which a malfunction in the signal circuits to the ECU is stored in code in the ECU memory at the time of occurrence, to be output by the technician during troubleshooting. Another function is the Input Signal Check which checks if the signals from various switches are sent to the ECU correctly.
By using these check functions, the problem areas can be narrowed down quickly and troubleshooting can be performed effectively. Diagnostic functions are incorporated in the following systems in the SEQUOIA.

System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
1. Engine	○ (with Check Mode)	○	○
2. Automatic Transmission	○ (with Check Mode)	○	○
3. Air Suspension Control System	○ (with Check Mode)	○	○
4. Tire Pressure Warning System	○	○	○
5. ABS with EBD & BA & TRAC & VSC System	○	○	○
6. Can Communication System	○		
7. Supplemental Restraint System	○ (with Check Mode)	○	
8. Power Seat Control System w/ Driving Position Memory		○	○
9. Cruise Control System	○	○	
10.Engine Immobilizer System	○		
11.Combination Meter System		○	○
12.Sliding Roof System		○	○
13.Body Control System		○	○
14.Driver Door Control System		○	○
15.Passenger Door Control System		○	○
16.Back Door Control System		○	○
17.Multiplex Communication System	○		
18.Audio System	○		
19.Rear Seat Audio System	○		
20.Rear Seat Entertainment System	○		
21.Air Conditioning System	○	○	○

In diagnostic trouble code check, it is very important to determine whether the problem indicated by the diagnostic trouble code is still occurring or occurred in the past but returned to normal at present. In addition, it must be checked in the problem symptom check whether the malfunction indicated by the diagnostic trouble code is directly related to the problem symptom or not. For this reason, the diagnostic trouble codes should be checked before and after the symptom confirmation to determine the current conditions, as shown in the table on the next page. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, thus making it more difficult to locate the problem, or in repairs not pertinent to the problem. Therefore, always follow the procedure in correct order and perform the diagnostic trouble code check.

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DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

Diagnostic Trouble Code Check (Make a note of and then clear)	Confirmation of Symptoms	Diagnostic Trouble Code Check	Problem Condition
Diagnostic Trouble Code Display	Problem symptoms exist	Same diagnostic trouble code is displayed	Problem is still occurring in the diagnostic circuit
		Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit (The diagnostic trouble code displayed first is either for a past problem or it is a secondary problem)
	No problem symptoms exist		The problem occurred in the diagnostic circuit in the past
Normal Code Display	Problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit
	No problem symptoms exist	Normal code is displayed	The problem occurred in a place other than in the diagnostic circuit in the past

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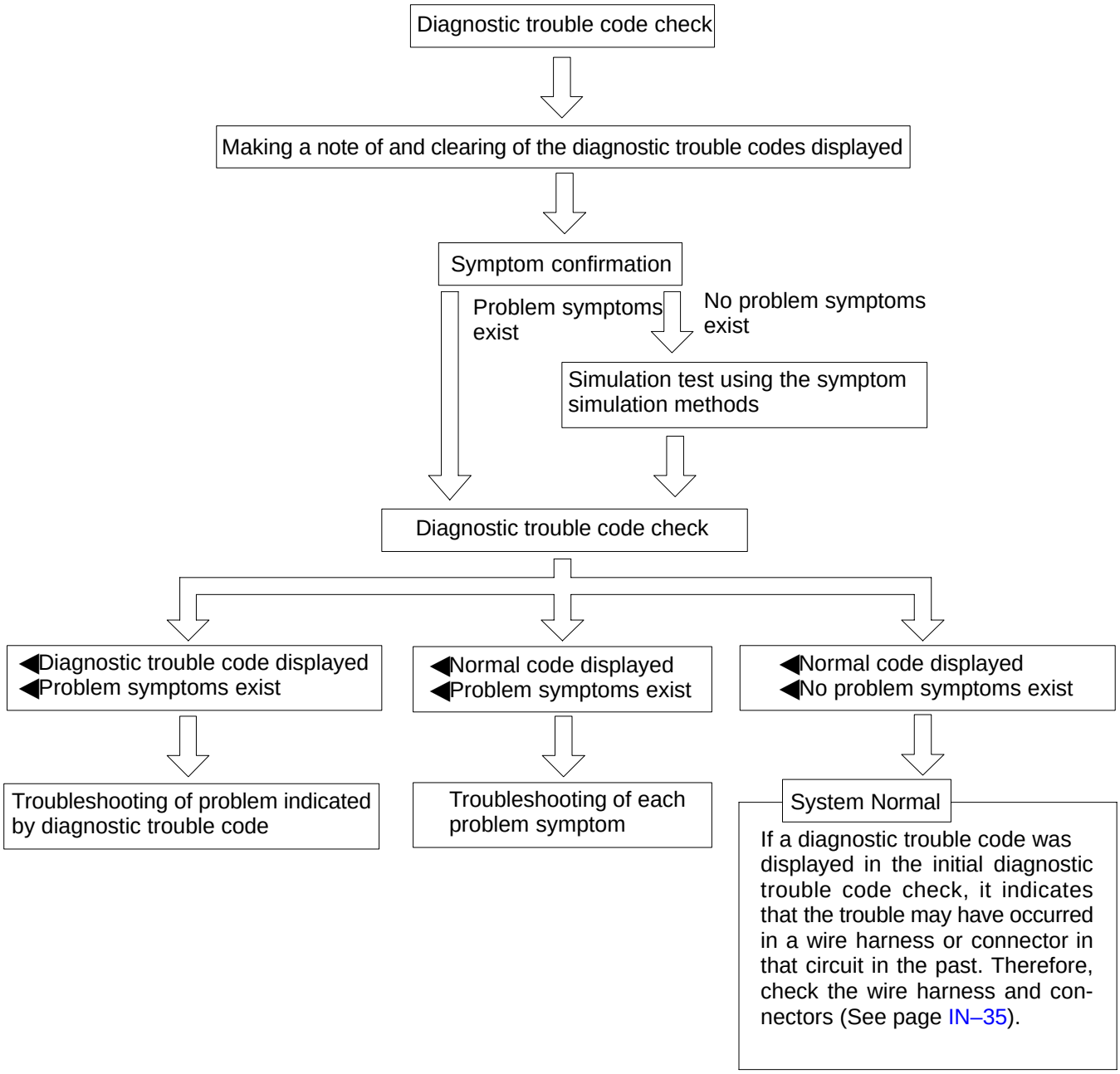
Taking into account the above points, a flow chart showing how to proceed with troubleshooting using the diagnostic trouble code check is shown below. This flow chart shows how to utilize the diagnostic trouble code check effectively, then by carefully checking the results, indicates how to proceed either to diagnostic trouble code troubleshooting or to troubleshooting of problem symptoms table.



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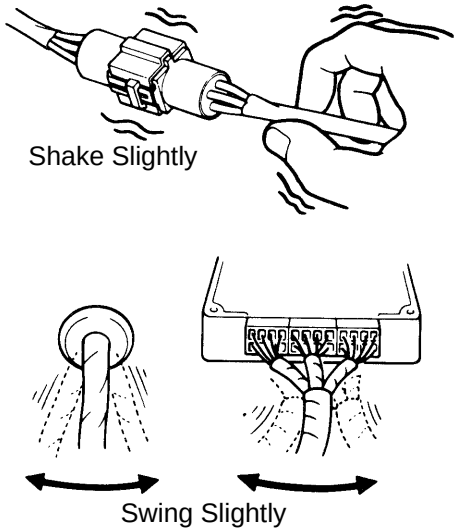
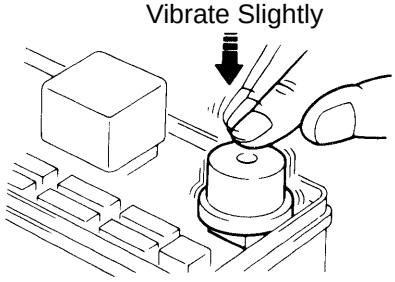
3. SYMPTOM SIMULATION

The most difficult case in troubleshooting is when there are no problem symptoms occurring. In such cases, a thorough customer problem analysis must be carried out, then simulate the same or similar conditions and environment in which the problem occurred in the customer's vehicle. No matter how much experience a technician has, or how skilled he may be, if he proceeds to troubleshoot without confirming the problem symptoms he will tend to overlook something important in the repair operation and make a wrong guess somewhere, which will only lead to a standstill. For example, for a problem which only occurs when the engine is cold, or for a problem which occurs due to vibration caused by the road during driving, etc., the problem can never be determined so long as the symptoms are confirmed with the engine hot or the vehicle at a standstill. Since vibration, heat or water penetration (moisture) is likely cause for problem which is difficult to reproduce, the symptom simulation tests introduced here are effective measures in that the external causes are applied to the vehicle in a stopped condition.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms should be confirmed, but the problem area or parts must also be found out. To do this, narrow down the possible problem circuits according to the symptoms before starting this test and connect a tester beforehand. After that, carry out the symptom simulation test, judging whether the circuit being tested is defective or normal and also confirming the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes of the symptom.

1	**VIBRATION METHOD: When vibration seems to be the major cause.**
CONNECTORS Slightly shake the connector vertically and horizontally. **WIRE HARNESS** Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas to be checked thoroughly.	 FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a finger to the part of the sensor considered to be the problem cause and check that the malfunction occurs. HINT: Applying strong vibration to relays may result in open relays.	 FI2330

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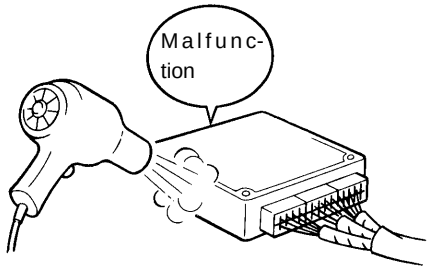
2	**HEAT METHOD: When the problem seems to occur when the suspect area is heated.**

Heat the component that is the likely cause of the malfunction with a hair dryer or similar object. Check to see if the malfunction occurs.

NOTICE:

(1) Do not heat to more than 60 ˚C (140 ˚F). (Temperature is limited not to damage the components.)

(2) Do not apply heat directly to parts in the ECU.



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3	**WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in a high–humidity condition.**

Sprinkle water onto the vehicle and check to see if the malfunction occurs.

NOTICE:

(1) Never sprinkle water directly into the engine compartment, but indirectly change the temperature and humidity by applying water spray onto the radiator front surface.

(2) Never apply water directly onto the electronic components.

HINT:

If a vehicle is subject to water leakage, the leaked water may contaminate the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.

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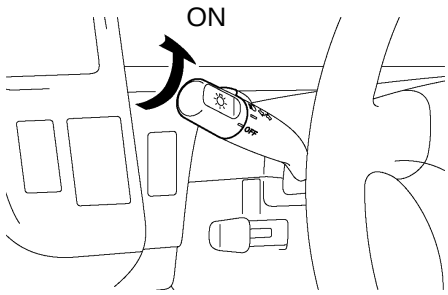
4	**OTHER: When a malfunction seems to occur when electrical load is excessive.**

Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.



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4. DIAGNOSTIC TROUBLE CODE CHART

The inspection procedure is shown in the table below. This table permits efficient and accurate troubleshooting using the diagnostic trouble codes displayed in the diagnostic trouble code check. Proceed with troubleshooting in accordance with the inspection procedure given in the diagnostic chart corresponding to the diagnostic trouble codes displayed. The engine diagnostic trouble code chart is shown below as an example.

◀DTC No.
Indicates the diagnostic trouble code.
◀Page or Instructions
Indicates the page where the inspection procedure for each circuit is to be found, or gives instructions for checking and repairs.

◀Trouble Area
Indicates the suspect area of the problem.

◀Detection Item
Indicates the system of the problem or contents of the problem.

DTC CHART (SAE Controlled)

HINT:
Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check mode, check the circuit for that code listed in the table below. For details of each code, turn to the page referred to under the "See page" for the respective "DTC No." in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI–24)	Mass Air Flow Circuit Malfunction	◀Open or short in mass air flow meter circuit ◀Mass air flow meter ◀ECM	○	○
P0101 (DI–28)	Mass Air Flow Circuit Range/ Performance Problem	◀Mass air flow meter	○	○
P0110 (DI–29)	Intake Air Temp. Circuit Malfunction	◀Open or short in intake air temp. sensor circuit ◀Intake air temp. sensor ◀ECM	○	○
P0115 (DI–33)	Engine Coolant Temp. Circuit Malfunction	◀Open or short in engine coolant temp. sensor circuit ◀Engine coolant temp. sensor ◀ECM	○	○
P0116 (DI–37)	Engine Coolant Temp. Circuit Range/ Performance Problem	◀Engine coolant temp. sensor ◀Cooling system	○	○
	/Pedal Position Sensor/Switch nction	◀Open or short in throttle position sensor circuit ◀Throttle position sensor ◀ECM		
	osition Sensor/ Switch rformance Prob-	◀Throttle position sensor		

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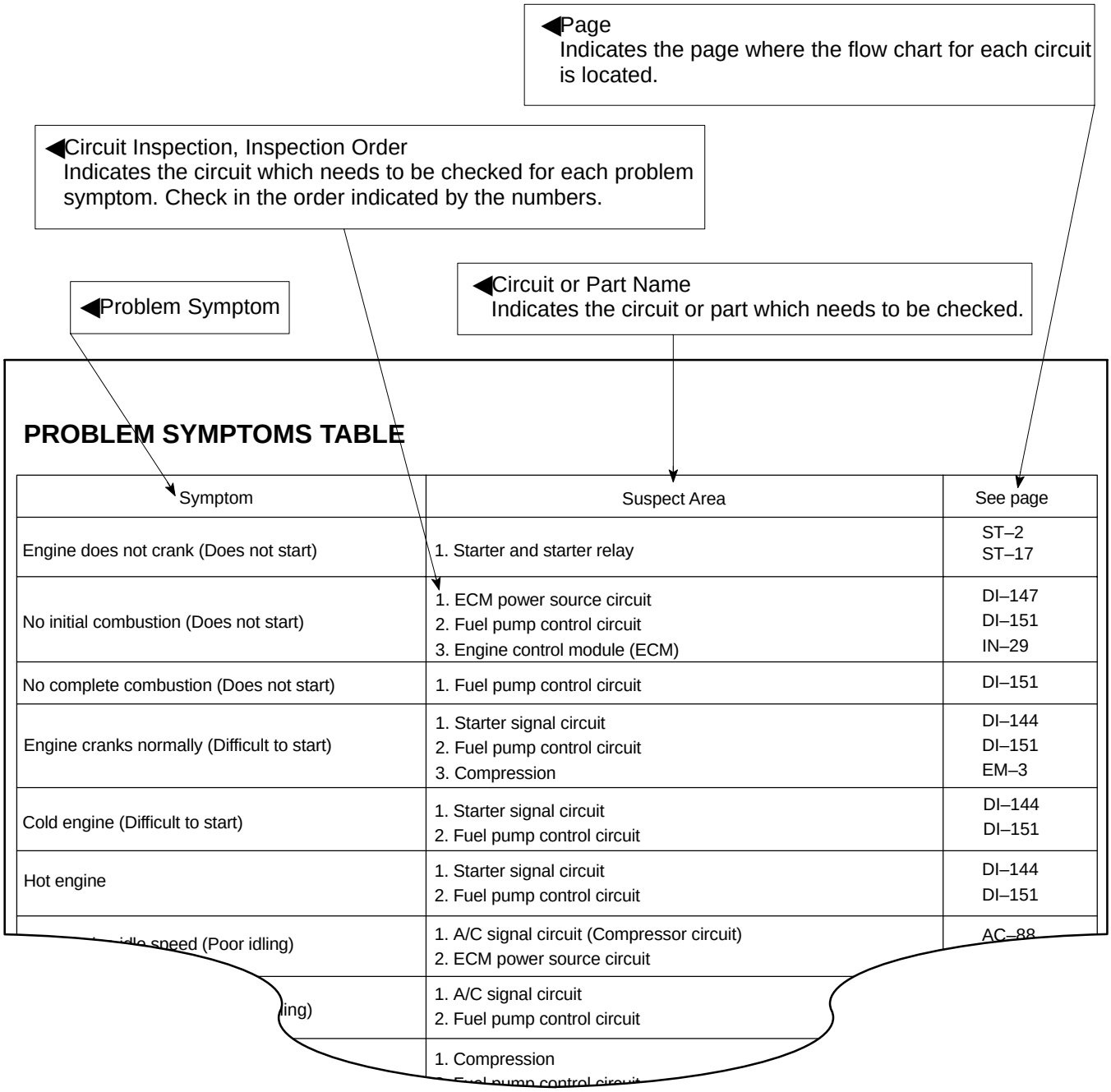
5. PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot the problem when a ”Normal” code is displayed in the diagnostic trouble code check but the problem is still occurring. Numbers in the table indicate the inspection order in which the circuits or parts should be checked.

HINT:

When the problem is not detected by the diagnostic system even though the problem symptom is present, it is considered that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a system other than the diagnostic system.



PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST–2 ST–17
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI–147 DI–151 IN–29
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–151
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI–144 DI–151 EM–3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–144 DI–151
Hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI–144 DI–151
idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	AC–88
ling)	1. A/C signal circuit 2. Fuel pump control circuit	
	1. Compression 2. Fuel pump control circuit	

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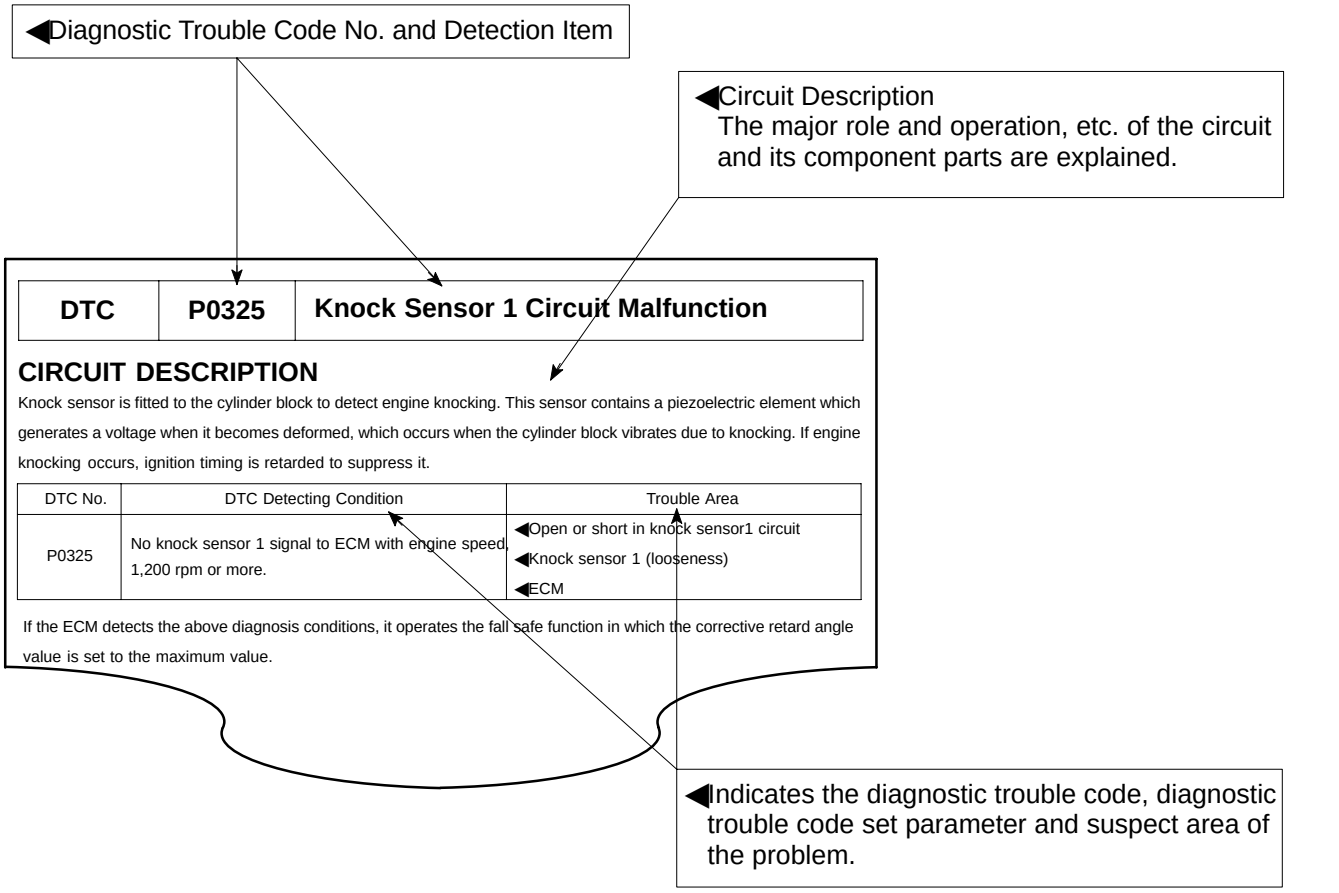
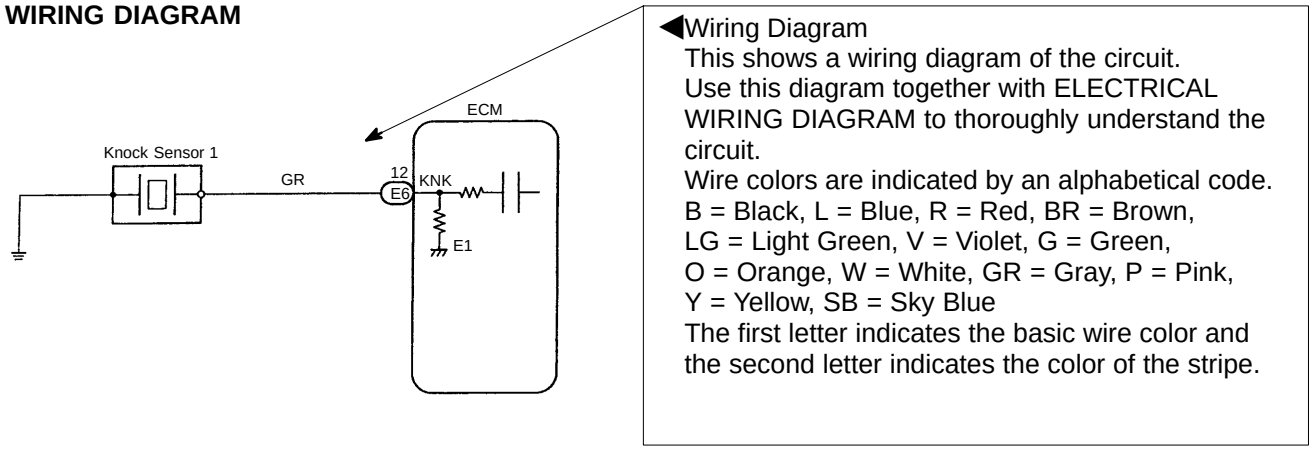
6. CIRCUIT INSPECTION

How to read and use each page is shown below.





V08423

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◀Indicates the position of the ignition switch during the check.

LOCK
Ignition Switch LOCK (OFF)

ON
Ignition Switch ON

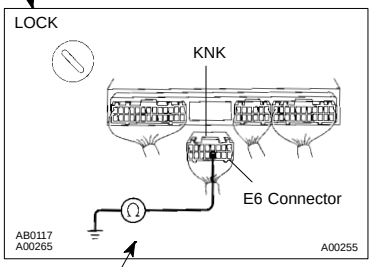
START
Ignition Switch START

ACC
Ignition Switch ACC

◀Inspection Procedure
Use the inspection procedure to determine if the circuit is normal or abnormal, and, if it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

INSPECTION PROCEDURE

1	**Check continuity between terminal KNK of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF–68).
(b) Disconnect the E6 connector of ECM.

CHECK:
Measure resistance between terminal KNK of ECM connector and body ground.

OK:
Resistance: 1 MΩ or higher

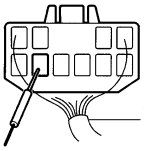
OK	**Go to step 3.**

NG

2	**Check knock sensor (See page SF–61).**

OK	**Replace knock sensor.**

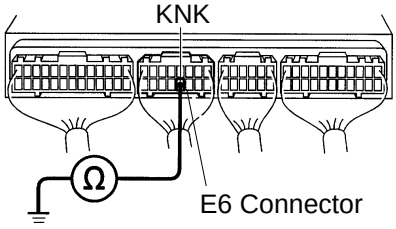
◀Indicates the place to check the voltage or resistance.
◀Indicates the connector position to be checked, from the front or back side.



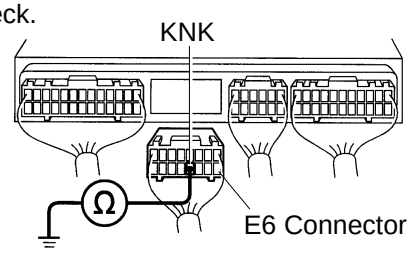
Check from the connector back side. (with harness)

Check from the connector front side. (without harness)
In this case, care must be taken not to bend the terminals.

◀Indicates the condition of the connector of ECU during the check.



Connector being checked is connected.



Connector being checked is disconnected.

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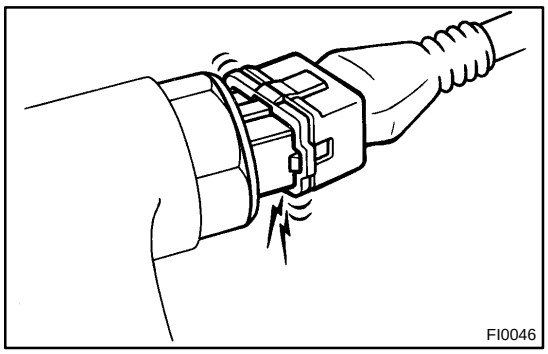
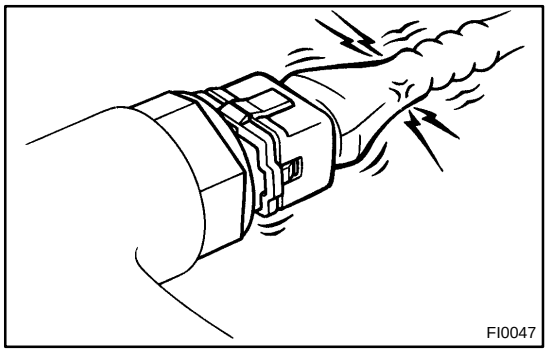
IN011–61


FI0046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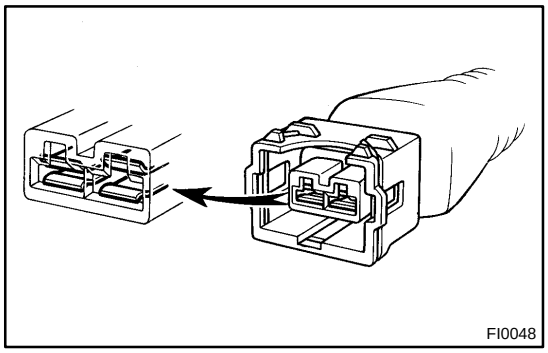
FI0048

HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE

1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

- For troubleshooting, diagnostic trouble code charts or problem symptom table are provided for each circuit with detailed inspection procedures on the following pages.
- When all the component parts, wire harnesses and connectors of each circuit except the ECU are found to be normal in troubleshooting, then it is determined that the problem is in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to step 8 to replace the ECU. So always confirm that the problem symptoms are occurring, or proceed with inspection while using the symptom simulation method.
- The instructions ”Check wire harness and connector” and ”Check and replace ECU” which appear in the inspection procedure, are common and applicable to all diagnostic trouble codes. Follow the procedure outlined below whenever these instructions appear.

OPEN CIRCUIT:

This could be due to a disconnected wire harness, faulty contact in the connector, and a connector terminal pulled out, etc.

HINT:

- It is rarely the case that a wire is broken in the middle of it. Most cases occur at the connector. In particular, carefully check the connectors of sensors and actuators.
- Faulty contact could be due to rusting of the connector terminals, to foreign materials entering terminals or a deformation of connector terminals. Simply disconnecting and reconnecting the connectors once changes the condition of the connection and may result in a return to normal operation. Therefore, in troubleshooting, if no abnormality is found in the wire harness and connector check, but the problem disappears after the check, then the cause is considered to be in the wire harness or connectors.

SHORT CIRCUIT:

This could be due to a contact between wire harness and the body ground or to a short circuit occurred inside the switch, etc.

HINT:

When there is a short circuit between the wire harness and body ground, check thoroughly whether the wire harness is caught in the body or is clamped properly.

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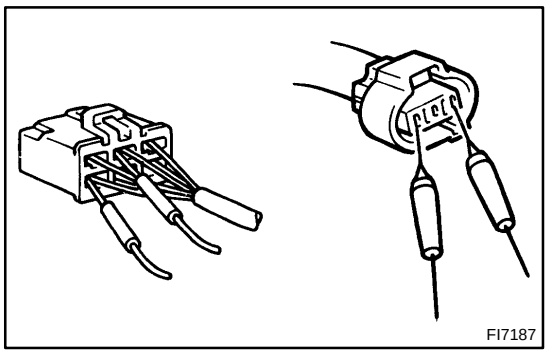
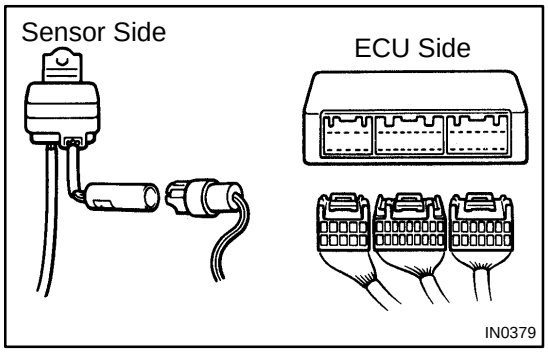


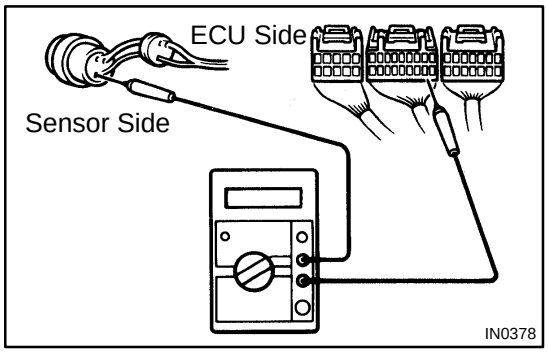
2. CONNECTOR HANDLING

When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

(a) Disconnect the connectors at both ECU and sensor sides.

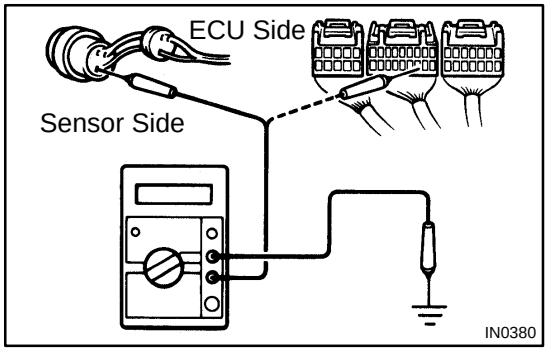


(b) Measure the resistance between the applicable terminals of the connectors.

Resistance: 1 Ω or less

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

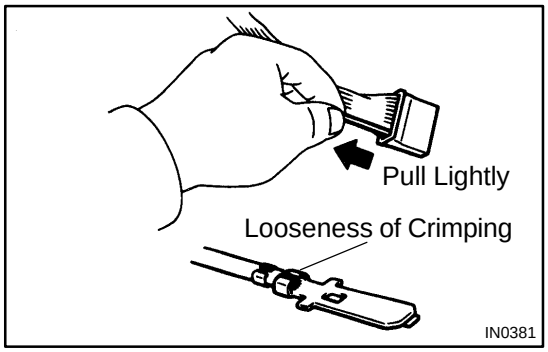
(a) Disconnect the connectors on both ends.

(b) Measure the resistance between the applicable terminals of the connectors and body ground. Be sure to carry out this check on the connectors on both ends.

Resistance: 1 MΩ or higher

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



5. VISUAL CHECK AND CONTACT PRESSURE CHECK

(a) Disconnect the connectors at both ends.

(b) Check for rust or foreign material, etc. in the terminals of the connectors.

(c) Check crimped portions for looseness or damage and check that the terminals are secured in lock portion.

HINT:

The terminals should not come out when pulled lightly from the back.

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(d) Prepare a test male terminal and insert it in the female terminal, then pull it out.

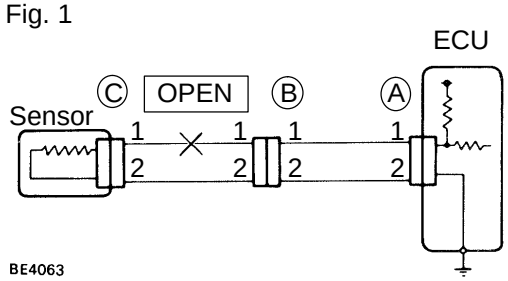
NOTICE:

When testing a gold–plated female terminal, always use a gold–plated male terminal.

HINT:

When the test terminal is pulled out more easily than others, there may be poor contact in that section.

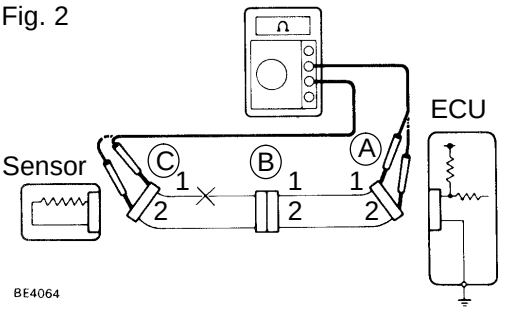
Fig. 1



6. CHECK OPEN CIRCUIT

For an open circuit in the wire harness in Fig. 1, perform "(a) Continuity Check" or "(b) Voltage Check" to locate the section.

Fig. 2



(a) Check the continuity.

(1) Disconnect connectors "A" and "C" and measure the resistance between them.

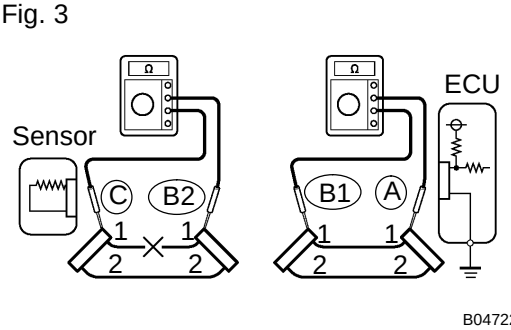
In the case of Fig. 2:

Between terminal 1 of connector "A" and terminal 1 of connector "C" → No continuity (open)

Between terminal 2 of connector "A" and terminal 2 of connector "C" → Continuity

Therefore, it is found out that there is an open circuit between terminal 1 of connector "A" and terminal 1 of connector "C".

Fig. 3



(2) Disconnect connector "B" and measure the resistance between the connectors.

In the case of Fig. 3:

Between terminal 1 of connector "A" and terminal 1 of connector "B1" → Continuity

Between terminal 1 of connector "B2" and terminal 1 of connector "C" → No continuity (open)

Therefore, it is found out that there is an open circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

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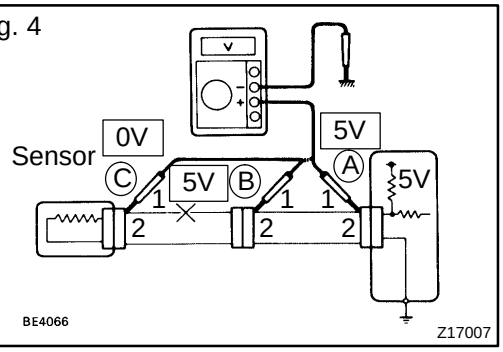
Fig. 4



(b) Check the voltage.

In a circuit in which voltage is applied (to the ECU connector terminal), an open circuit can be checked by conducting a voltage check.

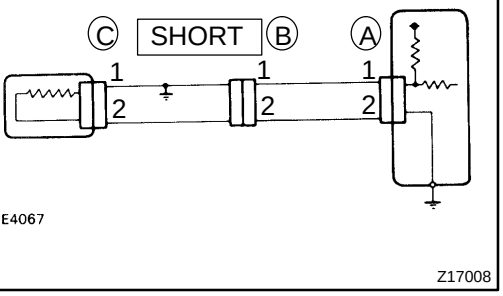
As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector ”A” at the ECU 5V output terminal, terminal 1 of connector ”B”, and terminal 1 of connector ”C”, in that order.

If the results are:

5V: Between Terminal 1 of connector ”A” and Body Ground
5V: Between Terminal 1 of connector ”B” and Body Ground
0V: Between Terminal 1 of connector ”C” and Body Ground

Then it is found out that there is an open circuit in the wire harness between terminal 1 of ”B” and terminal 1 of ”C”.

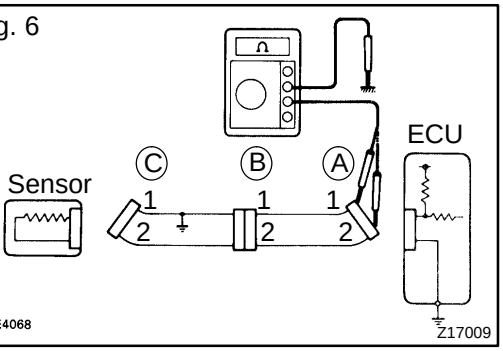
Fig. 5



7. CHECK SHORT CIRCUIT

If the wire harness is shorted as in Fig. 5, locate the section by conducting a ”continuity check with ground”.

Fig. 6



Check the continuity with ground.

(1) Disconnect connectors ”A” and ”C” and measure the resistance between terminals 1 and 2 of connector ”A” and body ground.

In the case of Fig. 6:

Between terminal 1 of connector ”A” and body ground → Continuity (short)

Between terminal 2 of connector ”A” and body ground → No continuity

Therefore, it is found out that there is a short circuit between terminal 1 of connector ”A” and terminal 1 of connector ”C”.

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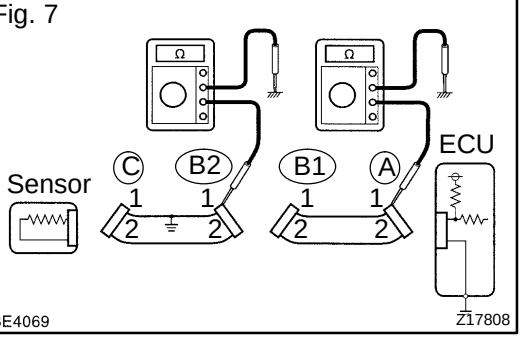
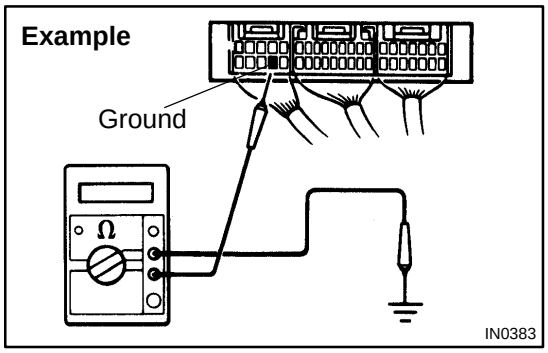
Fig. 7



(2) Disconnect connector ”B” and measure the resistance between terminal 1 of connector ”A” and body ground, and terminal 1 of connector ”B2” and body ground.
In the case of Fig. 7:
Between terminal 1 of connector ”A” and body ground → No continuity
Between terminal 1 of connector ”B2” and body ground → Continuity (short)
Therefore, it is found out that there is a short circuit between terminal 1 of connector ”B2” and terminal 1 of connector ”C”.

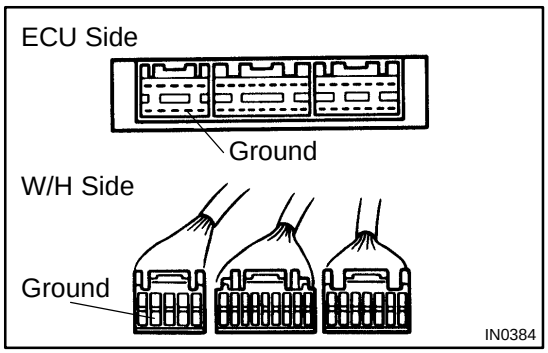
8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty, so replace the ECU with a normal functioning one and check that the symptoms appear.



(1) Measure the resistance between the ECU ground terminal and the body ground.

Resistance: 1 Ω or less



(2) Disconnect the ECU connector, check the ground terminals on the ECU side and the wire harness side for bend and check the contact pressure.

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TERMS

IN04Q–33

ABBREVIATIONS USED IN THIS MANUAL

Abbreviations	Meaning
ABS	Anti–Lock Brake System
A/C	Air Conditioner
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACM	Active Control Engine Mount
ACSD	Automatic Cold Start Device
A.D.D.	Automatic Disconnecting Differential
A/F	Air–Fuel Ratio
AHC	Active Height Control Suspension
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
ASSY	Assembly
A/T, ATM	Automatic Transmission (Transaxle)
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
B+	Battery Voltage
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
BDC	Bottom Dead Center
B/L	Bi–Level
B/S	Bore–Stroke Ratio
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
CB	Circuit Breaker
CCo	Catalytic Converter For Oxidation
CCV	Canister Closed Valve
CD	Compact Disc
CF	Cornering Force
CG	Center Of Gravity
CH	Channel
CKD	Complete Knock Down
COMB.	Combination
CPE	Coupe
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRS	Child Restraint System
CTR	Center
C/V	Check Valve
CV	Control Valve
CW	Curb Weight

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DC	Direct Current
DEF	Defogger
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
D/INJ	Direct Injection
DLC	Data Link Connector
DLI	Distributorless Ignition
DOHC	Double Overhead Camshaft
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
DTC	Diagnostic Trouble Code
DVD	Digital Versatible Disc
EBD	Electric Brake Force Distribution
EC	Electrochoromic
ECAM	Engine Control And Measurement System
ECD	Electronically Controlled Diesel
ECDY	Eddy Current Dynamometer
ECT	Electronic Control Transmission
ECU	Electronic Control Unit
ED	Electro–Deposited Coating
EDU	Electronic Driving Unit
EDIC	Electric Diesel Injection Control
EFI	Electronic Fuel Injection
E/G	Engine
EGR	Exhaust Gas Recirculation
EGR–VM	EGR–Vacuum Modulator
ELR	Emergency Locking Retractor
EMPS	Electric Motor Power Steering
ENG	Engine
ESA	Electronic Spark Advance
ETCS–i	Electronic Throttle Control System–intelligent
EVAP	Evaporative Emission Control
EVP	Evaporator
E–VRV	Electric Vacuum Regulating Valve
EX	Exhaust
FE	Fuel Economy
FF	Front–Engine Front–Wheel–Drive
F/G	Fuel Gauge
FIPG	Formed In Place Gasket
FL	Fusible Link
F/P	Fuel Pump
FPU	Fuel Pressure Up
FR	Front
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front–Wheel–Drive
GAS	Gasoline
GND	Ground
GPS	Global Positioning System
HAC	High Altitude Compensator

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H/B	Hatchback
H–FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Head Lamp)
HSG	Housing
HT	Hard Top
HWS	Heated Windshield System
IC	Integrated Circuit
IDI	Indirect Diesel Injection
IFS	Independent Front Suspension
IG	Ignition
IIA	Integrated Ignition Assembly
IN	Intake (Manifold, Valve)
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
ISC	Idle Speed Control
J/B	Junction Block
J/C	Junction Connector
KD	Kick–Down
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left–Hand
LHD	Left–Hand Drive
L/H/W	Length, Height, Width
LLC	Long–Life Coolant
LNG	Liquified Natural Gas
LO	Low
LPG	Liquified Petroleum Gas
LSD	Limited Slip Differential
LSP & PV	Load Sensing Proportioning And Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAP	Manifold Absolute Pressure
MAX.	Maximum
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MG1	Motor Generator No.1
MG2	Motor Generator No.2
MP	Multipurpose
MPI	Multipoint Electronic Injection
MPX	Multiplex Communication System
M/T, MTM	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral
NA	Natural Aspiration
NO.	Number
O2S	Oxygen Sensor
O/D	Overdrive

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OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
ORVR	On–board Refilling Vapor Recovery
O/S	Oversize
P & BV	Proportioning And Bypass Valve
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PS	Power Steering
PTO	Power Take–Off
P/W	Power Window
R & P	Rack And Pinion
RAM	Random Access Memory
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
RFS	Rigid Front Suspension
RH	Right–Hand
RHD	Right–Hand Drive
RLY	Relay
ROM	Read Only Memory
RR	Rear
RRS	Rigid Front Suspension
RWD	Rear–Wheel Drive
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SOC	State Of Charge
SOHC	Single Overhead Camshaft
SPEC	Specification
SPI	Single Point Injection
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
STJ	Cold–Start Fuel Injection
SW	Switch
SYS	System
T/A	Transaxle
TACH	Tachometer
TBI	Throttle Body Electronic Fuel Injection
TC	Turbocharger
TCCS	TOYOTA Computer–Controlled System
TCV	Timing Control Valve
TDC	Top Dead Center
TEMP.	Temperature
TEMS	TOYOTA Electronic Modulated Suspension
TFT	TOYOTA Free–Tronic
TIS	Total Information System For Vehicle Development

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T/M	Transmission
TMC	TOYOTA Motor Corporation
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TRC	Traction Control System
TURBO	Turbocharge
TWC	Three–Way Catalyst
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VENT	Ventilator
VIM	Vehicle Interface Module
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Skid Control
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
VVT–i	Variable Valve Timing–intelligent
W/	With
WGN	Wagon
W/H	Wire Harness
W/O	Without
1ST	First
2ND	Second
2WD	Two Wheel Drive Vehicle (4 x 2)
3RD	Third
4TH	Fourth
4WD	Four Wheel Drive Vehicle (4 x 4)
4WS	Four Wheel Steering System
5TH	Fifth

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IN01X–04

GLOSSARY OF SAE AND TOYOTA TERMS

This glossary lists all SAE–J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their Toyota equivalents.

SAE ABBREVIATIONS	SAE TERMS	TOYOTA TERMS ( )—ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner, A/CL
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	–
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	HAC
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	–
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	–
CTOX	Continuous Trap Oxidizer	–
CTP	Closed Throttle Position	LL ON, Idle ON
DFI	Direct Fuel Injection	Direct Injection (DI/INJ)
DI	Distributor Ignition	–
DLC3	Data Link Connector 3	OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Trouble Code
DTM	Diagnostic Test Mode	–
ECL	Engine Coolant Level	–
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	Distributorless Ignition (DLI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	–
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	–
FEPROM	Flash Erasable Programmable Read Only Memory	–
FF	Flexible Fuel	–
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)
HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO_2S)

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IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	–
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel–Shutoff	–
ISC	Idle Speed Control	–
KS	Knock Sensor	Knock Sensor
MAF	Mass Airflow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	–
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Lamp
MST	Manifold Surface Temperature	–
MVZ	Manifold Vacuum Zone	–
NVRAM	Non–Volatile Random Access Memory	–
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On–Board Diagnostic	On–Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Convert (OC), CCo
OL	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	–
PNP	Park/Neutral Position	–
PROM	Programmable Read Only Memory	–
PSP	Power Steering Pressure	–
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	–
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E–ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	–
SRI	Service Reminder Indicator	–
SRT	System Readiness Test	–
ST	Scan Tool	–
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter
TCM	Transmission Control Module	Transmission ECU, ECT ECU

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TP	Throttle Position	Throttle Position
TR	Transmission Range	–
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three–Way Catalytic Converter	Three–Way Catalytic (TWC) Manifold Converter CC_{RO}
TWC+OC	Three–Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Airflow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle
WU–OC	Warm Up Oxidation Catalytic Converter	–
WU–TWC	Warm Up Three–Way Catalytic Converter	–
3GR	Third Gear	–
4GR	Fourth Gear	–

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OUTSIDE VEHICLE

MA001–42

GENERAL MAINTENANCE

The owners are responsible for these maintenance and inspection items.
They can be done by the owner or they can have them done at a service shop.
These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do.
Items and procedures for general maintenance are as follows.

1. GENERAL NOTES

- ▶ Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
- ▶ Every service item in the periodic maintenance schedule must be performed.
- ▶ Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- ▶ Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- ▶ Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

2. TIRES

(a) Check the pressure with a gauge.

If necessary, adjust.

(b) Check for cuts, damage or excessive wear.

3. WHEEL NUTS

When checking the tires, check the nuts for looseness or for missing.
If necessary, tighten them.

4. TIRE ROTATION (See page SA–3)

Check the owner's manual supplement in which the maintenance schedule is shown.

5. WINDSHIELD WIPER BLADES

Check for wear or cracks whenever they do not wipe clean.
If necessary, replace.

6. FLUID LEAKS

(a) Check underneath for leaking fuel, oil, water or other fluid.
(b) If you smell gasoline fumes or notice any leak, find the cause and correct.

7. DOORS AND ENGINE HOOD

(a) Check that all doors and the tailgate operate smoothly, and that all latches lock securely.
(b) Check that the engine hood secondary latch secures the hood from opening when the primary latch is released.

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INSIDE VEHICLE

MA002–35

GENERAL MAINTENANCE

These are maintenance and inspection items which are considered to be the owner's responsibility. They can be done by the owner or they can have them done at a service shop.
These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do.
Items and procedures for general maintenance are as follows.

1. GENERAL NOTES

- ▶ Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
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- ▶ Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- ▶ Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

2. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights are all working.
(b) Check the headlight aim.

3. WARNING LIGHTS AND BUZZERS

Check that all warning lights and buzzers function properly.

4. HORN

Check that it is working.

5. WINDSHIELD GLASS

Check for scratches, pits or abrasions.

6. WINDSHIELD WIPER AND WASHER

(a) Check operation of the wipers and washer.
(b) Check that the wipers do not streak.

7. WINDSHIELD DEFROSTER

Check that air comes out from the defroster outlet when operating the heater or air conditioner.

8. REAR VIEW MIRROR

Check that it is mounted securely.

9. SUN VISORS

Check that they move freely and are mounted securely.

10. STEERING WHEEL

Check that it has the specified free play. Be alert for changes in steering condition, such as hard steering, excessive free play or strange noises.

11. SEATS

(a) Check that the seat adjusters operate smoothly.
(b) Check that all latches lock securely in any position.
(c) Check that the head restraints move up and down smoothly and that the locks hold securely in any latch position.
(d) For fold–down seat backs, check that the latches lock securely.

12. SEAT BELTS

(a) Check that the seat belt system such as the buckles, retractors and anchors operate properly and smoothly.
(b) Check that the belt webbing is not cut, frayed, worn or damaged.

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13. ACCELERATOR PEDAL

Check the pedal for smooth operation and uneven pedal effort or catching.

14. BRAKE PEDAL

(See page BR–6)

(a) Check the pedal for smooth operation.

(b) Check that the pedal has the proper reserve distance and free play.

(c) Check the brake booster function.

15. BRAKES

At a safe place, check that the brakes do not pull to one side when applied.

16. PARKING BRAKE

(See page BR–9)

(a) Check that the lever has the proper travel.

(b) On a safe incline, check that the vehicle is held securely with only the parking brake applied.

17. AUTOMATIC TRANSMISSION ”PARK” MECHANISM

On a safe incline, check that the vehicle is held securely with the selector lever in ”P” position and all brakes released.

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UNDER HOOD

MA003–50

GENERAL MAINTENANCE

1. GENERAL NOTES

- ▶ Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
- ▶ Every service item in the periodic maintenance schedule must be performed.
- ▶ Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- ▶ Maintenance service after the last period should be performed at the same interval as before unless otherwise noted.
- ▶ Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

2. WINDSHIELD WASHER FLUID

Check that there is sufficient fluid in the tank.

3. ENGINE COOLANT LEVEL

Check that the coolant level is between the FULL and LOW lines on the see–through reservoir.

4. RADIATOR AND HOSES

(a) Check that the front of the radiator is clean and not blocked with leaves, dirt or bugs.
(2UZ–FE engine: See page CO–14)

(b) Check the hoses for cracks, kinks, rot or loose connections.

5. BATTERY ELECTROLYTE LEVEL

Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case.

6. BRAKE AND CLUTCH FLUID LEVELS

Check that the brake and clutch fluid levels are near the upper level line on the see–through reservoirs.

7. ENGINE DRIVE BELTS

Check all drive belts for fraying, cracks, wear or oiliness.

8. ENGINE OIL LEVEL

Check the level on the dipstick with the engine turned off.

9. POWER STEERING FLUID LEVEL

(a) Check the level on the dipstick.

(b) The level should be in the HOT or COLD range depending on the fluid temperature.

10. AUTOMATIC TRANSMISSION FLUID LEVEL

(a) Park the vehicle on a level surface.

(b) With the engine idling and the parking brake applied, shift the selector into all positions from the P to L, and then shift into the P position.

(c) Pull out the dipstick and wipe off the fluid with a clean rag. Re–insert the dipstick and check that the fluid level is in the HOT range.

(d) Do this check with the fluid at normal driving temperature (70 – 80˚C, 158 – 176˚F).

HINT:

Wait until the engine cools down (approx. 30 min.) before checking the fluid level after extended driving at high speeds, in hot weather, in heavy traffic or pulling a trailer.

11. EXHAUST SYSTEM

(a) Visually inspect for cracks, holes or loose supports.

(b) If any change in the sound of the exhaust or smell of the exhaust fumes is noticed, find the cause and correct.

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ENGINE

MA004–18

INSPECTION

HINT:

Perform the following procedures when the engine is cold.

1. REPLACE TIMING BELT
(See page EM–13)

2. INSPECT DRIVE BELT
(See page CH–1)

3. REPLACE SPARK PLUGS
(See page IG–1)

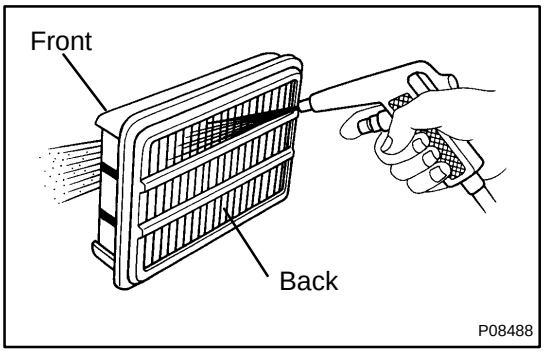
4. INSPECT AIR FILTER

(a) Visually check that the air cleaner element is not excessively dirty, damaged or oily.

HINT:

Oiliness may indicate a stuck PCV valve.

If necessary, replace the air cleaner element.



(b) Clean the element with compressed air.
First blow from back side thoroughly, then blow off the front side of the element.

5. REPLACE AIR FILTER

Replace the used air cleaner element with a new one.

6. REPLACE ENGINE OIL AND OIL FILTER
(See page LU–2)

7. REPLACE ENGINE COOLANT
(See page CO–2)

8. INSPECT CHARCOAL CANISTER
(See page EC–9)

9. REPLACE GASKET IN FUEL TANK CAP
(See page SF–33)

10. INSPECT FUEL LINES, CONNECTIONS, FUEL TANK VAPOR VENT SYSTEM HOSES AND FUEL TANK BAND

Visually inspect the fuel lines for cracks, leakage loose connections, deformation or tank band looseness.

11. INSPECT EXHAUST PIPES AND MOUNTINGS

Visually inspect the pipes, hangers and connections for severe corrosion, leaks or damage.

12. INSPECT VALVE CLEARANCE
(See page EM–4)

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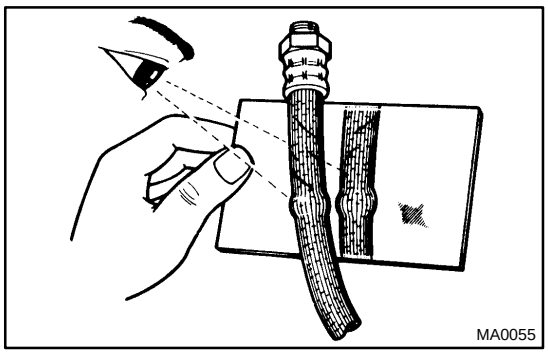

BRAKE

INSPECTION

MA014–06

1. INSPECT BRAKE LINE PIPES AND BOOTS

HINT:

Inspect in a well–lighted area. Inspect the entire circumference and length of the brake hoses using a mirror as required. Turn the front wheels fully right or left before inspecting the front brake.

(a) Check all brake lines and hoses for:
- ▶ Damage
- ▶ Wear
- ▶ Deformation
- ▶ Cracks
- ▶ Corrosion
- ▶ Leaks
- ▶ Bends
- ▶ Twists

(b) Check all clamps for tightness and connections for leakage.

(c) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system.

(d) Check that the lines installed in grommets pass through the center of the grommets.

2. INSPECT FRONT AND REAR BRAKE PADS AND DISCS

(Front pads: See page BR–25)
(Rear pads: See page BR–34)

HINT:

If a squealing or scraping noise occurs from the brake during driving, check the pad wear indicator.

If there are traces of the indicator contacting the disc rotor, the disc pad should be replaced.

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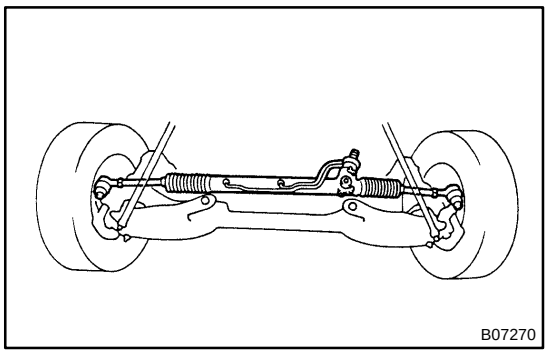

B07270

CHASSIS

MA04O–03

INSPECTION

1. INSPECT STEERING LINKAGE

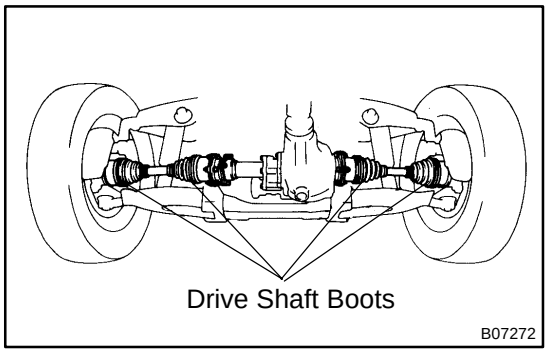
(a) Check the steering wheel free play (See page SR–9).

(b) Check the steering linkage for looseness or damage.
Check that:
- ▶ Tie rod ends do not have excessive play.
- ▶ Dust seals are not damaged.
- ▶ Boot clamps are not loose.

2. INSPECT SRS AIRBAG (See page RS–3)

3. INSPECT STEERING GEAR HOUSING OIL

Check the steering gear housing for oil leaks.
If leakage is found, check the cause and repair.



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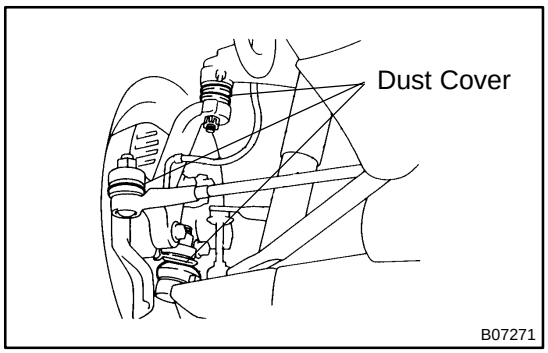
4. 4WD:
INSPECT DRIVE SHAFT BOOTS

Inspect the drive shaft boots for clamp looseness, grease leakage or damage.



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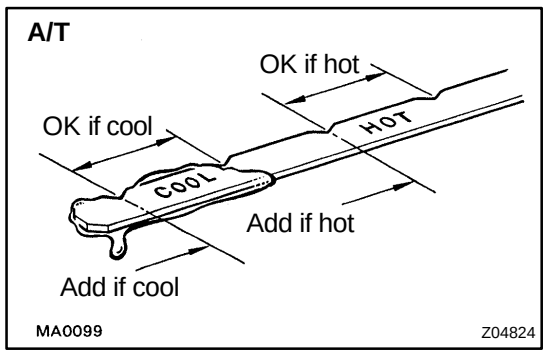
5. INSPECT BALL JOINTS AND DUST COVERS

(a) Inspect the ball joints for excessive looseness.

(b) Inspect the dust cover for damage.



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6. 2WD:
CHECK OIL LEVEL IN AUTOMATIC TRANSMISSION AND DIFFERENTIAL

(a) Automatic transmission:
Check that the fluid level is in the "HOT" range at the normal operating temperature (70 – 80°C or 158 – 176°F) and add as necessary.

NOTICE:
Do not overfill.

Transmission fluid (A/T): See page DI–524

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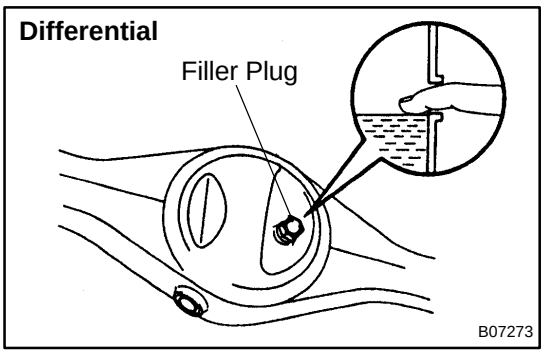
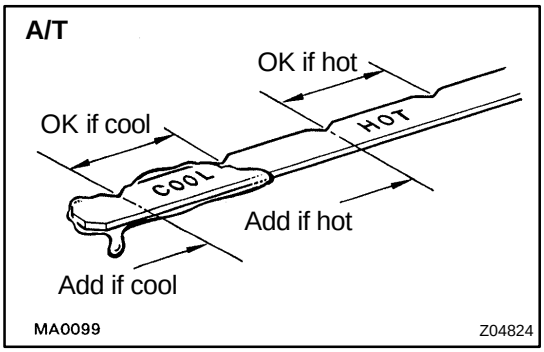


(b) Differential:
Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it reaches the bottom of the filler hole.
Differential oil: See page SA–129

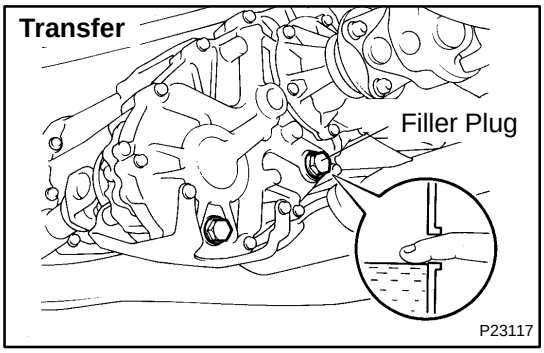


7. 4WD:
CHECK OIL LEVEL IN AUTOMATIC TRANSMISSION, TRANSFER AND DIFFERENTIAL

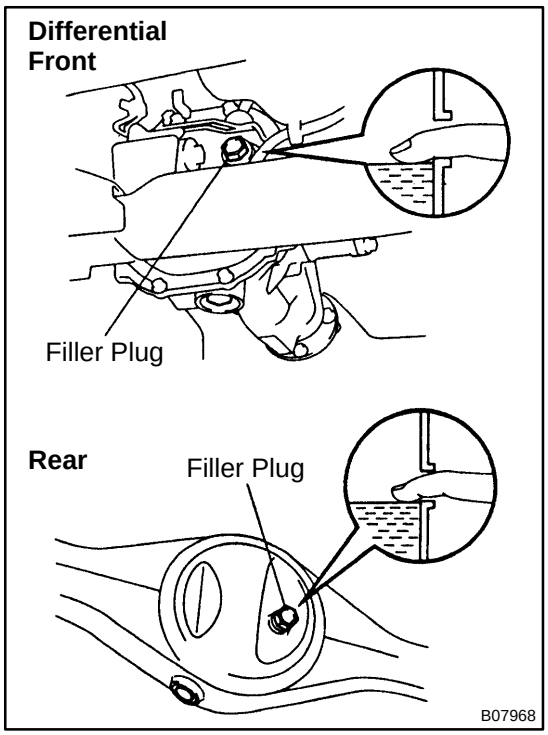
(a) Automatic transmission:
Check that the fluid level is in the ”HOT” range at the normal operating temperature (70 – 80˚C or 158 – 176˚F) and add as necessary.

NOTICE:
Do not overfill.

Transmission fluid (A/T): See page DI–524



(b) Transfer:
Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it reaches the bottom of the filler hole.
Transfer oil: See page TR–4



(c) Differential:
Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it reaches the bottom of the filler hole.
Front differential oil: See page SA–38
Rear differential oil: See page SA–129

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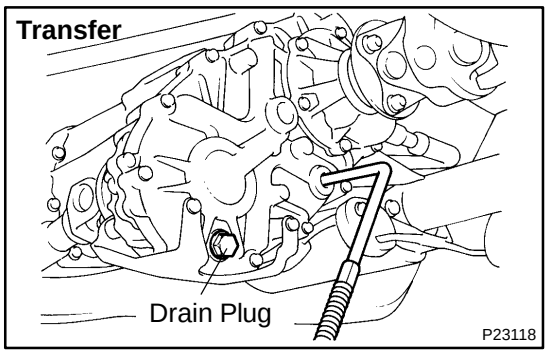


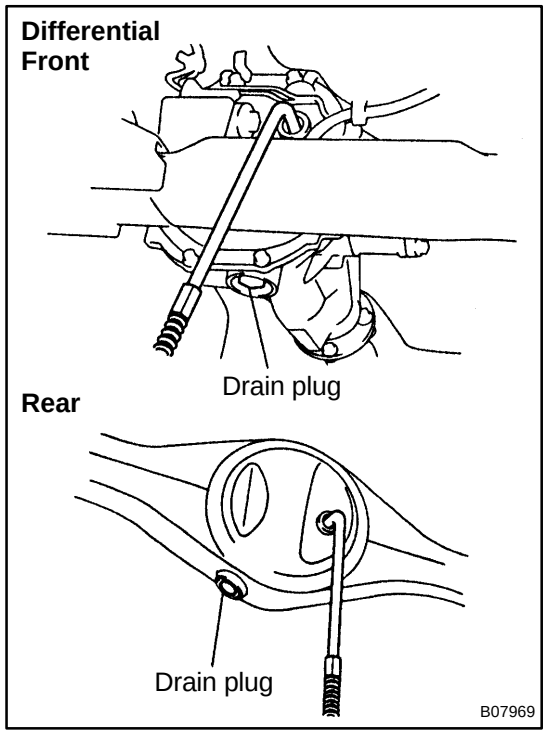
8. REPLACE TRANSFER AND DIFFERENTIAL OIL

(a) Transfer:
Remove the transfer cover.

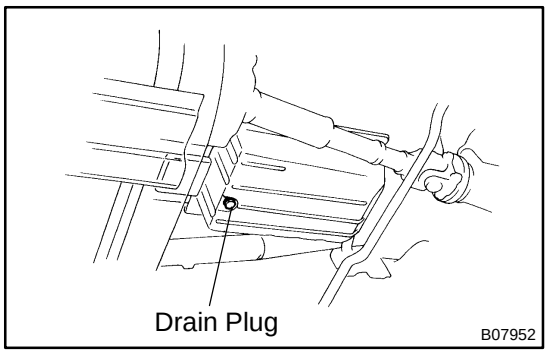
(b) Remove the drain plug and drain the oil.

(c) Reinstall the drain plug securely.

(d) Add new oil until it reaches the bottom of the filler hole.
Transfer oil: See page TR–4



Front differential oil: See page SA–38
Rear differential oil: See page SA–129



9. REPLACE AUTOMATIC TRANSMISSION FLUID

(a) Remove the drain plug and drain the fluid.

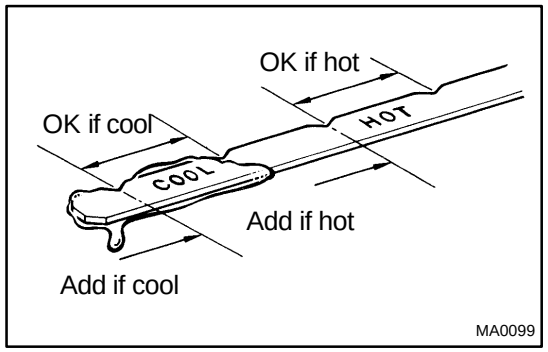
(b) Reinstall the drain plug securely.

(c) With the engine OFF, add new fluid through the dipstick tube.
Transmission fluid (A/T): See page DI–524

(d) Start the engine and shift the selector into all positions from ”P” through ”L” and then shift into ”P”.

(e) With the engine idling, check the fluid level.
Add fluid up to the ”COOL” level on the dipstick.

(f) Check that the fluid level is in the ”HOT” range at the normal operating temperature (70 – 80˚C or 158 – 176˚F) and add as necessary.



NOTICE:
Do not overfill.

10. RECOAT FRONT WHEEL BEARINGS AND THRUST BUSH

(a) Recoat the front wheel bearing with grease (See page SA–28).

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(b) Recoat the drive shaft thrust bush with grease (See page SA–34).

11. 4WD:

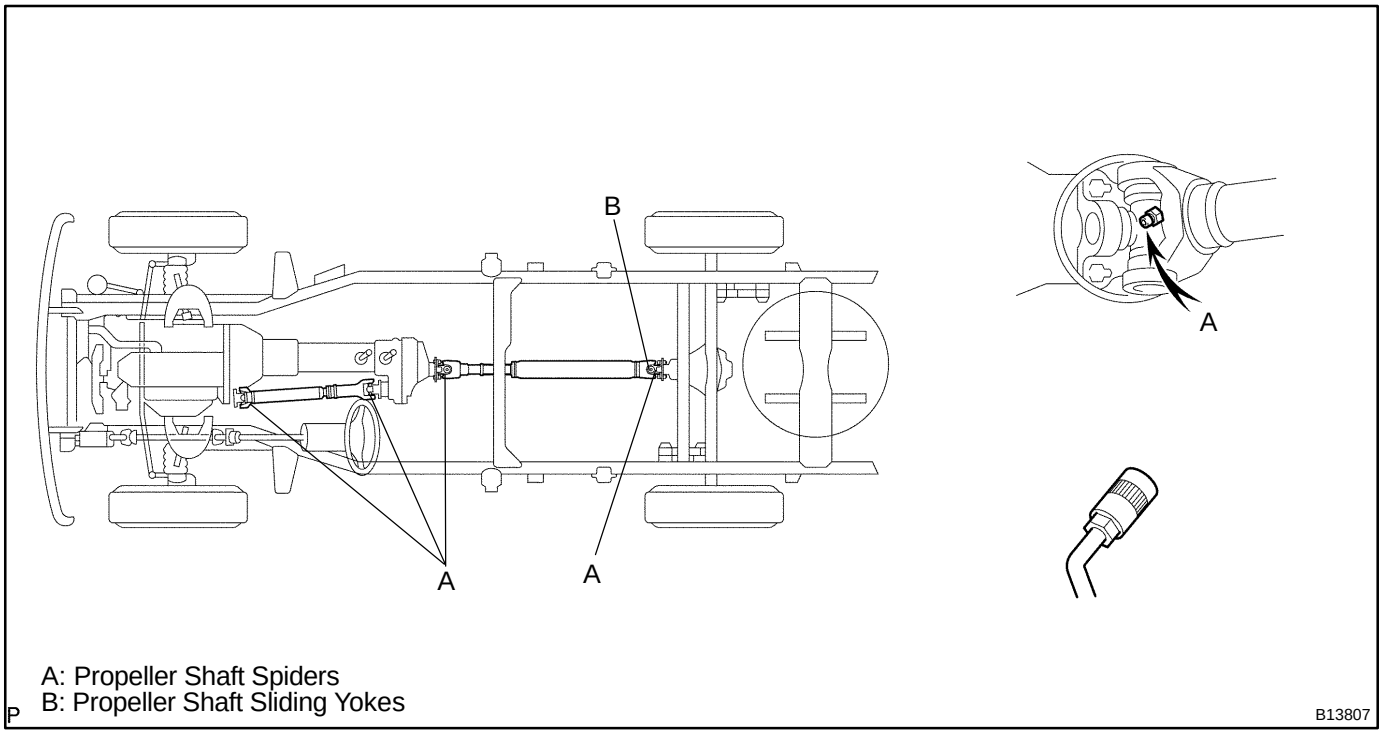
LUBRICATE PROPELLER SHAFT AND TIGHTEN BOLTS

(a) Lubricate the propeller shaft, referring to the lubrication chart. Before pumping in grease, wipe off any mud and dust on the grease fitting.

Grease grade:

Propeller shaft (Except Double–cardan joint)

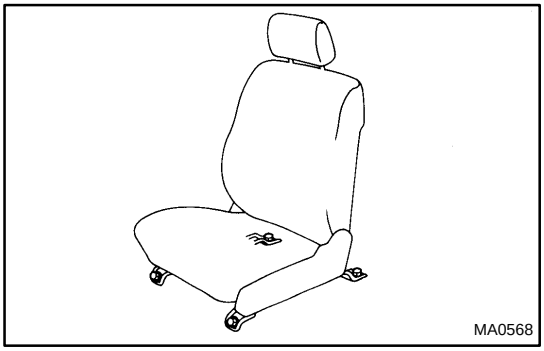
Lithium base chassis grease NLGI No.2



A: Propeller Shaft Spiders
B: Propeller Shaft Sliding Yokes

(b) Tighten the bolts for propeller shaft.
(2WD: See page PR–5)
(4WD: See page PR–9)

12. ROTATE TIRE (See page SA–3)



13. TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

(a) Tighten the following parts:

▶ Seat mounting bolts

Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)

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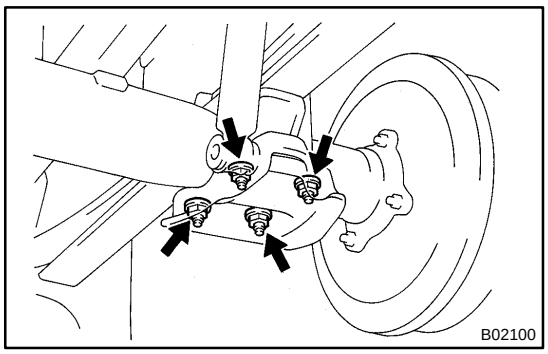

- Leaf spring U–bolt mounting nuts

Torque: 133 N·m (1,350 kgf·cm, 98 ft·lbf)

(b) Under Severe Conditions:

In addition to the above maintenance items, check for loose or missing bolts and nuts on the following.

- Steering system
- Drive train
- Suspension system
- Fuel tank mounts
- Engine mounts, etc.

14. FINAL INSPECTION

(a) Check operation of body parts:

- Hood:
  - Auxiliary catch operates properly
  - Hood locks securely when closed
- Doors:
  - Door locks operate properly
  - Doors close properly
- Seats:
  - Seat adjusts easily and locks securely in any positions
  - Seat backs lock securely at any angle
  - Fold–down seat backs lock securely

(b) Road test:

- Engine and chassis parts do not have abnormal noises.
- Vehicle does not wander or pull to one side.
- Brakes work properly and do not drag.

(c) Be sure to deliver a clean vehicle and especially check:

- Steering wheel
- Shift lever knob
- All switch knobs
- Door handles
- Seats

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MAINTENANCE

EQUIPMENT

PP1D4–02

Mirror	Brake hose

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PP1D5–02

LUBRICANT

Item	Capacity	Classification
Brake fluid	–	SAE J1703 or FMVSS No.116 DOT3

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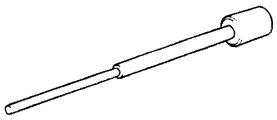
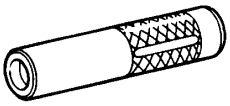
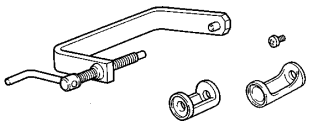
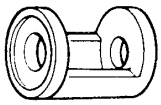
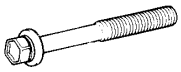
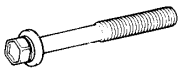
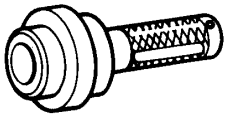
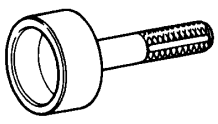
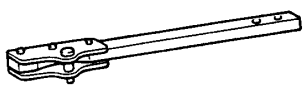
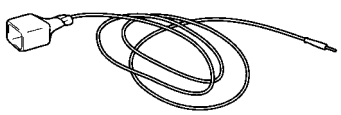
ENGINE MECHANICAL

PP42W–01

SST (Special Service Tools)

	09201–01055	Valve Guide Bushing Remover & Replacer 5.5	
	09201–41020	Valve Stem Oil Seal Replacer	
	09202–70020	Valve Spring Compressor	
	(09202–00010)	Attachment	
	09213–70011	Crankshaft Pully Holding Tool	
	(90105–08076)	Bolt	
	(90119–08216)	Bolt	
	09222–30010	Connecting Rod Bushing Remover & Replacer	
	09223–46011	Crankshaft Front Oil Seal Replacer	Crankshaft pulley Crankshaft timing pulley
	09223–56010	Crankshaft Rear Oil Seal Replacer	
	09330–00021	Companion Flange Holding Tool	Crankshaft pulley
	09843–18030	Tacho–pulse Pickup Wire No.2	

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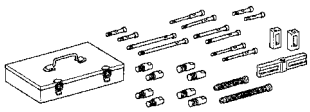
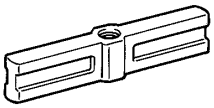
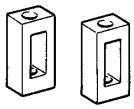
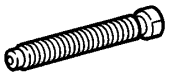
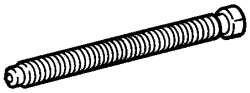
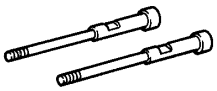
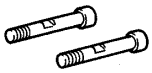
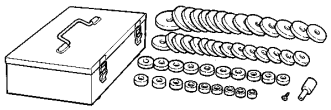
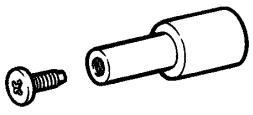
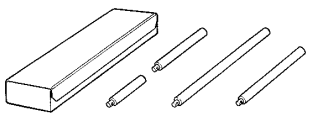
	09843–18040 Diagnosis Check Wire No.2	
	09950–50013 Puller C Set	
	(09951–05010) Hanger 150	Crankshaft pulley Crankshaft timing pulley
	(09952–05010) Slide Arm	Crankshaft pulley Crankshaft timing pulley
	(09953–05010) Center Bolt 100	Crankshaft pulley Crankshaft timing pulley
	(09953–05020) Center Bolt 150	Crankshaft pulley Crankshaft timing pulley
	(09954–05011) Claw No.1	Crankshaft timing pulley
	(09954–05021) Claw No.2	Crankshaft pulley
	09950–60010 Replacer Set	
	(09951–00240) Replacer 24	
	(09951–00440) Replacer 44	
	(09952–06010) Adapter	
	09950–70010 Handle Set	

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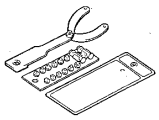
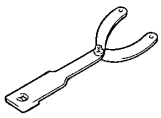
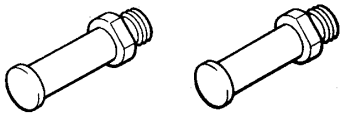
	(09951–07100) Handle 100	Spark plug tube Valve guide bushing
	09960–10010 Variable Pin Wrench Set	
	(09962–01000) Variable Pin Wrench Arm Assy	Camshaft sub–gear
	(09963–00400) Pin 4	Camshaft sub–gear
	(09963–00500) Pin 5	Camshaft sub–gear
	(09963–01000) Pin 10	Camshaft sub–gear

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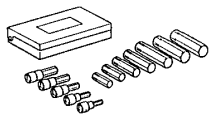
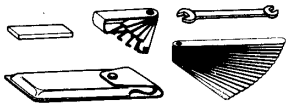
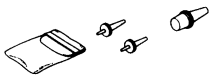
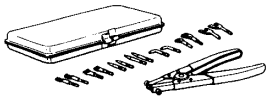
PP1BL–10

RECOMMENDED TOOLS

	09040–00011	Hexagon Wrench Set .	
	09090–04020	Engine Sling Device	For suspension engine
	09200–00010	Engine Adjust Kit .	
	09258–00030	Hose Plug Set .	Plug for vacuum hose, fuel hose etc.
	09904–00010	Expander Set .	

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PP1BM–08

EQUIPMENT

Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune–up tester	
Groove cleaning tool	
Heater	
Magnetic finger	
Micrometer	
OBD II scan tool	
Pin hole grinder	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Press	
Ridge reamer	
Soft brush	
Solvent	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Valve seat cutter	
Vernier calipers	
V–block	
Wire brush	Valve

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PP1BN–07

SSM (Special Service Materials)

08826–00080	Seal Packing Black or equivalent (FIPG)	Camshaft bearing cap Cylinder head semi–circular plug Cylinder head cover Rear oil sear retainer
08826–00080	Seal Packing Black or equivalent (FIPG)	Camshaft housing plug
08826–00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	Coolant drain union
08833–00070	Adhesive 1324, THREE BOND 1324 or equivalent	Drive plate bolt Torque converter clutch bolt
08833–00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	No.1 idler pulley bolt

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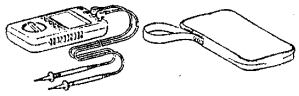
EMISSION CONTROL

PP42V–01

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	

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PP1DL–04

EQUIPMENT

Torque wrench	
MITYVAC (Hand–held vacuum pump)	
Vacuum Gauge	
Hose Clipper	

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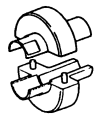
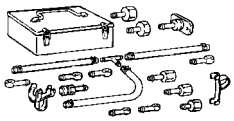
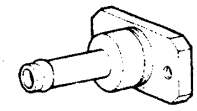
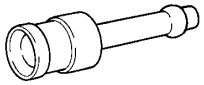
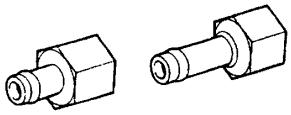
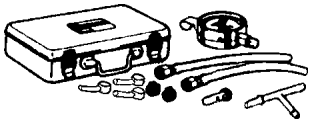
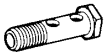
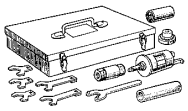
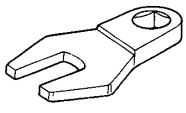
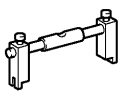
SFI

SST (Special Service Tools)

PP42X–01

	09268–21010	Fuel Hose Puller	
	09268–41047	Injection Measuring Tool Set	
	(09268–41091)	NO.7 Union	
	(09268–41110)	Adaptor	
	(09268–41300)	Clamp	
	(09268–52011)	Injection Measuring Attachment	
	09268–45014	EFI Fuel Pressure Gauge	
	(09268–41190)	Adapter	
	(90405–06167)	I Union	
	09612–24014	Steering Gear Housing Overhaul Tool Set	
	(09617–24011)	Steering Rack Wrench	Fuel pressure pulsation damper
	09808–14020	Retainer Tool, Fuel Pump	

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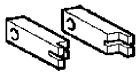
	(09808–01410) Holder	
	(09808–01420) Claw	
	(09808–01430) Bolt	
	09842–30070 Wiring ”F” EFI Inspection	

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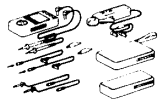
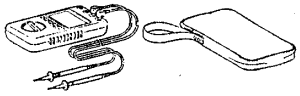
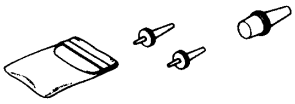
PP42Y–01

RECOMMENDED TOOLS

	09082–00050	TOYOTA Electrical Tester Set.	
	(09082–00040)	TOYOTA Electrical Tester.	
	09258–00030	Hose Plug Set .	Plug for vacuum hose, fuel hose etc.

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PP0NI–09

EQUIPMENT

Graduated cylinder	Injector
OBD II scan tool	
Sound scope	Injector
Torque wrench	
Vacuum gauge	

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COOLING

EQUIPMENT

PP1AQ–04

Heater	Thermostat
Radiator cap tester	
Thermometer	Thermostat
Torque wrench	

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PP1AR–04

COOLANT

Item	Capacity	Classification
Engine coolant	11.6 liters (12.3 US qts, 10.2 lmp. qts)	”Toyota Super Long Life Coolant” or similar high quality ethylene glycol based non–silicate, non–amine, non–nitrite, and non–borate coolant with long–life hybrid organic acid technology

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SSM (Special Service Materials)

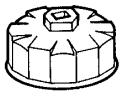
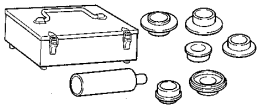
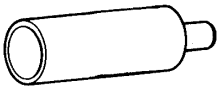
08826–00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	Water inlet housing

Dardoor.com

LUBRICATION

PP24A–06

SST (Special Service Tools)

	09032–00100	Oil Pan Seal Cutter	
	09228–07501	Oil Filter Wrench	
	09316–60011	Transmission & Transfer Bearing Replacer	
	(09316–00011)	Replacer Pipe	Crankshaft front oil seal

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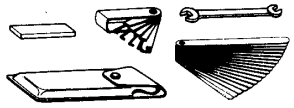
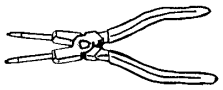
PP1AU–07

RECOMMENDED TOOLS

	09200–00010 Engine Adjust Kit .	
	09905–00013 Snap Ring Pliers .	

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PP1AV–03

EQUIPMENT

Oil pressure gauge	
Precision straight edge	
Torque wrench	

Dardoor.com

PP1AW–08

LUBRICANT

Item	Capacity	Classification
Engine oil		
Dry fill	7.1 liters (7.5 US qts, 6.2 Imp. qts)	API grade SL Energy–Conserving or ILSAC multigrade engine oil.
Drain and refill		
w/ Oil filter change	6.2 liters (6.6 US qts, 5.5 Imp. qts)	
w/o Oil filter change	5.7 liters (6.0 US qts, 5.0 Imp qts)	

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PP1AX–03

SSM (Special Service Materials)

08826–00080	Seal Packing Black or equivalent (FIPG)	Oil pump No.1 oil pan No.2 oil pan
08833–00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Oil pressure switch

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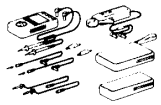
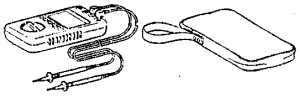
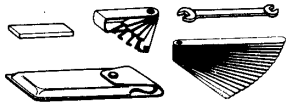
IGNITION

RECOMMENDED TOOLS

PP42Z–01

	09082–00050	TOYOTA Electrical Tester Set.	
	(09082–00040)	TOYOTA Electrical Tester.	
	09200–00010	Engine Adjust Kit .	

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PP1AM–03

EQUIPMENT

Megger (Insulation resistance meter)	Spark plug
Spark plug cleaner	
Torque wrench	

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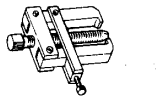
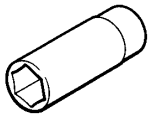
STARTING

PP1D6–06

SST (Special Service Tools)

	09286–46011	Injection Pump Spline Shaft Puller	Armature front bearing
	09810–38140	Starter Magnet Switch Nut Wrench 14	
	09820–00031	Alternator Rear Bearing Replacer	Armature bearing

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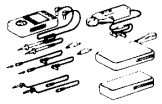
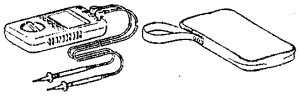
PP430–01

RECOMMENDED TOOLS

	09082–00050 TOYOTA Electrical Tester Set.	
	(09082–00040) TOYOTA Electrical Tester.	

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PP1D8–02

EQUIPMENT

Dial indicator	Commutator
Magnetic finger	Steel ball
Pull scale	Brush spring
Sandpaper	Commutator
Torque wrench	
V–block	Commutator
Vernier calipers	Commutator, Brush

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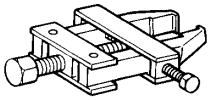
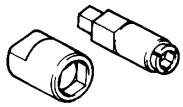
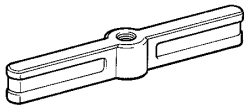
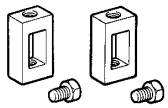
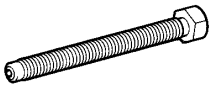
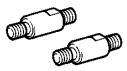
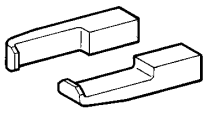
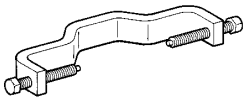
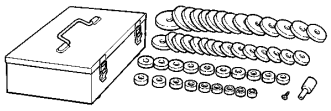
CHARGING

PP3WZ–02

SST (Special Service Tools)

	09285–76010	Injection Pump Camshaft Bearing Cone Replacer	
	09820–00021	Alternator Rear Bearing Puller	
	09820–00031	Alternator Rear Bearing Replacer	
	09820–63011	Alternator Pulley Set Nut Wrench Set	
	09950–40011	Puller B Set	
	(09951–04020)	Hanger 200	
	(09952–04010)	Slide Arm	
	(09953–04020)	Center Bolt 150	
	(09954–04010)	Arm 25	
	(09955–04071)	Claw No.7	
	(09958–04011)	Holder	
	09950–60010	Replacer Set	

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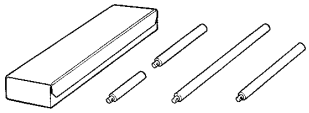
	(09951–00250) Replacer 25	
	(09951–00470) Replacer 47	
	09950–70010 Handle Set	
	(09951–07100) Handle 100	

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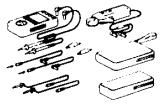
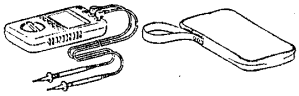
PP3X0–02

RECOMMENDED TOOLS

	09082–00050 TOYOTA Electrical Tester Set.	
	(09082–00040) TOYOTA Electrical Tester.	

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PP1DB–03

EQUIPMENT

Ammeter(A)	
Torque wrench	
Vernier calipers	Rotor (Slip ring)

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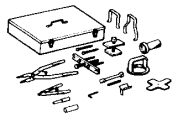
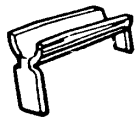
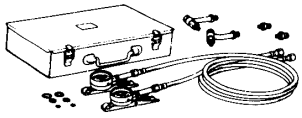
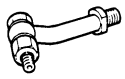
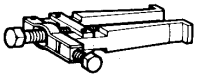
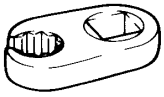
AUTOMATIC TRANSMISSION (A750E, A750F)

PP42K–01

SST (Special Service Tools)

	09350–30020	TOYOTA Automatic Transmission Tool Set	
	(09351–32020)	Stator Stopper	Torpue converter clutch and drive plate
	09992–00095	Automatic Transmission Oil Pressure Gauge Set	
	(09992–00231)	Adaptor C	
	(09992–00271)	Gauge Assy	
	09308–10010	Oil Seal Puller	Extension housing oil seal
	09325–40010	Transmission Oil Plug	Extension housing oil seal
	09023–12701	Union Nut Wrench 17mm	Oil cooler pipe

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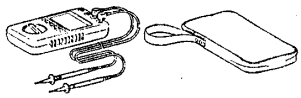
PP42L–01

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	

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PP42M–01

EQUIPMENT

OBD II scan tool	
Torque wrench	
Calipers	Torque converter clutch
Straight edge	Torque converter clutch
Dial indicator	Drive plate runout

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PP42N–01

LUBRICANT

Item	Capacity	Classification
Automatic transmission fluid		
Dry fill	10.4 liters (11.0 US qts, 9.2 lmp qts)	Toyota Genuine ATF WS
Drain and refill	3.0 liters (3.2 US qts, 2.6 lmp qts)	

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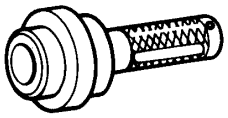
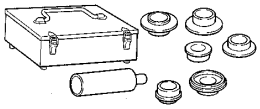
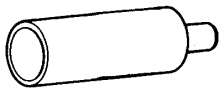
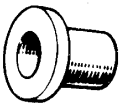
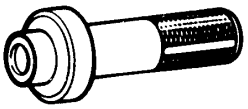
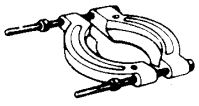
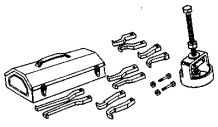
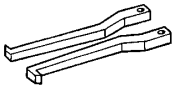
TRANSFER

PP42S–01

SST (Special Service Tools)

	09223–15020	Oil Seal & Bearing Replacer	PLANETARY GEAR
	09223–46011	Crankshaft Front Oil Seal Replacer	TRANSFER ASSEMBLY
	09316–60011	Transmission & Transfer Bearing Replacer	REAR OUTPUT SHAFT DRIVEN SPROCKET TRANSFER ASSEMBLY
	(09316–00011)	Replacer Pipe	REAR OUTPUT SHAFT TRANSFER ASSEMBLY
	(09316–00031)	Replacer ”B”	DRIVEN SPROCKET
	(09316–00071)	Replacer ”F”	REAR OUTPUT SHAFT
	09330–00021	Companion Flange Holding Tool	TRANSFER ASSEMBLY
	09515–30010	Rear Wheel Bearing Replacer	PLANETARY GEAR
	09554–30011	Differential Oil Seal Replacer	PLANETARY GEAR
	09555–55010	Differential Drive Pinion Bearing Replacer	PLANETARY GEAR REAR OUTPUT SHAFT DRIVEN SPROCKET
	09612–65014	Steering Worm Bearing Puller	PLANETARY GEAR
	(09612–01030)	Claw ”C”	PLANETARY GEAR

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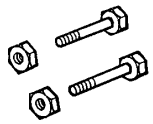
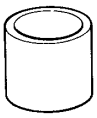
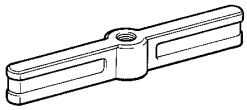
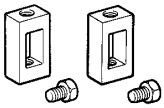
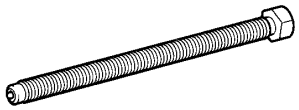
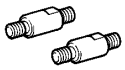
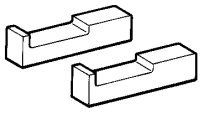
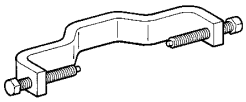
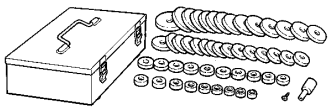
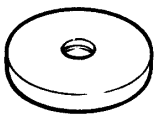
	(09612–01050)	Hanger Pin with Nut	PLANETARY GEAR
	09631–32020	Seal Ring Tool	TRANSFER ASSEMBLY
	09950–40011	Puller B Set	TRANSFER ASSEMBLY
	(09951–04020)	Hanger 200	TRANSFER ASSEMBLY
	(09952–04010)	Slide Arm	TRANSFER ASSEMBLY
	(09953–04030)	Center Bolt 200	TRANSFER ASSEMBLY
	(09954–04010)	Arm 25	TRANSFER ASSEMBLY
	(09955–04051)	Claw No.5	TRANSFER ASSEMBLY
	(09957–04010)	Attachment	TRANSFER ASSEMBLY
	(09958–04011)	Holder	TRANSFER ASSEMBLY
	09950–60010	Replacer Set	PLANETARY GEAR TRANSFER ASSEMBLY
	(09951–00320)	Replacer 32	TRANSFER ASSEMBLY
	(09951–00570)	Replacer 57	PLANETARY GEAR

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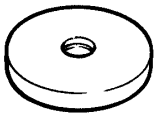
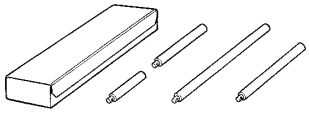
	(09951–00590) Replacer 59	TRANSFER ASSEMBLY
	09950–70010 Handle Set	PLANETARY GEAR TRANSFER ASSEMBLY
	(09951–07100) Handle 100	PLANETARY GEAR TRANSFER ASSEMBLY

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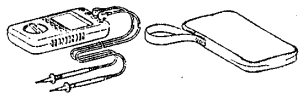
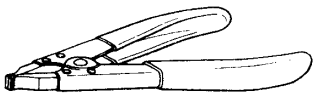
PP42T–01

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	
	09905–00012 Snap Ring No.1 Expander .	

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PP1DX–02

EQUIPMENT

Dial indicator with magnetic base	
Micrometer	
Torque wrench	
Plastic hammer	
Vernier calipers	

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PP1DY–03

LUBRICANT

Item	Capacity	Classification
Transfer oil	1.4 liters (1.5 US qts, 1.2 Imp. qts)	API GL–5 SAE 75W–90

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PP1DZ–02

SSM (Special Service Materials)

08826–00080	Seal Packing Black or equivalent (FIPG)	
08826–00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	Front case x Rear case Rear case x Case cover Case x Extension housing Motor actuator x Front case

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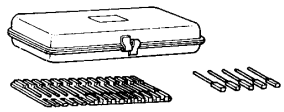
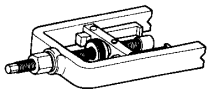
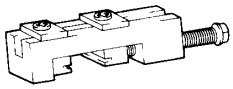
PROPELLER SHAFT

SST (Special Service Tools)

PP42U–01

	09240–00020	Wire Gauge Set	PROPELLER SHAFT ASSEMBLY
	09325–40010	Transmission Oil Plug	PROPELLER SHAFT ASSEMBLY
	09332–25010	Universal Joint Bearing Remover & Replacer	SPIDER BEARING
	09521–24010	Drive Shaft Boot Clamping Tool	PROPELLER SHAFT ASSEMBLY

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PP0EZ–02

EQUIPMENT

Dial indicator	
Torque wrench	

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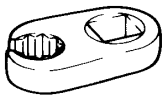
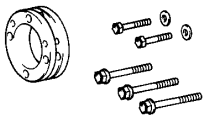
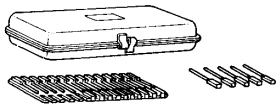
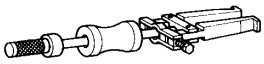
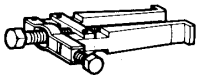
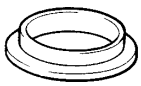
SUSPENSION AND AXLE

PP434–01

SST (Special Service Tools)

	09023–00101	Union Nut Wrench 10mm	Rear axle
	09213–58013	Crankshaft Pully Holding Tool	Rear differential
	09223–15020	Oil Seal & Bearing Replacer	Front differential
	09223–15030	Oil Seal & Bearing Replacer	Front axle
	09226–10010	Crankshaft Front & Rear Bearing Replacer	Front differential
	09240–00020	Wire Gauge Set	Front drive shaft
	09308–00010	Oil Seal Puller	Front differential Rear axle
	09308–10010	Oil Seal Puller	Front differential Rear differential
	09309–37010	Transmission Bearing Replacer	Front differential Front suspension
	09316–12010	Transfer Bearing Replacer	Rear differential
	09318–12010	Transfer Bearing Adjusting Nut Wrench	Front axle (2WD)
	09330–00021	Companion Flange Holding Tool	Front differential Rear differential

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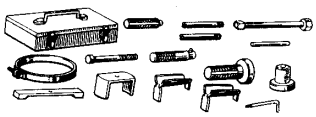
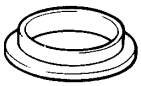
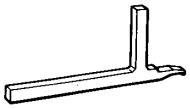
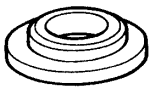
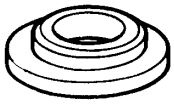
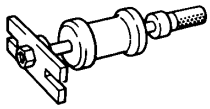
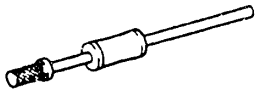
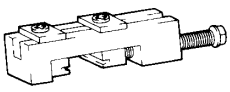
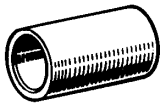
	09350–20015	TOYOTA Automatic Transmission Tool Set	Front differential
	(09369–20040)	Piston Spring Compressor Set	
	09502–12010	Differential Bearing Replacer	Front differential Front suspension
	09504–22012	Differential Side Bearing Replacer	Rear differential
	09506–30012	Differential Drive Pinion Rear Bearing Cone Replacer	Front differential
	09506–35010	Differential Drive Pinion Rear Bearing Replacer	Rear differential
	09520–01010	Drive Shaft Remover Attachment	Front drive shaft
	09520–24010	Differential Side Gear Shaft Puller	Front drive shaft
	(09520–32040)	Shocker Set	
	09521–24010	Drive Shaft Boot Clamping Tool	Front drive shaft
	09521–25011	Rear Axle Shaft Puller	Rear axle
	09521–25021	Rear Axle Shaft Puller Attachment	Rear axle
	09523–36010	Rear Axle Hub Guide Tool	Rear differential

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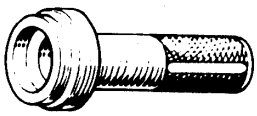
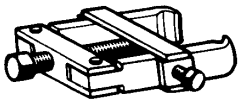
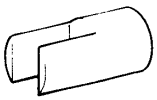
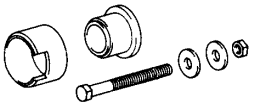
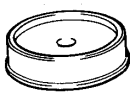
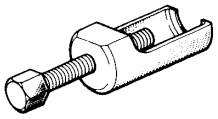
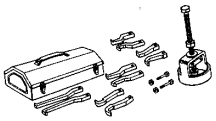
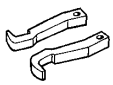
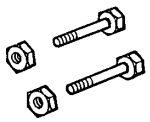
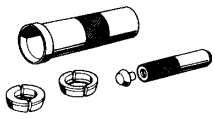
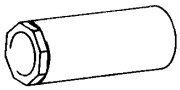
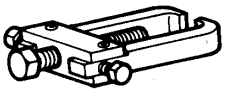
	09527–17011	Rear Axle Shaft Bearing Remover	Front axle
	09554–22010	Differential Oil Seal Replacer	Front differential
	09556–22010	Drive Pinion Front Bearing Remover	Front differential Rear differential
	09564–32011	Differential Preload Adaptor	Front differential
	09570–22011	Differential Mounting Cushion Remover & Replacer	Front differential
	09608–32010	Steering Knuckle Oil Seal Replacer	Front differential
	09610–20012	Pitman Arm Puller	Front suspension
	09612–65014	Steering Worm Bearing Puller	Front differential
	(09612–01020)	Claw "B"	
	(09612–01050)	Hanger Pin with Nut	
	09613–26010	Steering Worm Bearing Cone Remover	Front suspension
	09631–20060	Bearing Guide Nut Wrench	
	09628–62011	Ball Joint Puller	Front drive shaft Front suspension

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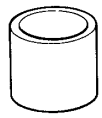
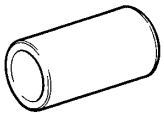
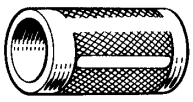
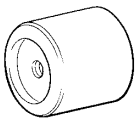
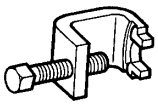
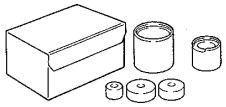
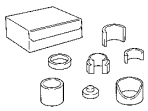
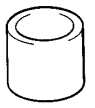
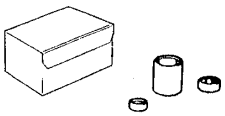
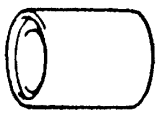
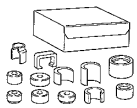
	09631–12090	Seal Ring Tool	Front suspension Rear axle
	09632–36010	Steering Vane Pump Bearing Replacer	Front suspension Rear suspension
	09636–20010	Upper Ball Joint Dust Cover Replacer	Front differential
	09649–17010	Steering Knuckle Tool	Front axle Rear differential
	09650–17011	Hub Bolt Remover	Front axle Rear axle
	09710–14013	Rear Suspension Bushing Tool Set	Rear suspension
	(09710–00061)	Replacer	
	09710–28012	Front Suspension Bushing Tool Set	Rear suspension
	(09710–07031)	Bushing Replacer	
	09710–30031	Rear Suspension Bushing Tool Set	Front suspension
	(09710–03161)	Remover	
	(09710–03171)	Base	
	09710–30021	Suspension Bushing Tool Set	

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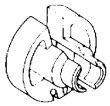
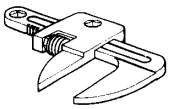
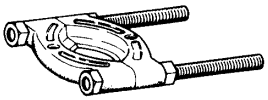
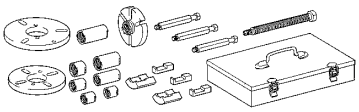
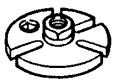
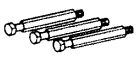
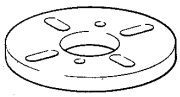
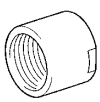
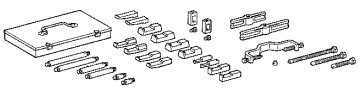
	(09710–03051)	Bushing Replacer	Front axle Front suspension
	09730–00010	Tube Remover	Electronic modulated air suspension Height control valve
	09843–18040	Diagnosis Check Wire No.2	Tire pressure monitor valve
	09922–10010	Variable Open Wrench	Front suspension
	09950–00020	Bearing Remover	Front drive shaft Front differential Front suspension Rear differential
	09950–30012	Puller A Set	
	(09951–03010)	Upper Plate	Front differential Rear differential
	(09953–03010)	Center Bolt	Front differential Rear differential
	(09954–03010)	Arm	Front differential Rear differential
	(09955–03030)	Lower Plate 130	Front differential Rear differential
	(09956–03020)	Adapter 18	Front differential
	(09956–03050)	Adapter 24	Rear differential
	09950–40011	Puller B Set	

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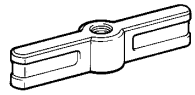
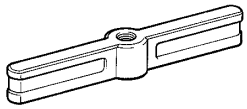
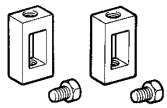
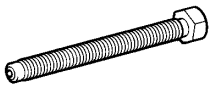
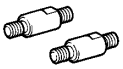
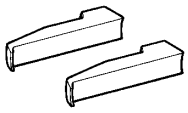
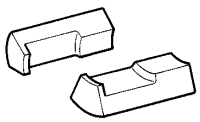
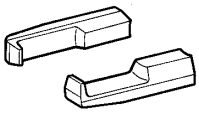
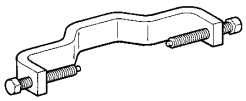
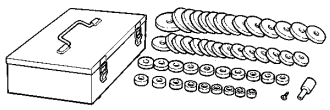
	(09951–04010) Hanger 150	Front axle Front differential Front suspension Rear differential
	(09951–04020) Hanger 200	Front axle
	(09952–04010) Slide Arm	Front axle Front differential Front suspension Rear differential
	(09953–04020) Center Bolt 150	Front axle Front differential Front suspension Rear differential
	(09954–04010) Arm 25	Front axle Front differential Front suspension Rear differential
	(09955–04011) Claw No.1	Front differential
	(09955–04031) Claw No.3	Front axle Front suspension
	(09955–04061) Claw No.6	Front differential Rear differential
	(09957–04010) Attachment	Front axle Front differential Front suspension Rear differential
	(09958–04011) Holder	Front axle Front differential Front suspension Rear differential
	09950–60010 Replacer Set	
	(09951–00380) Replacer 38	Front differential
	(09951–00480) Replacer 48	Front differential Rear differential

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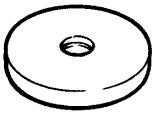
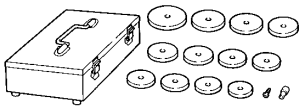
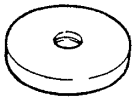
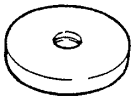
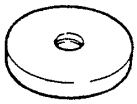
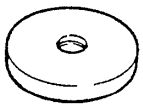
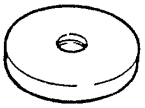
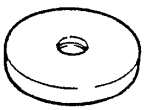
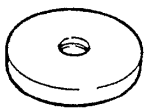
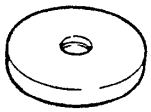
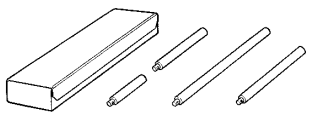
	(09951–00510) Replacer 51	Front differential
	(09951–00650) Replacer 65	Front axle Front differential
	09950–60020 Replacer Set No.2	
	(09951–00680) Replacer 68	Rear differential
	(09951–00710) Replacer 71	Rear axle Rear differential
	(09951–00730) Replacer 73	Rear axle
	(09951–00790) Replacer 79	Front differential
	(09951–00810) Replacer 81	Front axle
	(09951–00890) Replacer 89	Rear axle
	(09951–00910) Replacer 91	Front axle
	(09951–01030) Replacer 103	Rear axle
	09950–70010 Handle Set	Front axle, Front differential Rear axle Rear differential Rear suspension
	(09951–07150) Handle 150	

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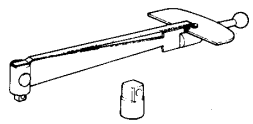
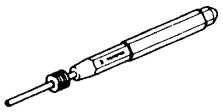
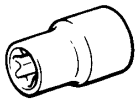
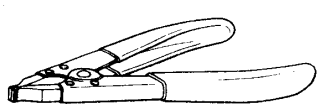
PP1BB–05

RECOMMENDED TOOLS

	09025–00010	Torque Wrench (30 kgf–cm)	
	09031–00030	Pin Punch .	
	09044–00020	Torx Socket E10 .	
	09905–00012	Snap Ring No.1 Expander .	

Torx is a registered trademark of Textron Inc.

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PP1BC–01

EQUIPMENT

Dial indicator with magnetic base	
Drill	
Micrometer	
Torque wrench	

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PP1BD–11

LUBRICANT

Item	Capacity	Application
Front drive shaft Outboard joint grease (Color = Black) Inboard joint grease (Color = Black)	 205 – 225 g (7.23 – 7.94 oz.) 190 – 210 g (6.70 – 7.41 oz.)	
Front differential Differential oil	1.15 liters (1.22 US qts. 1.01 lmp. qts)	Hypoid gear oil API GL–5 SAE 75W–90
Rear differential Differential oil	3.65 liters (3.86 US qts. 3.21 lmp. qts)	Hypoid gear oil API GL–5 SAE 75W – 140 (Synthetic)

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PP1BE–01

SSM (Special Service Materials)

08826–00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	
08833–00070	Adhesive 1324, THREE BOND 1324 or equivalent	
08833–00100	THREE BOND 1360K or equivalent	

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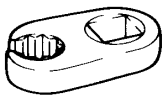
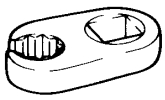
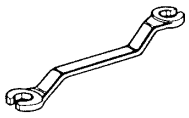
BRAKE

PP3WW–02

SST (Special Service Tools)

	09023–00101	Union Nut Wrench 10mm	
	09023–38201	Union Nut Wrench 12mm	
	09751–36011	Brake Line Union Nut 10 x 12 mm Wrench	
	09843–18040	Diagnosis Check Wire No.2	

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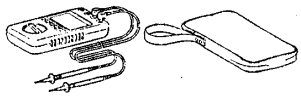
PP3JV–02

RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	

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PP0FC–03

EQUIPMENT

Clip remover	
Torque wrench	
Micrometor	Brake disc
Dial indicator	Brake disc
Brake drum gauge	Brake disc

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PP0FD–03

LUBRICANT

Item	Capacity	Classification
Brake fluid	–	SAE J1703 or FMVSS No. 116 DOT3

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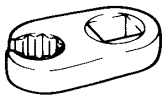
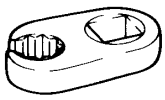
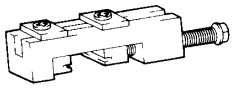
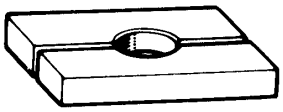
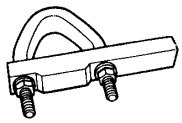
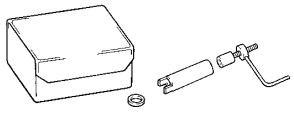
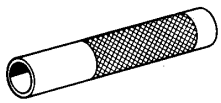
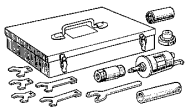
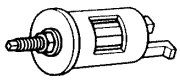
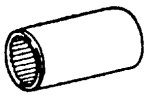
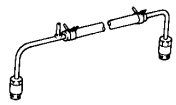
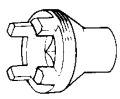
STEERING

SST (Special Service Tools)

PP3JP–04

	09023–12701	Union Nut Wrench 17mm	PS gear
	09023–38401	Union Nut Wrench 14mm	PS gear
	09521–24010	Drive Shaft Boot Clamping Tool	PS gear
	09527–20011	Rear Axle Shaft Bearing Remover	PS gear
	09612–00012	Rack & Pinion Steering Rack Housing Stand	PS gear
	09612–07010	Main Shaft Retaining Ring Remover & Replacer	Steering column
	09612–22011	Tilt Handle Bearing Replacer	PS gear
	09612–24014	Steering Gear Housing Overhaul Tool Set	PS gear
	(09613–22011)	Steering Rack Shaft Bushing Puller	
	09616–00011	Steering Worm Bearing Adjusting Socket	PS gear
	09631–12071	Steering Rack Oil Seal Test Tool	PS gear
	09631–16010	Cylinder End Stopper Nut Wrench	PS gear

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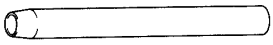
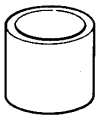
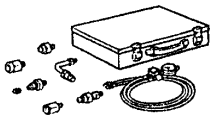
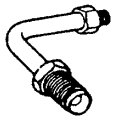
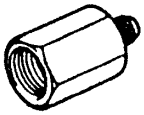
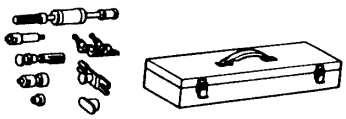
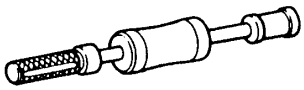
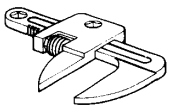
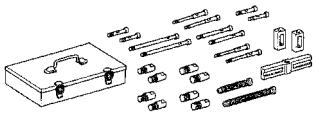
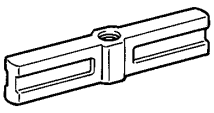
	09631–20051	Steering Rack Cover ”C”	PS gear
	09631–20081	Seal Ring Tool	PS gear
	09640–10010	Power Steering Pressure Gauge Set	
	(09641–01010)	Gauge Assy	Power steering fluid
	(09641–01030)	Attachment B	Power steering fluid
	(09641–01060)	Attachment E	Power steering fluid
	09816–30010	Oil Pressure Switch Socket	PS gear
	09910–00015	Puller Set	
	(09911–00011)	Puller Clamp	Steering column
	(09912–00010)	Puller Slide Hammer	Steering column
	09922–10010	Variable Open Wrench	PS gear
	09950–50013	Puller C Set	
	(09951–05010)	Hanger 150	Steering column

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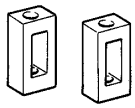
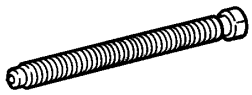
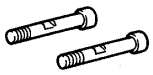
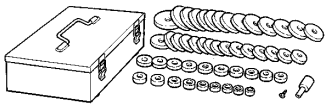
	(09952–05010) Slide Arm	Steering column
	(09953–05020) Center Bolt 150	Steering column
	(09954–05021) Claw No.2	Steering column
	09950–60010 Replacer Set	
	(09951–00180) Replacer 18	PS gear
	(09951–00250) Replacer 25	PS gear
	(09951–00260) Replacer 26	PS gear
	(09951–00300) Replacer 30	PS gear
	(09951–00310) Replacer 31	PS gear
	(09951–00320) Replacer 32	PS gear
	(09951–00330) Replacer 33	PS vane pump PS gear
	(09951–00340) Replacer 34	PS gear
	(09951–00360) Replacer 36	PS gear

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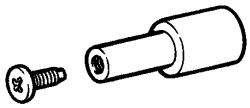
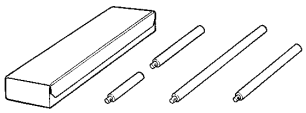
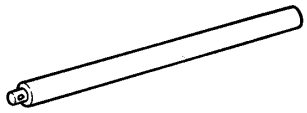
	(09951–00400) Replacer 40	Steering column
	(09951–00460) Replacer 46	Steering column PS gear
	(09951–00490) Replacer 49	PS gear
	(09952–06010) Adapter	PS gear
	09950–70010 Handle Set	
	(09951–07100) Handle 100	PS vane pump
	(09951–07150) Handle 150	Steering column
	(09951–07360) Handle 360	Steering column

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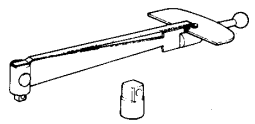
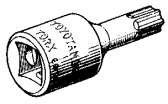
PP3JQ–02

RECOMMENDED TOOLS

	09025–00010	Torque Wrench (30 kgf–cm)	PS vane pump PS gear
	09042–00010	Torx Socket T30 .	Steering column

Torx is a registered trademark of Textron Inc.

Dardoor.com

PP1B7–02

EQUIPMENT

Caliper gauge	PS vane pump
Calipers	PS vane pump
Dial indicator	PS gear
Feeler gauge	PS vane pump
Micrometer	PS vane pump
Torque wrench	

Dardoor.com

PP1B8–02

LUBRICANT

Item	Capacity	Classification
Power steering fluid Total	0.8 liters (0.9 US qts, 0.7 lmp.qts)	ATF DEXRON® II or III

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PP1B9–02

SSM (Special Service Materials)

08833–00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	PS gear

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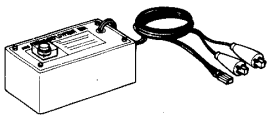
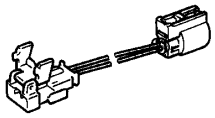
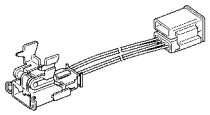
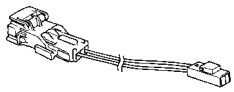
SUPPLEMENTAL RESTRAINT SYSTEM

PP43B–01

SST (Special Service Tools)

	09082–00700	SRS Airbag Deployment Tool	
	09082–00750	Airbag Deployment Wire Sub–harness No.3	
	09082–00780	Airbag Deployment Wire Sub–Harness No.6	
	09082–00802	Airbag Deployment Wire Sub–Harness No.8	
	(09082–10801)	Wire A	
	(09082–20801)	Wire B	
	(09082–30801)	Wire C	

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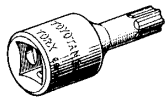
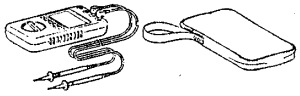
PP43A–01

RECOMMENDED TOOLS

	09042–00010 Torx Socket T30 .	
	09082–00040 TOYOTA Electrical Tester.	

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PP0MS–23

EQUIPMENT

Torque wrench	
Bolt: Length: 35 mm (1.387 in.) Pitch: 1.0 mm (0.039 in.) Diam.: 6.0 mm (0.236 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diam.: 360mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Plastic bag	Airbag disposal

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BODY ELECTRICAL

PP0O0–19

SST (Special Service Tools)

	09843–18040 Diagnosis Check Wire No.2	

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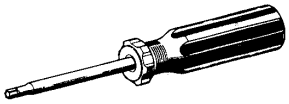
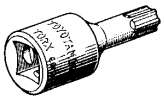
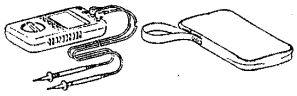
PP0O1–21

RECOMMENDED TOOLS

	09041–00030	Torx Driver T30 .	For removing and installing steering wheel pad
	09042–00010	Torx Socket T30 .	For removing and installing steering wheel pad
	09082–00040	TOYOTA Electrical Tester.	

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PP0O2–06

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Engine coolant temperature sender gauge, Engine oil level warning switch, Seat heater
Syphon	Brake fluid level warning switch
Oil bath	Engine oil level warning switch
Bulb (1.4 W)	Defogger switch
Bulb (3.4 W)	Fuel sender gauge, Engine coolant temperature receiver gauge, Seat belt warning relay
Dry cell battery	Fuel sender gauge, Power mirror
Heat light	Seat heater
Hexagon wrench (6 mm)	Power seat
Torque wrench	
Masking tape	Rear window defogger wire
Tin foil	Rear window defogger wire

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PP0T6–12

SSM (Special Service Materials)

08888–88888	DuPont Paste No. 4817 or equivalent	Rear window defogger

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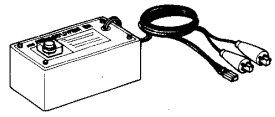
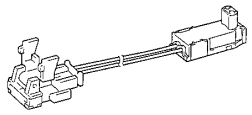
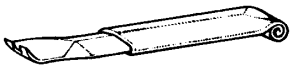
BODY

SST (Special Service Tools)

PP3JT–01

	09082–00700	SRS Airbag Deployment Tool	SEAT BELT PRETENSIONER
	09082–00740	Airbag Deployment Wire Sub–harness No.2	SEAT BELT PRETENSIONER
	09806–30010	Windshield Moulding Remover	WINDSHIELD ROOF DRIP SIDE FINISH MOULDING
	09812–00010	Door Hinge Set Bolt Wrench	FRONT DOOR

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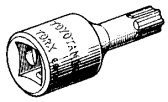
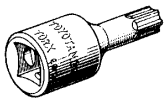
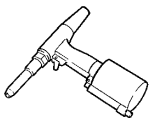
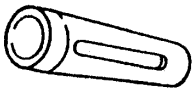
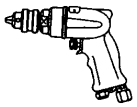
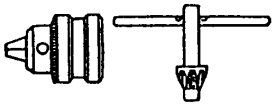
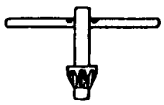
PP1AO–09

RECOMMENDED TOOLS

	09042–00010	Torx Socket T30 .	
	09042–00020	Torx Socket T40 .	
	09050–20010	Air Riveter.	
	(09050–02010)	Dust Cap.	
	(09050–02020)	Nose Piece No.1.	
	09050–00032	Air Drill	
	(09050–00210)	Chuck Set	
	(09050–00220)	Handle	
	09060–60350	Revet Cutter.	
	09070–20010	Moulding Remover .	

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PP0SI–02

EQUIPMENT

Clip remover	
Torque wrench	
Hexagon wrench (6 mm)	
Torx driver	
Hog ring pliers	
Hand riveter	
Tape	To avoid surface damage
Adhesive tape	To avoid surface damage
Double–stick tape	
Adhesive	
Cleaner	
Shop rag	
Knife	
Sealer gun	
Brush	
Putty spatula	
Glass plate or similar object	
Wooden block or similar object	
Heat light	
Piano wire	
Rope (no projections, difficult to break)	Seat belt pretensioner
Tire with disk wheel Width: 185 mm (7.28 in.) Inner diam: 360 mm (14.17 in.)	Seat belt pretensioner
Vinyl bag	Seat belt pretensioner

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LUBRICANT

Item	Capacity	Classification
MP grease	–	–

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SSM (Special Service Materials)

08833–00030	Three cement black or equivalent	
08833–00070	Adhesive 1324, THREE BOND 1324 or equivalent	
08850–00801	Windshield Glass Adhesive Set or equivalent	

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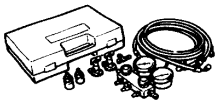
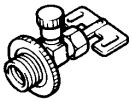
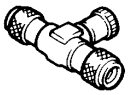
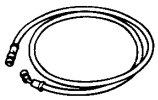
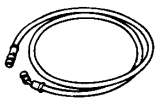
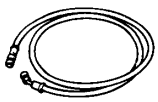
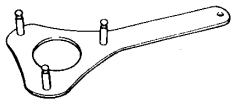
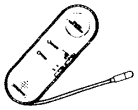
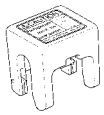
AIR CONDITIONING

PP3JZ–01

SST (Special Service Tools)

	07110–58060	Air Conditioner Service Tool Set	
	(07117–58060)	Refrigerant Drain Service Valve	
	(07117–58070)	T–Joint	
	(07117–58080)	Quick Disconnect Adapter	High pressure side
	(07117–58090)	Quick Disconnect Adapter	Low pressure side
	(07117–88060)	Refrigerant Charging Hose	High pressure side (Color: Red)
	(07117–88070)	Refrigerant Charging Hose	Low pressure side (Color: Blue)
	(07117–88080)	Refrigerant Charging Hose	Utility (Color: Green)
	07112–66040	Magnetic Clutch Remover	
	07112–76060	Magnetic Clutch Stopper	
	07116–38360	Gas Leak Detector Assembly	
	09870–00015	A/C Quick Joint Puller No.1	Suction tube

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	09870–00025	A/C Quick Joint Puller No.2	Liquid tube
	95994–10020	Snap Ring Pliers (DENSO Part No.)	

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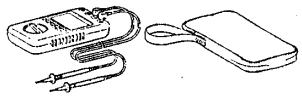
RECOMMENDED TOOLS

	09082–00040 TOYOTA Electrical Tester.	

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PP1AG–08

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Sensor
Torque wrench	
Dial indicator	Magnetic clutch
Plastic hammer	Magnetic clutch
Hexagon wrench	Expansion valve

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PP1AH–01

LUBRICANT

Item	Capacity	Classification
Compressor oil	–	ND–OIL 8 or equivalent
When replacing condenser	40 cc (1.4 fl. oz.)	
When replacing evaporator	40 cc (1.4 fl. oz.)	

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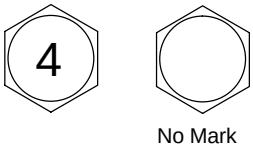
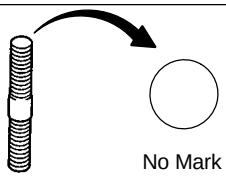
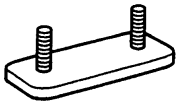
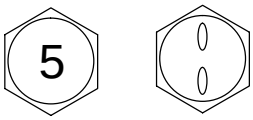
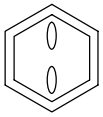
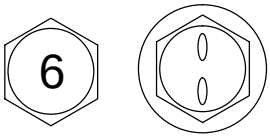
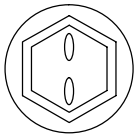
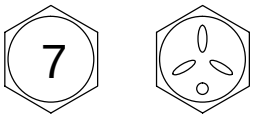
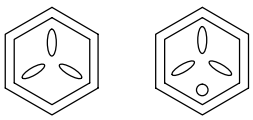
STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS0ZS–01

Bolt Type				Class
Hexagon Head Bolt		Stud Bolt	Weld Bolt	
Normal Recess Bolt	Deep Recess Bolt			
 No Mark	No Mark	 No Mark		4T
				5T
 w/ Washer	 w/ Washer			6T
				7T
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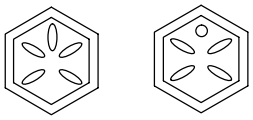
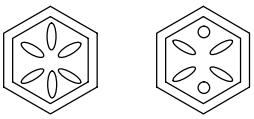
				10T
				11T

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SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N·m	kgf·cm	ft·lbf	N·m	kgf·cm	ft·lbf
4T	6	1	5	55	48 in.·lbf	6	60	52 in.·lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	–	–	–
5T	6	1	6.5	65	56 in.·lbf	7.5	75	65 in.·lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	–	–	–
6T	6	1	8	80	69 in.·lbf	9	90	78 in.·lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	–	–	–
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	–	–	–
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

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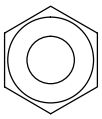
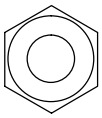
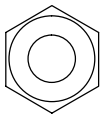
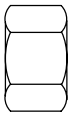
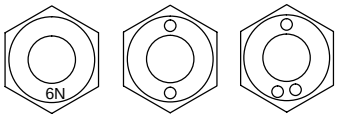
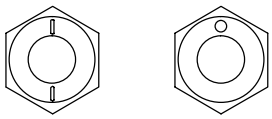
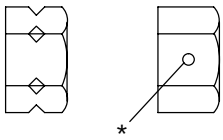
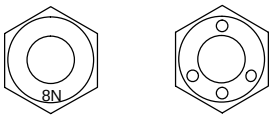
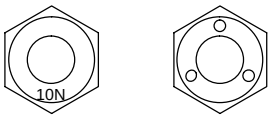
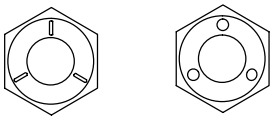
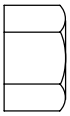
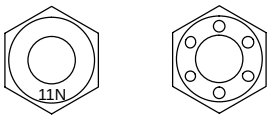
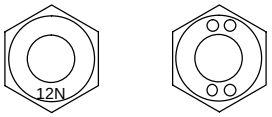
HOW TO DETERMINE NUT STRENGTH

Nut Type			Class
Present Standard Hexagon Nut	Old Standard Hexagon Nut		
	Cold Forging Nut	Cutting Processed Nut	
 No Mark			4N
 No Mark (w/ Washer)	 No Mark (w/ Washer)	 No Mark	5N (4T)
 6N			6N
		 *	7N (5T)
 8N			8N
 10N		 No Mark	10N (7T)
 11N			11N
 12N			12N

*: Nut with 1 or more marks on one side surface of the nut.

B06432

HINT:

Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example: Bolt = 4T

Nut = 4N or more

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ENGINE MECHANICAL

SERVICE DATA

SS0OQ–12

Compression pressure	at 250 rpm STD	1,373 kPa (14.0 kgf/cm^2, 199 psi) or more
	Minimum	1,030 kPa (10.5 kgf/cm^2, 149 psi)
	Difference of pressure between each cylinder	98 kPa (1.0 kgf/cm^2, 14 psi) or less
Valve clearance	at cold Intake	0.15 to 0.25 mm (0.006 to 0.010 in.)
	Exhaust	0.25 to 0.35 mm (0.010 to 0.014 in.)
	Valve clearance adjusting shim No.00	2.000 mm (0.0787 in.)
	No.02	2.020 mm (0.0795 in.)
	No.04	2.040 mm (0.0803 in.)
	No.06	2.060 mm (0.0811 in.)
	No.08	2.080 mm (0.0819 in.)
	No.10	2.100 mm (0.0827 in.)
	No.12	2.120 mm (0.0835 in.)
	No.14	2.140 mm (0.0843 in.)
	No.16	2.160 mm (0.0850 in.)
	No.18	2.180 mm (0.0858 in.)
	No.20	2.200 mm (0.0866 in.)
	No.22	2.220 mm (0.0874 in.)
	No.24	2.240 mm (0.0882 in.)
	No.26	2.260 mm (0.0890 in.)
	No.28	2.280 mm (0.0898 in.)
	No.30	2.300 mm (0.0906 in.)
	No.32	2.320 mm (0.0913 in.)
	No.34	2.340 mm (0.0921 in.)
	No.36	2.360 mm (0.0929 in.)
	No.38	2.380 mm (0.0937 in.)
	No.40	2.400 mm (0.0945 in.)
	No.42	2.420 mm (0.0953 in.)
	No.44	2.440 mm (0.0961 in.)
	No.46	2.460 mm (0.0969 in.)
	No.48	2.480 mm (0.0976 in.)
	No.50	2.500 mm (0.0984 in.)
	No.52	2.520 mm (0.0992 in.)
	No.54	2.540 mm (0.1000 in.)
	No.56	2.560 mm (0.1008 in.)
	No.58	2.580 mm (0.1016 in.)
	No.60	2.600 mm (0.1024 in.)
	No.62	2.620 mm (0.1031 in.)
	No.64	2.640 mm (0.1039 in.)
	No.66	2.660 mm (0.1047 in.)
	No.68	2.680 mm (0.1055 in.)
	No.70	2.700 mm (0.1063 in.)
	No.72	2.720 mm (0.1071 in.)
	No.74	2.740 mm (0.1079 in.)
	No.76	2.760 mm (0.1087 in.)
	No.78	2.780 mm (0.1094 in.)
	No.80	2.800 mm (0.1102 in.)
Ignition timing	w/ Terminals TC and E1 connected of DLC1	5 to15° BTDC @ idle
Idle speed	–	700 ± 50 rpm
Timing belt tensioner	Protrusion from housing end	10.5 to 11.5 mm (0.413 to 0.453 in.)

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Cylinder head	Warpage	Maximum	0.10 mm (0.039 in.)
	Valve seat		
	Refacing angle		30°, 45°, 60°
	Contacting angle		45°
	Contacting width		1.0 to 1.4 mm (0.039 to 0.055 in.)
	Valve guide bushing bore diameter	STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
		O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
	Cylinder head bolt thread inside diameter	STD	9.810 to 9.960 mm (0.3862 to 0.3921 in.)
		Minimum	9.700 mm (0.3819 in.)
	Protrusion height	Intake	9.2 to 9.8 mm (0.362 to 0.386 in.)
		Exhaust	8.2 to 8.8 mm (0.323 to 0.346 in.)
Valve guide bushing	Inside diameter		5.510 to 5.530 mm (0.2169 to 0.2374 in.)
	Outside diameter (for repair part)	STD	10.333 to 10.344 mm (0.4068 to 0.4072 in.)
		O/S 0.05	10.383 to 10.394 mm (0.4088 to 0.4092 in.)
Valve	Valve overall length	STD Intake	95.05 mm (3.7421 in.)
		Exhaust	95.10 mm (3.7441 in.)
		Minimum Intake	94.55 mm (3.7224 in.)
		Exhaust	94.60 mm (3.7244 in.)
	Valve face angle		44.5°
	Stem diameter	Intake	5.470 to 5.485 mm (0.2154 to 0.2159 in.)
		Exhaust	5.465 to 5.480 mm (0.2152 to 0.2157 in.)
	Stem oil clearance	STD Intake	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
		Exhaust	0.030 to 0.065 mm (0.0012 to 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	1.0 mm (0.039 in.)
		Minimum	0.5 mm (0.020 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length		54.1 mm (2.130 in.)
	Installed tension at 35.0 mm (1.378 in.)		210 to 226 N (21.4 to 23.0 kgf, 47.2 to 50.7 lbf)
Valve lifter	Lifter diameter		30.968 to 30.976 mm (1.2192 to 2.2195 in.)
	Lifter bore diameter		31.000 to 31.016 mm (1.2205 to 1.2211 in.)
	Oil clearance	STD	0.024 to 0.050 mm (0.0009 to 0.0020 in.)
		Maximum	0.07 mm (0.0028 in.)
Camshaft	Thrust clearance	STD Intake	0 to 0.040 mm (0 to 0.0016 in.)
		Exhaust	0.030 to 0.070 mm (0.0011 to 0.0028 in.)
		Maximum Intake	0.12 mm (0.0047 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Journal oil clearance	STD	0.030 to 0.071 mm (0.0012 to 0.0028 in.)
		Maximum	0.10 mm (0.0039 in.)
	Timing tube journal oil clearance	STD	0.036 to 0.057 mm (0.0014 to 0.0022 in.)
		Maximum	0.075 mm (0.0030 in.)
	Journal diameter		26.954 to 26.970 mm (1.0612 to 1.0618 in.)
	Timing tube journal diameter	STD	39.955 to 39.964 mm (1.5730 to 1.5734 in.)
	Circle runout		0.03 mm (0.0012 in.)
	Cam lobe height	STD Intake	42.61 to 42.71 mm (1.6776 to 1.6815 in.)
		Exhaust	42.63 to 42.71 mm (1.6783 to 1.6823 in.)
		Minimum Intake	42.46 mm (1.6717 in.)
		Exhaust	42.48 mm (1.6724 in.)
	Camshaft gear backlash	STD	0.020 to 0.200 mm (0.0008 to 0.0079 in.)
		Maximum	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance		18.2 to 18.8 mm (0.712 to 0.740 in.)
Manifold	Warpage	Maximum Exhaust	0.10 mm (0.0039 in.)

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Cylinder block	Cylinder head surface warpage	Maximum	0.07 mm (0.0028 in.)
	Cylinder bore diameter	STD Mark 1	94.002 to 94.010 mm (3.7009 to 3.7012 in.)
		Mark 2	94.010 to 94.023 mm (3.7012 to 3.7017 in.)
		Mark 3	94.023 to 94.031 mm (3.7017 to 3.7020 in.)
		Maximum STD	94.231 mm (3.7099 in.)
		O/S 050	94.731 mm (3.7296 in.)
	Main bearing cap bolt tension portion diameter	STD	10.760 to 10.970 mm (0.4236 to 0.4319 in.)
		Minimum	10.40 mm (0.4094 in.)
Piston and piston ring	Piston diameter	STD Mark 1	93.902 to 93.935 mm (3.6969 to 3.6982 in.)
		Mark 2	93.912 to 93.940 mm (3.6973 to 3.6984 in.)
		Mark 3	93.920 to 93.950 mm (3.6976 to 3.6988 in.)
		O/S 0.50	94.402 to 94.450 mm (3.7166 to 3.7185 in.)
	Piston oil clearance	STD	0.030 to 0.071 mm (0.0012 to 0.0028 in.)
		Maximum	0.13 mm (0.0051 in.)
	Piston ring groove clearance	No.1	0.030 to 0.080 mm (0.0012 to 0.0031 in.)
		No.2	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
	Piston ring end gap	STD No.1	0.300 to 0.400 mm (0.0118 to 0.0157 in.)
		No.2	0.400 to 0.550 mm (0.0157 to 0.0217 in.)
		Oil	0.130 to 0.380 mm (0.0051 to 0.0150 in.)
		Maximum No.1	1.10 mm (0.0433 in.)
		No.2	1.30 mm (0.0511 in.)
		Oil	0.09 mm (0.0354 in.)
Connecting rod	Thrust clearance	STD	0.160 to 0.290 mm (0.0063 to 0.0138 in.)
		Maximum	0.35 mm (0.0138 in.)
	Connecting rod thickness		22.880 to 22.920 mm (0.9008 to 0.9024 in.)
	Connecting rod oil clearance	STD	0.021 to 0.047 mm (0.0008 to 0.0019 in.)
		Maximum	0.059 mm (0.0023 in.)
	Connecting rod bearing center wall thickness (Reference)	Mark 2	1.487 to 1.490 mm (0.0585 to 0.0587 in.)
		Mark 3	1.490 to 1.493 mm (0.0587 to 0.0588 in.)
		Mark 4	1.493 to 1.496 mm (0.0588 to 0.0589 in.)
		Mark 5	1.496 to 1.499 mm (0.0589 to 0.0590 in.)
		Mark 6	1.499 to 1.502 mm (0.0590 to 0.0591 in.)
		Mark 7	1.502 to 1.505 mm (0.0591 to 0.0593 in.)
	Rod bend	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Bushing inside diameter		22.005 to 22.014 mm (0.8663 to 0.8667 in.)
	Piston pin diameter		21.997 to 22.009 mm (0.8660 to 0.8664 in.)
	Bushing oil clearance	STD	0.005 to 0.011 mm (0.0002 to 0.0004 in)
		Maximum	0.05 mm (0.0020 in.)
	Connecting rod bolt tension portion diameter	STD	7.200 to 7.300 mm (0.2835 to 0.2874 in.)
		Minimum	7.00 mm (0.2756 in.)
Crankshaft	Thrust clearance	STD	0.020 to 0.220 mm (0.0008 to 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness		2.440 to 2.490 mm (0.0961 to 0.0980 in.)
	Main journal bore diameter on cylinder block (with main bearing)		66.986 to 67.000 mm (2.6372 to 2.6378 in.)
	Main journal oil clearance	STD No.1, No.5	0.028 to 0.046 mm (0.0011 to 0.0018 in.)
		others	0.040 to 0.058 mm (0.0016 to 0.0023 in.)
		Maximum	0.065 mm (0.0026 in.)
	Main journal diameter		66.988 to 67.000 mm (2.6373 to 2.6378 in.)

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Crankshaft (cont'd)	Main bearing center wall thickness (Reference)		
	No.1 and No.5	Mark 3	2.487 to 2.490 mm (0.0979 to 0.0980 in.)
		Mark 4	2.490 to 2.493 mm (0.0980 to 0.0981 in.)
		Mark 5	2.493 to 2.496 mm (0.0981 to 0.0983 in.)
		Mark 6	2.496 to 2.499 mm (0.0983 to 0.0984 in.)
		Mark 7	2.499 to 2.502 mm (0.0984 to 0.0985 in.)
	Others	Mark 1	2.481 to 2.484 mm (0.0977 to 0.0978 in.)
		Mark 2	2.484 to 2.487 mm (0.0978 to 0.0979 in.)
		Mark 3	2.487 to 2.490 mm (0.0979 to 0.0980 in.)
		Mark 4	2.490 to 2.493 mm (0.0980 to 0.0981 in.)
		Mark 5	2.493 to 2.496 mm (0.0981 to 0.0983 in.)
	Crank pin diameter		51.982 to 52.000 mm (2.0465 to 2.0472 in.)
	Circle runout	Maximum	0.04 mm (0.0016 in.)
	Main journal taper and out–of–round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out–of–round	Maximum	0.02 mm (0.0008 in.)

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SS0OR–13

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fan shroud x Radiator assembly		5.5	50	43 in.·lbf
Radiator bracket x Radiator assembly		20	200	15
A/C Compressor x Cylinder block		49	500	36
Generator x Generator bracket		39	400	29
No.1 idler pulley, No.2 idler pulley x Cylinder Block		34.5	350	25
Camshaft timing pulley x Camshaft timing tube		8.1	83	72 in.·lbf
Drive belt tensioner x Cylinder block		16	160	12
Timing belt tensioner x Oil pump		26	270	19
Crankshaft pulley x Crankshaft		245	2,500	181
Fan bracket x Cylinder block	12 mm head 14 mm head	16 32	160 330	12 24
No.2 timing belt cover x Cylinder block		16	160	12
No.3 timing belt cover x Cylinder block, cylinder head		7.5	80	66 in.·lbf
Drive belt idler pulley x Fan bracket		39	400	29
Fluid coupling x Fan bracket		29	296	21
Exhaust manifold x Cylinder head		44	450	33
Cylinder head x Cylinder block	1st 2nd 3rd	40 Turn 90° Turn 90°	408 Turn 90° Turn 90°	30 Turn 90° Turn 90°
Camshaft bearing cap x Cylinder head	Bolt A Others	7.5 16	80 160	66 in.·lbf 12
Cylinder head cover x Cylinder head		6.0	60	53 in.·lbf
Engine hanger x Cylinder head		37	380	27
Front water bypass joint, Rear water bypass joint x Cylinder head		18	185	13
Intake manifold x Cylinder head		18	185	13
Timing belt rear plate x Cylinder head		7.5	80	66 in.·lbf
Drive plate x Crankshaft	1st 2nd	49 Turn 90°	500 Turn 90°	36 Turn 90°
Transmission x Cylinder block		72	730	53
Transmission x No.1 oil pan		37	380	27
Drive plate x Torque converter clutch		48	490	35
Flywheel housing under cover x Transmission		18	185	13
Engine rear mounting bracket x Transmission		65	663	48
Frame crossmember x Rear engine mounting insulator	Bolt A Bolt B	18 72	183 730	13 53
Frame bracket x Engine mounting bracket		38	388	28
PS pump x Cylinder head		62	632	46
Main bearing cap x Cylinder block	1st 2nd	27 Turn 90°	275 Turn 90°	20 Turn 90°
Connecting rod cap x Connecting rod	1st 2nd	24.5 Turn 90°	250 Turn 90°	18 Turn 90°
Rear oil seal retainer x Cylinder block		8.0	80	71 in.·lbf
Engine coolant drain union x Cylinder block		49	500	36
Engine mounting bracket x Cylinder block		36	370	27
Water bypass pipe x Cylinder block		18	185	13

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Front exhaust pipe x Exhaust manifold	62	630	46
Center exhaust pipe x Front exhaust pipe	48	489	35
Heated oxygen sensor (Bank 1, 2 sensor 2) x Front exhaust pipe	44	450	32

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EMISSION CONTROL

SS1M8–01

SERVICE DATA

VSV for air injection system	Resistance	at 20˚C (68˚F)	33 to 39 Ω

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SS0PS–05

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Front exhaust pipe x Exhaust manifold	62	632	46
Front exhaust pipe x Center pipe	48	489	35
Heated oxygen sensor x Front exhaust pipe	44	450	32
Air pump assembly x Cylinder head	16	163	12
Air switching valve No.2 x Cylinder head	10	102	7
Air tube No.3 x Cylinder head	10	102	7

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SFI

SS0CB–23

SERVICE DATA

Fuel pump	Resistance	at 20˚C (68˚F)	0.2 to 3.0 Ω
Fuel pressure regulator	Fuel pressure	at no vacuum	265 to 304 kPa (2.7 to 3.1 kgf/cm^2, 38 to 44 psi)
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage	at 20˚C (68˚F)	13.4 to 14.2 Ω 56 to 69 cm^3 (3.4 to 4.2 cu in.) per 15 seconds 13 cm^3 (0.8 cu in.) or less 1 drop or less per 12 minutes
MAF meter	Resistance (THA – E2)	at –20˚C (–4˚F) at 20˚C (68˚F) at 60˚C (140˚F)	12.5 to 16.9 kΩ 2.19 to 2.67 kΩ 0.50 to 0.68 kΩ
Throttle body	Throttle body fully closed angle		5.5˚
Throttle control motor	Motor resistance	at 20˚C (68˚F)	0.3 to 100 Ω
VSV for EVAP	Resistance	at 20˚C (68˚F)	30 to 34 Ω
VSV for ACIS	Resistance	at 20˚C (68˚F)	33 to 39 Ω
VT sensor	Resistance	Cold Hot	835 to 1,400 Ω 1,060 to 1,645 Ω
Knock sensor	Resistance	at 20˚C (68˚F)	120 to 280 Ω
ECT sensor	Resistance	at –20˚C (–4˚F) 0˚C (32˚F) 20˚C (68˚F) 40˚C (104˚F) 60˚C (140˚F) 80˚C (176˚F)	10 to 20 kΩ 4 to 7 kΩ 2 to 3 kΩ 0.9 to 1.3 kΩ 0.4 to 0.7 kΩ 0.2 to 0.4 kΩ
Air–fuel ratio sensor	Heater coil resistance	at 20˚C (68˚F)	11 to 16 kΩ
Heated oxygen sensor	Heater coil resistance	at 20˚C (68˚F)	11 to 16 kΩ
Accelerator pedal position sensor	Standard throttle valve opening percentage Sensor lever full–open position		 60 % or more
Fuel cut rpm		Fuel return rpm	1,400 rpm
Fuel pump resister		at 20˚C (68 ˚F)	0.70 to 0.76 kΩ

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SS0CC–22

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fuel pressure pulsation damper x Delivery pipe	for use with SST	33 39	340 400	24 29
Fuel pressure regulator x RH delivery pipe		7.5	80	66 in.·lbf
Front fuel pipe x Lower intake manifold		7.5	80	66 in.·lbf
Fuel return pipe x Delivery pipe		7.5	80	66 in.·lbf
Delivery pipe x Intake manifold		21	214	15
Fuel tank band x Body		62	632	45
Fuel pressure regulator x Delivery pipe		7.5	76	66 in.·lbf
Throttle body x Intake manifold		18	185	13
ECT sensor x Front water bypass joint		19.6	200	14
Knock sensor x Cylinder head		20	204	15
Air–fuel ratio sensor x Exhaust manifold		44	450	32
Heated oxygen sensor x Front exhaust pipe		44	450	32
Fuel pump resister x Body		8	82	71 in.·lbf
Camshaft oil control valve x Cylinder head		7.5	80	66 in.·lbf
Air pump assembly x Cylinder head		16	163	12

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COOLING

SS0O9–05

SERVICE DATA

Thermostat	Valve opening temperature		80 to 84˚C (176 to 183˚F)
	Valve lift	at 95˚C (203˚F)	10 mm (0.39 in.) or more
Radiator cap	Relief valve opening pressure	Standard	74 to 103 kPa (0.75 to 1.05 kgf/cm^2, 10.7 to 14.9 psi)
		Minimum	59 kPa (0.6 kgf/cm^2, 8.6 psi)

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SS0OA–04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Drain plug x Union on cylinder block		12.7	130	9
Fan x Fluid coupling		8.5	85	75 in.·lbf
Water pump x Cylinder block	Bolt	21	215	15
	Stud bolt and nut	18	185	13
Water inlet housing x Water pump		18	185	13
Water inlet x Water inlet housing		19	195	14
Radiator x Radiator support		12.7	130	9
No.1 fan shroud x Radiator		5	50	44 in.·lbf
Radiator mounting bolt		12	120	9

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LUBRICATION

SERVICE DATA

SS0OB–05

Oil pressure		at idle speed	29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
		at 3,000 rpm	294 to 588 kPa (3.0 to 6.0 kgf/cm^2, 43 to 85 psi)
Oil pump	Tip clearance	Standard	0.060 to 0.180 mm (0.0024 to 0.0071 in.)
		Maximum	0.18 mm (0.0071 in.)
	Side clearance	Standard	0.030 to 0.090 mm (0.0012 to 0.0035 in.)
		Maximum	0.09 mm (0.0035 in.)
	Body clearance	Standard	0.250 to 0.325 mm (0.0098 to 0.0128 in.)
		Maximum	0.325 mm (0.0128 in.)

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SS0OC–05

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
No.2 oil pan x Drain plug		39	400	29
Oil pump body cover x Oil pump body		10	105	8
Oil pump x Cylinder block	14 mm head	30.5	310	22
	Others	15.5	160	11
Relief valve x Oil pump body		49	500	36
Oil strainer x Cylinder block, Oil pump		7.5	80	66 in.·lbf
No.1 oil pan x Oil pump, Oil seal retainer, Cylinder block	10 mm head	7.5	80	66 in.·lbf
	12 mm head	28	290	21
Oil pan baffle plate x No.1 oil pan		7.5	80	66 in.·lbf
No.2 oil pan x No.1 oil pan		7.5	80	66 in.·lbf
Oil filter bracket x Oil pump		18	185	13
Oil dipstick guide x Cylinder head		15	153	11
Oil cooler x Oil filter bracket		68.6	700	51
Oil nozzle x Cylinder block		9.0	92	80 in.·lbf

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IGNITION

SS0O6–07

SERVICE DATA

Firing order	–		1 – 8 – 4 – 3 – 6 – 5 – 7 – 2
Spark plug	Recommended spark plug	DENSO made	SK20R11
		NGK made	IFR6A11
	Electrode gap		1.0 to 1.1 mm (0.039 to 0.043 in.)
Crankshaft position sensor	Resistance	Cold	1,630 to 2,740 Ω
		Hot	2,065 to 3,225 Ω

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SS0O7–05

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	17.5	180	13
Ignition coil (with igniter) x Cylinder head cover	7.5	76	66 in.·lbf
Camshaft position sensor x LH cylinder head	7.5	76	66 in.·lbf
Crankshaft position sensor x Oil pump	6.5	65	58 in.·lbf

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STARTING

SS0PK–05

SERVICE DATA

Starter	Rated voltage and output power		12 V
	No–load characteristics	Current	100 A or less at 11.5 V
		rpm	2,500 rpm or less
	Brush length		
		STD	15.0 mm (0.591 in.)
		Minimum	9.0 mm (0.354 in.)
	Spring installed load		
		STD	21.5 to 27.5 N (2.2 to 2.8 kgf, 4.8 to 6.2 lbf)
		Minimum	12.7 N (1.3 kgf, 2.9 lbf)
	Commutator		
	Diameter	STD	35.0 mm (1.378 in.)
		Minimum	34.0 mm (1.339 in.)
	Undercut depth	STD	0.7 mm (0.028 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Field frame		
	Shunt coil resistance	at 20°C (68°F)	1.5 to 1.9 Ω
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)

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SS0PL–02

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Terminal 30 nut, Terminal C nut x Terminal bolt	17	170	13
End cover x Magnetic switch housing	3.6	37	32 in.·lbf
End cover x Brush holder	3.8	39	34 in.·lbf
Starter hosing x Magnetic switch	9.3	95	82 in.·lbf
End cover with field frame x Magnetic switch	9.3	95	82 in.·lbf
Lead wire of field coil x Terminal C	5.9	60	52 in.·lbf
Wire clamp, Starter wire x Starter	9.81	100	87 in.·lbf
Starter x Cylinder block	39	400	29

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CHARGING

SS0PM–07

SERVICE DATA

Battery	Specific gravity	at 20˚C (68˚F)	1.25 to 1.29
	Voltage	at 20˚C (68˚F)	12.5 to 12.9 V
Generator	Rated output		12V 130A
	Rotor coil resistance	at 20˚C (68˚F)	1.5 to 1.9 Ω
	Slip ring diameter	STD	14.2 to 14.4 mm (0.559 to 0.567 in.)
		Minimum	14.0 mm (0.551 in.)
	Brush exposed length	STD	10.5 mm (0.413 in.)
		Minimum	4.5 mm (0.177 in.)
Charging circuit	Without load	STD amperage	10 A or less
		STD voltage	13.2 to 14.0 V
	With load	STD amperage	30 A or less

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SS0PN–07

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Bearing retainer x Drive end frame		2.6	27	23 in.·lbf
Rectifier end frame x Drive end frame		5.8	59	51 in.·lbf
Generator pulley x Rotor		110.3	1,125	81
Brush holder x Rectifier end frame		1.8	18	16 in.·lbf
Rear end cover x Rectifier end frame		4.6	47	41 in.·lbf
Generator x Cylinder block	Bolt	39	400	29
	Nut 10 mm	39	440	29
	Nut 8 mm	15.5	158	11

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AUTOMATIC TRANSMISSION (A750E, A750F)

SS1M9–01

SERVICE DATA

2UZ–FE (A750E/A750F)		
Line pressure (Wheel locked)		
	Engine idling	
	D position	361 – 421 kPa (3.7 – 4.3 kgf·cm^2, 52 – 61 psi)
	R position	495 – 576 kPa (5.0 – 5.9 kgf·cm^2, 72 – 84 psi)
	AT stall (Throttle valve fully opened)	
	D position	1,236 – 1,332kPa (12.6 – 13.6 kgf·cm^2, 179 – 193 psi)
	R position	1,229 – 1,349 kPa (12.5 – 13.8 kgf·cm^2, 178 – 196 psi)
Engine stall revolution	D and R positions	2,200 ≧ 150 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	700 ≧ 50 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter runout	Max.	0.30 mm (0.0118 in.)
Shift schedule		
D position		
(Throttle valve fully opened)	1 → 2	45 – 57 km/h (28 – 35 mph)
	2 → 3	84 – 97 km/h (52 – 60 mph)
	3 → 4	120 – 138 km/h (75 – 86 mph)
	4 → 5	163 – 179 km/h (101 – 111 mph)
	5 → 4	158 – 174 km/h (98 – 108 mph)
	4 → 3	110 – 124 km/h (68 – 77 mph)
	3 → 2	75 – 83 km/h (47 – 52 mph)
	2 → 1	35 – 41 km/h (22 – 25 mph)
(Throttle valve fully closed)	4 → 5	44 – 50 km/h (27 – 31 mph)
	5 → 4	22 – 28 km/h (14 – 17 mph)
4 position (O/D OFF)		
(Throttle valve fully opened)	1 → 2	45 – 57 km/h (28 – 35 mph)
	2 → 3	84 – 97 km/h (52 – 60 mph)
	3 → 4	120 – 138 km/h (75 – 86 mph)
	5 → 4	173 – 190 km/h (108 – 118 mph)
	4 → 3	110 – 124 km/h (68 – 77 mph)
	3 → 2	75 – 83 km/h (47 – 52 mph)
	2 → 1	35 – 41 km/h (22 – 25 mph)
3 position		
(Throttle valve fully opened)	1 → 2	45 – 57 km/h (28 – 35 mph)
	2 → 3	84 – 97 km/h (52 – 60 mph)
	4 → 3	121 – 135 km/h (75 – 84 mph)
	3 → 2	75 – 83 km/h (47 – 52 mph)
	2 → 1	35 – 41 km/h (22 – 25 mph)
2 position		
(Throttle valve fully opened)	1 → 2	45 – 57 km/h (28 – 35 mph)
	3 → 2	80 – 92 km/h (50 – 57 mph)
	2 → 1	35 – 41 km/h (22 – 25 mph)
L position		
(Throttle valve fully opened)	2 → 1	35 – 41 km/h (22 – 25 mph)
Lock–up point	Throttle valve opening 5 %	
D position		
5th gear	Lock–up ON	63 – 71 km/h (39 – 44 mph)
	Lock–up OFF	57 – 64 km/h (35 – 40 mph)
4 position		
4th gear	Lock–up ON	102 – 112 km/h (63 – 70 mph)
	Lock–up OFF	96 – 105 km/h (60 – 65 mph)

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SS1MA–01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Drain plug x Oil pan		20	204	15
Overflow plug x Oil pan		20	204	15
Refill plug x Transmission case		39	400	29
No.1 vehicle speed sensor	A750E	9.8	100	86 in.·lbf
	A750F	11.5	117	8
Speed sensor NT x Automatic transmission		5.4	55	48 in.·lbf
Speed sensor SP2 x Automatic transmission		5.4	55	48 in.·lbf
Transmission wire set bolt x Automatic transmission		5.4	55	48 in.·lbf
Transmission wire clamp x Valve body	A	11	112	8
	B	10	100	7
Oil pan x Transmission case		4.4	45	39 in.·lbf
Park/neutral position switch	Bolt	13	130	10
	Nut	6.9	70	61 in.·lbf
Shift solenoid valve S1 x Valve body		6.4	65	56 in.·lbf
Shift solenoid valve S2 x Valve body		10	102	7
Shift solenoid valve SR x Valve body		6.4	65	57 in.·lbf
Shift solenoid valve SLU, SL2 x Valve body		6.4	65	57 in.·lbf
Shift solenoid valve SLT, SL1 x Valve body		6.4	65	57 in.·lbf
Valve body x Transmission case		11	112	8
Oil strainer x Valve body		10	100	7
Parking lock pawl bracket x Transmission case		7.4	75	65 in.·lbf
Oil cooler x Body		11	110	8
Transmission oil cooler bracket x Oil cooler		4.9	50	43 in.·lbf
Oil cooler tube clamp x Body		5.0	50	48 in.·lbf
Shift lever x Shift lever housing		18	180	13
Shift lever housing x Steering column assemby		12	120	9
Parking lock cable No. 1 x Shift lever housing		2.9	29	25 in.·lbf
Parking lock cable No. 2 x Column upper bracket		2.2	23	19 in.·lbf
Parking lock cable housing x Steering column assembly		10.5	110	8
Front suspension member bracket x Body		33	336	24
Heat insulator		16	164	12
Shift control cable x Transmission		14.5	148	11
Shift control cable bracket x Transmission		19.5	199	14
Oil cooler pipe clamp x Transmission		12	122	9
Oil cooler pipe x Transmission		34	346	25
Stabilizer bar		37	377	27
Rear end plate x Transmission		18	185	13
Torque converter clutch x Drive plate		48	490	35
Engine rear mounting insulator x Crossmember		18	185	13
Crossmember x Frame		72	734	53
Engine rear mounting insulator x Extension housing		65	660	48
Automatic transmission x Engine	17 mm head	71	720	53
	14 mm head	37	380	27

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TRANSFER

SS0PX–04

SERVICE DATA

Transfer assembly	Planetary gear snap ring thickness	Mark	
		A	2.10 to 2.15 mm (0.0827 to 0.0846 in.)
		B	2.15 to 2.20 mm (0.0846 to 0.0866 in.)
		C	2.20 to 2.25 mm (0.0866 to 0.0886 in.)
		D	2.25 to 2.30 mm (0.0886 to 0.0906 in.)
		E	2.30 to 2.35 mm (0.0906 to 0.0925 in.)
		F	2.35 to 2.40 mm (0.0925 to 0.0945 in.)
		G	2.40 to 2.45 mm (0.0945 to 0.0965 in.)
		H	2.45 to 2.50 mm (0.0965 to 0.0984 in.)
		J	2.50 to 2.55 mm (0.0984 to 0.1004 in.)
		K	2.55 to 2.60 mm (0.1004 to 0.1024 in.)
		L	2.60 to 2.65 mm (0.1024 to 0.1043 in.)
		M	2.65 to 2.70 mm (0.1043 to 0.1063 in.)
		N	2.70 to 2.75 mm (0.1063 to 0.1083 in.)
		P	2.75 to 2.80 mm (0.1083 to 0.1102 in.)
		Q	2.80 to 2.85 mm (0.1102 to 0.1122 in.)
		R	2.85 to 2.90 mm (0.1122 to 0.1142 in.)
		S	2.90 to 2.95 mm (0.1142 to 0.1161 in.)
		T	2.95 to 3.00 mm (0.1161 to 0.1181 in.)
		U	3.00 to 3.05 mm (0.1181 to 0.1201 in.)
Rear output shaft	Drive sprocket thrust clearance	Standard	0.15 to 0.24 mm (0.0059 to 0.0094 in.)
		Maximum	0.24 mm (0.0094 in.)
	Drive sprocket radial clearance	Standard	0.01 to 0.06 mm (0.0004 to 0.0024 in.)
		Maximum	0.06 mm (0.0024 in.)
	Rear output shaft journal outer diameter		
	Part A	Standard	27.98 to 27.99 mm (1.1016 to 1.1020 in.)
		Minimum	27.98 mm (1.1016 in.)
	Part B	Standard	31.98 to 32.00 mm (1.2591 to 1.2598 in.)
		Minimum	31.98 mm (1.2591 in.)
	Part C	Standard	34.98 to 35.00 mm (1.3772 to 1.3780 in.)
		Minimum	34.98 mm (1.3772 in.)
	Part D	Standard	36.98 to 37.00 mm (1.4559 to 1.4567 in.)
		Minimum	36.98 mm (1.4559 in.)
	No. 1 gear shift fork claw thickness		10 mm (0.3937 in.)
	Front drive clutch sleeve groove distance		10.5 mm (0.4134 in.)
	No. 1 gear shift fork to front drive sleeve clearance		
		Standard	0.26 to 0.84 mm (0.0102 to 0.0331 in.)
		Maximum	0.84 mm (0.0331 in.)
	No. 2 gear shift fork claw thickness		10 mm (0.3937 in.)
	High and low clutch sleeve groove distance		10.5 mm (0.4134 in.)
	No. 2 gear shift fork to high and low clutch sleeve clearance		
		Standard	0.26 to 0.84 mm (0.0102 to 0.0331 in.)
		Maximum	0.84 mm (0.0331 in.)

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Input shaft	Input shaft journal outer diameter	Maximum	47.59 mm (1.8736 in.)
	Input shaft bushing diameter	Maximum	48.14 mm (1.8953 in.)
Planetary gear	Pinion gear thrust clearance	Standard	0.11 to 0.84 mm (0.0043 to 0.0331 in.)
		Maximum	0.84 mm (0.0331 in.)
	Pinion gear radial clearance	Standard	0.009 to 0.038 mm (0.0004 to 0.0015 in.)
		Maximum	0.038 mm (0.0015 in.)
	Outer bearing snap ring thickness	Mark	
		1	1.45 to 1.50 mm (0.0571 to 0.0591 in.)
		2	1.50 to 1.55 mm (0.0591 to 0.0610 in.)
		3	1.55 to 1.60 mm (0.0610 to 0.0630 in.)
		4	1.60 to 1.65 mm (0.0630 to 0.0650 in.)
		5	1.65 to 1.70 mm (0.0650 to 0.0669 in.)
	Inner bearing press in depth		7.7 to 8.3 mm (0.303 to 0.327 in.)

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SS0PY–05

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Transfer x Transfer adaptor	24	245	18
Engine rear mounting x Transmission	65	660	48
Crossmember x Frame	72	730	53
Engine rear mounting x Crossmember	18	185	13
Heat insulator x Crossmember	16	164	12
Front suspension member bracket x Crossmember	33	336	24
Filler plug x Transfer	37	377	27
Rear propeller shaft x Rear differential	88	897	65
Rear propeller shaft x Transfer	88	897	65
Protector x Transfer	18	185	13
Front propeller shaft x Front differential	74	750	54
Front propeller shaft x Transfer	88	897	65
Front exhaust pipe x Exhaust manifold	62	630	46
Front exhaust pipe x Center exhaust pipe	48	490	35
Transfer case cover x Transfer front case	18	184	13
Case plug x Transfer front case	18.6	190	14
Front bearing retainer x Transfer front case	11.5	119	8
Front output shaft companion flange lock nut	118	1,203	87
Oil pump x Front case	7.5	69	66 in.·lbf
Oil separator x Front case	7.5	69	66 in.·lbf
Transfer shift actuator x Transfer case rear	20	204	15
Front case x Transfer case rear	28	286	21
Shift shaft stopper	19	194	14
Drain and filler plug	37	377	27
Transfer extension housing x Transfer case rear	12	122	9
Rear output shaft companion flange lock nut	118	1,203	87
Gear shift fork	24	245	18

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PROPELLER SHAFT

SS1M7–01

SERVICE DATA

Propeller shaft	Runout	Maximum	0.8 mm (0.031 in.)
Spider bearing axial play		Maximum	
	4WD rear propeller shaft		0.05 mm (0.0020 in.)
	2WD and 4WD front propeller shaft		0.05 mm (0.0020 in.)
4WD rear propeller shaft	Snap ring thickness	Color/Mark	
		None	2.00 mm (0.0784 in.)
		Light brown	2.03 mm (0.0799 in.)
		Blue	2.06 mm (0.0811 in.)
		None	2.09 mm (0.0823 in)
		1	1.99 mm (0.0783 in.)
		2	2.01 mm (0.0791 in.)
		3	2.03 mm (0.0799 in.)
		4	2.05 mm (0.0807 in.)
		5	2.07 mm (0.0815 in.)
		6	2.09 mm (0.0823 in.)
		7	2.11 mm (0.0831 in.)
		8	2.13 mm (0.0839 in.)
		9	2.15 mm (0.0846 in.)
		10	2.17 mm (0.0854 in.)
2WD and 4WD front propeller shaft	Snap ring thickness	Color	
		Blue	1.638 mm (0.0645 in.)
		Yellow	1.588 mm (0.0625 in.)
		Silver	1.537 mm (0.0605 in.)
		Copper	1.511 mm (0.0595 in.)
		Black	1.486 mm (0.0585 in.)
		Red	1.435 mm (0.0565 in.)
		Green	1.384 mm (0.0545 in.)

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SS07Z–05

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Propeller shaft assembly (2WD)			
Propeller shaft x Differential	88	897	65
Propeller shaft assembly (4WD)			
Front propeller shaft x Front differential	74	750	54
Front propeller shaft x Transfer	88	897	65
Rear propeller shaft x Rear differential	88	897	65
Rear propeller shaft x Transfer	88	897	65

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SUSPENSION AND AXLE

SERVICE DATA

SS0OJ–22

Cold tire inflation pressure	Tire size: P245/70R16	Front	220 kPa (2.2 kgf/cm^2, 32 psi)
		Rear	240 kPa (2.4 kgf/cm^2, 35 psi)
	Tire size: P265/70R16	Front	220 kPa (2.2 kgf/cm^2, 32 psi)
		Rear	220 kPa (2.2 kgf/cm^2, 32 psi)
	Tire size: P265/65R17	Front	220 kPa (2.2 kgf/cm^2, 32 psi)
		Rear	220 kPa (2.2 kgf/cm^2, 32 psi)
Front wheel Alignment	◀ Vehicle height (Except air suspension models)		
	UCK35L–GKBSKA		
	Tire size: P245/70R16	Front: A*1 – B*2	69.7 mm (2.74 in.)
		Rear: C*3 – D*4	76.2 mm (3.00 in.)
	Tire size: P265/70R16 and P265/65R17		
		Front: A*1 – B*2	69.5 mm (2.74 in.)
		Rear: C*3 – D*4	75.5 mm (2.97 in.)
	UCK35L–GKBLKA	Front: A*1 – B*2	71.6 mm (2.82 in.)
		Rear: C*3 – D*4	77.3 mm (3.04 in.)
	UCK45L–GKBSKA	Front: A*1 – B*2	61.6 mm (2.43 in.)
		Rear: C*3 – D*4	63.8 mm (2.51 in.)
	UCK45L–GKBLKA	Front: A*1 – B*2	62.8 mm (2.47 in.)
		Rear: C*3 – D*4	65.2 mm (2.57 in.)
	◀ Vehicle height (Except air suspension models)		
	UCK35L–GKBSKA		
	Tire size: P245/70R16	Front: A*1 – B*2	53.5 – 83.5 mm (2.11 – 3.29 in.)
		Rear: C*3 – D*4	74.8 – 104.8 mm (2.94 – 4.13 in.)
	Tire size: P265/70R16 and P265/65R17		
		Front: A*1 – B*2	53.3 – 83.3 mm (2.10 – 3.28 in.)
		Rear: C*3 – D*4	74.1 – 104.1 mm (2.92 – 4.10 in.)
	UCK35L–GKBLKA	Front: A*1 – B*2	55.3 – 85.3 mm (2.18 – 3.36 in.)
		Rear: C*3 – D*4	74.6 – 104.6 mm (2.94 – 4.12 in.)
	UCK45L–GKBSKA	Front: A*1 – B*2	45.5 – 75.5 mm (1.79 – 2.97 in.)
		Rear: C*3 – D*4	61.0 – 91.0 mm (2.40 – 3.58 in.)
	UCK45L–GKBLKA	Front: A*1 – B*2	46.8 – 76.8 mm (1.84 – 3.02 in.)
		Rear: C*3 – D*4	61.3 – 91.3 mm (2.41 – 3.59 in.)

A*1: Ground clearance of the front drive shaft center
B*2: Ground clearance of the front adjusting cam bolt center
C*3: Ground clearance of the rear axle shaft center
D*4: Ground clearance of the rear lower control arm front bolt center

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Front wheel Alignment	◀ Camber	Right–left error: 30' (0.5°) or less
	UCK35L–GKBSKA	0°08' ± 45' (0.14° ± 0.75°)
	UCK35L–GKBLKA	0°06' ± 45' (0.10° ± 0.75°)
	UCK45L–GKBSKA	0°17' ± 45' (0.28° ± 0.75°)
	UCK45L–GKBLKA	0°16' ± 45' (0.26° ± 0.75°)
	◀ Caster (Except air suspension models)	Right–left error: 30' (0.5°) or less
	UCK35L–GKBSKA Tire size: P245/70R16 Tire size: P265/70R16 and P265/65R17	 2°56' ± 45' (2.93° ± 0.75°) 2°59' ± 45' (2.98° ± 0.75°)
	UCK35L–GKBLKA	3°02' ± 45' (3.04° ± 0.75°)
	UCK45L–GKBSKA	2°36' ± 45' (2.60° ± 0.75°)
	UCK45L–GKBLKA	2°38' ± 45' (2.64° ± 0.75°)
	◀ Caster (Air suspension models)	Right–left error: 30' (0.5°) or less
	UCK35L–GKBSKA Tire size: P245/70R16 Tire size: P265/70R16 and P265/65R17	 3°17' ± 45' (3.28° ± 0.75°) 3°20' ± 45' (3.33° ± 0.75°)
	UCK35L–GKBLKA	3°21' ± 45' (3.35° ± 0.75°)
	UCK45L–GKBSKA	2°55' ± 45' (2.91° ± 0.75°)
	UCK45L–GKBLKA	2°56' ± 45' (2.93° ± 0.75°)
	◀ Steering axis inclination	Right–left error: 30' (0.5°) or less
	UCK35L–GKBSKA	10°14' ± 45' (10.24° ± 0.75°)
	UCK35L–GKBLKA	10°16' ± 45' (10.27° ± 0.75°)
	UCK45L–GKBSKA	10°05' ± 45' (10.09° ± 0.75°)
	UCK45L–GKBLKA	10°07' ± 45' (10.11° ± 0.75°)
	◀ Toe–in (total)	Rack end length difference: 1.5 mm (0.059 in.) or less
	UCK35L–GKBSKA Tire size: P245/70R16 Tire size: P265/70R16 and P265/65R17 Tire size: P265/65R17 (Air suspension models)	 0°05' ± 0°09' (0.09° ± 0.15°, 1.19 ± 2 mm (0.05 ± 0.08 in.) 0°05' ± 0°09' (0.09° ± 0.15°, 1.29 ± 2 mm (0.05 ± 0.08 in.) 0°05' ± 0°09' (0.09° ± 0.15°, 1.28 ± 2 mm (0.05 ± 0.08 in.)
	UCK35L–GKBLKA	0°05' ± 0°09' (0.08° ± 0.15°, 1.15 ± 2 mm (0.05 ± 0.08 in.)
	UCK45L–GKBSKA Tire size: P265/70R16 (Air suspension models)	0°05' ± 0°09' (0.08° ± 0.15°, 1.08 ± 2 mm (0.04 ± 0.08 in.) 0°05' ± 0°09' (0.08° ± 0.15°, 1.07 ± 2 mm (0.04 ± 0.08 in.)
	UCK45L–GKBLKA	0°04' ± 0°09' (0.07° ± 0.15°, 0.99 ± 2 mm (0.04 ± 0.08 in.)
	UCK35L–GKSSKA Inside wheel Outside wheel: Reference Outside wheel (Air suspension models): Reference	−35°24' (−35.40°) 32°08' (32.13°) 31°54' (31.90°)
	UCK35L–GKSLKA Inside wheel Outside wheel: Reference	−35°22' (−35.36°) 32°07' (32.12°)
	UCK45L–GKSSKA Inside wheel Outside wheel: Reference	−35°37' (−35.61°) 32°17' (32.28°)
	UCK45L–GKSLKA Inside wheel Outside wheel: Reference	−35°35' (−35.59°) 32°16' (32.26°)
Front drive shaft	Front drive shaft length	523.5 ± 2.0 mm (20.610 ± 0.079 in.)
Front suspension	Upper ball joint turning torque	0.7 – 4.4 N·m (7 – 45 kgf·cm, 6 – 39 in.·lbf)
	Lower ball joint excessive play Maximum	0.5 mm (0.020 in.)
	Lower ball joint turning torque	1.0 – 6.5 N·m (10 – 66 kgf·cm, 9 – 56 in.·lbf)
	Stabilizer bar link ball joint turning toque	0.05 – 2.0 N·m (0.5 – 20 kgf·cm, 0.4 – 17 in.·lbf)

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Front differential	Companion flange vertical runout	Maximum	0.10 mm (0.0039 in.)
	Companion flange horizontal runout	Maximum	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting)	New bearing	1.2 – 1.9 N·m (12 – 19 kgf·cm, 10.4 – 16.5 in.·lbf)
		Reused bearing	0.6 – 1.0 N·m (6 – 10 kgf·cm, 5.2 – 8.7 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)
	Drive pinion to ring gear backlash		0.13 – 0.18 mm (0.0051 – 0.0071 in.)
	Side gear backlash		0 – 0.20 mm (0 – 0.0079 in.)
	Rear oil seal drive in depth		4.5 ± 0.3 mm (0.177 ± 0.012 in.)
	Side oil seal drive in depth		0 mm (0 in.)
	Side tube oil seal drive in depth		5.5 ± 0.3 mm (0.217 ± 0.012 in.)
	Side gear thrust washer thickness		0.96 – 1.04 mm (0.0378 – 0.0409 in.)
			1.06 – 1.14 mm (0.0417 – 0.0449 in.)
			1.16 – 1.24 mm (0.0457 – 0.0488 in.)
			1.26 – 1.34 mm (0.0496 –0.0528 in.)
	Side gear bearing adjusting washer thickness		2.00 – 2.02 mm (0.0787 – 0.0795 in.)
			2.03 – 2.05 mm (0.0799 – 00807 in.)
			2.06 – 2.08 mm (0.0811 – 0.0819 in.)
			2.09 – 2.11 mm (0.0823 – 0.0831 in.)
			2.12 – 2.14 mm (0.0835 – 0.0843 in.)
			2.15 – 2.17 mm (0.0846 – 0.0854 in.)
			2.18 – 2.20 mm (0.0858 – 0.0866 in.)
			2.21 – 2.23 mm (0.0870 – 0.0878 in.)
			2.24 – 2.26 mm (0.0882 – 0.0890 in.)
			2.27 – 2.29 mm (0.0894 – 0.0902 in.)
			2.30 – 2.32 mm (0.0906 – 0.0913 in.)
			2.33 – 2.35 mm (0.0917 – 0.0925 in.)
			2.36 – 2.38 mm (0.0929 – 0.0937 in.)
			2.39 – 2.41 mm (0.0941 – 0.0949 in.)
			2.42 – 2.44 mm (0.0953 – 0.0961 in.)
			2.45 – 2.47 mm (0.0965 – 0.0972 in.)
			2.48 – 2.50 mm (0.0976 – 0.0984 in.)
			2.51 – 2.53 mm (0.0988 – 0.0996 in.)
			2.54 – 2.56 mm (0.1000 – 01008 in.)
			2.57 – 2.59 mm (0.1012 – 0.1020 in.)
			2.60 – 2.62 mm (0.1024 – 0.1031 in.)
			2.63 – 2.65 mm (0.1035 – 0.1043 in.)
			2.66 – 2.68 mm (0.1047 – 0.1055 in.)
			2.69 – 2.71 mm (0.1059 – 0.1067 in.)
			2.72 – 2.74 mm (0.1071 – 0.1079 in.)
			2.75 – 2.77 mm (0.1083 – 0.1091 in.)
			2.78 – 2.80 mm (0.1094 – 0.1102 in.)

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Front differential	Drive pinion bearing adjusting washer thickness		1.69 – 1.71 mm (0.0665 – 0.0673 in.)
			1.72 – 1.74 mm (0.0677 – 0.0685 in.)
			1.75 – 1.77 mm (0.0689 – 0.0697 in.)
			1.78 – 1.80 mm (0.0701 – 0.0709 in.)
			1.81 – 1.83 mm (0.0713 – 0.0720 in.)
			1.84 – 1.86 mm (0.0724 – 0.0732 in.)
			1.87 – 1.89 mm (0.0736 – 0.0744 in.)
			1.90 – 1.92 mm (0.0748 – 0.0756 in.)
			1.93 – 1.95 mm (0.0760 – 0.0768 in.)
			1.96 – 1.98 mm (0.0772 – 0.0780 in.)
			1.99 – 2.01 mm (0.0783 – 0.0791 in.)
			2.02 – 2.04 mm (0.0795 – 0.0803 in.)
			2.05 – 2.07 mm (0.0807 – 0.0815 in.)
			2.08 – 2.10 mm (0.0819 – 0.0827 in.)
			2.11 – 2.13 mm (0.0831 – 0.0839 in.)
			2.14 – 2.16 mm (0.0843 – 0.0850 in.)
			2.17 – 2.19 mm (0.0854 – 0.0862 in.)
			2.20 – 2.22 mm (0.0866 – 0.0874 in.)
			2.23 – 2.25 mm (0.0878 – 0.0886 in.)
			2.26 – 2.28 mm (0.0890 – 0.0898 in.)
			2.29 – 2.31 mm (0.0902 – 0.0909 in.)
			2.32 – 2.34 mm (0.0913 – 0.0921 in.)
	A.D.D. sleeve fork to clutch sleeve clearance		0.35 mm (0.0138 in.) or less
	Differential case needle bearing press in depth		0.3 ± 0.3 mm (0.012 ± 0.012 in.)
Rear axle shaft	Axle shaft bearing backlash	Maximum	0.6 mm (0.024 in.)
	Axle shaft deviation	Maximum	0.05 mm (0.0020 in.)
	Shaft runout	Maximum	2.0 mm (0.079 in.)
	Flange runout	Maximum	0.05 mm (0.0020 in.)

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Rear differential	Companion flange vertical runout	Maximum	0.09 mm (0.0035 in.)
	Companion flange horizontal runout	Maximum	0.09 mm (0.0035 in.)
	Drive pinion preload (at starting)	New bearing Reused bearing	1.3 – 1.9 N·m (13 – 19 kgf·cm, 11.4 – 16.7 in.·lbf) 0.8 – 1.1 N·m (8 – 11kgf·cm, 7.0 – 9.7 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)
	Drive pinion to ring gear backlash		0.13 – 0.18 mm (0.0051 – 0.0071 in.)
	Side gear backlash		0.05 – 0.20 mm (0.0020 – 0.0079 in.)
	Ring gear runout	Maximum	0.05 mm (0.0020 in.)
	Differential case runout	Maximum	0.04 mm (0.0016 in.)
	Drive pinion oil seal drive in depth		0 mm (0 in.)
	Side gear thrust washer thickness		1.50 mm (0.0590 in.)
			1.55 mm (0.0610 in.)
			1.60 mm (0.0630 in.)
			1.65 mm (0.0650 in.)
			1.70 mm (0.0669 in.)
			1.75 mm (0.0689 in.)
			1.80 mm (0.0709 in.)
			1.85 mm (0.0728 in.)
			1.90 mm (0.0748 in.)

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Rear differential	Side bearing adjusting washer thickness	58	2.58 mm (0.1015 in.)
		60	2.60 mm (0.1024 in.)
		62	2.62 mm (0.1031 in.)
		64	2.64 mm (0.1039 in.)
		66	2.66 mm (0.1047 in.)
		68	2.68 mm (0.1055 in.)
		70	2.70 mm (0.1063 in.)
		72	2.72 mm (0.1071 in.)
		74	2.74 mm (0.1079 in.)
		76	2.76 mm (0.1087 in.)
		78	2.78 mm (0.1094 in.)
		80	2.80 mm (0.1102 in.)
		82	2.82 mm (0.1110 in.)
		84	2.84 mm (0.1118 in.)
		86	2.86 mm (0.1126 in.)
		88	2.88 mm (0.1134 in.)
		90	2.90 mm (0.1142 in.)
		92	2.92 mm (0.1150 in.)
		94	2.94 mm (0.1157 in.)
		96	2.96 mm (0.1165 in.)
		98	2.98 mm (0.1173 in.)
		00	3.00 mm (0.1181 in.)
		02	3.02 mm (0.1189 in.)
		04	3.04 mm (0.1197 in.)
		06	3.06 mm (0.1205 in.)
		08	3.08 mm (0.1213 in.)
		10	3.10 mm (0.1220 in.)
		12	3.12 mm (0.1228 in.)
		14	3.14 mm (0.1236 in.)
		16	3.16 mm (0.1244 in.)
		18	3.18 mm (0.1252 in.)
		20	3.20 mm (0.1260 in.)
		22	3.22 mm (0.1268 in.)
		24	3.24 mm (0.1276 in.)
		26	3.26 mm (0.1283 in.)
		28	3.28 mm (0.1291 in.)
		30	3.30 mm (0.1299 in.)
		32	3.32 mm (0.1307 in.)
		34	3.34 mm (0.1315 in.)
		36	3.36 mm (0.1323 in.)
		38	3.38 mm (0.1331 in.)
		40	3.40 mm (0.1339 in.)
		42	3.42 mm (0.1346 in.)
		44	3.44 mm (0.1354 in.)
		46	3.46 mm (0.1362 in.)
		48	3.48 mm (0.1370 in.)

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Rear differential	Drive pinion bearing adjusting washer thickness	87	1.87 mm (0.0736 in.)
		88	1.88 mm (0.0740 in.)
		89	1.89 mm (0.0744 in.)
		90	1.90 mm (0.0748 in.)
		91	1.91 mm (0.0752 in.)
		92	1.92 mm (0.0756 in.)
		93	1.93 mm (0.0760 in.)
		94	1.94 mm (0.0764 in.)
		95	1.95 mm (0.0768 in.)
		96	1.96 mm (0.0772 in.)
		97	1.97 mm (0.0776 in.)
		98	1.98 mm (0.0780 in.)
		99	1.99 mm (0.0783 in.)
		00	2.00 mm (0.0787 in.)
		01	2.01 mm (0.0791 in.)
		02	2.02 mm (0.0795 in.)
		03	2.03 mm (0.0799 in.)
		04	2.04 mm (0.0803 in.)
		05	2.05 mm (0.0807 in.)
		06	2.06 mm (0.0811 in.)
		07	2.07 mm (0.0815 in.)
		08	2.08 mm (0.0819 in.)
		09	2.09 mm (0.0823 in.)
		10	2.10 mm (0.0827 in.)
		11	2.11 mm (0.0831 in.)
		12	2.12 mm (0.0835 in.)
		13	2.13 mm (0.0839 in.)
		14	2.14 mm (0.0843 in.)
		15	2.15 mm (0.0846 in.)
		16	2.16 mm (0.0850 in.)
		17	2.17 mm (0.0854 in.)
		18	2.18 mm(0.0858 in.)
		19	2.19 mm (0.0862 in.)
		20	2.20 mm (0.0866 in.)
		21	2.21 mm (0.0870 in.)
		22	2.22 mm (0.0874 in.)
		23	2.23 mm (0.0878 in.)
		24	2.24 mm (0.0882 in.)
		25	2.25 mm (0.0886 in.)
		26	2.26 mm (0.0890 in.)
		27	2.27 mm (0.0894 in.)
		28	2.28 mm (0.0898 in.)

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Air suspension	Amount of change in vehicle height HIGH position: LOW position (4WD): LOW position (2WD):	 40 mm (1.57 in.) –30 mm (–1.18 in.) –15 mm (–0.59 in.)
	Difference between the tester value and vehicle height (D–C measurement):	5 mm (0.20 in.) or less
	Height control sensor link standard length:	6.5 – 15.0 mm (0.26 – 0.59 in.) or less

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SS1KF–04

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
TIRE PRESSURE MONITOR RECEIVER			
Tire pressure monitor receiver set bolt	7.5	76	66 in.·lbf
TIRE PRESSURE MONITOR VALVE			
Tire pressure monitor valve set nut	4.0	41	35 in.·lbf
FRONT AXLE			
Hub nut	110	1,150	83
Tie rod end lock nut	55	560	41
Steering knuckle x Brake caliper	80	820	59
Steering knuckle x Dust cover	123	1,250	90
Drive shaft lock nut	18	185	13
Upper suspension arm x Upper ball joint	235	2,400	173
Brake line clamp x Steering knuckle	105	1,100	77
ABS speed sensor x Steering knuckle	28	285	21
ABS speed sensor wire harness clamp x Steering knuckle	8.0	82	71 in.·lbf
ABS speed sensor wire harness clamp x Upper suspension arm	8.0	82	71 in.·lbf
FRONT DIFFERENTIAL			
Drive pinion x companion flange	See page SA–43		
Differential front mounting cushion x Chassis frame	137	1,400	101
Differential rear mounting cushion x Chassis frame	87	890	64
Differential front mounting cushion x Differential	157	1,600	116
Differential rear mounting cushion x Differential	108	1,100	80
Ring gear x Differential case	97	985	71
Differential carrier x Differential tube	78	800	58
Differential carrier x Side bearing retainer	69	700	51
Differential x Front propeller shaft	74	750	54
A.D.D. clutch case x Differential	78	800	58
A.D.D. clutch case x Differential tube	78	800	58
A.D.D. actuator x A.D.D. clutch case	21	210	15
Tube with wire harness assembly clamp x Differential carrier	13	130	9
Drain plug	65	660	48
Filler plug	39	400	29
FRONT SUSPENSION			
Suspension support x Chassis frame	64	650	47
Piston rod x Suspension support	25	250	18
Lower suspension arm x Shock absorber	135	1,400	100
Upper suspension arm x Chassis frame	98	1,000	72
Lower suspension arm x Chassis frame	130	1,325	96
Lower suspension arm x Lower ball joint	159	1,621	117
Power steering gear – Left side nut	130	1,350	96
Power steering gear – Center bolt	165	1,700	122
Power steering gear – Right side bolt and nut	165	1,700	122
Tie rod end x Lower ball joint	91	930	67
No. 1, No. 2 spring bumper	31 (23)	315 (235)	23 (17)
Lower suspension arm x Stabilizer bar link	69	700	51

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Stabilizer bar x Stabilizer bar link	19	190	14
Stabilizer bar bracket x Chassis frame	37	377	27

( ) For use with SST

Part tightened	N·m	kgf·cm	ft·lbf
REAR AXLE			
Hub nut	110	1,122	83
Backing plate x Brake caliper	105	1,070	77
Parking brake cable x Backing plate	8.0	82	71 in.·lbf
Axle housing x Backing plate	122	1,244	90
Brake line union nut	15.5	158	11
ABS speed sensor x Axle housing	8.0	82	71 in.·lbf
REAR DIFFERENTIAL			
Differential x Propeller shaft	74	750	56
Drive pinion x Companion flange	See page SA–113		
Companion flange x Stud bolt	10	102	7.4
Differential carrier x Axle housing	73	740	54
Differential carrier x Bearing cap	113	1,150	83
Differential case x Ring gear	125	1,270	92
Drain plug	49	500	36
Filler plug	49	500	36
REAR SUSPENSION			
Shock absorber x Chassis frame	58	591	43
Shock absorber x Axle housing	87	887	64
REAR LATERAL CONTROL ROD			
Lateral control rod x Chassis frame	140	1,428	103
Lateral control rod x Axle housing	130	1,326	96
REAR UPPER AND LOWER CONTROL ARM			
Upper control arm x Chassis frame	140	1,428	103
Upper control arm x Axle housing	140	1,428	103
Upper control arm x Brake line bracket	28	286	21
Lower control arm x Chassis frame	130	1,326	96
Lower control arm x Axle housing	130	1,326	96
Lower control arm x Parking brake cable bracket	26	265	19
REAR STABILIZER BAR			
Bracket x Axle housing	37	377	27
Stabilizer bar link x Chassis frame	69	704	51
Stabilizer bar x Stabilizer bar link	69	704	51
HEIGHT CONTROL COMPRESSOR AND DRYER			
Height control compressor x Bracket	29	300	21
Height control filter x Height control compressor	6.4	65	57 in.·lbf
Bracket x Body	29	300	21
HEIGHT CONTROL VALVE			
Height control set bolt	29	300	21

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REAR HEIGHT CONTROL SENSOR			
Rear height control sensor set nut	29	300	21
Rear height control link set nut	5.4	55	48 in.·lbf

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BRAKE

SS084–03

SERVICE DATA

Brake pedal height (from dash panel)		151.1 – 165.1 mm (5.949 – 6.500 in.)
Brake pedal free play		1 – 6 mm (0.04 – 0.24 in.)
Brake pedal reserve distance at 490 N (590 kgf, 110.2 lbf)		More than 95 mm (3.74 in.)
Front brake pad thickness	STD	11.5 mm (0.453 in.)
	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	STD	28.0 mm (1.102 in.)
	Minimum	26.0 mm (1.024 in.)
Front brake disc runout	Maximum	0.07 mm (0.0028 in.)
Rear brake pad thickness	STD	10 mm (0.39 in.)
	Minimum	1.0 mm (0.039 in.)
Rear brake disc thickness	STD	18.0 mm (0.709 in.)
	Minimum	16.0 mm (0.611 in.)
Rear brake disc runout	Maximum	0.1 mm (0.0039 in.)
Rear brake disc inside diameter	STD	210.0 mm (8.27 in.)
	Maximum	211.0 mm (8.31 in.)
Rear brake shoe lining thickness for rear disc brake	STD	4.0 mm (0.157 in.)
	Minimum	1.0 mm (0.039 in.)
Parking brake clearance between rear shoe and lever		0.25 mm (0.010 in.)
Parking brake pedal travel at 300 N (31 kgf, 67 lbf)		6 – 9 clicks
Stop light switch clearance		0.5 – 2.4 mm (0.020 – 0.095 in.)
Parking brake adjusting shim thickness for rear disc brake		0.3 mm (0.012 in.) 0.4 mm (0.016 in.) 0.5 mm (0.020 in.) 0.6 mm (0.024 in.) 0.9 mm (0.035 in.)

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SS085–04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Bleeder plug		11	110	8
Master cylinder x Reservoir		1.5	15	13 in.·lbf
Master cylinder x Brake booster		25	250	18
Master cylinder x Master cylinder pressure sensor		25	250	18
Brake booster clevis lock nut		25	250	18
Brake booster x Brake booster bracket		25	250	18
Brake booster x Pedal bracket		13	130	9
Brake pedal x Pedal bracket		34	350	25
Stop light switch lock nut		25	260	19
Parking brake pedal assembly x Pedal bracket		32	320	23
Parking brake pedal assembly x Body		13	130	9
Brake line union nut	10 mm	15	155	11
	12 mm	19.5	195	14
Front disc brake caliper x Steering knuckle		123	1,250	90
Rear disc brake caliper installation bolt		88	900	65
Rear disc brake caliper x Flexible hose		31	320	23
Rear disc brake torque plate x Backing plate		105	1,070	77
Actuator bracket x Body		11	112	8
Actuator bracket x Actuator assembly		9.5	97	84 in.·lbf
Actuator x Skid control ECU		1.8	18	16 in.·lbf
Speed sensor installation bolt		8.0	82	71 in.·lbf
Front speed sensor harness x Steering knuckle		8.0	82	71 in.·lbf
Front speed sensor harness x Upper arm		8.0	82	71 in.·lbf
Front speed sensor harness x Coil support		8.0	82	71 in.·lbf

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STEERING

SERVICE DATA

SS08W–04

POWER STEERING FLUID		
Oil level rise	Maximum	5 mm (0.20 in.)
Oil pressure at idle speed with valve closed	Minimum	8,336 kPa (85 kgf/cm^2, 1,209 psi)
STEERING WHEEL		
Steering wheel freeplay	Maximum	30 mm (1.18 in.)
Steering effort at idle speed	Reference:	4.9 N·m (50 kgf·cm, 43 in.·lbf)
PS VANE PUMP		
Pump shaft and front housing bushing oil clearance	STD	0.03–0.05 mm (0.0012–0.0020 in.)
Pump shaft and front housing bushing oil clearance	Maximum	0.07 mm (0.0028 in.)
Vane plate height	Minimum	8.6 mm (0.339 in.)
Vane plate thickness	Minimum	1.397 mm (0.0550 in.)
Vane plate length	Minimum	14.991 mm (0.5902 in.)
Vane plate and pump rotor groove clearance	Maximum	0.033 mm (0.0013 in.)
Vane plate length	Pump rotor and cam ring mark	
	None	14.999–15.001 mm (0.59051–0.59059 in.)
	1	14.997–14.999 mm (0.59043–0.59051 in.)
	2	14.995–14.997 mm (0.59035–0.59043 in.)
	3	14.993–14.995 mm (0.59027–0.59035 in.)
	4	14.991–14.993 mm (0.59020–0.59027 in.)
Flow control valve spring length	Minimum	33.2 mm (1.307 in.)
Pump rotating torque	Maximum	0.28 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less
PS GEAR		
Steering rack runout	Maximum	0.03 mm (0.0118 in.)
Total preload	Turning	1.2–1.6 N·m (12–16 kgf·cm, 10.4–13.9 in.·lbf)

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SS08X–05

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
TILT STEERING COLUMN			
Steering wheel pad set screw (Torx screw)	8.8	90	78 in.·lbf
Steering wheel set nut	50	510	37
Control valve shaft x No. 2 intermediate shaft assembly	35	360	26
No. 2 intermediate shaft assembly x Sliding yoke	35	360	26
No. 2 universal joint assembly x Sliding yoke	35	360	26
No. 2 universal joint assembly x Main shaft assembly	35	360	26
Steering column assembly set nut	26	260	19
Column hole cover No. 2 set bolt	8.0	82	71 in.·lbf
Shift lever set bolt	18	180	13
Shift lever housing x Column tube assembly	12	120	9
Turn signal bracket x Steering column housing	7.5	75	65 in.·lbf
Tilt lever lock shaft	9.0	90	78 in.·lbf
PS VANE PUMP			
Union bolt x Pressure feed tube	46.5	475	34
PS vane pump assembly set stud bolt	22	220	16
PS vane pump assembly set bolt and nut	44	450	33
Suction port union set bolt	13	130	9
Pressure port union	83	850	61
Front housing x Rear housing	24	240	17
PS GEAR			
Turn pressure tube union nut	13 (15)	135 (150)	10 (11)
Tie rod end lock nut	55	560	41
Rack x Rack end	76 (103)	770 (1,050)	56 (76)
Rack guide spring cap lock nut	44 (59)	450 (600)	32 (43)
Rack housing cap	59	600	43
Self–locking nut	25	250	18
Control valve housing set bolt	18	185	13
PS gear assembly set bolt	165	1,700	123
PS gear assembly set bolt and nut	130	1,350	96
Bracket x Body Bolt and nut	165	1,700	123
Bracket x Body Stud bolt	20	200	15
Pressure feed and return tubes x Control valve housing	22 (25)	227 (250)	16 (18)
No. 2 intermediate shaft assembly x No. 2 universal joint assembly	35	360	26
Control valve shaft x No. 2 intermediate shaft assembly	35	360	26
Tie rod end x Lower arm	91	930	67

( ): For use without SST

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SUPPLEMENTAL RESTRAINT SYSTEM

SS061–77

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Steering wheel set nut	50	510	37
Steering wheel pad set screw (Torx screw)	8.8	90	78 in.·lbf
Front passenger airbag assembly x Instrument panel	5.0	51	44 in.·lbf
Front passenger airbag assembly x Instrument panel reinforcement	20	204	15
Front seat x Body	37	377	27
Front seat inner belt x Front seat	41	428	31
Seatback cover x Seatback frame	5.5	56	49 in.·lbf
Armrest x Seatback frame	37	377	27
Cutain shield airbag assembly x Body	9.8	100	7
Airbag senaor assembly x Body	17.5	179	13
Front airbag sensor x Body	17.5	179	13
Side airbag sensor assembly x Body	17.5	179	13
Curtain shield airbag sensor assembly x Body	17.5	179	13
Seat position sensor assembly x Body	8.0	82	71 in.·lbf

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BODY ELECTRICAL

SS0CN–32

SERVICE DATA

SPEEDOMETER (ON–VEHICLE)	
USA:	
Standard indication (mph)	Allowable range (mph)
20	19 – 22
40	39 – 42.5
60	59.5 – 63.5
80	79.5 – 84
100	100 – 105
CANADA:	
Standard indication (km/h)	Allowable range (km/h)
20	17.5 – 21.5
40	38 – 42
60	58 – 63
80	78 – 84
100	98.5 – 104.5
120	119 – 125
140	139 – 145
160	159 – 167
TACHOMETER (ON–VEHICLE) / DC 13.5 V 25 ˚C at (68 ˚F)	
Standard indication	Allowable range
700	630 – 770
1,000	900 – 1,100
2,000	1,850 – 2,150
3,000	2,800 – 3,200
4,000	3,800 – 4,200
5,000	4,800 – 5,200
6,000	5,750 – 6,250
ENGINE COOLANT TEMPERATURE RECEIVER GAUGE	
Temperature ˚C (˚F)	Resistance (Ω)
–20 (–4)	13,840 to 16,330
50 (68)	2,320 to 2,590
80 (176)	310 to 326
110 (230)	139.9 to 143.5

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BODY

TORQUE SPECIFICATION

SS0OL–14

Part tightened	N·m	kgf·cm	ft·lbf
FRONT BUMPER	–	–	–
Side support x Body	3.0	30	27 in.·lbf
Front bumper reinforcement x Body	50	510	37
Front bumper cover x Body	7.0	71	62 in.·lbf
REAR BUMPER	–	–	–
Rear bumper reinforcement x Body	95	970	70
Rear bumper side support x Rear bumper reinforcement	19	195	14
Back step reinforcement x Rear bumper side support	19	195	14
Rear bumper cover x Body	7.0	71	62 in.·lbf
Rear bumper cover x Rear bumper extension	5.0	50	43 in.·lbf
HOOD	–	–	–
Hood hinge x Hood	13	133	10
Hood lock x Hood	7.8	80	69 in.·lbf
HOOD SUPPORT	–	–	–
Hood support x Body	22	224	16
Hood support x Hood	22	224	16
FRONT DOOR	–	–	–
Door hinge x Body	23	235	17
Door hinge x Door panel	23	235	17
Door check x Door panel	30	306	22
Door lock striker x Body	23	235	17
Outside rear view mirror x Door panel	8.0	82	71 in.·lbf
Door glass x Window regulator sub–assembly	8.0	82	71 in.·lbf
Window regulator sub–assembly x Door panel	8.0	82	71 in.·lbf
Door lock x Door panel	5.0	51	44 in.·lbf
Outside handle with lock cylinder x Door panel	5.5	56	49 in.·lbf
Outside handle x Lock cylinder	5.5	56	49 in.·lbf
REAR DOOR	–	–	–
Door hinge x Body	23	230	17
Door hinge x Door panel	23	230	17
Door check x Door panel	30	306	22
Door lock striker x Body	23	230	17
Window regulator x Door panel	8.0	82	71 in.·lbf
Door lock x Door panel Bolt:	5.5	56	49 in.·lbf
Door lock x Door panel Screw:	5.0	51	44 in.·lbf
Outside handle x Door panel	5.5	56	49 in.·lbf
BACK DOOR	–	–	–
Back door hinge x Body	19.5	199	14.4
Back door hinge x Door panel	19.5	199	14.4
Door lock striker x Body	27	275.5	19.9
Guide bracket x Door panel	8.0	82	71 in.·lbf
Back door glass x Door panel	8.0	82	71 in.·lbf

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Power window regulator x Door panel	5.5	56	49 in.·lbf
Back door lock x Door panel	8.0	82	71 in.·lbf
FRONT WIPER AND WASHER	–	–	–
Wiper link x Body	5.5	56	49 in.·lbf
Wiper motor x Wiper link	5.5	56	49 in.·lbf
Wiper arm x Wiper link	20	204	15
REAR WIPER AND WASHER	–	–	–
Rear wiper motor x Body	5.5	56	49 in.·lbf
Wiper arm x Rear wiper motor	5.5	56	49 in.·lbf
BODY OUTSIDE MOULDING	–	–	–
Rear bumper cover x Rear bumper extension	5.0	50	43 in.·lbf
WINDSHIELD	–	–	–
Inner rear view mirror set torx screw	2.5	25	22 in.·lbf
SLIDING ROOF	–	–	–
Sliding roof housing x Body	5.5	56	49 in.·lbf
INSTRUMENT PANEL	–	–	–
Front passenger airbag assembly x Instrument panel	5.0	51	44 in.·lbf
Front passenger airbag assembly x Instrument panel reinforcement	20	204	15
Steering wheel x Steering wheel pad	8.8	90	78 in.·lbf
Box panel sub–assembly x Floor panel	40	408	30
FRONT SEAT (Power Adjuster Type)	–	–	–
w/ Side airbag: Seatback cover bracket x Seat frame assembly	5.5	56	49 in.·lbf
Armrest x Seat frame assembly	37	380	27
Front seat x Body	37	380	27
FRONT SEAT (Manual Adjuster Type)	–	–	–
w/ Side airbag: Seatback cover bracket x Seat frame assembly	5.5	56	49 in.·lbf
Armrest x Seat frame assembly	37	380	27
Front seat x Body	37	380	27
REAR NO.1 SEAT (Separate Type)	–	–	–
Rear seat cushion hinge x Body	37	380	27
LH rear seat lock x Seat cushion frame	43	440	32
Rear seat reclining adjuster x Seat cushion frame	43	440	32
Rear seat reclining adjuster x Seatback frame	43	440	32
RH rear seat lock x Seat cushion frame	64	653	47
REAR NO. 1 SEAT (Split Type LH)	–	–	–
Rear seat cushion hinge x Body	43	440	32
Rear No. 1 seat outer adjuster x Seat cushion frame	43	440	32
Rear No. 1 seat outer adjuster x Seatback frame	43	440	32
Rear No. 1 seat inner adjuster x Seat cushion frame	43	440	32
Rear No. 1 seat inner adjuster x Seatback frame	42	430	31
Rear seat shoulder belt guide x Seatback frame	37	380	27
REAR NO.1 SEAT (Split Type RH)	–	–	–
Rear seat cushion hinge x Body	37	380	27
Rear seat lock x Seat cushion frame	43	440	32

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Rear seat reclining adjuster x Seat cushion frame		43	440	32
Rear seat reclining adjuster x Seatback frame		43	440	32
REAR NO. 2 SEAT		–	–	–
Seat adjuster x Seat cushion frame		19	195	14
No .2 seat reclining adjuster x Seat cushion frame		43	440	32
No. 2 seat reclining adjuster x Seatback frame		43	440	32
SEAT BELT		–	–	–
Front seat outer belt shoulder anchor x Adjustable anchor		42	430	32
Front seat outer belt floor anchor x Body		42	430	32
Front seat outer belt retractor x Body		42	430	32
Adjustable anchor x Body		42	430	32
Front seat inner belt x Front seat		42	430	32
Rear No. 1 seat outer belt shoulder anchor x Adjustable anchor		42	430	32
Rear No. 1 seat outer belt floor anchor x Body		42	430	32
Rear No. 1 seat outer belt retractor x Body	Upper bolt:	8.5	87	76 in.·lbf
Rear No. 1 seat outer belt retractor x Body	Lower bolt:	42	430	32
Rear outer belt retractor x Rear No. 1 seat		42	430	32
Rear outer belt floor anchor x Rear seat lock		42	430	32
Rear No. 2 seat outer belt shoulder anchor x Body		42	430	32
Rear No. 2 seat outer belt floor anchor x Body		42	430	32
Rear No. 2 seat outer belt retractor x Body	Upper bolt:	8.5	87	76 in.·lbf
Rear No. 2 seat outer belt retractor x Body	Lower bolt:	42	430	32
Rear No.2 seat outer center belt x Body		42	430	32
Rear No. 2 inner belt x Rear No. 2 seat		42	430	32
SIDE STEP		–	–	–
Side step bracket x Body		19	195	14
Step plate x Side step bracket		4.9	50	43 in.·lbf
ROOF RACK		–	–	–
Front leg x Body		11	115	8
Center support x Body		11	115	8
Rear leg x Body		11	115	8
SPOILER		–	–	–
Rear spoiler x Body		12	120	8

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AIR CONDITIONING

SS0O3–04

SERVICE DATA

Refrigerant charge volume	Single A/C	750 ± 50 g (26.45 ± 1.76 oz.)
	Dual A/C	1,050 ± 50 g (37.03 ± 1.76 oz.)
Idle speed	Magnetic clutch not engaged	700 ± 50 rpm
	Magnetic clutch engaged	780 ± 50 rpm
Magnetic clutch clearance		0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

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SS0O4–05

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
REFRIGERANT LINE			
Receiver x Liquid tube	5.4	55	48 in.·lbf
Condenser x Discharge hose	5.4	55	48 in.·lbf
Condenser x Liquid tube	5.4	55	48 in.·lbf
Compressor x Discharge hose	10	100	7
Compressor x Suction hose	10	100	7
Liquid and suction tube (Nut)	5.4	55	48 in.·lbf
Liquid and suction tube x Rear A/C unit	5.4	55	48 in.·lbf
COOLING UNIT			
Evaporator x Expansion valve x Liquid and suction tube	3.5	36	31 in.·lbf
REAR A/C UNIT			
Tube and accessory x Evaporator	5.4	55	31 in.·lbf
Tube and accessory x Expansion valve	22	235	16
Expansion valve x Liquid tube	13	135	10
COMPRESSOR AND MAGNETIC CLUTCH			
Compressor x Engine (Bolt)	47	480	35
Compressor x Bracket x Engine (Nut)	25	255	18
Pressure plate x Rotor x Compressor	18	184	12.3
PRESSURE SWITCH			
Pressure switch x Liquid tube	10	100	7
WATER TEMPERATURE SWITCH			
Water temperature switch x Radiator	7.4	75	65 in.·lbf

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ENGINE

DID7M–01

PRECAUTION

NOTICE:

- **When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.**

System Name	See Page
Back Door Power Window Control System	BE–77

- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assembly, engine assembly or ECM (See page DI–543).**

HINT:
Initialization can not be completed by only removing the battery.

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DID7N–01

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic..
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. When a sensor is being monitored, the next sensor or component will not be monitored until the sensor monitoring is finished.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. ”Once per driving cycle” means that the ECM detects the malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects malfunction every time an enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the ”typical enabling conditions” are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. ”Immediately” means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

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DID7O–02

TOYOTA PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro–carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three–way catalyst	HC adsorptive three–way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor ”A”	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On–board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power–steering pressure switch
VSV for ACM	Active control engine mount

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Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobiliser system, Immobiliser system	Vehicle anti–theft system
Air switching valve (ASV)	Secondary air injection control valve
AI system	Secondary air injection system
Air pump	Secondary air injection pump
Air switching valve No.2 (ASV No.2)	Secondary air injection bypass valve Bank 1, 2
VSV for air injection control	Secondary air injection vacuum switching valve
Air injection driver	Secondary air injection driver

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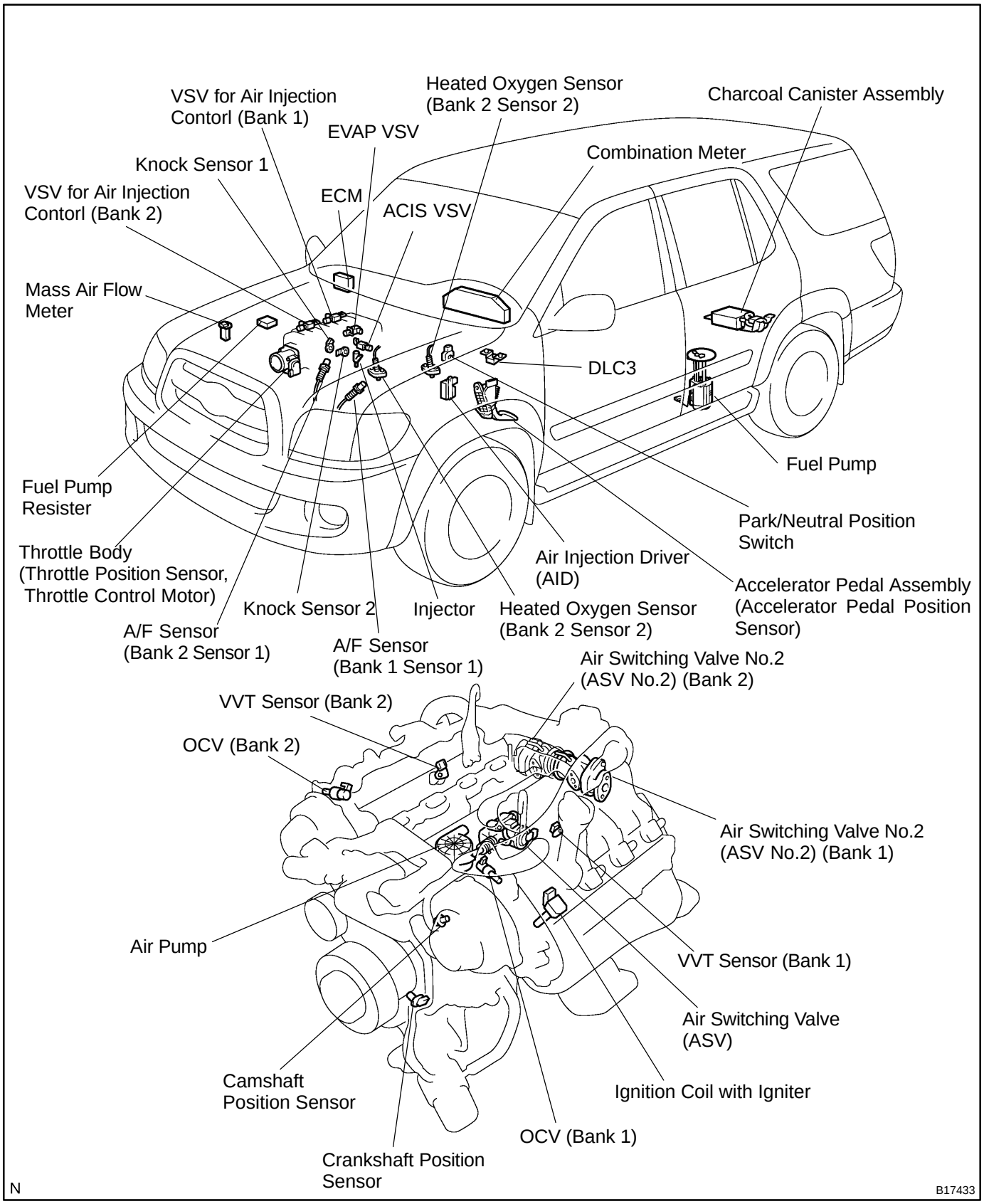
DID7P–01

LOCATION



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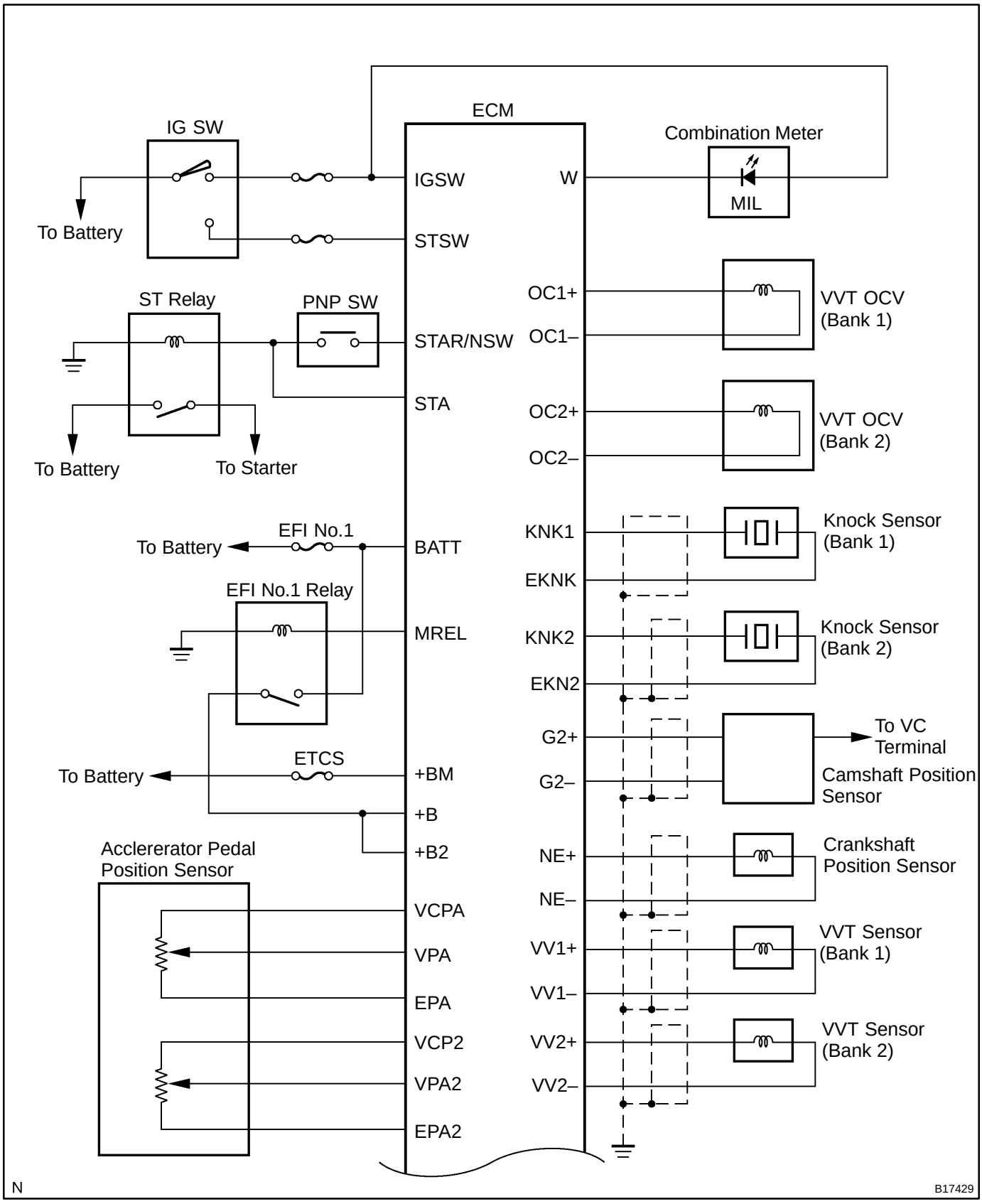
DID7Q–01

SYSTEM DIAGRAM



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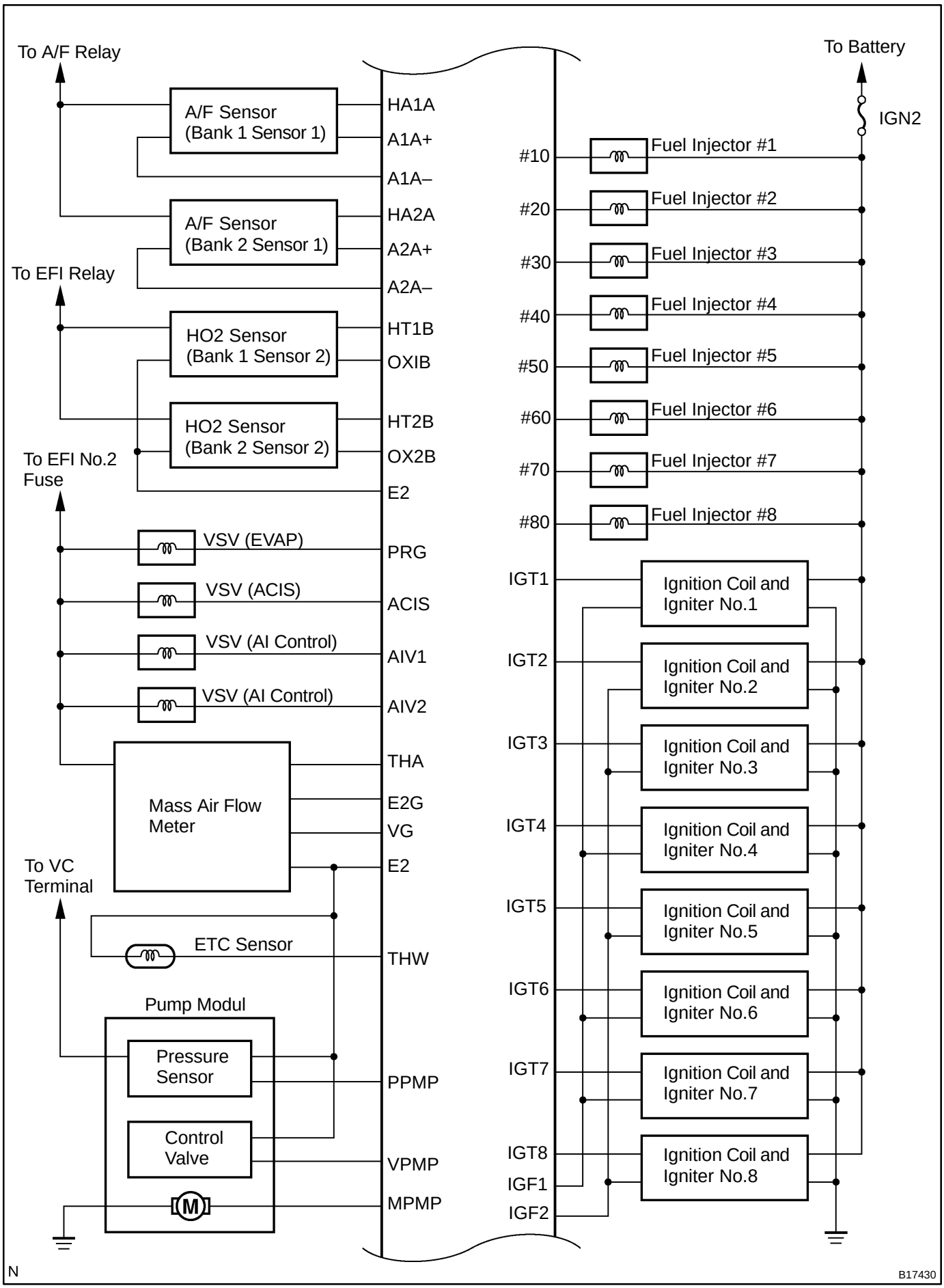
To A/F Relay
A/F Sensor (Bank 1 Sensor 1)
HA1A
A1A+
A1A–
A/F Sensor (Bank 2 Sensor 1)
HA2A
A2A+
A2A–
To EFI Relay
HO2 Sensor (Bank 1 Sensor 2)
HT1B
OXIB
HO2 Sensor (Bank 2 Sensor 2)
HT2B
OX2B
E2
To EFI No.2 Fuse
VSV (EVAP)
PRG
VSV (ACIS)
ACIS
VSV (AI Control)
AIV1
VSV (AI Control)
AIV2
Mass Air Flow Meter
THA
E2G
VG
E2
To VC Terminal
ETC Sensor
THW
Pump Modul
Pressure Sensor
PPMP
Control Valve
VPMP
M
MPMP
To Battery
IGN2
#10
Fuel Injector #1
#20
Fuel Injector #2
#30
Fuel Injector #3
#40
Fuel Injector #4
#50
Fuel Injector #5
#60
Fuel Injector #6
#70
Fuel Injector #7
#80
Fuel Injector #8
IGT1
Ignition Coil and Igniter No.1
IGT2
Ignition Coil and Igniter No.2
IGT3
Ignition Coil and Igniter No.3
IGT4
Ignition Coil and Igniter No.4
IGT5
Ignition Coil and Igniter No.5
IGT6
Ignition Coil and Igniter No.6
IGT7
Ignition Coil and Igniter No.7
IGT8
Ignition Coil and Igniter No.8
IGF1
IGF2
N
B17430

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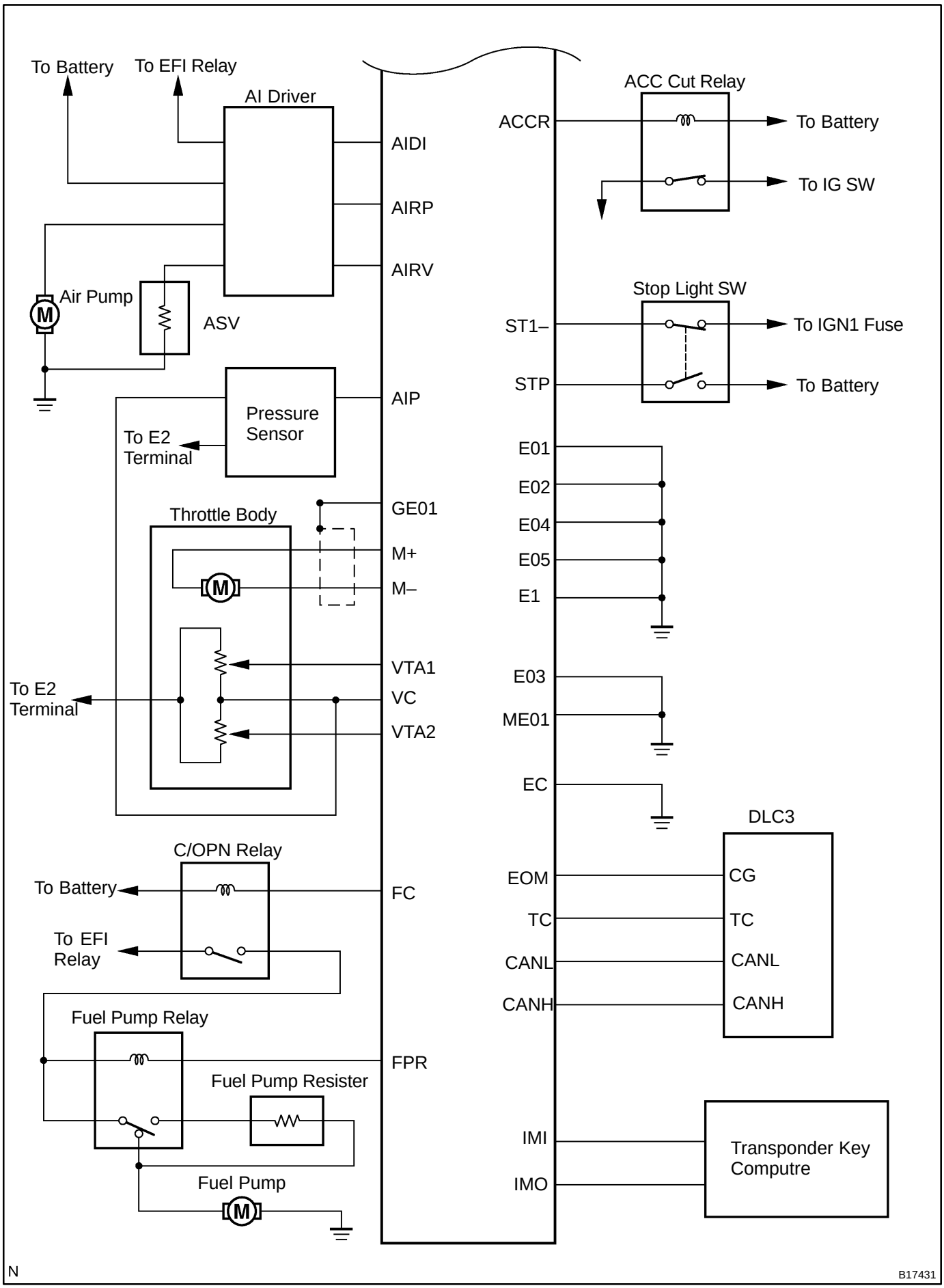
To Battery
To EFI Relay
AI Driver
AIDI
AIRP
AIRV
Air Pump
ASV
Pressure Sensor
AIP
To E2 Terminal
Throttle Body
GE01
M+
M–
VTA1
VC
VTA2
To E2 Terminal
C/OPN Relay
To Battery
To EFI Relay
FC
Fuel Pump Relay
FPR
Fuel Pump Resister
Fuel Pump
ACC Cut Relay
ACCR
To Battery
To IG SW
Stop Light SW
ST1–
To IGN1 Fuse
STP
To Battery
E01
E02
E04
E05
E1
E03
ME01
EC
DLC3
EOM
TC
CANL
CANH
CG
TC
CANL
CANH
IMI
IMO
Transponder Key Computre
N
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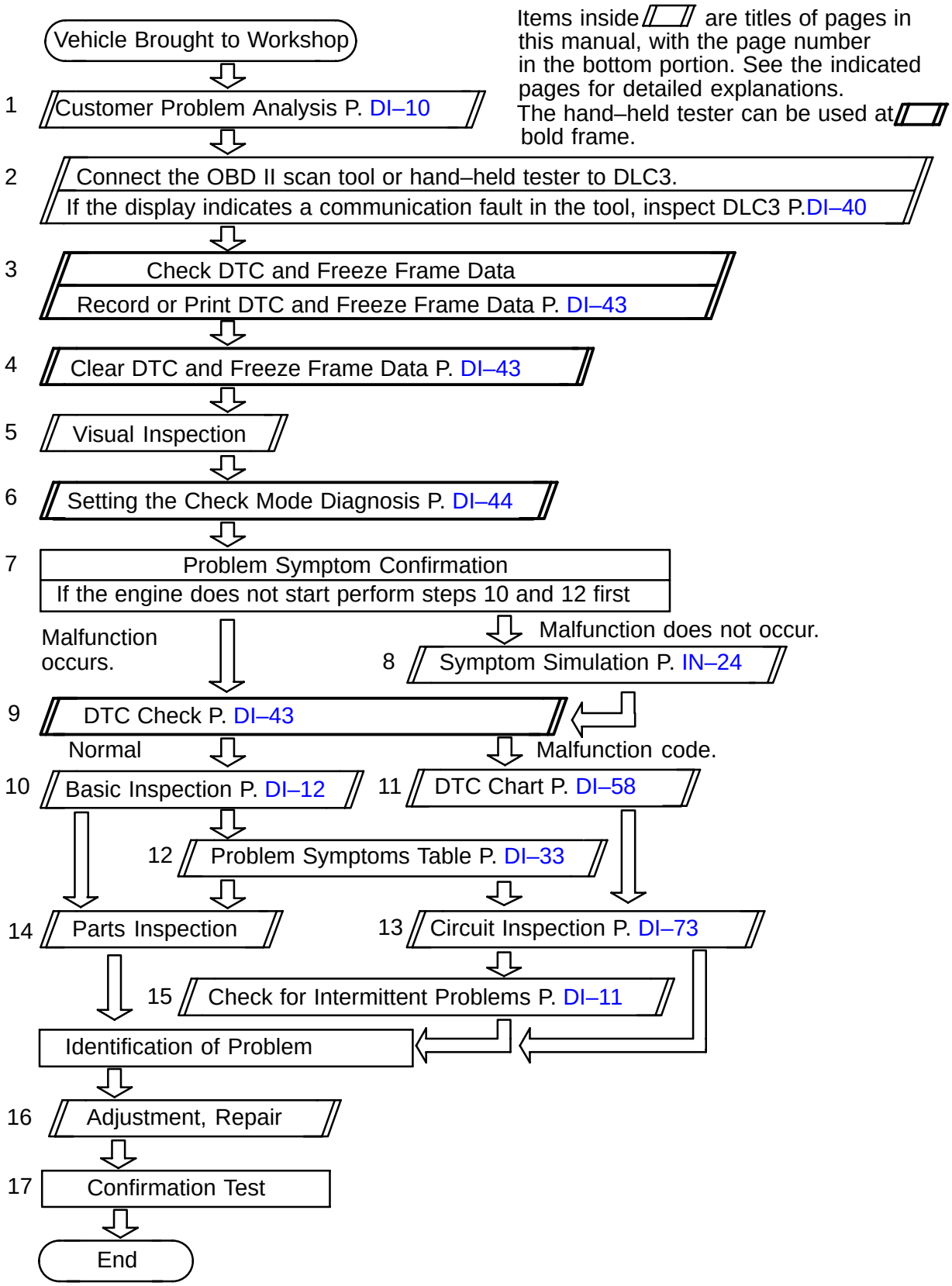
DI3H8–10

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.



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DI3H9–07

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		VIN	
Driver's Name		Production Date	
Data Vehicle Brought in		Licence Plate No.	
Engine model		Odometer Reading	km / miles

Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other _____
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other _____
	☐ Poor Driveability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after–fire) ☐ Surging ☐ Knocking ☐ Other _____
	☐ Engine Stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C operation ☐ Shifting from N to D ☐ Other _____
	☐ Others	

Dates Problem Occurred		
Problem Frequency		☐ Constant ☐ Sometimes (times per day/month) ☐ Once only ☐ Other _____
Condition When Problem Occurs	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other _____
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (approx. ____˚C/____˚F)
	Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other _____
	Engine Temp.	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temp. ☐ Other _____
	Engine Operation	☐ Starting ☐ Just after starting (min.) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other _____

Condition of malfunction indicator light (MIL)		☐ Remains on ☐ Sometimes lights up ☐ Does not light up
DTC Inspection	Normal Mode (Pre–check)	☐ Normal ☐ Malfunction code(s) (code) ☐ Freeze frame data ( )
	Check Mode	☐ Normal ☐ Malfunction code(s) (code) ☐ Freeze frame data ( )

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DID7R–01

CHECK FOR INTERMITTENT PROBLEMS

HINT:

Hand–held tester only:

Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect with a hand–held tester when the ECM is in check mode. In check mode, the ECM uses 1trip detection logic, which is more sensitive to malfunctions than normal mode (default), which uses 2 trip detection logic.

(d) Clear DTCs (see page DI–43).

(e) Switch the ECM from normal mode to check mode using a hand–held tester (see page DI–44).

(f) Perform a simulation test (see page IN–24).

(g) Check and wiggle the harness(es), connector(s) and terminal(s) (see page IN–35).

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DID7S–01

BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location causing the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.

1	**Is battery voltage 11 V or more when engine stopped?**

NO → **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to page ST–15 and continue to troubleshoot.**

YES

3	**Does engine start?**

NO → **Go to step 6.**

YES

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4	**Check air filter.**

PREPARATION:
Remove the air filter.
CHECK:
Visual check that the air filter is not excessively dirty or oily.

NG → **Repair or replace air filter.**

OK ↓

5	**Check idle speed (See page EM–11).**

NG → **Proceed to problem symptoms table on page DI–33.**

OK ↓

6	**Check fuel pressure (See page SF–7).**

NG → **Proceed to page SF–7 and continue to trouble-shoot.**

OK ↓

7	**Check for spark (See page IG–1).**

NG → **Proceed to page IG–1 and continue to trouble-shoot.**

OK ↓

Proceed to problem symptoms table on page DI–33.

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DID7T–01

REGISTRATION

NOTICE:

The Vehicle Identification Number (VIN) must be input into the replacement ECM.

HINT:

The VIN is in the form of a 17–digit alphanumeric vehicle identification number. A hand–held tester is required to register the VIN.

1. DESCRIPTION

This registration section consists of three parts, Input Instructions, Read VIN and Write VIN.

(a) Input Instructions: Explains the general VIN input instructions using a hand–held tester.

(b) Read VIN: Explains the VIN reading process in a flowchart. This process allows the VIN stored in the ECM to be read, in order to confirm that the two VINs, provided with the vehicle and stored in the vehicle's ECM, are the same.

(c) Write VIN: Explains the VIN writing process in a flowchart. This process allows the VIN to be input into the ECM. If the ECM is changed, or the VIN and VIN do not match, the VIN can be registered, or overwritten in the ECM by following this procedure.

2. INPUT INSTRUCTIONS

(a) Hand–held tester

The arrow buttons (UP, DOWN, RIGHT and LEFT) and numerical buttons (0 to 9) are used, in order to input the VIN.

(b) Cursor Operation

To move the cursor around the tester screen, press the RIGHT and LEFT buttons.

(c) Alphabetical Character Input

(1) Press the UP and DOWN buttons to select the desired alphabetical character.

(2) After selection, the cursor should move.

(d) Numeric Character Input

(1) Press the numerical button corresponding to the number that you want to input.

(2) Select or input the correct character using the UP/DOWN buttons, or the numerical buttons.

HINT:

Numerical characters can be selected by using the UP and DOWN buttons.

(e) Correction

(1) After input, the cursor should move.

(2) When correcting the input character(s), put the cursor onto the character using the RIGHT or LEFT buttons.

(f) Finishing Input Operation

(1) Make sure that the input VIN matches the vehicle VIN after input.

(2) Press the ENTER button on the tester.

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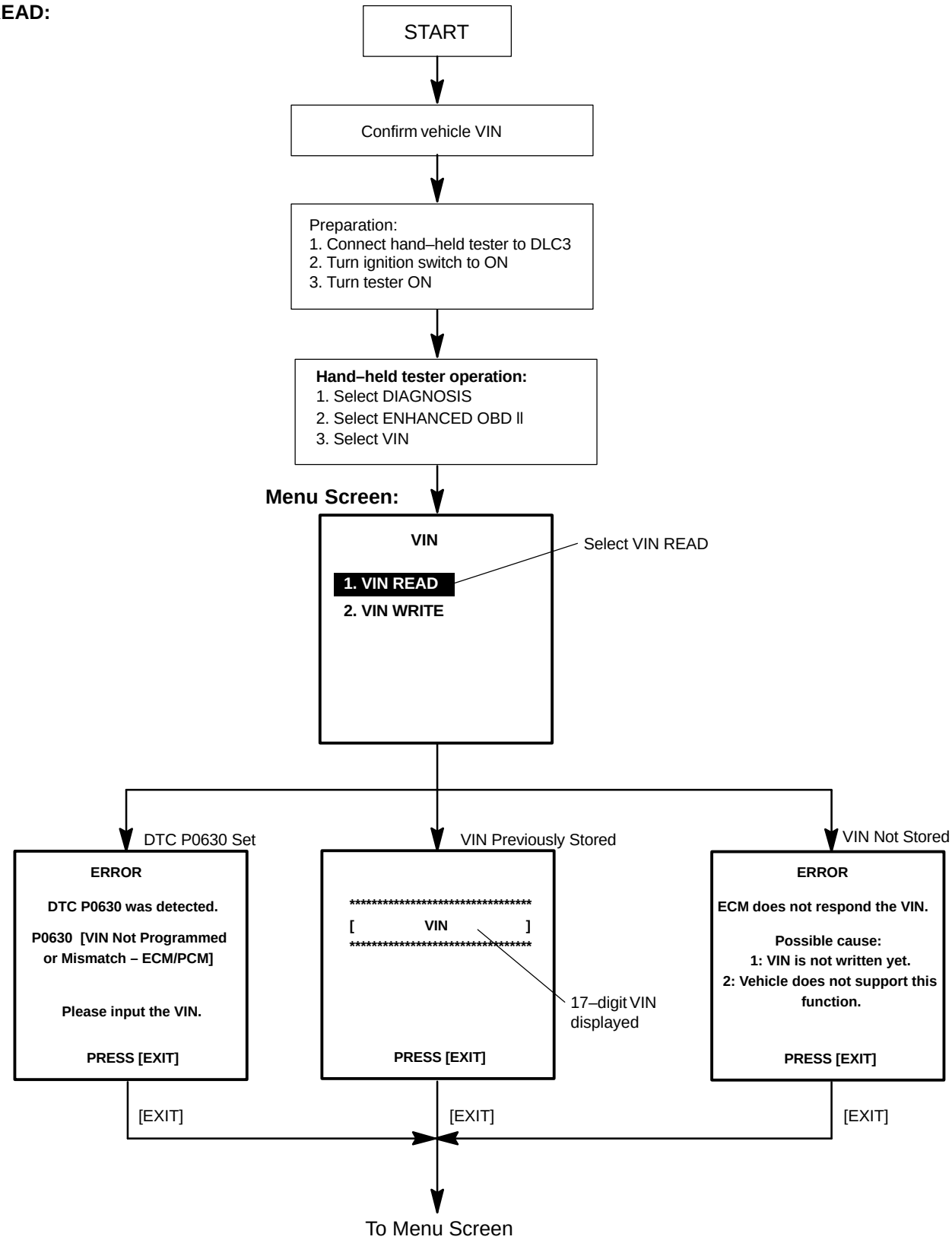
3. READ VIN (Vehicle Identification Number)

(a) Read VIN using a hand–held tester.

READ:



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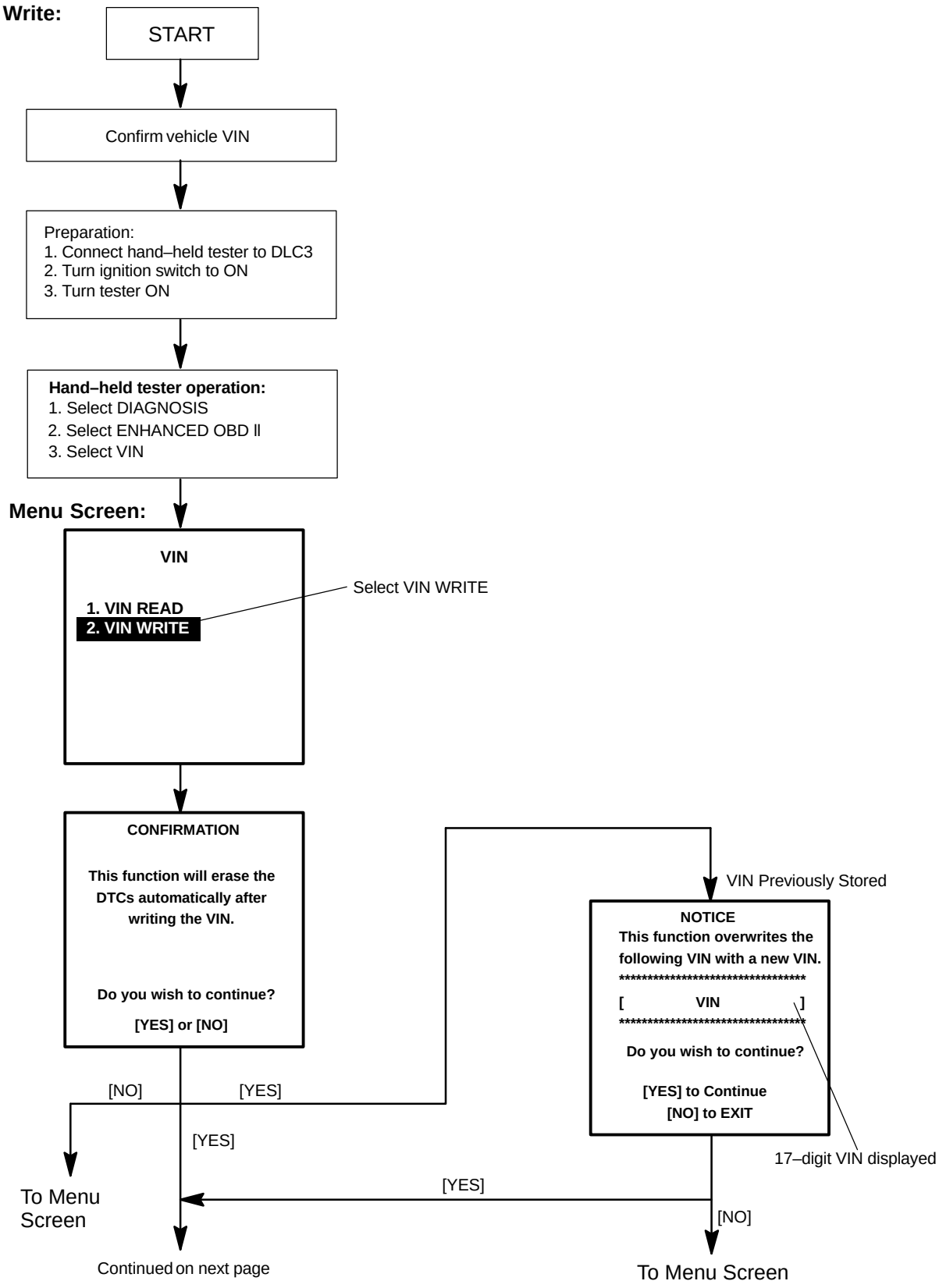
4. WRITE VIN

(a) Write VIN using the hand–held tester.



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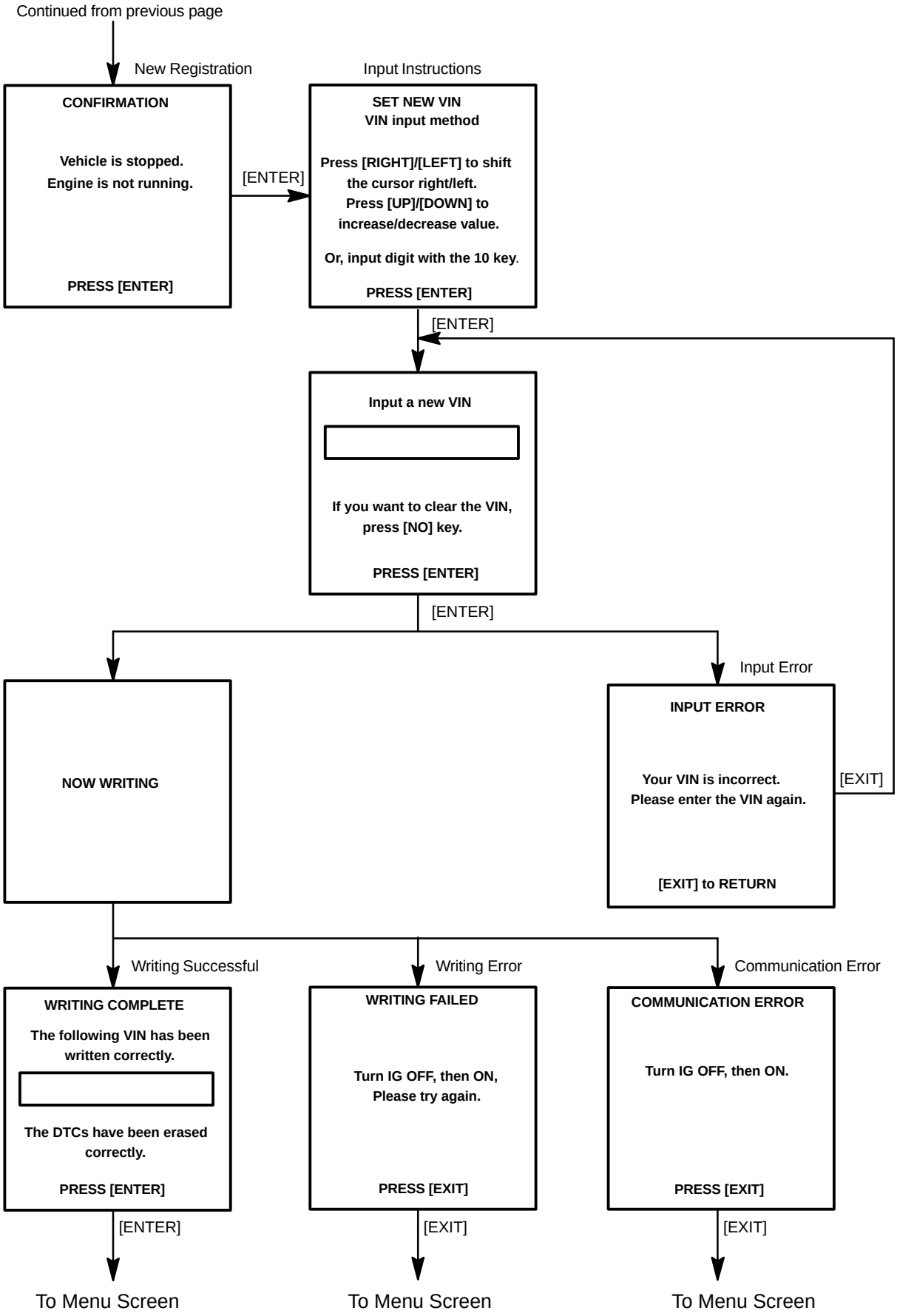
Continued from previous page
New Registration
Input Instructions
CONFIRMATION
Vehicle is stopped.
Engine is not running.
PRESS [ENTER]
[ENTER]
SET NEW VIN
VIN input method
Press [RIGHT]/[LEFT] to shift the cursor right/left.
Press [UP]/[DOWN] to increase/decrease value.
Or, input digit with the 10 key.
PRESS [ENTER]
[ENTER]
Input a new VIN
If you want to clear the VIN, press [NO] key.
PRESS [ENTER]
[ENTER]
Input Error
NOW WRITING
INPUT ERROR
Your VIN is incorrect.
Please enter the VIN again.
[EXIT] to RETURN
[EXIT]
Writing Successful
Writing Error
Communication Error
WRITING COMPLETE
The following VIN has been written correctly.
The DTCs have been erased correctly.
PRESS [ENTER]
WRITING FAILED
Turn IG OFF, then ON,
Please try again.
PRESS [EXIT]
COMMUNICATION ERROR
Turn IG OFF, then ON.
PRESS [EXIT]
[ENTER]
[EXIT]
[EXIT]
To Menu Screen
To Menu Screen
To Menu Screen

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DID7U–01

LIST OF DISABLE A MONITOR

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction: Fault code	Fault code	Component/system	Monitor disablement (X - disabled): P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0010,P0020	P0010,P0020	VVT VSV1,2																				X					X	
P0011	P0011	VVT System1 - Advance				X		X														X					X	
P0012	P0012	VVT System1 - Retard				X		X														X					X	
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance			X	X																X					X	
P0022	P0022	VVT System2 - Retard			X																	X					X	
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X	
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X	
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X		
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																									X	
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X
P0128	P0128	Thermostat																					X					
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X	
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																								X		
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																									X	
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X		
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X		
P0325,P0330	P0325-P0333	Knock sensor																										X
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X						
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X						
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X
P0401	P0401	EGR system (closed)																				X					X	
P0402	P0402	EGR system (open)																				X	X	X	X	X	X	
P0405,P0409	P0405-P0409	Lift sensor																									X	
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X		
P0450,P0451	P0450-P0453	EVAP press sensor																										

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire			
P0500	P0500	VSS																				X	X	X	X	X	X	X			
P0511	P0511	IAC valve																					X								
P0510	P0510	Idle switch												X		X						X	X		X	X	X	X			
P0560	P0560	System Voltage																													
P0617	P0617	Starter signal																													
P0705	P0705	Shift lever position switch																													
P0710	P0710-P0713	Trans fluid temp sensor																													
P0720-P0793	P0720-P0793	Output speed sensor																													
P0715-P0717	P0715-P0717	Input speed sensor																													
P0724	P0724	Stop lamp switch																													
P0741-P0796	P0741-P0796	Trans solenoid (function)																													
P0748-P0798	P0748-P0799	Trans solenoid (range)																													
P0850	P0850	PNP switch																										X			
P1010,P1020	P1010,P1020	VVTL																				X					X				
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X					X				
P1126	P1126	Electronic magnet clutch																													
P1129	P1129	Electronic throttle system																													
P1430	P1430	HC adsorber ACT press sensor																													
P2004,6	P2004,6	Intake Manifold Runner Control																													
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																													
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																													
P2102,P2103	P2102,P2103	Throttle motor																													
P2120-P2138	P2120-P2138	Accel position sensor																													
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				X			X	X					
P2226	P2226	BARO sensor																					X		X	X					
P2237,P2240	P2237,P2240	A/F sensor (open)																				X			X	X					
P2423,24	P2423,24	HC Adsorption Catalyst																													
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																													
P2431	P2431	AIR Pressure Sensor(Rationality)																													
P2440	P2440	AIR control valve stuck open																					X	X	X	X	X				
P2441	P2441	AIR control valve stuck close																					X	X	X	X	X				
P2444	P2444	AIP stuck On																					X	X	X	X	X				
P2445	P2445	AIP stuck Off																					X	X	X	X	X				
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																													
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				X			X	X					

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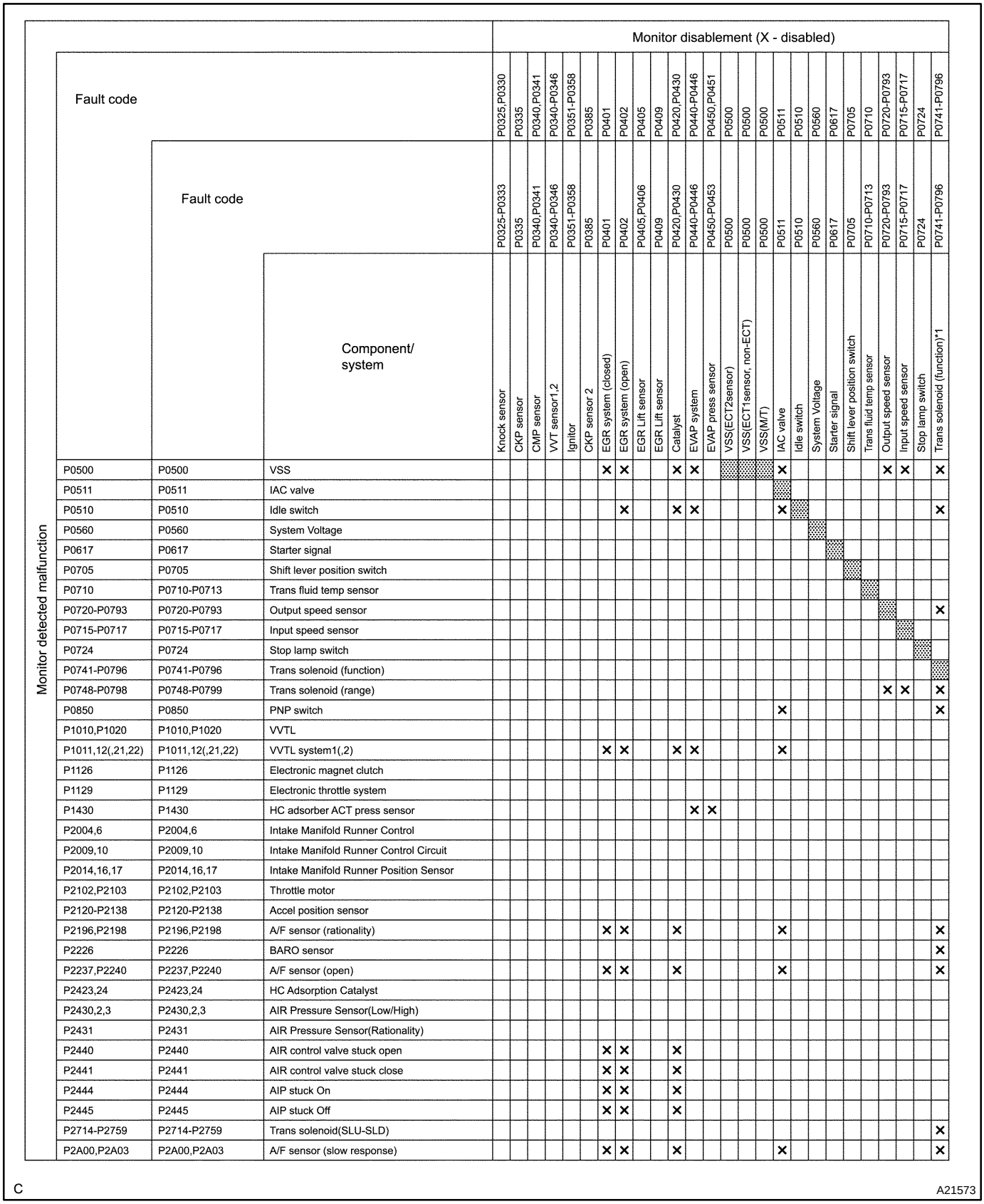
Monitor detected malfunction

| Fault code | Fault code | Component/system | Monitor disablement (X - disabled) | | |



Monitor detected malfunction: Fault code	Fault code	Component/system	Monitor disablement (X - disabled): P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	P0325-P0333	Knock sensor																										
	P0335	CKP sensor																										
	P0340,P0341	CMP sensor																										
	P0340-P0346	VVT sensor1,2																										
	P0351-P0358	Ignitor																										
	P0385	CKP sensor 2																										
	P0401	EGR system (closed)																										
	P0402	EGR system (open)																										
	P0405,P0406	EGR Lift sensor																										
	P0409	EGR Lift sensor																										
	P0420,P0430	Catalyst																										
	P0440-P0446	EVAP system																										
	P0450,P0451	EVAP press sensor																										
	P0500	VSS(ECT2sensor)																										
	P0500	VSS(ECT1sensor, non-ECT)																										
	P0500	VSS(M/T)																										
	P0511	IAC valve																										
	P0510	Idle switch																										
	P0560	System Voltage																										
	P0617	Starter signal																										
	P0705	Shift lever position switch																										
	P0710-P0713	Trans fluid temp sensor																										
	P0720-P0793	Output speed sensor																										
	P0715-P0717	Input speed sensor																										
	P0724	Stop lamp switch																										
	P0741-P0796	Trans solenoid (function)*1																										

P0500	P0500	VSS							×	×			×	×					×						×	×		×
P0511	P0511	IAC valve																										
P0510	P0510	Idle switch								×			×	×					×									×
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										×
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																							×	×		×
P0850	P0850	PNP switch																	×									×
P1010,P1020	P1010,P1020	VVTL																										
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							×	×			×	×					×									
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor												×	×													
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)							×	×			×						×									×
P2226	P2226	BARO sensor																										×
P2237,P2240	P2237,P2240	A/F sensor (open)							×	×			×						×									×
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open							×	×			×															
P2441	P2441	AIR control valve stuck close							×	×			×															
P2444	P2444	AIP stuck On							×	×			×															
P2445	P2445	AIP stuck Off							×	×			×															
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										×
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							×	×			×						×									×

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Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
				P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
	P0010,P0020	P0010,P0020	VVT VSV1,2																				X	X	X	X			
	P0011	P0011	VVT System1 - Advance																				X	X	X	X			
	P0012	P0012	VVT System1 - Retard																				X	X	X	X			
	P0016,P0018	P0016,P0018	VVT System - Misalignment																				X	X	X	X			
	P0021	P0021	VVT System2 - Advance																				X	X	X	X			
	P0022	P0022	VVT System2 - Retard																				X	X	X	X			
	P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	X			X	X	X	X			
	P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														X		X	X			X	X	X	X			X
	P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														X			X									
	P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	X									
	P0100,P0101	P0100-P0103	MAF sensor				X	X									X		X	X			X	X	X	X			X
	P0105,P0106	P0105-P0108	MAP sensor				X	X									X		X	X			X	X	X	X			X
	P0110	P0110-P0113	IAT sensor									X					X		X				X	X	X	X			X
	P0115,P0116	P0115-P0118	ECT sensor	X			X	X				X					X		X	X			X	X	X	X			X
	P0120,P0121	P0120-P0223,P2135	TP sensor														X		X	X			X	X	X	X			X
	P0125	P0125	Insufficient ECT for Closed Loop	X			X										X		X	X			X	X	X	X			X
	P0128	P0128	Thermostat																										
	P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	X			X	X	X	X			
	P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														X		X	X			X	X	X	X			X
	P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														X			X									
	P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	X									
	P0171,P0172	P0171,P0172	Fuel system														X		X	X			X	X	X	X			X
	P0300-P0308	P0300-P0308	Misfire														X		X	X			X	X	X	X			X
	P0325,P0330	P0325-P0333	Knock sensor																				X	X	X	X			
	P0335	P0335	CKP sensor				X	X									X		X	X			X	X	X	X			X
	P0340, P0341	P0340, P0341	CMP sensor				X	X									X		X	X			X	X	X	X			X
	P0340-P0346	P0340-P0346	VVT sensor1,2																				X	X	X	X			
	P0351-P0358	P0351-P0358	Ignitor																	X			X	X	X	X			
	P0385	P0385	CKP sensor 2				X	X									X		X	X			X	X	X	X			X
	P0401	P0401	EGR system (closed)																	X									
	P0402	P0402	EGR system (open)														X		X	X			X	X	X	X			X
	P0405,P0409	P0405-P0409	Lift sensor																										
	P0420,P0430	P0420,P0430	Catalyst																										
	P0442-P0456	P0442-P0456	EVAP system														X		X				X	X	X	X			X
	P0450,P0451	P0450-P0453	EVAP press sensor																				X	X	X	X			

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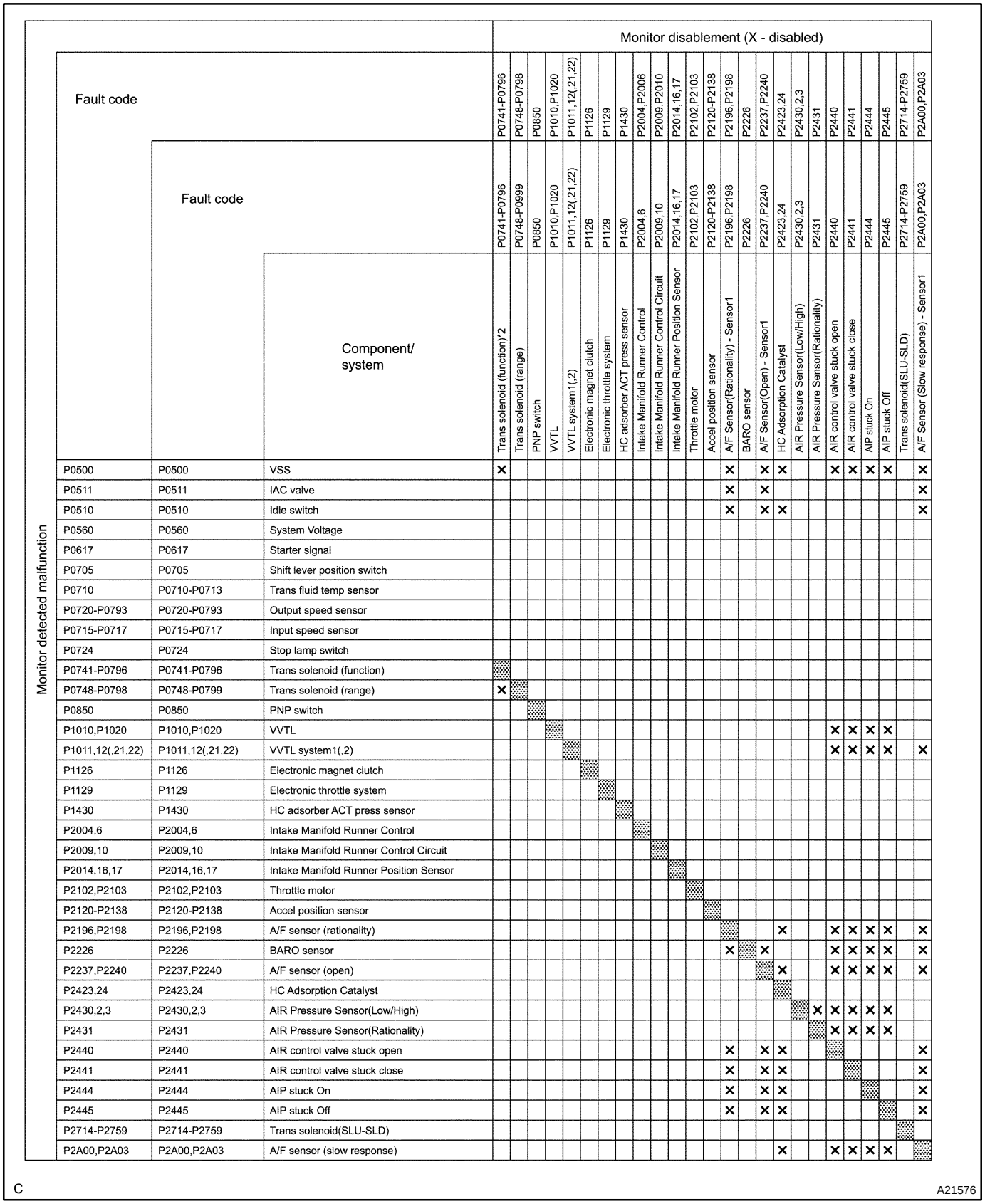

Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																										
				P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
	P0500	P0500	VSS	X													X		X	X			X	X	X	X		X
	P0511	P0511	IAC valve														X		X									X
	P0510	P0510	Idle switch														X		X	X								X
	P0560	P0560	System Voltage																										
	P0617	P0617	Starter signal																										
	P0705	P0705	Shift lever position switch																										
	P0710	P0710-P0713	Trans fluid temp sensor																										
	P0720-P0793	P0720-P0793	Output speed sensor																										
	P0715-P0717	P0715-P0717	Input speed sensor																										
	P0724	P0724	Stop lamp switch																										
	P0741-P0796	P0741-P0796	Trans solenoid (function)																										
	P0748-P0798	P0748-P0799	Trans solenoid (range)	X																									
	P0850	P0850	PNP switch																										
	P1010,P1020	P1010,P1020	VVTL																				X	X	X	X			
	P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X	X	X	X			X
	P1126	P1126	Electronic magnet clutch																										
	P1129	P1129	Electronic throttle system																										
	P1430	P1430	HC adsorber ACT press sensor																										
	P2004,6	P2004,6	Intake Manifold Runner Control																										
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
	P2102,P2103	P2102,P2103	Throttle motor																										
	P2120-P2138	P2120-P2138	Accel position sensor																										
	P2196,P2198	P2196,P2198	A/F sensor (rationality)																	X			X	X	X	X			X
	P2226	P2226	BARO sensor														X		X				X	X	X	X			X
	P2237,P2240	P2237,P2240	A/F sensor (open)																	X			X	X	X	X			X
	P2423,24	P2423,24	HC Adsorption Catalyst																										
	P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																			X	X	X	X	X			
	P2431	P2431	AIR Pressure Sensor(Rationality)																				X	X	X	X			
	P2440	P2440	AIR control valve stuck open														X		X	X									X
	P2441	P2441	AIR control valve stuck close														X		X	X									X
	P2444	P2444	AIP stuck On														X		X	X									X
	P2445	P2445	AIP stuck Off														X		X	X									X
	P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																	X			X	X	X	X			

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O2S TEST RESULT

INTRODUCTION

The O2S TEST RESULT refers to the results of the engine control module (ECM) when it monitors the oxygen sensor (O2S), and it can be read using the hand–held tester or the generic OBD II scan tool. Based on this, you can find the O2S's conditions.

The ECM monitors the O2S in the various items. You can read the monitor result (TEST DATA) of each monitor item using the O2S TEST RESULT. However, the output value of the TEST DATA is the latest "snapshot" value that is taken after monitoring and therefore it is not dynamic.

In this repair manual, the description of the O2S TEST RESULT (for O2S related DTCs) are written in a table.

This table consists of 5 items:

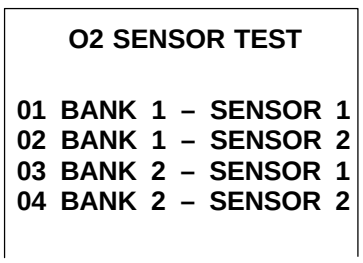
(1) TEST ID (a code applied to each TEST DATA)
(2) Description of TEST DATA
(3) Conversion Factor (When Conversion Factor has a value written in the table, multiply the TEST DATA value appearing on the scan tool by the Conversion Factor value. The result will be the required value.)
(4) Unit
(5) Standard Value

If the TEST DATA value appearing on the scan tool is out of the standard value, the O2S is malfunctioning. If it is within the standard value, the O2S is functioning normally. However, if the value is on the borderline of the standard value, the O2S may malfunction very soon.

HOW TO READ O2S TEST RESULT USING HAND–HELD TESTER

(a) Connect the hand–held tester to the DLC3.

O2S TEST RESULT Screen



(b) On the tester screen, select the following menus: DIAGNOSIS / CARB OBDII / O2S TEST RESULT. A list of the O2S equipped on the vehicle will be displayed.

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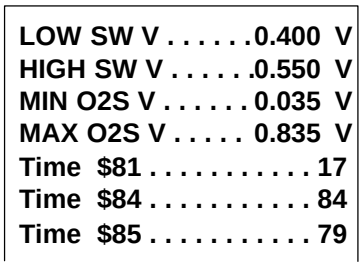
TEST DATA Screen



(c) Select the desired O2S and press ENTER. The following screen will appear.

(d) Press HELP and ↓ simultaneously. More information will appear.

(e) Example:

(1) The hand–held tester displays ”17” as a value of the ”TIME $81” (see the illustration on the left).

(2) Find the Conversion Factor value of ”TIME $81” in the O2S TEST RESULT chart below. 0.3906 is specified for $81 in this chart.

(3) Multiply ”17” in step (1) by 0.3906 (Conversion Factor) in the step (2).

17 x 0.3906 = 6.6 %

(4) If the answer is within the standard value, the ”TIME $81” can be confirmed to be normal.

O2S TEST RESULT Chart

TEST ID	Description of TEST DATA	Conversion Factor	Unit	Standard Value
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05V	Multiply 0.3906	%	Within 60 %

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CHECKING MONITOR STATUS

1. OUTLINE

The monitor results and the test values can be checked with the OBD II scan tool.
The engine control module (ECM) monitors the emissions–related components as the thermostat, catalyst converter and evaporative emissions (EVAP), and determines whether they are functioning normally or not. When finished and monitoring, the ECM stores the monitor results and the test values.
The monitor result indicates whether the component is functioning normally or not. The test value is the value that was used to determine the monitor result. If the test value is outside the test limit (malfunction criterion), the ECM determines the component is malfunctioning. Some emissions–related components have multiple test values to determine monitor result. If one of these test values is outside test limit, the ECM determines the component is determine monitor result. If one of these test values is outside test limit, the ECM determines the components is malfunctioning.

2. DESCRIPTION

The test value and test limit information are described as shown in the following table. This information is included under ”MONITOR RESULT” in the emissions–related DTC sections.

Thermostat:

MID	TID	Scaling	Test Result	Minimum Test Limit	Maximum Test Limit
$E1	$E8	Multiply by 0.1 [°C]	ECT sensor output when estimated ECT reached to malfunction criteria	Malfunction criteria	Maximum test limit

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.
- ▶ Scaling is used to calculate the test value indicated on generic OBD II scan tools.

3. PROCEDURE (USING HAND–HELD TESTER)

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch and hand–held tester ON.
(c) Clear DTCs.
(d) Allow the vehicle to drive, in accordance with the applicable drive pattern described in the READINESS MONITOR DRIVE PATTERN section (see page DI–27).
(e) Check the monitor result. Select the hand–held tester menus: DIAGNOSIS/ENHANCED OBDII/MONITOR INFO/MONITOR STATUS. The monitor result appears after the component name.
- ▶ AVAIL indicates the component has not been monitored yet.
- ▶ COMPL indicates the component is functioning normally.
- ▶ INCMPL indicates the component is malfunctioning.

(f) Check the test value(s). Select the hand–held tester menus: DIAGNOSIS/ENHANCED OBDII/MONITOR INFO/TEST RESULT.
(g) Select the component and press ENTER. If the monitor result has been COMPL or INCMPL, the accuracy test value appears.
(h) Compare the test value with the test limits, MIN and MAX.
- ▶ If the test value is outside of the test limit, the component is malfunctioning.
- ▶ If the test value is on the borderline of the test limit, a malfunction is concealed in the component.

HINT:
The monitor result might on rare occasions be COMPL even if the malfunction indicator lamp (MIL) is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

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DICEL–02

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF THE READINESS TESTS

- The On–Board Diagnostic (OBD II) system is designed to monitor the performance of emission–related components and report any detected abnormalities in the form of Diagnostic Trouble Codes (DTCs). Since the various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors. Many state Inspection and Maintenance (I/M) programs require that vehicles complete their Readiness Monitors prior to beginning an emission test.
- The current status of the Readiness Monitors can be seen by using the hand–held tester with version 9.0 software (or newer), or a generic OBD II Scan tool.
- To view the Readiness Monitor status using the hand–held tester, select ”Monitor Status” from the Enhanced OBD II Menu.
- A status of ”complete” indicates that the necessary conditions have been met to run the performance tests for the related Readiness Monitor.
- The Readiness Monitor will be reset to ”incomplete” if:
  - ECM has lost power (battery or fuse).
  - DTCs have been cleared.
  - The conditions for running the Readiness Monitor have not been met.
- In the event that any Readiness Monitor shows ”incomplete,” follow the appropriate Readiness Monitor Drive Pattern to activate the monitor and change the readiness status to ”complete.”

CAUTION:

Strictly observe the posted speed limits, traffic laws, and road conditions when performing these drive patterns.

NOTICE:

These drive patterns represent the fastest method to satisfy all necessary conditions which allow the specific readiness monitor to complete.

In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors) the drive pattern can be resumed, and in most cases, the readiness monitor will still set to ”complete”.

To ensure rapid completion of readiness monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

Contents:

TITLE	STEP(s)
CATALYST MONITOR	2
EVAP MONITOR	3, 4
AIR–FUEL RATIO (A/F) AND OXYGEN SENSOR (O2S) MONITOR	5
OXYGEN SENOSR HEATER MONITOR	6

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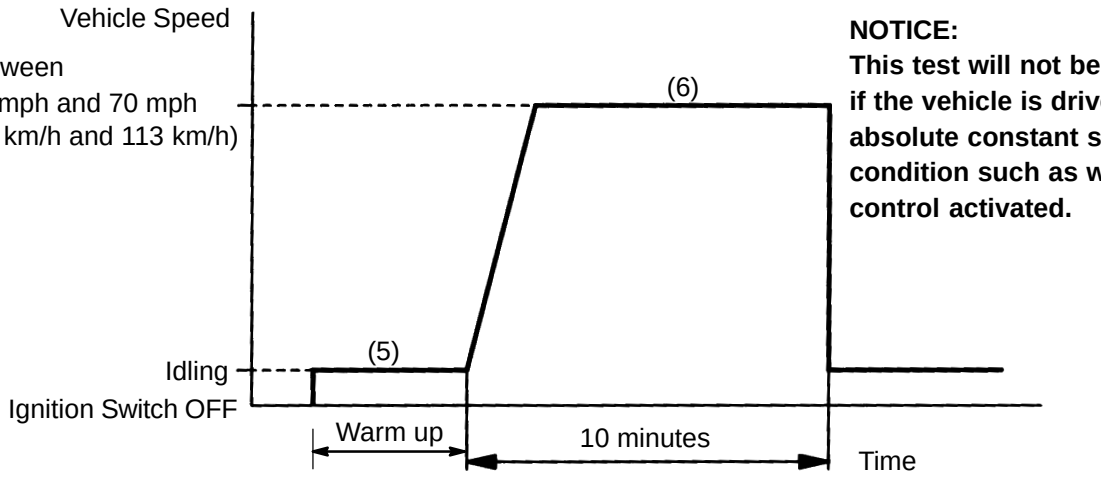
2. CATALYST MONITOR (ACTIVE AIR–FUEL RATIO CONTROL TYPE)



(a) Preconditions

The monitor will not run unless:

▶ The MIL is OFF

(b) Drive Pattern

(1) Connect a hand–held tester or OBD II scan tool to the DLC3.

(2) Turn the ignition switch to ON.

(3) Turn the tester or scan tool ON.

(4) Clear DTCs (where set) (see page DI–43).

(5) Start the engine and warm it up.

(6) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes.

(c) Monitor Status

(1) Check the Readiness Monitor status displayed on the tester or scan tool.

(2) If the status does not switch to COMPL (complete), extend the driving time.

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3. EVAP MONITOR (VACUUM PRESSURE MONITOR)

NOTICE:

A cold soak must be performed prior to conducting the drive pattern to complete the Internal Pressure Readiness Monitor.

(a) Cold Soak Preconditions

The monitor will not run unless:

- ▶ MIL is OFF
- ▶ Fuel level is approximately 1/2 to 3/4
- ▶ Altitude is 7,800 feet (2,400 m) or less

(b) Cold Soak Procedure

Let the vehicle cold soak for 8 hours or until the difference between IAT and ECT becomes less than 7˚C (13˚F)

HINT:

Examples:

- ▶ Scenario 1

  ECT = 24˚C (75˚F)

  IAT = 16˚C (60˚F)

  Difference between ECT and IAT is 8˚C (15˚F)

  → The monitor will not run because difference between ECT and IAT is greater than 7˚C (13˚F)
- ▶ Scenario 2

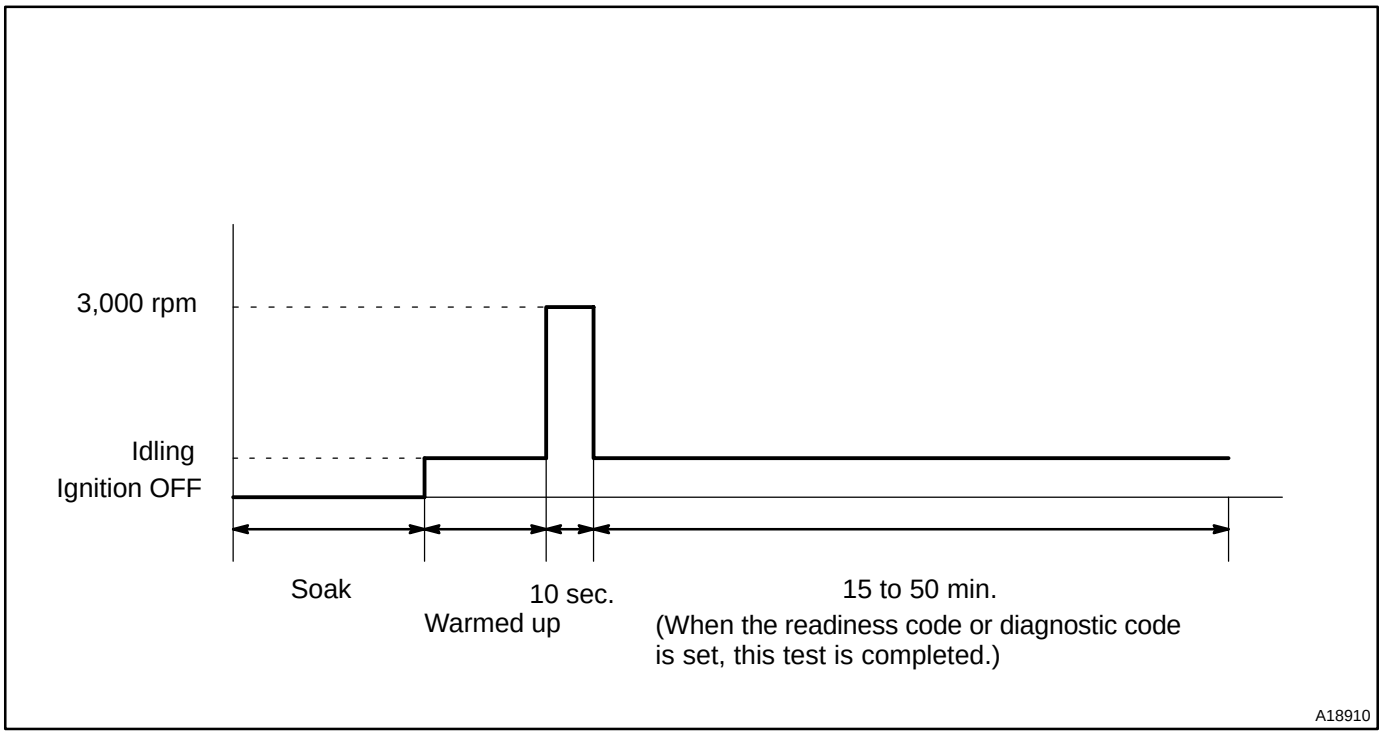
  ECT = 21˚C (70˚F)

  IAT = 20˚C (68˚F)

  Difference between ECT and IAT is 1˚C (2˚F)

  → The monitor will run because difference between ECT and IAT is less than 7˚C (13˚F)

4. EVAP MONITOR (VACUUM PRESSURE MONITOR) (CONTINUED)



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(a) Preconditions

The monitor will not run unless:

- ▶ MIL is OFF
- ▶ Fuel level is approximately 1/2 to 3/4
- ▶ Altitude is 7,800 feet (2,400 m) or less
- ▶ Engine Coolant Temperature (ECT) is between 4.4˚C and 35˚C (40˚F and 95˚F)
- ▶ Intake Air Temperature (IAT) is between 4.4˚C and 35˚C (40˚F and 95˚F)
- ▶ Cold Soak Procedure has been completed
- ▶ Before starting the engine, the difference between ECT and IAT must be less than 7˚C (13˚F)

HINT:

Examples:

- ▶ Scenario 1

  ECT = 24˚C (75˚F)

  IAT = 16˚C (60˚F)

  Difference between ECT and IAT is 8˚C (15˚F)

  → The monitor will not run because difference between ECT and IAT is higher than 7˚C (13˚F)

- ▶ Scenario 2

  ECT = 21˚C (70˚F)

  IAT = 20˚C (68˚F)

  Difference between ECT and IAT is 1˚C (2˚F)

  → The monitor will run because difference between ECT and IAT is less than 7˚C (13˚F)

The readiness test can be completed in cold ambient conditions (less than 40˚F / 4.4˚C) and/or at high altitudes (more than 7,800 feet / 2,400 m) if the drive pattern is repeated a second time after cycling the ignition off.

(b) Drive Pattern

(1) Connect the OBD II scan tool to DLC3 to check monitor status and preconditions (refer to (a)).

(2) Release pressure in fuel tank by removing the fuel tank cap and then reinstall it.

(3) Start the engine and allow it to idle until ECT becomes 75˚C (167˚F) or higher.

(4) Run the engine at 3,000 rpm for approximately 10 seconds.

(5) Allow the engine to idle with the A/C ON (to create slight load) for 15 to 50 minutes.

NOTICE:

If the vehicle is not equipped with A/C, put a slight load on the engine by doing the following :

- ▶ **Securely set the parking brake.**
- ▶ **Block the drive wheels with wheel chocks.**
- ▶ **Allow the vehicle to idle in drive for 15 to 50 minutes.**

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5. AIR–FUEL RATIO (A/F) AND OXYGEN SENSOR (HO2) MONITOR (ACTIVE AIR–FUEL RATIO CONTROL TYPE)

(a) Preconditions

The monitor will not run unless:

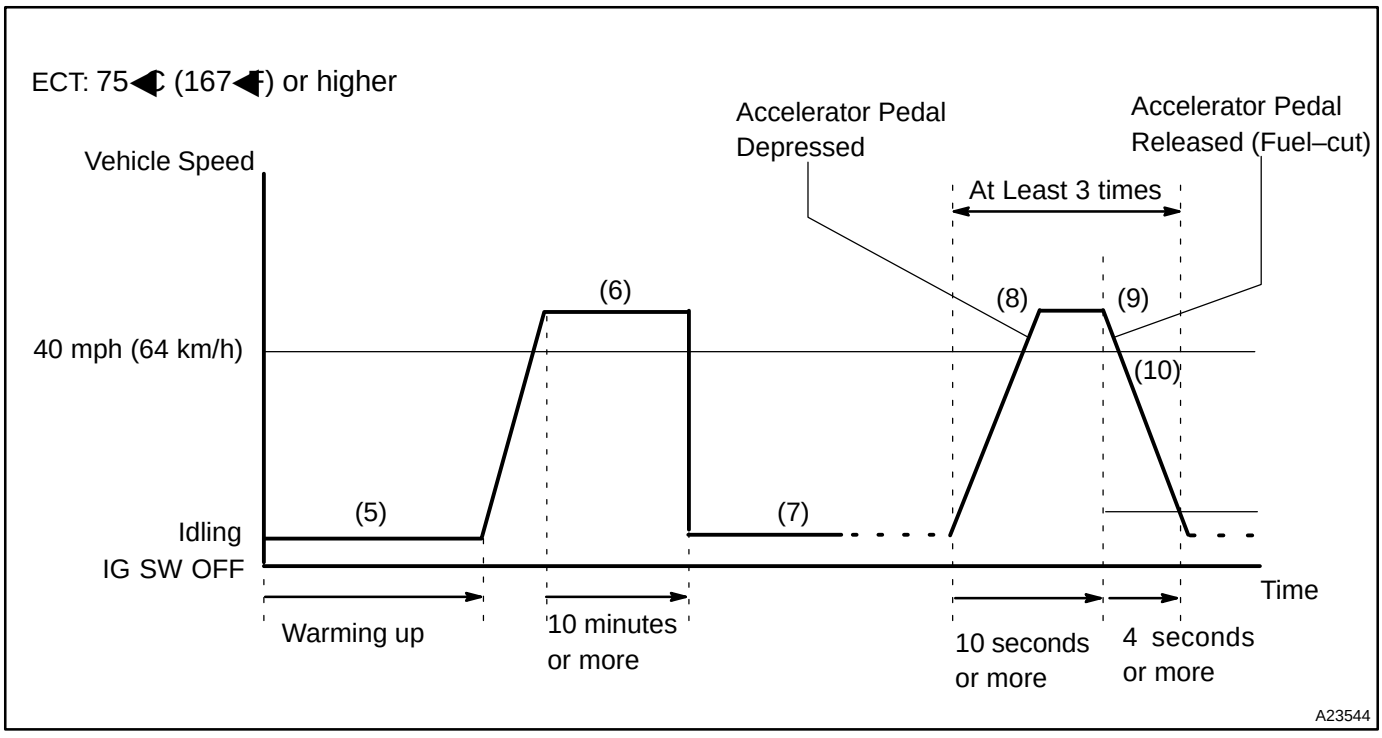
- 2 minutes or more have elapsed since the engine was started.
- The Engine Coolant Temperature (ECT) is 75◀C (167◀F) or higher.
- Air–fuel ratio feedback control is performed.
- Fuel–cut control is performed for 8 seconds or more.

(b) Drive Pattern

(1) Connect the hand–held tester to DLC3.
(2) Turn the ignition switch to ON.
(3) Clear DTCs (see page DI–43).
(4) Start the engine, and warm it up until the ECT reaches 75◀C (167◀F) or higher.
(5) Drive the vehicle at 40 mph (64 km/h) or more for at least 10 minutes.
(6) Change the transmission to 2nd gear.
(7) Accelerate the vehicle to 30 mph (48 km/h) or more by depressing the accelerator pedal for at least 10 seconds.
(8) Soon after performing step (8) above, release the accelerator pedal for at least 4 seconds without depressing the brake pedal, in order to execute fuel–cut control.
(9) Stop the vehicle and allow the engine to idle for 10 seconds or more.
(10) Allow the vehicle to decelerate until the vehicle speed declines to less than 6 mph (10 km/h).
(11) Repeat steps from (8) through (10) above at least 3 times in one driving cycle.

(c) Monitor Status

(1) Check the Readiness Monitor status displayed on the tester.
(2) If the status does not switch to COMPL (complete), make sure that the preconditions have been met, and then perform steps from (5) through (11) in Drive Pattern above.



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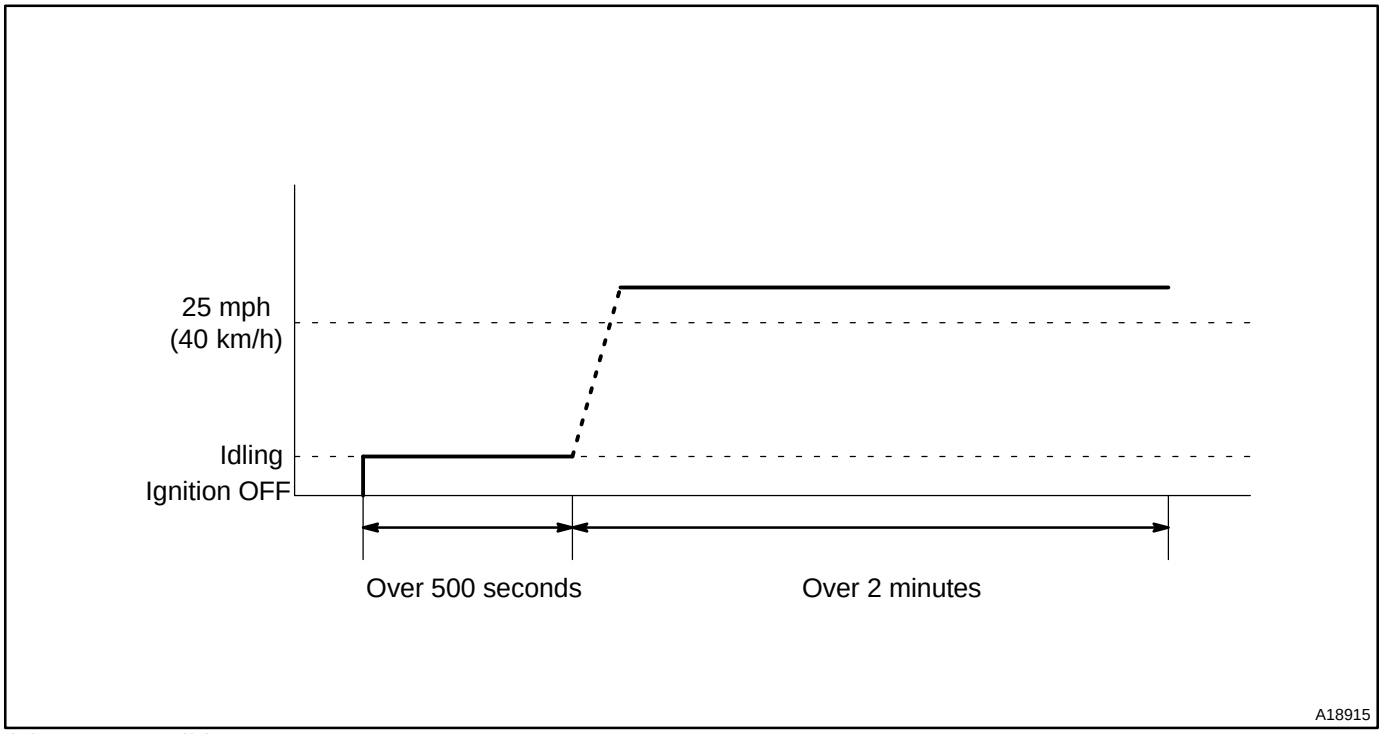
6. OXYGEN SENSOR HEATER MONITOR



(a) Preconditions

The monitor will not run unless:

▶ MIL is OFF

(b) Drive Pattern

(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions (refer to (a)).

(2) Start the engine and allow it to idle for 500 seconds or more.

(3) Drive the vehicle at 25 mph (40 km/h) or more for at least 2 minutes.

(4) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure the preconditions are met, turn the ignition off and then repeat steps (2) and (3).

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DI3HJ–10

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	22.Starter 23.Starter relay 24.Park/neutral position switch	ST–15 ST–17 DI–576
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI–493 DI–509 IN–35
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–509
Engine cranks normally but difficult to start	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI–298 DI–509 EM–3
Difficult to start with cold engine	1. Starter signal circuit 2. Fuel pump control circuit	DI–298 DI–509
Difficult to start with hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI–298 DI–509
High engine idle speed (Poor idling)	1. A/C switch circuit 2. ECM power source circuit	– DI–493
Low engine idle speed (Poor idling)	1. A/C switch circuit 2. Fuel pump control circuit	– DI–509
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM–3 DI–509
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI–493 DI–509
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI–509 –
Surging (Poor driveability)	1. Fuel pump control circuit	DI–509
Engine stalls soon after starting	1. Fuel pump control circuit	DI–509
Engine stalls during A/C operation	1. A/C switch circuit 2. Engine control module (ECM)	– IN–35
Unable to refuel/Difficult to refuel	1. ORVR system	–

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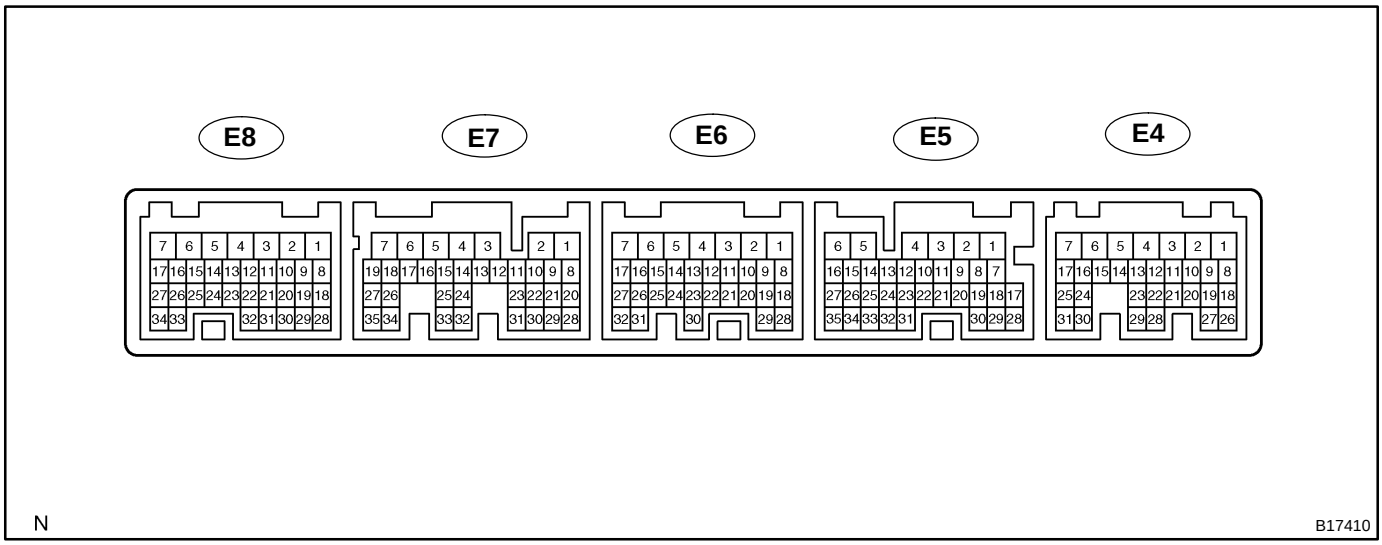
TERMINALS OF ECM



Each ECM terminals' standard voltage is shown in the table below. In the table, first follow the information under "Condition".
Look under "Symbols (Terminals No.)" for the terminals to be inspected.
The standard voltage between the terminals is shown under "STD Voltage".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage
BATT (E4–3) – E1 (E6–1)	B–Y – BR	Always	9 to 14 V
+BM (E4–7) – E1 (E6–1)	W–G – BR		
IGSW (E4–9) – E1 (E6–1)	B–O – BR	IG switch ON	9 to 14 V
+B (E4–1) – E1 (E6–1)	B–R – BR		
+B2 (E4–2) – E1 (E6–1)	B–R – BR		
MREL (E4–8) – E1 (E6–1)	B–W – BR	IG switch ON	9 to 14 V
VC (E8–23) – E2 (E8–28)	G–B – G–W	IG switch ON	4.5 to 5.5 V
VG (E8–30) – E2G (E8–29)	R–W – B–W	Idling, P or N position, A/C switch OFF	0.5 to 3.0 V
THA (E8–22) – E2 (E8–28)	Y–G – G–W	Idling, Intake air temp. 20˚C (68˚F)	0.5 to 3.4 V
THW (E8–21) – E2 (E8–28)	G–Y – G–W	Idling, Engine coolant temp. 80˚C (176˚F)	0.2 to 1.0 V
VTA1 (E8–20) – E2 (E8–28)	B–Y – G–W	IG switch ON, Accelerator pedal released	0.5 to 1.2 V
		IG switch ON, Accelerator pedal depressed	3.2 to 4.8 V
VTA2 (E8–19) – E2 (E8–28)	P–L – G–W	IG switch ON, Accelerator pedal released	2.0 to 3.1 V
		IG switch ON, Accelerator pedal depressed	4.7 to 5.1 V
VPA (E4–18) – E2 (E8–28)	G–R – G–W	IG switch ON, Accelerator pedal released	0.3 to 0.9 V
		IG switch ON, Accelerator pedal depressed	3.2 to 4.8 V
VPA2 (E4–19) – E2 (E8–28)	L–Y – G–W	IG switch ON, Accelerator pedal released	1.8 to 2.7 V
		IG switch ON, Accelerator pedal depressed	4.7 to 5.1 V
VCPA (E4–26) – EPA (E4–20)	G–B – G–W	IG switch ON	4.5 to 5.5 V
VCP2 (E4–27) – EPA2 (E4–21)	L–R – L–B	IG switch ON	4.5 to 5.5 V

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#10 (E6–2) – E01 (E8–7) #20 (E6–3) – E01 (E8–7) #30 (E6–4) – E01 (E8–7) #40 (E6–5) – E01 (E8–7) #50 (E6–6) – E01 (E8–7) #60 (E6–7) – E01 (E8–7) #70 (E8–3) – E01 (E8–7) #80 (E8–2) – E01 (E8–7)	R – W–B W – W–B G – W–B R–B – W–B L – W–B Y – W–B L–R – W–B R–W – W–B	IG switch ON	9 to 14 V
		Idling	Pulse generation (See waveform 1)
KNK1 (E7–29) – EKNK (E7–28)	G – R	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See waveform 2)
KNK2 (E7–21) – EKN2 (E7–20)	W – B		
OC1+ (E6–17) – OC1– (E6–16)	L–W – P–L	Accelerate slowly after engine warmed–up	Pulse generation (See waveform 3)
OC2+ (E6–15) – OC2– (E6–14)	L–B – R–L	Accelerate slowly after engine warmed–up	Pulse generation (See waveform 3)
VV1+ (E6–25) – VV1– (E6–24)	R – W	Idling	Pulse generation (See waveform 4)
VV2+ (E6–18) – VV2– (E6–28)	G – R	Idling	Pulse generation (See waveform 4)
G2+ (E6–19) – G2– (E6–29)	Y – L	Idling	Pulse generation (See waveform 5)
NE+ (E6–21) – NE– (E6–20)	R – G	Idling	Pulse generation (See waveform 5)
PRG (E8–34) – E1 (E6–1)	W–G – BR	IG switch ON	9 to 14 V
SPD (E5–8) – E1 (E6–1)	G–O – BR	IG switch ON, Rotate driving wheel slowly	Pulse generation (See waveform 6)
M+ (E8–5) – E1 (E6–1)	V – BR	Idling	Pulse generation (See waveform 7)
M– (E8–4) – E1 (E6–1)	P – BR	Idling	Pulse generation (See waveform 8)
FPR (E6–30) – E1 (E6–1)	V – BR	IG switch ON	0 to 3.0 V
FC (E4–10) – E1 (E6–1)	G–O – BR	IG switch ON	9 to 14 V
IGT1 (E8–8) – E1 (E6–1) IGT2 (E8–15) – E1 (E6–1) IGT3 (E8–11) – E1 (E6–1) IGT4 (E8–10) – E1 (E6–1) IGT5 (E8–13) – E1 (E6–1) IGT6 (E8–12) – E1 (E6–1) IGT7 (E8–14) – E1 (E6–1) IGT8 (E8–9) – E1 (E6–1)	B–L – BR LG–B – BR G–B – BR R–W – BR G–W – BR P–L – BR G–R – BR LG – BR	Idling	Pulse generation (See waveform 9)
IGF1 (E8–24) – E1 (E6–1) IGF2 (E8–25) – E1 (E6–1)	B–R – BR B–W – BR	IG switch ON	4.5 to 5.5 V
		Idling	Pulse generation (See waveform 9)
A1A+ (E7–22) – E1 (E6–1)	G – BR	Always (Ignition switch ON)	3.3 V*1
A1A– (E7–30) – E1 (E6–1)	R – BR	Always (Ignition switch ON)	3.0 V*1
A2A+ (E7–23) – E1 (E6–1)	W – BR	Always (Ignition switch ON)	3.3 V*1
A2A– (E7–31) – E1 (E6–1)	B – BR	Always (Ignition switch ON)	3.0 V*1
HT1B (E8–1) – E1 (E6–1) HT2B (E7–5) – E1 (E6–1)	W–R – BR Y – BR	Idling	Below 3.0 V
		IG switch ON	9 to 14 V
OX1B (E8–18) – E2 (E8–28)	G – G–W	Idling	Pulse generation (See waveform 10)

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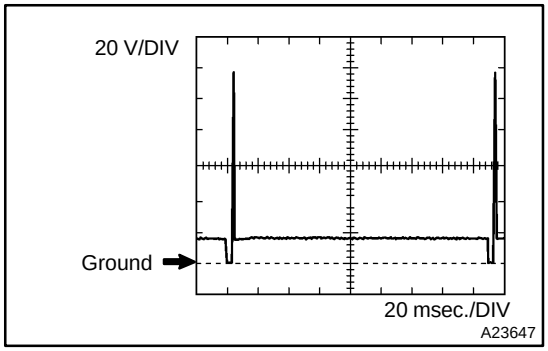
OX2B (E7–33) – E2 (E8–28)	R – G–W	Idling	Pulse generation (See waveform 10)
STP (E4–15) – E1 (E6–1)	G–Y – BR	Brake pedal is depressed	7.5 to 14 V
		Brake pedal is released	Below 1.5 V
ST1– (E4–16) – E1 (E6–1)	L–B – BR	Brake pedal is depressed	Below 1.5 V
		Brake pedal is released	7.5 to 14 V
STA (E6–11) – E1 (E6–1)	B–R – BR	Shift lever position P or N, Ignition switch START	6.0 V or more
STSW (E6–12) – E1 (E6–1)	B – BR	Shift lever position P or N, ignition switch START	6.0 V or more
STAR/NSW (E7–8) – E1 (E6–1)	B – BR	IG switch ON, Other shift position in P, N	9 to 14 V
		IG switch ON, Shift position in P, N	0 to 3.0 V
W (E5–30) – E1 (E6–1)	V–W – BR	Idling	9 to 14 V
		IG switch ON	Below 3.0 V
TACH (E5–1) – E1 (E6–1)	Y–G – BR	Idling	Pulse generation (See waveform 11)
ACIS (E8–33) – E1 (E6–1)	B–L – BR	IG switch ON	9 to 14 V
VPMP (E4–5) – E1 (E6–1)	P–L – BR	Ignition switch ON	9 V to 14 V
MPMP (E4–6) – E1 (E6–1)	V–G – BR	▶Vacuum pump OFF ▶Vacuum pump ON	0 V to 3 V 9 V to 14 V
PPMP (E4–22) – E1 (E6–1)	R–G – BR	Ignition switch ON	3 V to 3.6 V
AIV1 (E8–27) – E1 (E6–1)	L–B – BR	Ignition switch ON	9 to 14 V
AIV2 (E8–26) – E1 (E6–1)	P–L – BR	Ignition switch ON	9 to 14 V
AIRV (E4–4) – E1 (E6–1)	R–W – BR	Ignition switch ON	9 to 14 V
AIRP (E4–25) – E1 (E6–1)	G–W – BR	Ignition switch ON	9 to 14 V
AIP (E8–32) – E1 (E6–1)	B–Y – BR	Ignition switch ON	3 V to 3.6 V

*1: The ECM terminal voltage is constant regardless of the output voltage from the sensor.



WAVEFORM 1

Fuel injector

ECM Terminal Names	Between #10 (to 40) and E01
Tester Ranges	20 V/DIV, 20 msec./DIV
Conditions	Idling

HINT:

The wavelength becomes shorter as the engine rpm increases.

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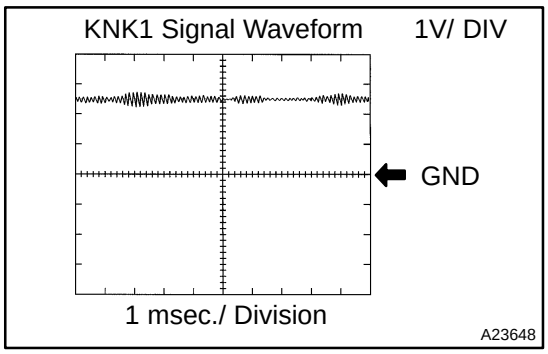


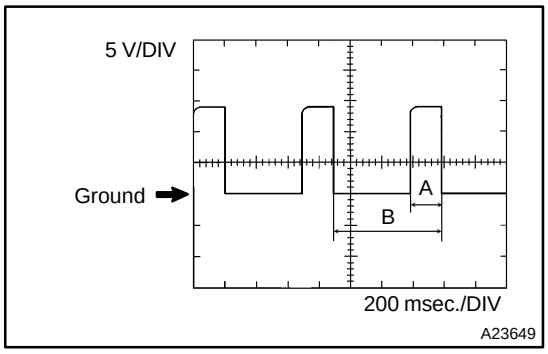
WAVEFORM 2

Knock sensor

ECM Terminal Name	Between KNK1 and EKNK Between KNK2 and EKN2
Tester Range	1 V/DIV, 1 msec./DIV
Condition	Maintain engine RPM at 2,000 rpm after engine warmed–up

HINT:

- The wavelength becomes shorter as engine rpm increases.
- The waveforms and amplitudes displayed differ slightly depending on the vehicle.



WAVEFORM 3

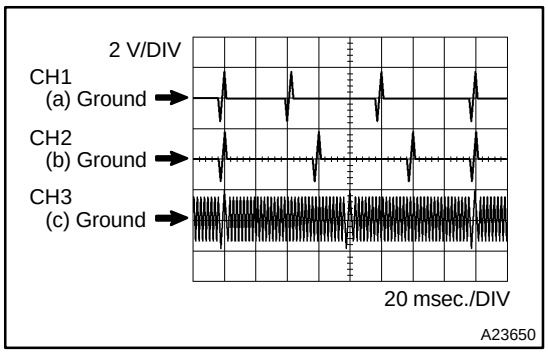
VVT OCV

ECM Terminal Name	Between OC1+ and OC1– Between OC2+ and OC2–
Tester Range	0.2 V/DIV, 200 msec./DIV
Condition	Accelerate slowly after engine warmed–up

HINT:

In the DATA LIST, the items VVT OCV DUTY B1 and B2 show the duty ratio of voltage flowing to the OCV (see illustration on left).

VVT OCV DUTY B1, B2 = A/B x 100 (%)



WAVEFORM 4

(a) VVT sensor bank 1
(b) VVT sensor bank 2
(c) Crankshaft position sensor

ECM Terminal Name	(a) Between VV1+ and VV1– (b) Between VV2+ and VV2– (c) Between NE+ and NE–
Tester Range	2 V/DIV, 20 msec./DIV
Condition	Idle after engine warmed–up

HINT:

The wavelength becomes shorter as the engine rpm increases.

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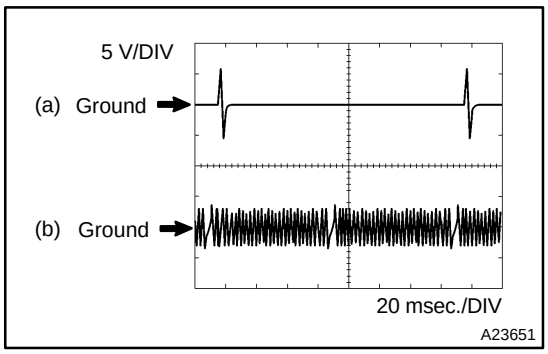


WAVEFORM 5

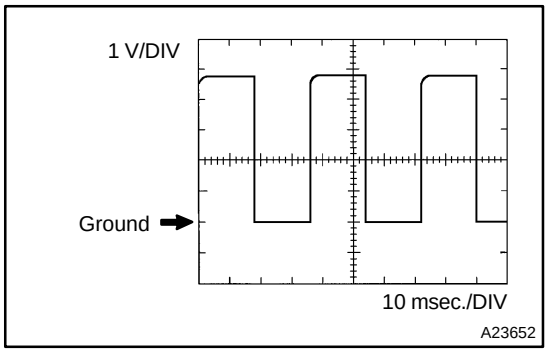
(a) Camshaft position sensor

(b) Crankshaft position sensor

ECM Terminal Name	(a) Between G2+ and G2– (b) Between NE+ and NE–
Tester Range	5 V/DIV, 20 msec./DIV
Condition	Idle after engine warmed–up

HINT:

The wavelength becomes shorter as the engine rpm increases.



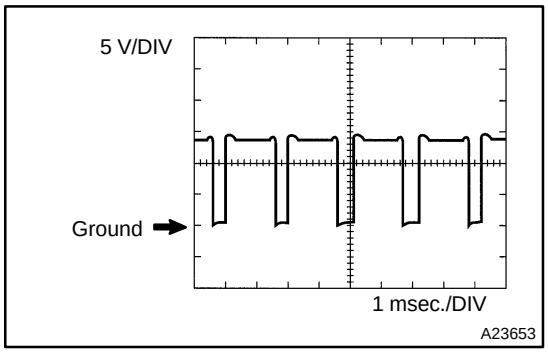
WAVEFORM 6

Vehicle speed signal

ECM Terminal Name	Between SP2+ and SP2–
Tester Range	5 V/DIV, 10 msec./DIV
Condition	Driving by 40 km/h (25 mph)

HINT:

The wavelength becomes shorter as vehicle speed increases.



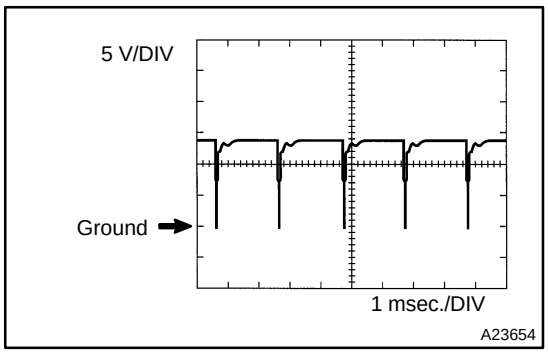
WAVEFORM 7

Throttle actuator positive terminal

ECM Terminal Name	Between M+ and ME01
Tester Range	5 V/DIV, 1 msec./DIV
Condition	Idle after engine warmed–up

HINT:

The duty ratio varies depending on the throttle opening operation.



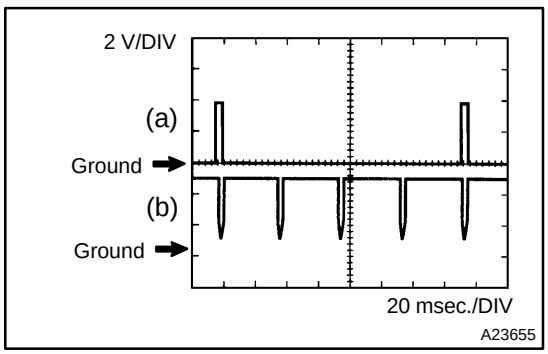
WAVEFORM 8

Throttle actuator negative terminal

ECM Terminal Name	Between M– and ME01
Tester Range	5 V/DIV, 1 msec./DIV
Condition	Idle after engine warmed–up

HINT:

The duty ratio varies depending on the throttle opening operation.



WAVEFORM 9

(a) Igniter IGT signal (from ECM to igniter)

(b) Igniter IGF signal (from igniter to ECM)

ECM Terminal Name	(a) Between IGT1 (to IGT8) and E1 (b) Between IGF1 (IGF2) and E1
Tester Range	2 V/DIV, 20 msec./DIV
Condition	Idling

HINT:

The wavelength becomes shorter as vehicle speed increases.

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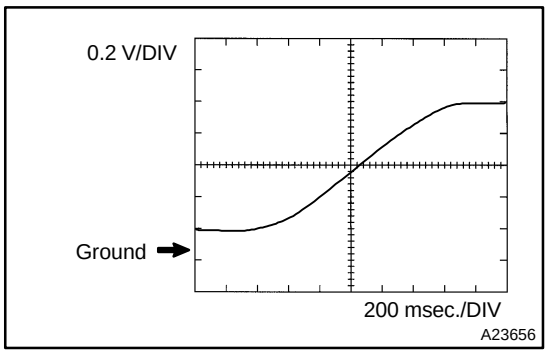


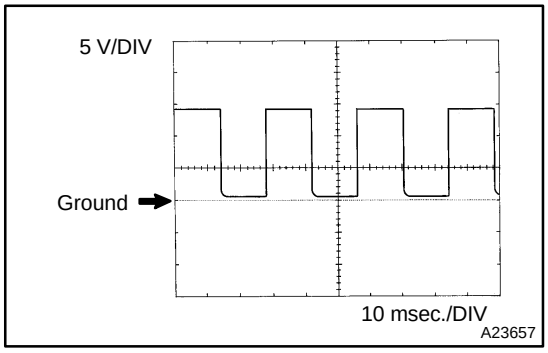
WAVEFORM 10

Heated oxygen sensor

ECM Terminal Names	Between OX1B and E2
Tester Ranges	0.2 V/DIV, 200 msec./DIV
Conditions	Engine speed maintained 2,500 rpm for 2 minutes after warming up sensor

HINT:

In the DATA LIST, item O2S B1S2 shows the ECM input values from the heated oxygen sensor.



WAVEFORM 11

Engine speed signal

ECM Terminal Names	Between TACH and E1
Tester Ranges	5 V/DIV, 10 msec./DIV
Conditions	Idling

HINT:

The wavelength becomes shorter as vehicle speed increases.

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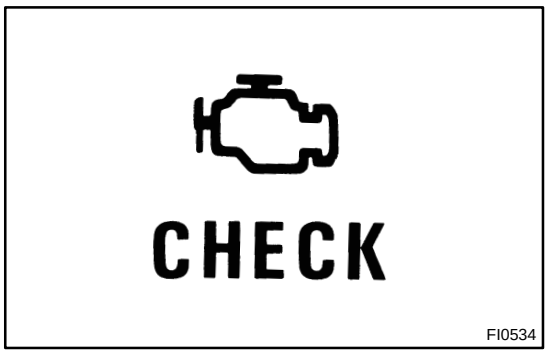
DID7X–01

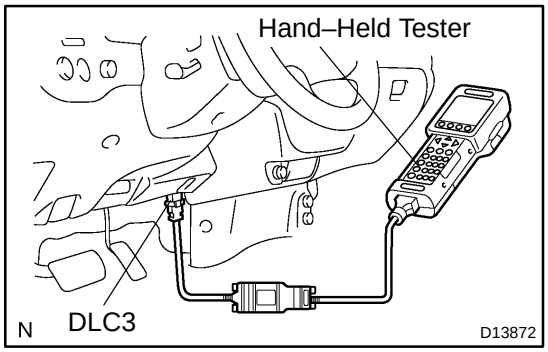
DIAGNOSIS SYSTEM



1. Description

- When troubleshooting On–Board Diagnostic (OBD ll) vehicles, the vehicle must be connected to the hand–held tester. Various data output from the vehicle's ECM can then be read.
- OBD ll regulations require that the vehicle's on–board computer illuminates the Malfunction Indicator Light (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (See page DI–58).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



To check the DTC, connect the hand–held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand–held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (See the instruction manual for the hand–held tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (See the DTC chart on page DI–58).

2. NORMAL MODE AND CHECK MODE

The diagnosis system operates in "normal mode" during normal vehicle use. In "normal mode", 2 trip detection logic* is used to ensure accurate detection of malfunctions. A "check mode" is also available to technicians as an option. In "check mode", 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions (See page DI–11).

3. 2–TRIP DETECTION LOGIC

When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. This is known as 1st trip detection. If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate. This is known as 2nd trip detection.

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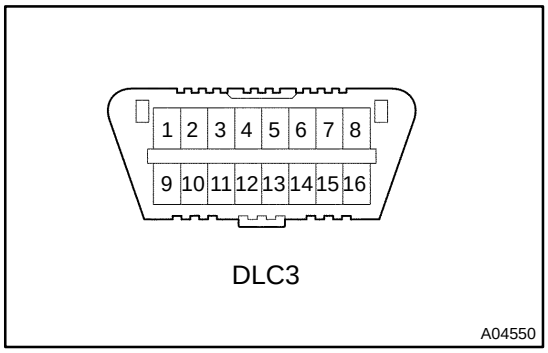
▶ Freeze frame data:
The freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Priorities for troubleshooting:
When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the component's DTC chart. If no instructions are written in the DTC chart, check DTCs in the following order of priority:

(a) DTCs other than fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175) and misfire DTCs (P0300 to P0308).
(b) Fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175).
(c) Misfire DTCs (P0300 to P0308).

4. CHECK DLC3

The vehicle's ECM uses the ISO 9141–2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.



DLC3

Symbol	Terminal Description	Condition	Specified Condition
SIL (7) – SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) – Body ground	Chassis ground	Always	Below 1 Ω
SG (5) – Body ground	Signal ground	Always	Below 1 Ω
BAT (16) – Body ground	Battery positive	Always	11 to 14 V
CANH (6) – CANL (14)	HIGH–level CAN bus line	Ignition switch OFF	54 to 69 Ω
CANH (6) – Battery positive	HIGH–level CAN bus line	Ignition switch OFF	1 MΩ or higher
CANH (6) – CG (4)	HIGH–level CAN bus line	Ignition switch OFF	1 kΩ or higher
CANL (14) – Battery positive	LOW–level CAN bus line	Ignition switch OFF	1 MΩ or higher
CANL (6) – CG (4)	LOW–level CAN bus line	Ignition switch OFF	1 kΩ or higher

HINT:
Connect the cable of the hand–held tester to the DLC3, turn the ignition switch ON and attempt to use the hand–held tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

▶ If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.

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▶ If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

5. INSPECT BATTERY VOLTAGE

Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

6. CHECK MIL

(a) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:

If the MIL is not illuminated, troubleshoot the MIL circuit (See page DI–512).

(b) When the engine is started, the MIL should not illuminate. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

7. ALL READINESS

For this vehicle, using the hand–held tester allows readiness codes corresponding to all DTCs to be read. When diagnosis (normal or malfunctioning) has been complete, readiness codes are set. Enter the following menus: ENHANCED OBD II / MONITOR STATUS on the hand–held tester.

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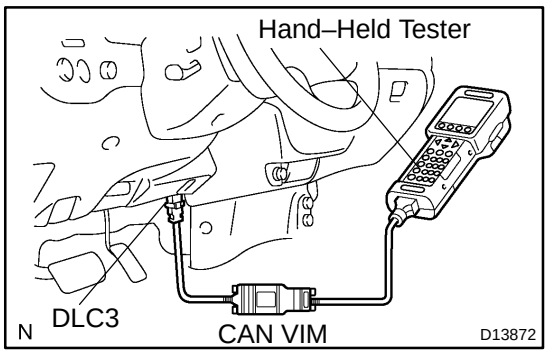
DID7Y–01



DTC CHECK / CLEAR

1. CHECK DTC

DTCs which are stored in the ECM can be displayed with the hand–held tester or generic OBD II scan tool.

These scan tools can display pending DTCs and current DTCs. Some DTCs are not stored if the ECM does not detect a malfunction during consecutive driving. However, the detected malfunction during once driving is stored as pending DTC.

(a) Connect the hand–held tester to the CAN VIM. Then connect the CAN VIM to the Data Link Connector 3 (DLC3).

(b) Turn the ignition switch to ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES (or PENDING CODE).

(d) Confirm the DTCs and freeze frame data and then write them down.

(e) See page DI–58 to confirm the details of the DTCs.

NOTICE:

When simulating a symptom with the hand–held tester to check the DTCs, use the normal mode. For DTC chart subject to ”2 trip detection logic”, perform either of the following actions.

Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL illuminates and the DTCs are recorded in the ECM.

2. CLEAR DTC

(a) Connect the hand–held tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch to ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES and press YES.

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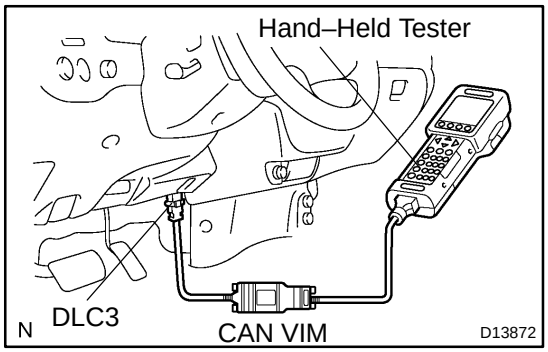
DID7Z–01

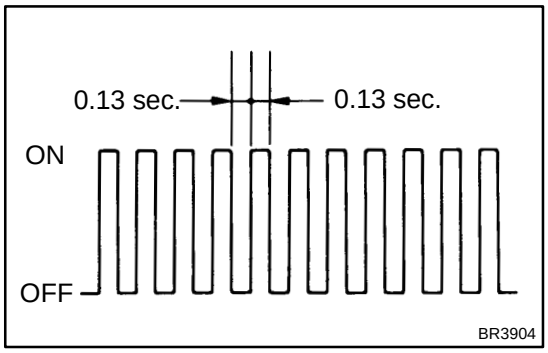
CHECK MODE PROCEDURE

HINT:

Hand–held tester only:

Check mode has a higher sensitivity to detect malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect.





1. CHECK MODE PROCEDURE

(a) Make sure that the items below are true.
  (1) Battery positive voltage 11 V or more
  (2) Throttle valve fully closed
  (3) Transmission in the P or N position
  (4) A/C switched OFF

(b) Turn the ignition switch OFF.

(c) Connect the hand–held tester to the DLC3.

(d) Turn the ignition switch ON.

(e) Change the ECM to check mode with the hand–held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE. Make sure the MIL flashes as shown in the illustration.

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the hand–held tester is used to change the ECM from normal mode to check mode or vice–versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

(f) Start the engine. The MIL should turn off after the engine starts.

(g) Simulate the conditions of the malfunction described by the customer.

(h) After simulating the malfunction conditions, use the hand–held tester diagnosis selector to check the DTC, freeze frame data and other data.

(i) After checking the DTC, inspect the applicable circuit.

2. CLEAR DTC (Using the hand–held tester)

(a) Connect the OBD ll scan tool or the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand–held tester. For the hand–held tester: 1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.

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3. CLEAR DTC (Not using the hand–held tester)

(a) Remove the EFI No. 1 and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
After disconnecting the battery terminal, perform the ”INITIALIZE” procedure.

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DID80–01

FAIL–SAFE CHART

If any of the following code is recorded, the ECM enters fail–safe mode.

DTC No.	Fail–Safe Operation	Fail–Safe Deactivation Conditions
P0031 P0032 P0037 P0038 P0051 P0052 P0057 P0058	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0100 P0102 P0103	Ignition timing is calculated from engine speed and throttle angle	”Pass” condition detected
P0110 P0112 P0113	Intake air temperature is fixed at 20°C (68°F)	”Pass” condition detected
P0115 P0117 P0118	Engine coolant temperature is fixed at 80°C (176°F)	”Pass” condition detected
P0120 P0121 P0122 P0123 P0220 P0222 P0223 P0607 P0657 P2102 P2103 P2111 P2112 P2118 P2119 P2135	If the Electronic Throttle Control System (ETCS) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16▶) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel–cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.	”Pass” condition is detected and then the ignition switch is turned OFF.
P0325 P0330	Max. timing retardation	Ignition switch OFF
P0351 P0352 P0353 P0354 P0355 P0356 P0357 P0358	Fuel cut	”Pass” condition detected

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P2120 P2121 P2122 P2123 P2125 P2127 P2128 P2138	The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.	”Pass” condition is detected and the ignition switch is turned OFF.
P2440 and P1441 and/or P1444	Restrict the throttle opening angle: Ga ≧ 30 g/s	
P1441 and P1444	Restrict the throttle opening angle: Ga ≧ 50 g/s	
P1441 P1444	Restrict the throttle opening angle: Ga ≧ 100 g/s	
P2430 P2431 P2432 P2433	Restrict the throttle opening angle: Ga ≧ 50 g/s	

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DID81–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By reading the DATA LIST displayed on a hand–held tester, you can check values, including those of the switches, sensors, and actuators, without removing any parts. Reading the DATA LIST as the first step of troubleshooting is one method of shortening diagnostic time.

NOTICE:

In the table below, the values listed under Normal Conditions are for reference only. Do not depend solely on these values when determining whether or not a part is faulty.

(a) Warm up the engine.
(b) Turn the ignition switch to OFF.
(c) Connect a hand–held tester to the DLC3.
(d) Turn the ignition switch to ON.
(e) Turn the tester ON.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) Check the values by referring to the table below.

Hand–Held Tester Display	Measurement Item:Range (Display)	Normal Condition *	Diagnostic Note
INJECTOR	Injection period of the No. 1 cylinder: Min.: 0 ms, Max.: 32.64 ms	2.3 to 3.8 ms: Idling	—
IGN ADVANCE	Ignition timing advance for No. 1 cylinder/ Min.: –64 deg., Max.: 63.5 deg.	BTDC 4 to 17˚: Idling	—
CALC LOAD	Calculated load by ECM: Min.: 0 %, Max.: 100 %	▶11 to 21 %: Idling ▶12 to 22 %: Running without load (2,500 rpm)	—
VEHICLE LOAD	Vehicle load: Min.: 0 %, Max.: 25700 %	Actual vehicle load	—
MAF	Air flow rate from MAF meter: Min.: 0 g/s, Max.: 655 g/s	2.0 to 3.9 g/s: Idling	If the value approximately 0.0 g/s: ▶Mass air flow meter power source circuit open ▶VG circuit open or short If the value 160.0 g/s or more: ▶E2G circuit open
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383 rpm	600 ≧50 rpm: Idling	—
VEHICLE SPD	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature: Min.: –40◀C, Max.: 140◀C	80 to 100˚C (176 to 212˚F): After warming up	▶If the value –40◀C (–40◀F): sensor circuit open ▶If the value 140◀C (284◀F): sensor circuit shorted
INTAKE AIR	Intake air temperature: Min.: –40◀C, Max.: 140◀C	Equivalent to ambient air temperature	▶If the value –40◀C (–40◀F): sensor circuit open ▶If the value 140◀C (284◀F): sensor circuit shorted
SECONDARY AIR	Second air system status: ON or OFF	ON: Secondary air system operation	—
AIR–FUEL RATIO	Air–fuel ratio: Min.: 0, Max.: 1.999	0.8 to 1.2: During idling	—
EVAP VAPOR PRES	EVAP vapor pressure: Min.: –8192 Pa, Max.: 8191 Pa	0 Pa: Fuel tank cap removed	—

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PURGE DENSITY	Learning value of purge density/ Min.: –50, Max.: 350	Idling: –40 to 0 %	Service data
PURGE FLOW	Purge flow: Min.: 0 %, Max.: 102.4 %	0 to 100 %: Idling	—
EVAP PURGE VSV	EVAP (Purge) VSV control duty: Min.: 0 %, Max.: 100 %	0 to 100 %: During idling	Order signal from ECM
VAPOR PRESS	Vapor pressure: Min.: –4.125 kPa, Max.: 2.125 kPa	0 kPa: Fuel tank cap removed	Pressure inside fuel tank monitored by the vapor pressure sensor
KNOCK CRRT VAL	Correction learning value of knocking: Min.: –64 CA, Max.: 1,984 CA	0 to 22 ◀CA: Driving, 44 mph (70 km/h)	Service data
KNOCK FB VAL	Feedback value of knocking: Min.: –64 CA, Max.: 1,984 CA	–22 to 0 ◀CA Driving, 44 mph (70 km/h)	Service data
ACCEL POS #1	Absolute Accelerator Pedal Position (APP) No. 1: Min.: 0 %, Max.: 100 %	10 to 22 %: accelerator pedal is released 54 to 86 %: accelerator pedal is fully depressed	—
ACCEL POS #2	Absolute APP No. 2: Min.: 0 %, Max.: 100 %	12 to 42 %: accelerator pedal is released 66 to 98 %: The accelerator pedal is fully depressed	—
ACCEL POS #1	APP sensor No. 1 voltage: Min.: 0 V, Max.: 4.98 V	—	ETCS freeze data
ACCEL POS #2	APP sensor No. 2 voltage: Min.: 0 V, Max.: 4.98 V	—	ETCS freeze data
ACCEL POS #1	APP sensor No. 1 voltage: Min.: 0 V, Max.: 5 V	0.5 to 1.1 V: accelerator pedal is released. 2.6 to 4.5 V: or pedal is fully depressed.	—
ACCEL POS #2	APP sensor No. 2 voltage: Min.: 0 V, Max.: 5 V	1.2 to 2.0 V: accelerator pedal is released. 3.4 to 5.3 V: accelerator pedal is fully depressed.	—
ACCEL IDL POS	Whether or not accelerator pedal position sensor detecting idle: ON or OFF	ON: Idling	—
THRTL LEARN VAL	Throttle valve fully closed (learned value):	0.4 to 0.8 V	—
ACCEL SSR #1 AD	Accelerator fully closed value No.1 (AD): Min.: 0, Max.: 4.98 V	—	ETCS service data
ACCEL LRN VAL#1	Accelerator fully closed learning value No.1: Min.: 0, Max.: 124.512	—	ETCS service data
ACCEL LRN VAL#2	Accelerator fully closed learning value No.2: Min.: 0, Max.: 124.512	—	ETCS service data
FAIL #1	Whether or not fail safe function executed: ON or OFF	ON: ETCS has failed	—
FAIL #2	Whether or not fail safe function executed: ON or OFF	ON: ETCS has failed	—

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ST1	Starter signal: ON or OFF	ON: Cranking	—
SYSGUARD JUDGE	System guard: ON or OFF	—	ETCS service data
OPN MALFUNCTION	Open side malfunction: ON or OFF	—	ETCS service data
THROTTLE POS	Absolute throttle position sensor: Min.: 0 %, Max.: 100 %	▶10 to 24 %: Throttle fully closed ▶64 to 96 %: Throttle fully open	Read the value with intrusive operation (active test)
THROTTL IDL POS	Whether or not throttle position sensor detecting idle: ON or OFF	ON: Idling	—
THRTL REQ POS	Throttle requirement position: Min.: 0 V, Max.: 5 V	0.5 to 1.0 V: Idling	—
THROTTLE POS	Throttle sensor positioning: Min.: 0 %, Max.: 100 %	10 to 18 %: Idling	Calculated value based on VTA1
THROTTLE POS #2	Throttle sensor positioning #2: Min.: 0 %, Max.: 100 %	—	Calculated value based on VTA2
THROTTLE POS #1	Throttle position sensor No. 1 output voltage: Min.: 0 V, Max.: 4.9 V	—	ETCS freeze data
THROTTLE POS #2	Throttle position sensor No.2 output voltage: Min.: 0 V, Max.: 4.9 V	—	ETCS freeze data
THROTTLE POS #1	Throttle position No. 1: Min.: 0 V, Max.: 5 V	▶0.5 to 1.2 V: Throttle fully closed ▶3.2 to 4.8 V: Throttle fully opened	—
THROTTLE POS #2	Throttle position No. 2: Min.: 0 V, Max.: 5 V	▶2.0 to 2.9 V: Throttle fully closed ▶4.6 to 5.5 V: Throttle fully open	Read the value with intrusive operation (active test)
THRTL COMND VAL	Throttle position command value: Min.: 0 V, Max.: 4.98 V	0.5 to 4.8 V	ETCS service data
THROTTLE SSR #1	Throttle sensor opener position No. 1: Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data
THROTTLE SSR #2	Throttle sensor opener position No. 2: Min.: 0 V, Max.: 4.98 V	2.2 to 2.6 V	ETCS service data
THRTL SSR #1 AD	Throttle sensor opener position No.1 (AD): Min.: 0 V, Max.: 4.98 V	0.6 to 0.9 V	ETCS service data
THROTTLE MOT	Whether or not throttle motor control permitted: ON or OFF	ON: Idling	Read the value with the power switch ON (Do not start engine)
THROTTLE MOT	Throttle motor current: Min.: 0 A, Max.: 80 A	0 to 3.0 A: Idling	—
THROTTLE MOT	Throttle motor: Min.: 0 %, Max.: 100 %	0.5 to 40 %: Idling	—
THROTTLE MOT	Throttle motor current: Min.: 0 A, Max.: 19.92 A	0 to 3.0 A: Idling	—
THROTL OPN DUTY	Throttle motor opening duty ratio: Min.: 0 %, Max.: 100 %	0 to 40 %: During idling	When accelerator pedal depressed, duty ratio increased
THROTL CLS DUTY	Throttle motor closed duty ratio: Min.: 0 %, Max.: 100 %	0 to 40 %: During idling	When accelerator pedal released quickly, duty ratio increased
THRTL MOT (OPN)	Throttle motor duty ratio (open): Min.: 0 %, Max.: 100 %	—	ETCS service data

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THRTL MOT (CLS)	Throttle motor duty ratio (close): Min.: 0 %, Max.: 100 %	—	ETCS service data
O2S B1 S2	Heated oxygen sensor output voltage for bank 1 sensor 2: Min.: 0 V, Max.: 1.275 V	0.1 to 0.9 V: Driving 44 mph (70 km/h)	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
O2S B2 S2	Heated oxygen sensor output voltage for bank 1 sensor 2: Min.: 0 V, Max.: 1.275 V	0.1 to 0.9 V: Driving 44 mph (70 km/h)	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
AFS B1 S1	A/F sensor output voltage for bank 1 sensor 1: Min.: 0 V, Max.: 7.999 V	2.8 to 3.8 V: Idling	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
AFS B2 S1	A/F sensor output voltage for bank 1 sensor 1: Min.: 0 V, Max.: 7.999 V	2.8 to 3.8 V: Idling	Performing the INJ VOL or A/F CONTROL function of the ACTIVE TEST enables the technician to check voltage output of the sensor
TOTAL FT #1	Total fuel trim of bank 1 Average value for fuel trim system of bank 1: Min.: –0.5, Max.: 1,496	–0.2 to 0.2: Idling	—
TOTAL FT #2	Total fuel trim of bank 1 Average value for fuel trim system of bank 1: Min.: –0.5, Max.: 1,496	–0.2 to 0.2: Idling	—
SHORT FT #1	Short–term fuel trim of bank 1: Min.: –100 %, Max.: 99.2%	0 ± 20 %	This item the short–term fuel compensation used to maintain the air–fuel ratio at stoichiometric air–fuel ratio
SHORT FT #2	Short–term fuel trim of bank 1: Min.: –100 %, Max.: 99.2%	0 ± 20 %	This item the short–term fuel compensation used to maintain the air–fuel ratio at stoichiometric air–fuel ratio
LONG FT #1	Long–term fuel trim of bank 1: Min.: –100 %, Max.: 99.2 %	0 ± 20 %	This item the overall fuel compensation carried out in long–term to compensate a continual deviation of the short–term fuel trim from the central value
LONG FT #2	Long–term fuel trim of bank 1: Min.: –100 %, Max.: 99.2 %	0 ± 20 %	This item the overall fuel compensation carried out in long–term to compensate a continual deviation of the short–term fuel trim from the central value
FUEL SYS #1	Fuel system status (Bank1): OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling after warming up	▶OL (Open Loop): Has not yet satisfied conditions to go closed loop ▶CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control. ▶OL DRIVE: Open loop due to driving conditions (fuel enrichment) ▶OL FAULT: Open loop due to detected system fault ▶CL FAULT: Closed loop but heated oxygen sensor, which used for fuel control malfunctioning

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FUEL SYS #2	Fuel system status (Bank1): OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling after warming up	▶OL (Open Loop): Has not yet satisfied conditions to go closed loop ▶CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control. ▶OL DRIVE: Open loop due to driving conditions (fuel enrichment) ▶OL FAULT: Open loop due to detected system fault ▶CL FAULT: Closed loop but heated oxygen sensor, which used for fuel control malfunctioning
O2FT B1 S2	Short–term fuel trim associated with the bank 1 sensor 2: Min.: –100 %, Max.: 99.2 %	0 ± 20 %	Same as SHORT FT #1
O2FT B2 S2	Short–term fuel trim associated with the bank 1 sensor 2: Min.: –100 %, Max.: 99.2 %	0 ± 20 %	Same as SHORT FT #1
AF FT B1 S1	Short–term fuel trim associated with the bank 1 sensor 1: Min.: 0, Max.: 1.999	▶Value less than 1 (0.000 to 0.999) = Lean ▶Stoichiometric air–fuel ratio=1 ▶Value greater than 1 (1.001 to 1.999) = RICH	—
AF FT B2 S1	Short–term fuel trim associated with the bank 1 sensor 1: Min.: 0, Max.: 1.999	▶Value less than 1 (0.000 to 0.999) = Lean ▶Stoichiometric air–fuel ratio=1 ▶Value greater than 1 (1.001 to 1.999) = RICH	—
CAT TEMP B1S1	Catalyst temperature (Bank 1, Sensor 1): Min.: –40, Max.: 6,513.5 ◀C	—	—
CAT TEMP B2S1	Catalyst temperature (Bank 1, Sensor 1): Min.: –40, Max.: 6,513.5 ◀C	—	—
CAT TEMP B1S2	Catalyst temperature (Bank 1, Sensor 2): Min.: –40, Max.: 6,513.5 ◀C	—	—
CAT TEMP B2S2	Catalyst temperature (Bank 1, Sensor 2): Min.: –40, Max.: 6,513.5 ◀C	—	—
INI COOL TEMP	Initial engine coolant temperature: Min.: –40◀C, Max.: 140◀C	Close to ambient air temperature	Service data
INI INTAKE TEMP	Initial intake air temperature: Min.: –40◀C, Max.: 140◀C	Close to ambient air temperature	Service data
INJ VOL	Injection volume (cylinder 1): Min.: 0 ml, Max.: 2.048 ml	0 to 0.5 ml	Quantity of fuel injection volume for 10 times
STARTER SIG	Starter signal: ON or OFF	ON: Cranking	—
PS SW	Power steering signal: ON or OFF	ON: Power steering operation	—
PS SIGNAL	Power steering signal: ON or OFF	ON: When steering wheel first turned after ignition switch turned to ON	This signal status usually ON until ignition switch turned to OFF
CTP SW	Closed throttle position switch: ON or OFF	▶ON: Throttle fully closed ▶OFF: Throttle open	—

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A/C SIG	A/C signal: ON or OFF	ON: A/C ON	—
ELECT LOAD SIG	Electrical load signal: ON or OFF	ON: Headlights or defogger is turned ON	—
STOP LIGHT SW	Stop lamp switch: ON or OFF	ON: brake pedal is depressed.	—
+BM	Whether or not electric throttle control system power inputted: ON or OFF	ON: Idling	—
+BM VOLTAGE	+BM voltage: Min.: 0, Max.: 19.92	10 to 15 V: Idling	ETCS service data
BATTERY VOLTAGE	Battery voltage: Min.: 0 V, Max.: 65.535 V	9 to 14 V: Idling	—
ACTUATOR POWER	Actuator power supply: ON or OFF	ON: Idling	ETCS service data
ATM PRESSURE	Atmospheric pressure: Min.: 0 kPa, Max.: 150 kPa	Equivalent to atmospheric pressure (absolute pressure)	—
SECOND AIR VSV	Secondary air injection system status	ON: Secondary air injection system operation	—
ACT VSV	A/C cut status for Active Test: ON or OFF	—	Active Test support data
EVAP (Purge) VSV	VSV status for EVAP control: ON or OFF	—	Active Test support data
FUEL PUMP / SPD	Fuel pump/speed status: ON or OFF	—	Active Test support data
VVT CTRL B1	VVT control status: ON or OFF	—	Active Test support data
VVT CTRL B2	VVT control status: ON or OFF	—	Active Test support data
VACUUM PUMP	Key–off EVAP system pump status: ON or OFF	—	Active Test support data
EVAP VENT VAL	Key–off EVAP system vent valve status: ON or OFF	—	Active Test support data
TC/TE1	TC and TE1 terminal of DLC3: ON or OFF	—	—
VVTL AIM ANGL #1	VVT aim angle (bank 1): Min.: 0 %, Max.: 100 %	0 %: Idling	VVT duty signal value during intrusive operation
VVTL AIM ANGL #2	VVT aim angle (bank 1): Min.: 0 %, Max.: 100 %	0 %: Idling	VVT duty signal value during intrusive operation
VVT CHNG ANGL #1	VVT change angle: Min.: 0◀FR, Max.: 60◀FR	0 to 5 ◀FR: Idling	Displacement angle during intrusive operation
VVT CHNG ANGL #2	VVT change angle: Min.: 0◀FR, Max.: 60◀FR	0 to 5 ◀FR: Idling	Displacement angle during intrusive operation
VVT OCV DUTY B1	VVT OCV operation duty: Min.: 0 %, Max.: 100 %	0 %: Idling	Requested duty value for intrusive operation
VVT OCV DUTY B2	VVT OCV operation duty: Min.: 0 %, Max.: 100 %	0 %: Idling	Requested duty value for intrusive operation
FC IDL	Fuel cut idle: ON or OFF	ON: Fuel cut operation	FC IDL = ”ON” when throttle valve fully closed and engine speed over 2,800 rpm

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FC TAU	Fuel cut TAU: Fuel cut during very light load: ON or OFF	ON: Fuel cut operating	The fuel cut being performed under very light load to prevent the engine combustion from becoming incomplete
IGNITION	Ignition counter: Min.: 0, Max.: 800	0 to 800	—
CYL #1, #2, #3, #4, #5, #6, #7, #8	Misfire ratio of the cylinder 1 to 4: Min.: 0, Max.: 255	0 %	This item displayed in only idling
CYL ALL	All cylinders misfire rate: Min.: 0, Max.: 255	0 to 35	—
MISFIRE RPM	Engine RPM for first misfire range: Min.: 0 rpm, Max.: 6,375 rpm	0 rpm: Misfire 0	—
MISFIRE LOAD	Engine load for first misfire range: Min.: 0 g/rev, Max.: 3.98 g/rev	0 g/rev: Misfire 0	—
MISFIRE MARGIN	Misfire monitoring: MIn.: –100 %, Max.: 99.22 %	–100 to 99.2 %	Misfire detecting margin
#CODES	#Codes: Min.: 0, Max.: 255	—	Number of detected DTCs
CHECK MODE	Check mode: 0: ON, 1: OFF	ON: Check mode ON	See page DI–44
SPD TEST	Check mode result for vehicle speed sensor: 0: COMPL, 1: INCOMPL	—	—
AS TEST	Check mode result for secondary air injection system: 0: COMPL, 1: INCOMPL	—	—
MISFIRE TEST	Check mode result for misfire monitor: 0: COMPL, 1: INCOMPL	—	—
OXS1 TEST	Check mode result for HO2 sensor : 0: COMPL, 1: INCOMPL	—	—
OXS2 TEST	Check mode result for HO2 sensor : 0: COMPL, 1: INCOMPL	—	—
A/F SSR TEST B1	Check mode result for air–fuel ratio sensor : 0: COMPL, 1: INCOMPL	—	—
A/F SSR TEST B2	Check mode result for air–fuel ratio sensor : 0: COMPL, 1: INCOMPL	—	—
MIL	MIL status: ON or OFF	ON: MIL ON	—
MIL ON RUN DIST	MIL ON Run Distance: Min.: 0 second, Max.: 65,535 seconds	Distance after DTC detected	—
MIL ON RUN TIME	Running time from MIL ON: Min.: 0 minute, Max.: 65,535 minutes	Equivalent to running time after MIL was ON	—
ENG RUN TIME	Engine run time: Min.: 0 second, Max.: 65,535 seconds	Time after engine start	Service data
TIME DTC CLEAR	Time after DTC cleared: Min.: 0 minute, Max.: 65,535 minutes	Equivalent to time after DTCs were erased	—

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DIST DTC CLEAR	Distance after DTC cleared: Min.: 0 km/h, Max.: 65535 km/h	Equivalent to drive distance after DTCs were erased	—
WU CYC DTC CLEAR	Warm–up cycle after DTC cleared: Min.: 0, Max.: 255	—	Number of warm–up cycles after DTC cleared
MODEL CODE	Model code:	—	Identifying the model code: UCK30 (2WD), UCK40 (4WD)
ENGINE TYPE	Engine type:	—	Identifying the engine type: 2UZFE
CYLINDER NUMBER	Cylinder number: Min.: 0, Max.: 255	—	Identifying the cylinder number: 8
TRANSMISSION	Transmission type:	—	Identifying the transmission type: ECT(5AT)
DESTINATION	Destination	—	Identifying the destination: A (America)
MODEL YEAR	Model year: Min.: 0, Max.: 255	—	Identifying the model year: 200#
SYSTEM	System identification	—	Identifying the engine system: GASLIN (gasoline engine)
AI STATUS	AI operation prohibit: OK or NG	OK	

*1: If no idling conditions are specified, the transmission gear selector lever should be in the N or P position, and the A/C switch and all accessory switches should be OFF.

2. ACTIVE TEST

HINT:

Performing an ACTIVE TEST enables components including the relays, VSV (Vacuum Switching Valve), and actuators, to be operated without removing any parts. The ACTIVE TEST can be performed with a hand–held tester. Performing an ACTIVE TEST as the first step of troubleshooting is one method of shortening diagnostic time.

DATA LIST can be displayed during ACTIVE TESTs.

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Turn the tester ON.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(e) Perform the ACTIVE TEST by referring to the table below.

Hand–held Tester Displays	Test Details	Control Ranges	Diagnostic Notes
INJ VOL	Change injection volume	Between –12 % and 25 %	▶All injectors tested at the same time ▶Perform test at less than 3,000 rpm ▶Injection volume can be changed in 1 % graduations within control range
A/F CONTROL	Change injection volume	Lower by 12.5 % or increase by 25 %	▶Perform test at less than 3,000 rpm ▶A/F CONTROL enables checking and graphing of A/F (Air Fuel Ratio) sensor and Heated Oxygen (HO2) sensor voltage outputs ▶To conduct test, select following menu items: ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press YES and ENTER followed by F4
EVAP VSV (ALONE)	Activate EVAP VSV control	ON/OFF	–

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VVT CTRL B1	Turn on and off OCV (Oil Control Valve)	ON/OFF	▶Engine stalls or idles roughly when OCV turned ON ▶Normal engine running or idling when OCV off
VVT CTRL B2	Turn on and off OCV (Oil Control Valve)	ON/OFF	▶Engine stalls or idles roughly when OCV turned ON ▶Normal engine running or idling when OCV off
A/C CUT SIG	Control A/C cut signal	ON/OFF	–
FUEL PUMP/SPD	Activate fuel pump (C/OPN Relay)	ON/OFF	–
TC/TE1	Turn on and off TC and TE1 connection	ON/OFF	▶ON: TC and TE1 connected ▶OFF: TC and TE1 disconnected
FC IDL PROHBT	Prohibit idling fuel cut control	ON/OFF	–
ETCS OPEN SLOW	Throttle actuator	ON: throttle valve opens slowly	This test is possible when the following conditions are met: ▶Ignition switch ON ▶Engine does not start ▶Fully depressing accelerator pedal (APP: 58 degrees or more)
ETCS CLOSE SLOW	Throttle actuator	ON: throttle valve closes slowly	Same as above
ETCS OPEN FAST	Throttle actuator	ON: throttle valve opens fast	Same as above
ETCS CLOSE FAST	Throttle actuator	ON: throttle valve closes fast	Same as above
FUEL CUT #1	Cylinder #1 injector fuel cut	ON/OFF	This test is possible during vehicle stopping and engine idling.
FUEL CUT #2	Cylinder #2 injector fuel cut	ON/OFF	Same as above
FUEL CUT #3	Cylinder #3 injector fuel cut	ON/OFF	Same as above
FUEL CUT #4	Cylinder #4 injector fuel cut	ON/OFF	Same as above
FUEL CUT #5	Cylinder #5 injector fuel cut	ON/OFF	Same as above
FUEL CUT #6	Cylinder #6 injector fuel cut	ON/OFF	Same as above
FUEL CUT #7	Cylinder #7 injector fuel cut	ON/OFF	Same as above
FUEL CUT #8	Cylinder #8 injector fuel cut	ON/OFF	Same as above
VENT VALVE (ALONE)	Activate vent valve (built into pump module)	ON/OFF	–
VCUUM PUMP	Activate vacuum pump (built into pump module)	ON/OFF	–

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3. SYSTEM CHECK

HINT:

Performing a SYSTEM CHECK enables the system, which consists of multiple actuators, to be operated without removing any parts. In addition, it can show whether or not any DTCs are set, and can detect potential malfunctions in the system. The SYSTEM CHECK can be performed with a hand–held tester.

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Turn the tester ON.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK.
(e) Perform the SYSTEM CHECK by referring to the table below.

Hand–held Tester Displays	Test Details	Recommended Fuel Temperatures	Diagnostic Notes
EVAP SYS CHECK (AUTO OPERATION)	Perform 5 steps in order to operate EVAP key–off monitor automatically	35°C (95°F) or less	▶If no DTCs in PENDING CODE after performing this test, system functioning normally ▶Refer to EVAP Inspection Procedure on page DI–460
EVAP SYS CHECK (MANUAL OPERATION)	Perform 5 steps in order to operate EVAP key–off monitor manually	35°C (95°F) or less	▶Used to detect malfunctioning parts ▶Refer to EVAP Inspection Procedure on page DI–460
AI INJ CHECK (AUTO OPERATION)	Perform 6 steps in order to operate air injection system automatically	–	▶If no DTCs in PENDING CODE after performing this test, system functioning normally
AI INJ CHECK (MANUAL OPERATION)	Perform 8 operations in order to operate air injection system monitor manually	–	▶Used to detect malfunctioning parts

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DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for the codes listed in the table below. For details of each code, refer to the ”See page” under the respective ’’DTC No.’’ in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*1	Memory
P0010 (DI–73)	Camshaft Position ”A” Actuator Circuit (Bank 1)	▶Open or short in OCV circuit ▶OCV ▶ECM	◀	◀
P0011 (DI–79)	Camshaft Position ”A” –Timing Over– Advanced or System Performance (Bank 1)	▶Valve timing ▶OCV ▶VVT controller assembly ▶ECM	◀	◀
P0012 (DI–79)	Camshaft Position ”A” –Timing Over– Retarded (Bank 1)	▶Valve timing ▶OCV ▶VVT controller assembly ▶ECM	◀	◀
P0016 (DI–85)	Crankshaft Position – Camshaft Position Correlation (Bank 1 Sensor A)	▶Open or short in VVT sensor circuit ▶VVT sensor ▶ECM	◀	◀
P0018 (DI–85)	Crankshaft Position – Camshaft Position Correlation (Bank 2 Sensor A)	▶Open or short in VVT sensor circuit ▶VVT sensor ▶ECM	◀	◀
P0020 (DI–73)	Camshaft Position ”A” Actuator Circuit (Bank 2)	▶Open or short in OCV circuit ▶OCV ▶ECM	◀	◀
P0021 (DI–79)	Camshaft Position ”A” –Timing Over– Advanced or System Performance (Bank 2)	▶Valve timing ▶OCV ▶VVT controller assembly ▶ECM	◀	◀
P0022 (DI–79)	Camshaft Position ”A” –Timing Over– Retarded (Bank 2)	▶Valve timing ▶OCV ▶VVT controller assembly ▶ECM	◀	◀
P0031 (DI–88)	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	▶Open in heater circuit of A/F sensor ▶A/F sensor heater ▶A/F relay ▶ECM	◀	◀
P0032 (DI–88)	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)	▶Short in heater circuit of A/F sensor ▶A/F sensor heater ▶A/F relay ▶ECM	◀	◀
P0037 (DI–93)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	▶Open in heater circuit of heated oxygen sensor ▶Heated oxygen sensor heater ▶EFI relay ▶ECM	◀	◀
P0038 (DI–93)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	▶Short in heater circuit of heated oxygen sensor ▶Heated oxygen sensor heater ▶EFI relay ▶ECM	◀	◀

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P0051 (DI–88)	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 2 Sensor 1)	▶Open in heater circuit of A/F sensor ▶A/F sensor heater ▶A/F relay ▶ECM	◀	◀
P0052 (DI–88)	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 2 Sensor 1)	▶Short in heater circuit of A/F sensor ▶A/F sensor heater ▶A/F relay ▶ECM	◀	◀
P0057 (DI–93)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)	▶Open in heater circuit of heated oxygen sensor ▶Heated oxygen sensor heater ▶EFI relay ▶ECM	◀	◀
P0058 (DI–93)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)	▶Short in heater circuit of heated oxygen sensor ▶Heated oxygen sensor heater ▶EFI relay ▶ECM	◀	◀
P0100 (DI–102)	Mass or Volume Air Flow Circuit	▶Open or short in mass air flow meter circuit ▶Mass air flow meter ▶ECM	◀	◀
P0101 (DI–110)	Mass or Volume Air Flow Circuit Range/Performance Problem	▶Mass air flow meter	◀	◀
P0102 (DI–102)	Mass or Volume Air Flow Circuit Low Input	▶Open or short in mass air flow meter circuit ▶Mass air flow meter ▶ECM	◀	◀
P0103 (DI–102)	Mass or Volume Air Flow Circuit High Input	▶Open or short in mass air flow meter circuit ▶Mass air flow meter ▶ECM	◀	◀
P0110 (DI–113)	Intake Air Temperature Circuit	▶Open or short in intake air temperature sensor circuit ▶Intake air temperature sensor (built in mass air flow meter) ▶ECM	◀	◀
P0112 (DI–113)	Intake Air Temperature Circuit Low Input	▶Open or short in intake air temperature sensor circuit ▶Intake air temperature sensor (built in mass air flow meter) ▶ECM	◀	◀
P0113 (DI–113)	Intake Air Temperature Circuit High Input	▶Open or short in intake air temperature sensor circuit ▶Intake air temperature sensor (built in mass air flow meter) ▶ECM	◀	◀
P0115 (DI–119)	Engine Coolant Temperature Circuit	▶Open or short in engine coolant temperature sensor circuit ▶Engine coolant temperature sensor ▶ECM	◀	◀
P0116 (DI–125)	Engine Coolant Temperature Circuit Range/Performance Problem	▶Engine coolant temperature sensor	◀	◀
P0117 (DI–119)	Engine Coolant Temperature Circuit Low Input	▶Open or short in engine coolant temperature sensor circuit ▶Engine coolant temperature sensor ▶ECM	◀	◀
P0118 (DI–119)	Engine Coolant Temperature Circuit High Input	▶Open or short in engine coolant temperature sensor circuit ▶Engine coolant temperature sensor ▶ECM	◀	◀
P0120 (DI–127)	Throttle/Pedal Position Sensor/ Switch "A" Circuit	▶Open or short in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶ECM	◀	◀
P0121 (DI–137)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Range/Performance Problem	▶Throttle control motor and sensor	◀	◀

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P0122 (DI–127)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit Low Input	▶Short in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Short in VTA1 circuit ▶Open in VC circuit ▶ECM	◀	◀
P0123 (DI–127)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit High Input	▶Open in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Open in VTA1 circuit ▶Open in E2 circuit ▶VC and VTA1 circuit are short–circuited ▶ECM	◀	◀
P0125 (DI–139)	Insufficient Coolant Temperature for Closed Loop Fuel Control	▶Cooling system ▶Engine coolant temperature sensor ▶Thermostat	◀	◀
P0128 (DI–142)	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	▶Thermostat ▶Cooling system ▶Engine coolant temperature sensor ▶ECM	¿	¿
P0136 (DI–146)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	▶Open or short in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶HO2 sensor heater (sensor 2) ▶Air–Fuel Ratio (A/F) sensor (sensor 1) ▶EFI relay ▶Gas leakage from exhaust system	◀	◀
P0137 (DI–146)	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)	▶Open in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶HO2 sensor heater (sensor 2) ▶EFI relay ▶Gas leakage from exhaust system	◀	◀
P0138 (DI–146)	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	▶Short in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶ECM internal circuit malfunction	◀	◀
P0156 (DI–146)	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	▶Open or short in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶HO2 sensor heater (sensor 2) ▶Air–Fuel Ratio (A/F) sensor (sensor 1) ▶EFI relay ▶Gas leakage from exhaust system	◀	◀
P0157 (DI–146)	Oxygen Sensor Circuit Low Voltage (Bank 2 Sensor 2)	▶Open in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶HO2 sensor heater (sensor 2) ▶EFI relay ▶Gas leakage from exhaust system	◀	◀
P0158 (DI–146)	Oxygen Sensor Circuit High Voltage (Bank 2 Sensor 2)	▶Short in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶ECM internal circuit malfunction	◀	◀

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P0171 (DI–165)	System too Lean (Bank 1)	▶Air induction system ▶Injector blockage ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Fuel pressure ▶Gas leakage on exhaust system ▶Open or short in heated oxygen sensor (bank 1 sensor 1) circuit ▶Heated oxygen sensor (bank 1 sensor 1) ▶Heated oxygen sensor heater ▶EFI relay ▶PCV piping ▶ECM	◀	◀
P0172 (DI–165)	System too Rich (Bank 1)	▶Injector leak, blockage ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Ignition system ▶Fuel pressure ▶Gas leakage in exhaust system ▶Open or short in heated oxygen sensor (bank 1 sensor 1) circuit ▶Heated oxygen sensor (bank 1 sensor 1) ▶ECM	◀	◀
P0174 (DI–165)	System too Lean (Bank 2)	▶Air induction system ▶Injector blockage ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Fuel pressure ▶Gas leakage on exhaust system ▶Open or short in heated oxygen sensor (bank 2 sensor 1) circuit ▶Heated oxygen sensor (bank 2 sensor 1) ▶Heated oxygen sensor heater ▶EFI relay ▶PCV piping ▶ECM	◀	◀
P0175 (DI–165)	System too Rich (Bank 2)	▶Injector leak, blockage ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Ignition system ▶Fuel pressure ▶Gas leakage in exhaust system ▶Open or short in heated oxygen sensor (bank 2 sensor 1) circuit ▶Heated oxygen sensor (bank 2 sensor 1) ▶ECM	◀	◀
P0220 (DI–127)	Throttle/Pedal Position Sensor/ Switch "B" Circuit	▶Throttle control motor and sensor ▶ECM	◀	◀
P0222 (DI–127)	Throttle/Pedal Position Sensor/ Switch "B" Circuit Low Input	▶Throttle control motor and sensor ▶Short in VTA2 circuit ▶Open in VC circuit ▶ECM	◀	◀
P0223 (DI–127)	Throttle/Pedal Position Sensor/ Switch "B" Circuit High Input	▶Throttle control motor and sensor ▶Open in VTA2 circuit ▶Open in E2 circuit ▶VC and VTA2 circuit are short–circuited ▶ECM	◀	◀

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P0230 (DI–179)	Fuel Pump Primary Circuit	▶Open or short in fuel pump relay circuit ▶Fuel pump relay ▶Circuit opening relay ▶Fuel pump ▶ECM	–	◀
P0300 (DI–184)	Random/Multiple Cylinder Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀
P0301 (DI–184)	Cylinder 1 Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀
P0302 (DI–184)	Cylinder 2 Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀
P0303 (DI–184)	Cylinder 3 Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀

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P0304 (DI–184)	Cylinder 4 Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀
P0305 (DI–184)	Cylinder 5 Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀
P0306 (DI–184)	Cylinder 6 Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀
P0307 (DI–184)	Cylinder 7 Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀

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P0308 (DI–184)	Cylinder 8 Misfire Detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM	◀*2	◀
P0325 (DI–204)	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)	▶Open or short in knock sensor 1 circuit ▶Knock sensor 1 (looseness) ▶ECM	◀	◀
P0327 (DI–204)	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	▶Short in knock sensor circuit ▶Knock sensor ▶ECM	◀	◀
P0328 (DI–204)	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	▶Open in knock sensor circuit ▶Knock sensor ▶ECM	◀	◀
P0330 (DI–204)	Knock Sensor 2 Circuit (Bank 2)	▶Open or short in knock sensor 2 circuit ▶Knock sensor 2 (looseness) ▶ECM	◀	◀
P0332 (DI–204)	Knock Sensor 2 Circuit High Input (Bank 2)	▶Open in knock sensor circuit ▶Knock sensor ▶ECM	◀	◀
P0333 (DI–204)	Knock Sensor 2 Circuit High Input (Bank 2)	▶Open in knock sensor circuit ▶Knock sensor ▶ECM	◀	◀
P0335 (DI–210)	Crankshaft Position Sensor ”A” Circuit	▶Open or short in crankshaft position sensor circuit ▶Crankshaft position sensor ▶Signal plate ▶ECM	◀	◀
P0339 (DI–210)	Crankshaft Position Sensor ”A” Circuit Intermittent	▶Open or short in crankshaft position sensor circuit ▶Crankshaft position sensor ▶Signal plate ▶ECM	–	◀
P0340 (DI–216)	Camshaft Position Sensor ”A” Circuit (Bank 1 or Single Sensor)	▶Open or short in camshaft position sensor circuit ▶Camshaft position sensor ▶LH camshaft timing pulley ▶Jumping teeth of timing belt ▶ECM	◀	◀
P0341 (DI–216)	Camshaft Position Sensor ”A” Circuit Range/Performance (Bank 1 or Single Sensor)	▶Open or short in camshaft position sensor circuit ▶Camshaft position sensor ▶LH camshaft timing pulley ▶Jumping teeth of timing belt ▶ECM	◀	◀
P0345 (DI–221)	Camshaft Position Sensor ”A” Circuit (Bank 2)	▶Open or short in camshaft position sensor circuit ▶VVT sensor ▶ECM	◀	◀
P0346 (DI–221)	Camshaft Position Sensor ”A” Circuit Range/Performance (Bank 2)	▶Open or short in camshaft position sensor circuit ▶VVT sensor ▶ECM	◀	◀

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P0351 (DI–221)	Ignition Coil "A" Primary/Secondary Circuit	▶Open or short in IGF 1 and IGT 1 circuit from No. 1 ignition coil with igniter to ECM ▶No. 1 ignition coil with igniter ▶Ignition system ▶ECM	◀	◀
P0352 (DI–221)	Ignition Coil "B" Primary/Secondary Circuit	▶Open or short in IGF 2 and IGT 2 circuit from No. 2 ignition coil with igniter to ECM ▶No. 2 ignition coil with igniter ▶Ignition system ▶ECM	◀	◀
P0353 (DI–221)	Ignition Coil "C" Primary/Secondary Circuit	▶Open or short in IGF 2 and IGT 3 circuit from No. 3 ignition coil with igniter to ECM ▶No. 3 ignition coil with igniter ▶Ignition system ▶ECM	◀	◀
P0354 (DI–221)	Ignition Coil "D" Primary/Secondary Circuit	▶Open or short in IGF 1 and IGT 4 circuit from No. 4 ignition coil with igniter to ECM ▶No. 4 ignition coil with igniter ▶Ignition system ▶ECM	◀	◀
P0355 (DI–221)	Ignition Coil "E" Primary/Secondary Circuit	▶Open or short in IGF 2 and IGT 5 circuit from No. 5 ignition coil with igniter to ECM ▶No. 5 ignition coil with igniter ▶Ignition system ▶ECM	◀	◀
P0356 (DI–221)	Ignition Coil "F" Primary/Secondary Circuit	▶Open or short in IGF 1 and IGT 6 circuit from No. 6 ignition coil with igniter to ECM ▶No. 6 ignition coil with igniter ▶Ignition system ▶ECM	◀	◀
P0357 (DI–221)	Ignition Coil "G" Primary/Secondary Circuit	▶Open or short in IGF 1 and IGT 7 circuit from No. 7 ignition coil with igniter to ECM ▶No. 7 ignition coil with igniter ▶Ignition system ▶ECM	◀	◀
P0358 (DI–221)	Ignition Coil "H" Primary/Secondary Circuit	▶Open or short in IGF 2 and IGT 8 circuit from No. 8 ignition coil with igniter to ECM ▶No. 8 ignition coil with igniter ▶Ignition system ▶ECM	◀	◀
P0412 (DI–234)	Air Injection System Air Switching Valve Malfunction	▶Open in air switching valve drive circuit ▶Short between air switching valve circuit and +B circuit ▶Air injection driver ▶ECM	◀	◀
P0418 (DI–242)	Air Injection System Air Pump Malfunction	▶Open in air pump drive circuit ▶Short between air pump circuit and +B circuit ▶Air injection driver ▶ECM	◀	◀
P0420 (DI–249)	Catalyst System Efficiency Below Threshold (Bank 1)	▶Gas leakage on exhaust system ▶Heated oxygen sensor (bank 1 sensor 1, 2) ▶Three–way catalytic converter	◀	◀
P0430 (DI–249)	Catalyst System Efficiency Below Threshold (Bank 2)	▶Gas leakage on exhaust system ▶Heated oxygen sensor (bank 2 sensor 1, 2) ▶Three–way catalytic converter	◀	◀

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P043E (DI–445)	Evaporate Emission System Reference Orifice Clog Up	▶Pump module	◀	◀
P043F (DI–445)	Evaporate Emission System Reference Orifice High Flow	▶Pump module	◀	◀
P0441 (DI–257)	Evaporative Emission Control System Incorrect Purge Flow	▶Purge valve ▶Purge valve circuit (between purge valve and ECM) ▶Leakage from EVAP line (between purge valve and intake manifold) ▶EVAP line (between purge valve and canister) clogged ▶ECM	◀	◀
P0450 (DI–264)	Evaporative Emission Control System Pressure Sensor/Switch [Fuel Tank Pressure Sensor]	▶Pump module (including pressure sensor)	◀	◀
P0451 (DI–264)	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance	▶Pump module (including pressure sensor)	◀	◀
P0452 (DI–264)	Evaporative Emission Control System Pressure Sensor/Switch Low Input	▶Pump module (including pressure sensor) ▶Connector/Wire harness (between pump module and ECM) ▶ECM	◀	◀
P0453 (DI–264)	Evaporative Emission Control System Pressure Sensor/Switch High Input	▶Pump module (include pressure sensor) ▶Connector/Wire harness (between pump module and ECM) ▶ECM	◀	◀
P0455 (DI–273)	Evaporative Emission Control System Leak Detected (Gross Leak)	▶Fuel tank cap (loose) ▶Leakage from EVAP line (between canister and fuel tank) ▶Leakage from EVAP line (between purge valve and canister) ▶Leakage from pump module ▶Leakage from fuel tank ▶Leakage from canister	◀	◀
P0456 (DI–273)	Evaporative Emission Control System Leak Detected (Very Small Leak)	▶Same as DTC No. P0445	◀	◀
P0500 (DI–278)	Vehicle Speed Sensor ”A”	▶Combination meter ▶Open or short in vehicle speed sensor circuit ▶Vehicle speed sensor ▶ECM	◀	◀
P0503 (DI–278)	Vehicle Speed Sensor ”A” Intermittent/Erratic/High	▶Combination meter ▶Open or short in vehicle speed sensor circuit ▶Vehicle speed sensor ▶ECM	–	◀
P0504 (DI–283)	Brake Switch ”A”/”B” Correlation	▶Short in stop lamp switch signal circuit ▶STOP fuse ▶Stop lamp switch ▶ECM	–	◀
P0505 (DI–288)	Idle Air Control System	▶Air induction system ▶Electric throttle control system ▶PCV hose connection	◀	◀
P0560 (DI–292)	System Voltage	▶Back–up power source circuit ▶EFI No. 1 fuse ▶ECM	◀	◀
P0604 (DI–296)	Internal Control Module Random Access Memory (RAM) Error	▶ECM	◀	◀
P0606 (DI–296)	ECM/PCM Processor	▶ECM	◀	◀
P0607 (DI–296)	Control Module Performance	▶ECM	◀	◀

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P0617 (DI–298)	Starter Relay Circuit High	▶Park/neutral position switch ▶Starter relay circuit ▶Ignition switch ▶ECM	◀	◀
P0630 (DI–302)	VIN not Programmed or Mismatch–ECM/PCM	▶ECM	◀	◀
P0657 (DI–296)	Actuator Supply Voltage Circuit/Open	▶ECM	◀	◀
P0705 (DI–576)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	▶Electronic Controlled Automatic Transaxle (ECT)	◀	◀
P0710 (DI–582)	Transmission Fluid Temperature Sensor ”A” Circuit	▶Electronic control automatic transmission (ECT)	◀	◀
P0711 (DI–588)	Transmission Fluid Temperature Sensor ”A” Performance	▶Electronic control automatic transmission (ECT)	◀	◀
P0712 (DI–582)	Transmission Fluid Temperature Sensor ”A” Circuit Low Input	▶Electronic control automatic transmission (ECT)	◀	◀
P0713 (DI–582)	Transmission Fluid Temperature Sensor ”A” Circuit High Input	▶Electronic control automatic transmission (ECT)	◀	◀
P0717 (DI–591)	Input/Turbine Speed Sensor ”A” Circuit No Signal	▶Electronic control automatic transmission (ECT)	◀	◀
P0722 (DI–596)	Output Speed Sensor Circuit No Signal	▶Electronic control automatic transmission (ECT)	◀	◀
P0724 (DI–600)	Brake Switch ”B” Circuit High	▶Electronic control automatic transmission (ECT)	◀	◀
P0748 (DI–603)	Pressure Control Solenoid ”A” Electrical (Shift Solenoid Valve SL1)	▶Electronic control automatic transmission (ECT)	◀	◀
P0751 (DI–608)	Shift Solenoid ”A” Performance (Shift Solenoid Valve S1)	▶Electronic control automatic transmission (ECT)	◀	◀
P0756 (DI–614)	Shift Solenoid ”B” Performance (Shift Solenoid Valve S2)	▶Electronic control automatic transmission (ECT)	◀	◀
P0771 (DI–620)	Shift Solenoid ”E” Performance (Shift Solenoid Valve SR)	▶Electronic control automatic transmission (ECT)	◀	◀
P0776 (DI–625)	Pressure Control Solenoid ”B” Performance (Shift Solenoid Valve SL2)	▶Electronic control automatic transmission (ECT)	◀	◀
P0778 (DI–631)	Pressure Control Solenoid ”B” Electrical (Shift Solenoid Valve SL2)	▶Electronic control automatic transmission (ECT)	◀	◀
P0781 (DI–636)	1–2 Shift (1–2 Shift Valve)	▶Electronic control automatic transmission (ECT)	◀	◀
P0973 (DI–641)	Shift Solenoid ”A” Control Circuit Low (Shift solenoid Valve S1)	▶Electronic control automatic transmission (ECT)	◀	◀
P0974 (DI–641)	Shift Solenoid ”A” Control Circuit High (Shift solenoid Valve S1)	▶Electronic control automatic transmission (ECT)	◀	◀
P0976 (DI–646)	Shift Solenoid ”B” Control Circuit Low (Shift solenoid Valve S2)	▶Electronic control automatic transmission (ECT)	◀	◀
P0977 (DI–646)	Shift Solenoid ”B” Control Circuit High (Shift solenoid Valve S2)	▶Electronic control automatic transmission (ECT)	◀	◀
P0985 (DI–651)	Shift Solenoid ”E” Control Circuit Low (Shift Solenoid Valve SR)	▶Electronic control automatic transmission (ECT)	◀	◀

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P0986 (DI–651)	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)	▶Electronic control automatic transmission (ECT)	◀	◀
P1340 (DI–304)	Camshaft Position Sensor "A" Circuit (Bank 1 Sensor 2)	▶Open or short in camshaft position sensor circuit ▶Camshaft position sensor ▶LH camshaft timing pulley ▶ECM	◀	◀
P1341 (DI–304)	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 Sensor 2)	▶Open or short in camshaft position sensor circuit ▶Camshaft position sensor ▶LH camshaft timing pulley ▶ECM	◀	◀
P1440 (DI–309)	Scondary Air Injection System Control Valve Circuit Bank 1	▶Open or short in VSV for air injection control circuit ▶ECM	◀	◀
P1441 (DI–314)	Scondary Air Injection System Switching Valve No.2 Bank 1 Stuck Open	▶VSV for air injection control circuit (Bank 1) ▶Air switching valve No.2 (Bank 1) ▶VSV for air injection system (Bank 1) ▶ECM	◀	◀
P1442 (DI–330)	Scondary Air Injection System Switching Valve No.2 Bank 1 Stuck Close	▶VSV for air injection control circuit (Bank 1) ▶Vacuum hose (VSV for air injection control – air switching valve No.2) ▶Air injector pipe (Air switching valve No.2 – exhaust manifold) ▶Air switching valve No.2 (Bank 1) ▶VSV for air injection control (Bank 1) ▶ECM	◀	◀
P1443 (DI–309)	Scondary Air Injection System Control Valve Circuit Bank 2	▶Open or short in VSV for air injection control circuit ▶ECM	◀	◀
P1444 (DI–314)	Scondary Air Injection System Switching Valve No.2 Bank 2 Stuck Open	▶VSV for air injection control circuit (Bank 2) ▶Air switching valve No.2 (Bank 2) ▶VSV for air injection system (Bank 2) ▶ECM	◀	◀
P1445 (DI–330)	Scondary Air Injection System Switching Valve No.2 Bank 2 Stuck Cloes	▶VSV for air injection control circuit (Bank 2) ▶Vacuum hose (VSV for air injection control – air switching valve No.2) ▶Air injector pipe (Air switching valve No.2 – exhaust manifold) ▶Air switching valve No.2 (Bank 2) ▶VSV for air injection control (Bank 2) ▶ECM	◀	◀
P1613 (DI–343)	Air Injection System Air Injection Driver	▶Short between air pump circuit and body ground ▶Open in air pump drive circuit ▶Short between air pump circuit and +B circuit ▶Air injection driver ▶ECM	◀	◀
P2102 (DI–354)	Throttle Actuator Control Motor Circuit Low	▶Open in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶ECM	◀	◀
P2103 (DI–354)	Throttle Actuator Control Motor Circuit High	▶Short in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Throttle valve ▶Throttle body ▶ECM	◀	◀
P2111 (DI–358)	Throttle Actuator Control System – Stuck Open	▶Throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Throttle valve ▶Throttle body	◀	◀

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P2112 (DI–358)	Throttle Actuator Control System – Stuck Closed	▶Throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Throttle valve ▶Throttle body	◀	◀
P2118 (DI–362)	Throttle Actuator Control Motor Current Range/Performance	▶Open in throttle control motor and sensor power source circuit ▶ETCS fuse ▶ECM	◀	◀
P2119 (DI–367)	Throttle Actuator Control Throttle Body Range/Performance	▶Electric throttle control system ▶Throttle body	◀	◀
P2120 (DI–370)	Throttle/Pedal Position Sensor/ Switch ”D” Circuit	▶Accelerator pedal position sensor ▶ECM	◀	◀
P2121 (DI–380)	Throttle/Pedal Position Sensor/ Switch ”D” Circuit Range/Performance	▶Accelerator pedal position sensor	◀	◀
P2122 (DI–370)	Throttle/Pedal Position Sensor/ Switch ”D” Circuit Low Input	▶Accelerator pedal position sensor ▶VCPA circuit open ▶VPA circuit open or ground short ▶ECM	◀	◀
P2123 (DI–370)	Throttle/Pedal Position Sensor/ Switch ”D” Circuit High Input	▶Accelerator pedal position sensor ▶EPA circuit open ▶ECM	◀	◀
P2125 (DI–370)	Throttle/Pedal Position Sensor/ Switch ”E” Circuit	▶Accelerator pedal position sensor ▶ECM	◀	◀
P2127 (DI–370)	Throttle/Pedal Position Sensor/ Switch ”E” Circuit Low Input	▶Accelerator pedal position sensor ▶VCP2 circuit open ▶VPA2 circuit open or ground short ▶ECM	◀	◀
P2128 (DI–370)	Throttle/Pedal Position Sensor/ Switch ”E” Circuit High Input	▶Accelerator pedal position sensor ▶EPA circuit open ▶ECM	◀	◀
P2135 (DI–127)	Throttle Pedal Position Sensor/ Switch ”A” / ”B” Voltage Correlation	▶Throttle control motor and sensor ▶VTA1 and VTA2 circuit are short–circuited ▶ECM	◀	◀
P2138 (DI–370)	Throttle Pedal Position Sensor/ Switch ”D” / ”E” Voltage Correlation	▶VPA and VPA2 circuit are short circuited ▶Accelerator pedal position sensor ▶ECM	◀	◀
P2195 (DI–383)	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits ▶Air induction system ▶Fuel pressure ▶Injector ▶ECM	◀	◀
P2196 (DI–383)	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits ▶Air induction system ▶Fuel pressure ▶Injector ▶ECM	◀	◀

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P2197 (DI–383)	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 2 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits ▶Air induction system ▶Fuel pressure ▶Injector ▶ECM	◀	◀
P2198 (DI–383)	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 2 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits ▶Air induction system ▶Fuel pressure ▶Injector ▶ECM	◀	◀
P2238 (DI–402)	Oxygen Sensor Pumping Current Circuit Low (For A/F Sensor) (Bank 1 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits	◀	◀
P2239 (DI–402)	Oxygen Sensor Pumping Current Circuit High (For A/F Sensor) (Bank 1 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits	◀	◀
P2241 (DI–402)	Oxygen Sensor Pumping Current Circuit Low (For A/F Sensor) (Bank 2 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits	◀	◀
P2242 (DI–402)	Oxygen Sensor Pumping Current Circuit High (For A/F Sensor) (Bank 2 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits	◀	◀
P2252 (DI–402)	Oxygen Sensor Reference Ground Current Circuit Low (For A/F Sensor) (Bank 1 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits	◀	◀
P2253 (DI–402)	Oxygen Sensor Reference Current Circuit High (For A/F Sensor) (Bank 1 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits	◀	◀
P2255 (DI–402)	Oxygen Sensor Reference Ground Current Circuit Low (For A/F Sensor) (Bank 2 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits	◀	◀
P2256 (DI–402)	Oxygen Sensor Reference Current Circuit High (For A/F Sensor) (Bank 2 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater (sensor 1) ▶A/F relay ▶A/F sensor heater and EFI relay circuits	◀	◀

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P2401 (DI–410)	Evaporative Emission System Leak Detection Pump Control Circuit Low	▶Pump module ▶Connector/Wire harness (between pump module and ECM) ▶ECM	◀	◀
P2402 (DI–410)	Evaporative Emission System Leak Detection Pump Control Circuit High	▶Pump module ▶Connector/Wire harness (between pump module and ECM) ▶ECM	◀	◀
P2419 (DI–416)	Evaporate Emission System Switching Valve Control Circuit Low	▶Pump module ▶Connector/Wire harness (between pump module and ECM) ▶ECM	◀	◀
P2420 (DI–416)	Evaporate Emission System Switching Valve Control Circuit High	▶Pump module ▶Connector/Wire harness (between pump module and ECM) ▶ECM	◀	◀
P2430 (DI–422)	Secondary Air Injection System Air Flow/Pressure Sensor Circuit Bank 1	▶Pressure sensor ▶Open or short in pressure sensor circuit ▶Vacuum hose ▶Check valve ▶ECM	◀	◀
P2431 (DI–422)	Secondary Air Injection System Air Flow/Pressure Sensor Circuit Range/Performance Bank 1	▶Pressure sensor ▶Open or short in pressure sensor circuit ▶Vacuum hose ▶Check valve ▶ECM	◀	◀
P2432 (DI–422)	Secondary Air Injection System Air Flow/Pressure Sensor Circuit Low Bank 1	▶Pressure sensor ▶Open or short in pressure sensor circuit ▶Vacuum hose ▶Check valve ▶ECM	◀	◀
P2433 (DI–422)	Secondary Air Injection System Air Flow/Pressure Sensor Circuit High Bank 1	▶Pressure sensor ▶Open or short in pressure sensor circuit ▶Vacuum hose ▶Check valve ▶ECM	◀	◀
P2440 (DI–314)	Secondary Air Injection System Switching Valve Stuck Open Bank 1	▶Electromagnetic air switching valve ▶Air switching valve No.2 (Bank 1 and/or 2) ▶VSV for air injection system (Bank 1 and/or 2) ▶Air injection driver ▶Air injection driver circuit ▶ECM	◀	◀
P2441 (DI–330)	Secondary Air Injection System Switching Valve Stuck Close Bank 1	▶Vacuum hoses (Throttle body – VSVs for air injection control) ▶Electromagnetic air switching valve ▶Air injector pipe (Air switching valve No.2 – exhaust manifold) ▶Air injection hose ▶Air switching valve No.2 (Bank 1 and/or 2) ▶VSV for air injection control (Bank 1 and/or 2) ▶Air injection driver ▶Air injection driver circuit ▶ECM	◀	◀
P2444 (DI–426)	Secondary Air Injection System Pump Stuck On Bank 1	▶Short in air pump circuit ▶Pressure sensor ▶Air pump assembly ▶Open or short in pressure sensor circuit ▶ECM	◀	◀

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P2445 (DI–426)	Secondary Air Injection System Pump Stuck On Bank 1	▶Air pump fuse ▶Vacuum hose ▶Air pump assembly ▶Open in air pump circuit ▶Air injection system piping ▶Pressure sensor ▶Open or short in pressure sensor circuit ▶ECM	◀	◀
P2610 (DI–442)	ECM/PCM Internal Engine Off Timer Performance	▶ECM	◀	◀
P2714 (DI–656)	Pressure Control Solenoid ”D” Performance (Shift Solenoid Valve SLT)	▶Electronic control automatic transmission (ECT)	◀	◀
P2716 (DI–662)	Pressure Control Solenoid ”D” Electrical (Shift Solenoid Valve SLT)	▶Electronic control automatic transmission (ECT)	◀	◀
P2740 (DI–666)	Transmission Fluid Temperature Sensor ”B” Circuit	▶Electronic control automatic transmission (ECT)	◀	◀
P2742 (DI–666)	Transmission Fluid Temperature Sensor ”B” Circuit Low Input	▶Electronic control automatic transmission (ECT)	◀	◀
2743 (DI–666)	Transmission Fluid Temperature Sensor ”B” Circuit High Input	▶Electronic control automatic transmission (ECT)	◀	◀
P2757 (DI–672)	Torque Converter clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	▶Electronic control automatic transmission (ECT)	◀	◀
P2759 (DI–680)	Torque Converter clutch Pressure Control Solenoid Electrical (Shift Solenoid Valve SLU)	▶Electronic control automatic transmission (ECT)	◀	◀
P2772 (DI–685)	Transfer L4 SW Circuit	▶Electronic control automatic transmission (ECT)	◀	◀
P2A00 (DI–451)	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶ECM	◀	◀
P2A03 (DI–451)	A/F Sensor Circuit Slow Response (Bank 2 Sensor 1)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶ECM	◀	◀
B2799 (DI–1580)	Engine Immobilizer System Malfunction	▶Immobilizer system	–	◀
U0001 (DI–444)	High Speed CAN Communication Bus	▶ECM	◀	◀

*1: – .... MIL does not light up. ◀ .... MIL lights up.
*2: MIL lights up or blinks.

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DID82–01

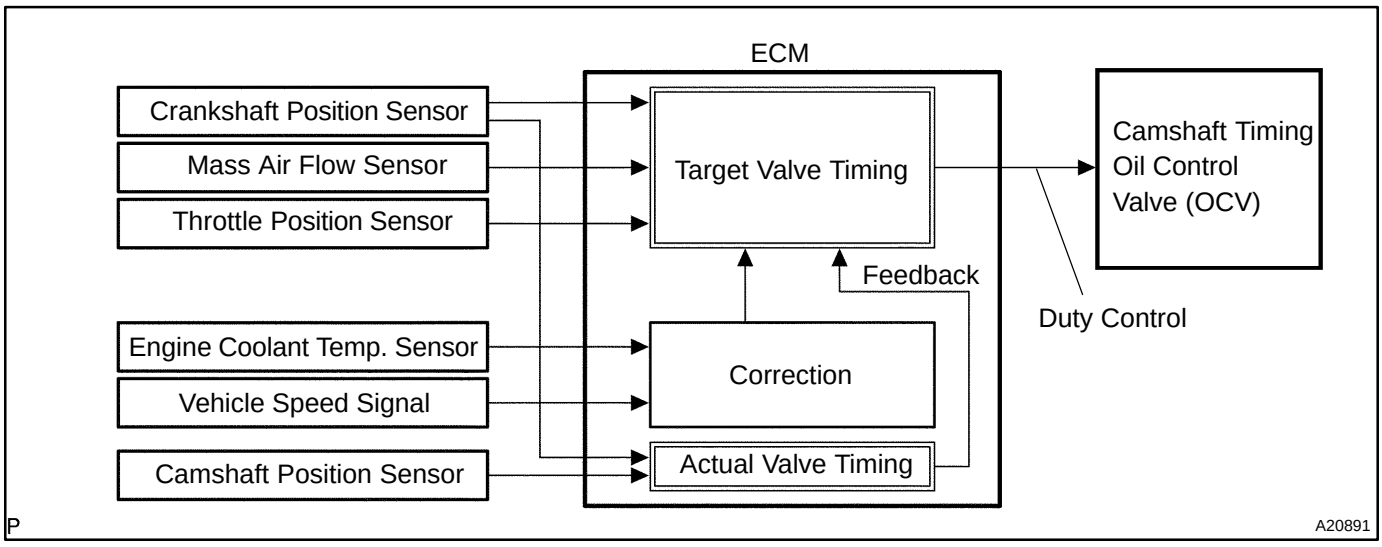
CIRCUIT INSPECTION

DTC	P0010	Camshaft Position ”A” Actuator circuit (Bank 1)

DTC	P0020	Camshaft Position ”A” Actuator circuit (Bank 2)

CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target ”duty–cycle” control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed based on engine operation conditions such as intake air volume, throttle position and engine coolant temperature.
The ECM controls the OCV, based on the signals output from the sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative position between the camshaft and the crankshaft is optimized, and the engine torque improves, fuel economy improves, and exhaust emissions decrease under overall driving conditions. Also, the ECM detects the actual valve timing using signals from the camshaft position sensor and the crankshaft position sensor, and performs feedback control. This is how target valve timing is verified by the ECM.



DTC No.	DTC Detecting Condition	Trouble Area
P0010 P0020	Open or short in OCV circuit	▶Open or short in OCV circuit ▶OCV ▶ECM

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MONITOR DESCRIPTION

After the ECM sends the ”target” duty–cycle signal to the OCV (Oil Control Valve), the ECM monitors the OCV current to establish an ”actual” duty–cycle. When the actual duty–cycle ratio varies from the target duty–cycle, the ECM sets a DTC.

MONITOR STRATEGY

Related DTCs	P0010	VVT oil control valve bank 1 range check
	P0020	VVT oil control valve bank 2 range check
Required sensors/components	OCV	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Battery voltage	11 V	13 V
Target duty ratio	–	70%
Starter	OFF	
Current cut status	Not cut	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Either of the following conditions is met:	Condition 1 or 2
1. Output signal duty for OCV	Output duty ratio is 100% (always ON) but target duty ratio is less than 70%
2. Output signal duty for OCV	Output duty is 3% or less despite the ECM supplying current to the OCV

COMPONENT OPERATING RANGE

Parameter	Standard Value
Output signal duty for OCV	”More than 3%” and ”less than 100%”

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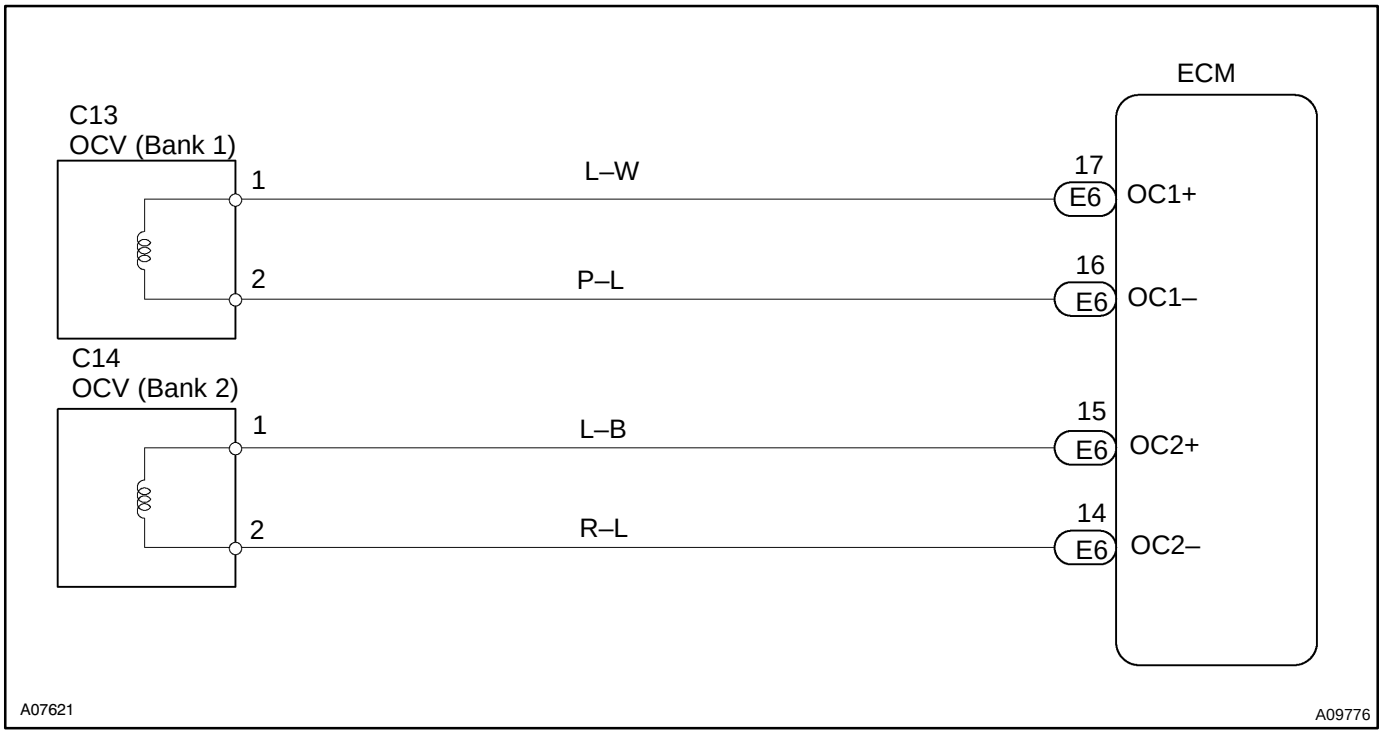
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0010 displayed, check left bank OCV circuit.
- If DTC P0020 displayed, check right bank OCV circuit.
- Read freeze frame data using hand–held tester. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

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1	Check OCV circuit.

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch to ON and turn the hand–held tester ON.

CHECK:

(a) Select the item: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1 or VVT CTRL B2.
(b) Using the hand–held tester, operate the OCV and check the engine speed.

OK:

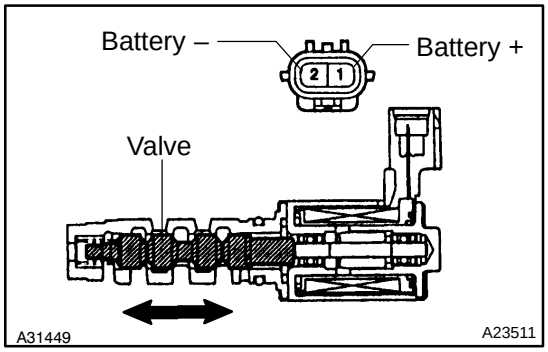
Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

OK → **Check for intermittent problems (See page DI–11).**

NG

2	Check operation of OCV.



PREPARATION:

(a) Start the engine and warmed it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage between the terminals of the OCV.

CHECK:

Check the engine speed.

OK:

Rough idle or engine stalled.

NG → **Replace OCV.**

OK

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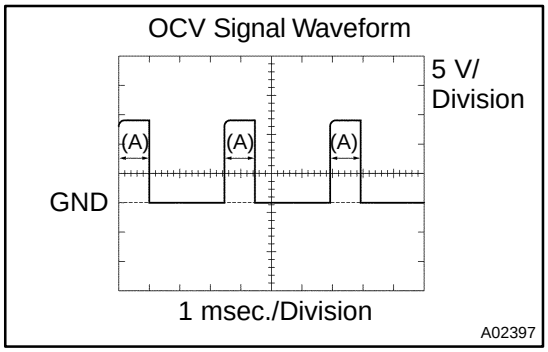
3	**Check voltage between terminals OC1+ and OC1–, OC2+ and OC2– of ECM connector.**



CHECK:

(a) Inspection using the oscilloscope.

(b) During idling, check the waveform between the specified terminals of the E6 ECM connector.

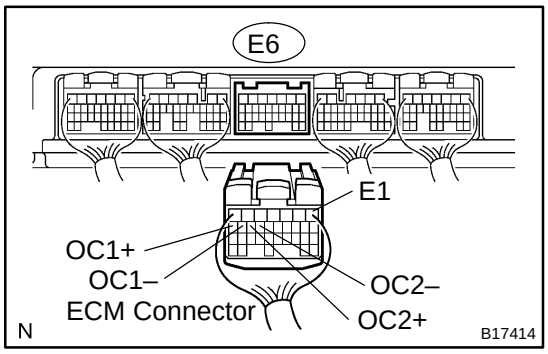
HINT:

The waveform frequency (A) is lengthened as the engine speed becomes higher.

OK:

Standard:

The correct waveform is as shown.



NG → **Replace ECM (See page SF–80).**

OK

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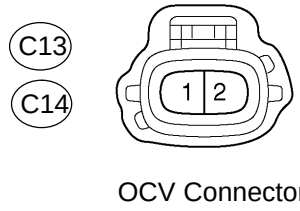
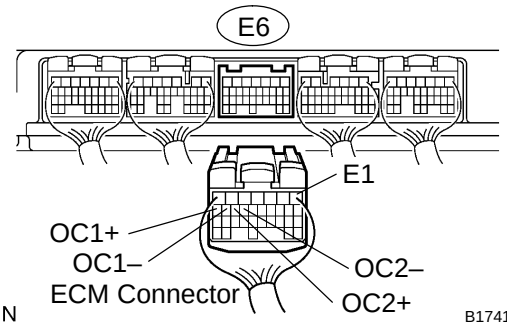
4	Check for open and short in harness and connector between OCV and ECM.

Wire Harness Side



OCV Connector

Y A23673



N B17414

PREPARATION:

(a) Disconnect the C13 or C14 OCV connector.

(b) Disconnect the E6 ECM connector.

CHECK:

(a) Check for resistance between the wire harness side connectors.

OK:

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
OCV (C14–1) – OC1+ (E6–17)	Below 1 Ω
OCV (C14–2) – OC1– (E6–16)	Below 1 Ω
OCV (C13–1) – OC2+ (E6–15)	Below 1 Ω
OCV (C13–2) – OC2– (E6–14)	Below 1 Ω

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
OCV (C14–1) or OC1+ (E6–17) – E1 (E6–1)	10 kΩ or higher
OCV (C14–1) or OC1– (E6–16) – E1 (E6–1)	10 kΩ or higher
OCV (C13–1) or OC2+ (E6–15) – E1 (E6–1)	10 kΩ or higher
OCV (C13–1) or OC2– (E6–14) – E1 (E6–1)	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Check for intermittent problems (See page DI–11).

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DTC	P0011	Camshaft Position ”A” –Timing Over–Actuator or System Performance (Bank 1)

DTC	P0012	Camshaft Position ”A” –Timing Over–Retarded (Bank 1)

DTC	P0021	Camshaft Position ”A” –Timing Over–Actuator or System Performance (Bank 2)

DTC	P0022	Camshaft Position ”A” –Timing Over–Retarded (Bank 2)

CIRCUIT DESCRIPTION

Refer to DTCs P0010 on page DI–73.

DTC No.	DTC Detecting Condition	Trouble Area
P0011 P0021	Advanced cam timing: After engine is warmed up and engine speed is at 400 to 4,000 rpm, condition (a) continues. (1 trip detection logic) (a) Valve timing does not change from current valve timing	▶Valve timing ▶OCV ▶VVT controller assembly ▶ECM
P0012 P0022	Retarded cam timing: After engine is warmed up and engine speed is at 400 to 4,000 rpm, condition (a) continues. (2 trip detection logic) (a) Valve timing does not change from current valve timing	

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT (Variable Valve Timing) system to control the intake valve camshaft. The VVT system includes the ECM, the OCV (Oil Control Valve) and the VVT controller. The ECM sends a target ”duty–cycle” control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft.

Example:

A DTC will set if: 1) the difference between the target and actual valve timing is more than 5 degrees of the crankshaft angle (CA) and the condition continues for more than 4.5 sec.; or 2) the OCV is forcibly activated 63 times or more.

Advanced cam DTCs are subject to ”1 trip” detection logic.

Retarded cam DTCs are subject to ”2 trip” detection logic.

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MONITOR STRATEGY

Related DTCs	P0011	VVT system advance (Bank 1)
	P0012	VVT system retard (Bank 1)
	P0021	VVT system advance (Bank 2)
	P0022	VVT system retard (Bank 2)
Required sensors/components	Main sensors/components	Camshaft position sensor
	Related sensors/components	Engine coolant temperature sensor, Crankshaft position sensor
Frequency of operation	Once per drive cycle	
Duration	10 sec.	
MIL operation	P0011, P0021: Immediate P0012, P0022: 2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Battery voltage	11 V	–
Throttle position learning	Completed	
Engine RPM	400 rpm	4,000 rpm
Engine coolant temperature	75°C (167°F)	100°C (212°F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Deviation of valve timing	More than 5°CA
OCV activation	63 times or more
Response of valve timing	1 sec./1°CA or more

WIRING DIAGRAM

Refer to DTCs P0010 on page DI–73.

INSPECTION PROCEDURE

HINT:

- Bank 1 refers to bank that includes cylinder No. 1.
- Bank 2 refers to bank that does not include cylinder No. 1.
- If DTC P0011, P0012 is displayed, check the bank 1 VVT system.
- If DTC P0021, P0022 is displayed, check the bank 2 VVT system.
- Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

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1	**Check operation of OCV.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch to ON and turn the hand–held tester ON.

CHECK:

(a) Select the item: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1 or VVT CTRL B2.
(b) Using the hand–held tester, operate the OCV and check the engine speed.

OK:

Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

OK → **VVT system is OK.***

*: DTC P0011, P0012, P0021 or P0022 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

NG

2	**Check valve timing (See page EM–23).**

NG → **Adjust valve timing.**

OK

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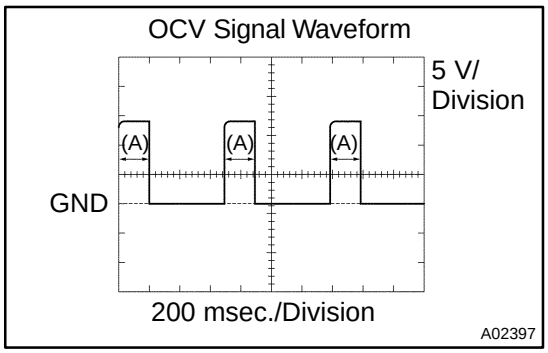
3	Check voltage between terminals OCV+ and OCV– of ECM connector.



CHECK:

(a) Inspection using the oscilloscope.

(b) During idling, check the waveform between the specified terminals of the E6 ECM connector.

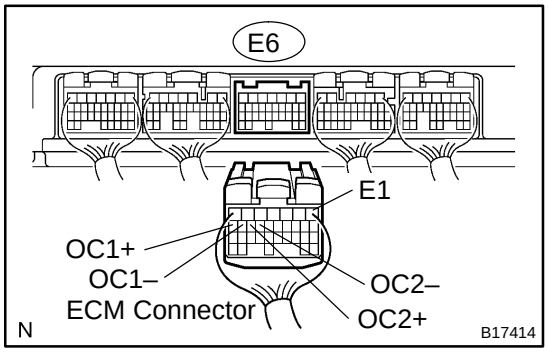
HINT:

The waveform frequency (A) is lengthened as the engine speed becomes higher.

OK:

Standard:

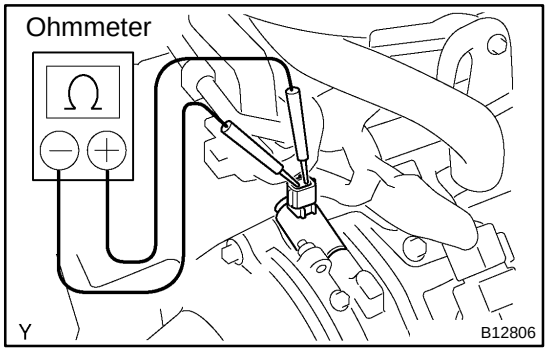
The correct waveform is as shown.



NG → **Check and replace ECM (See page IN–35).**

OK

4	Check OCV.



PREPARATION:

(a) Remove the V–bank cover.

(b) Remove the air cleaner inlet and intake air connector.

(c) Disconnect the oil control valve connector.

CHECK:

(a) Using an Ohmmeter, measure the resistance between the terminals.

Resistance: 6.9 – 7.9 Ω at 20˚C (68˚F)

NG → **Replace OCV, and then go to step 6.**

OK

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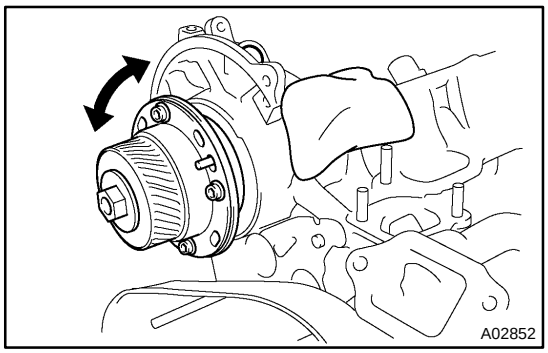
5	Check VVT controller assembly.



PREPARATION:

(a) Remove the timing belt (See page EM–16).
(b) Remove the cylinder head cover.
(c) Remove the OCV (See page SF–46).
(d) Drain the oil in the VVT controller assembly (See page EM–36).

CHECK:

Check whether the oil in VVT controller assembly is drained or not.

OK:

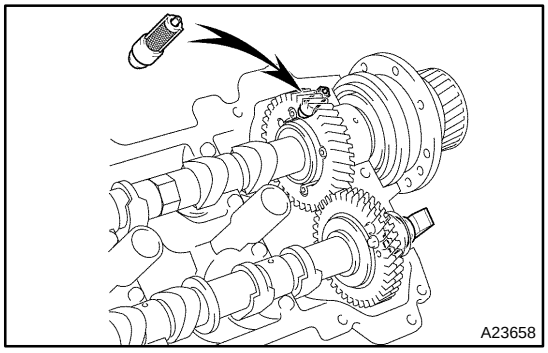
Standard:

The oil in VVT controller assembly is drained.

NG	Replace VVT controller assembly, and then go to step 6.

OK

6	Check oil control valve filter.



PREPARATION:

(a) Remove the cylinder head cover.
(b) Remove the camshaft bearing cap and OCV filter.

CHECK:

Check that the filter is not clogged.

OK:

The filter is not clogged.

NG	Repair or replace.

OK

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7	**Check whether or not DTC P0010, P0012, P0021 or P0022 is stored.**

PREPARATION:

(a) Clear the DTC (See page DI–43).

(b) Perform simulation test.

CHECK:

Check whether or not DTC P0011, P0012, P0021 or P0022 is stored (See page DI–43).

OK:

Standard: DTC P0011, P0012, P0021 or P0022 is not stored.

OK → **VVT system is OK.***

*: DTC P0011, P0012, P0021 or P0022 is also output when a foreign object is detected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign object, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

NG

Replace ECM.

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DTC	P0016	Crankshaft Position – Camshaft Position Correlation (Bank 1 Sensor A)

DTC	P0018	Crankshaft Position – Camshaft Position Correlation (Bank 2 Sensor A)

CIRCUIT DESCRIPTION

VVT sensor (VVL or VVR signal) consist of a signal plate and pickup coil.
The VVL or VVR signal plate has 1 tooth on its outer circumference and is mounted on the intake camshafts. When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil.
The actual camshaft angle is detected by the VVT sensor and it provides feedback to the ECM to control the intake valve timing in response to during condition.

DTC No.	DTC Detecting Condition	Trouble Area
P0016 P0018	No VVT sensor signal to ECM during cranking at 4 sec. or more	▶Open or short in VVT sensor circuit ▶VVT sensor ▶ECM
	No VVT sensor signal to ECM with 5 sec. or more engine speed 600 rpm or more	
	While the crankshaft rotates twice, VVT sensor signal will be input to ECM 5 times	

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT (Variable Valve Timing) system to control the intake valve camshaft. The VVT system includes the ECM, the OCV (Oil Control Valve) and the VVT controller. The ECM sends a target duty–cycle control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft. The ECM calibrates the valve timing of the VVT system by setting the camshaft to the maximum retard angle when the engine is idle. The ECM closes the OCV to retard the cam. The ECM stores this value as VVT learning value (When the difference between the target valve timing and the actual valve timing is 5 degrees or less, the ECM stores this in its memory.).
If the learning value meets both of the following conditions ((a) and (b)), the ECM interprets this as a defect in the VVT system and sets a DTC.
(a) VVT learning value is less than 20°CA (Crankshaft Angle) or more than 39°CA.
(b) Above condition continues for more than 18 sec.

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MONITOR STRATEGY

Related DTCs	P0016	Deviation in crankshaft position sensor signal and camshaft position sensor signal (Bank 1)
	P0018	Deviation in crankshaft position sensor signal and camshaft position sensor signal (Bank 2)
Required sensors/components	Crankshaft position sensor, Camshaft position sensor	
Frequency of operation	Once per drive cycle	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Engine RPM	400 rpm	1,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration that either of the following conditions 1 or 2 is met	18 sec. or more
1. VVT angle when camshaft is retarded maximum	Less than 20◀CA
2. VVT angle when camshaft is retarded maximum	More than 39◀CA

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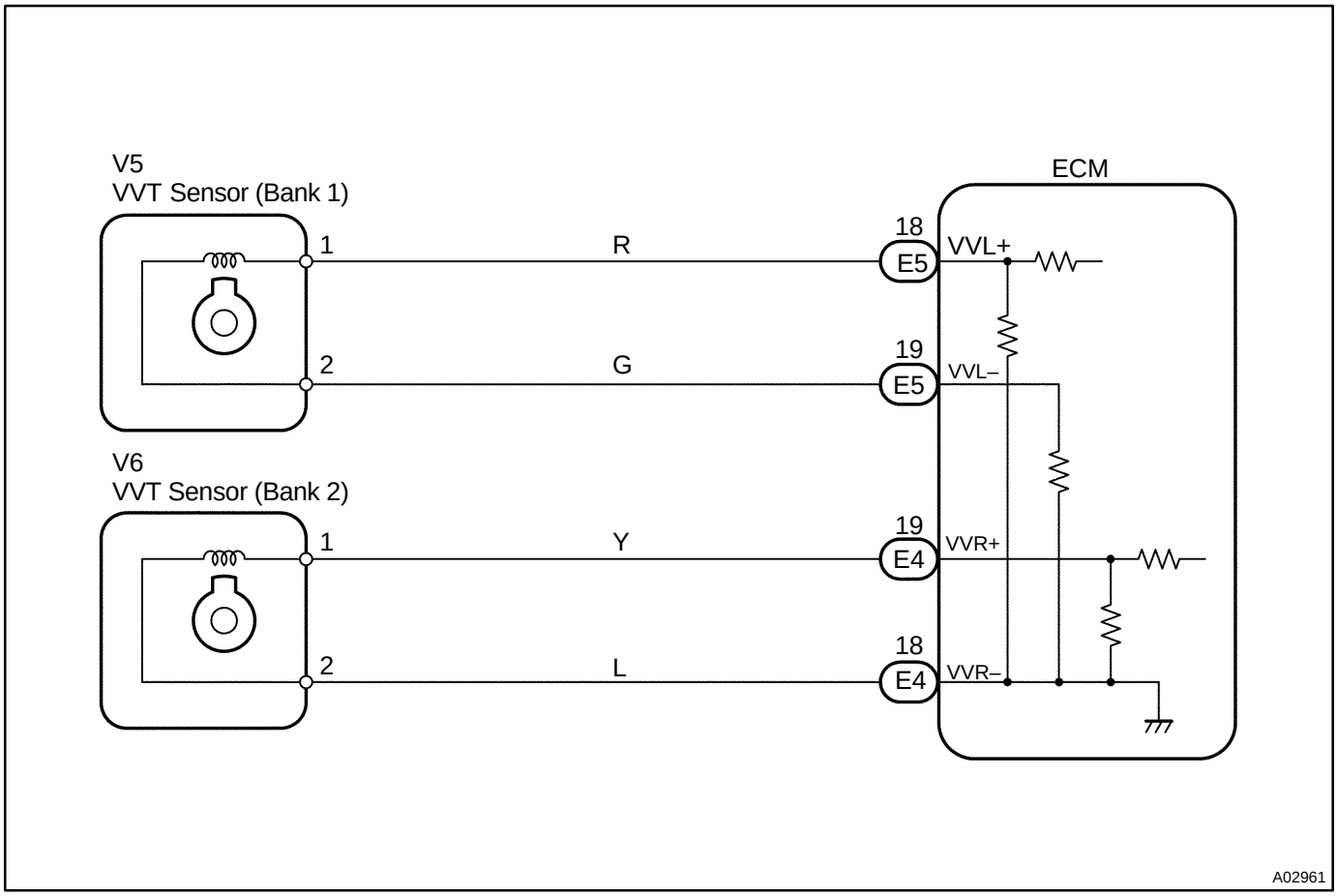
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0016 is displayed, check left bank VVT sensor.
- If DTC P0018 is displayed, check right bank VVT sensor.
- Read freeze frame data using hand–held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check valve timing (Check for loose and jumping teeth of timing belt) (See page EM–16).**

NG → **Adjust valve timing (Repair or replace timing belt).**

OK

Replace ECM (See page SF–80).

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DIDFP–01

DTC	P0031	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)

DTC	P0032	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)

DTC	P0051	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 2 Sensor 1)

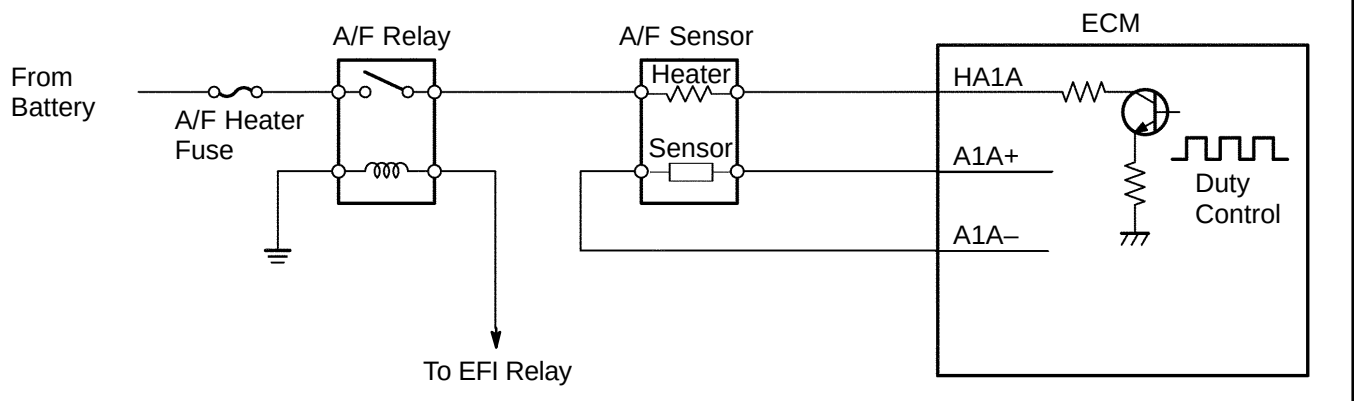
DTC	P0052	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 2 Sensor 1)

HINT:
Although each DTC title (DTC description) says ”oxygen sensor”, these DTCs are related to the ”A/F sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page DI–383.
HINT:
The ECM provides a pulse width modulated control circuit to adjust current through the heater. The A/F sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (Bank 1 Sensor 1 System Drawing):



DTC No.	DTC Detection Condition	Trouble Area
P0031 P0051	Heated current is 0.8 A or less when heater operates (1 trip detection logic)	▶Open or short in heater circuit of A/F sensor ▶A/F sensor heater ▶A/F sensor heater relay ▶ECM
P0032 P0052	When the heater operates, heated current exceeds 19.7 A (1 trip detection logic)	

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HINT:

- Bank 1 refers to the bank that includes cylinder No.1.
- Bank 2 refers to the bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

MONITOR DESCRIPTION

The ECM uses the Air–Fuel Ratio sensor (A/F sensor) information to regulate the air–fuel ratio close to the stoichiometric ratio. This maximizes the catalytic converter's ability to purify exhaust gases. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.

The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The zirconia element generates a small voltage when there is a large difference in the oxygen concentrations of the exhaust and the outside air. The platinum coating amplifies the voltage generation. When heated, the sensor becomes very efficient. If the temperature of the exhaust is low, the sensor will not generate useful voltage signals without supplemental heating. The ECM regulates the supplemental heating using a duty–cycle approach to regulate the average current in the heater element. If the heater current is out of the normal range, the sensor's output signals will be inaccurate and the ECM can not regulate the air–fuel ratio properly.

When the heater current is out of the normal operating range, the ECM interprets this as a malfunction and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0031	A/F sensor heater (Bank 1) range check (Low current)
	P0032	A/F sensor heater (Bank 1) range check (High current)
	P0051	A/F sensor heater (Bank 2) range check (Low current)
	P0052	A/F sensor heater (Bank 2) range check (High current)
Required sensors/components	Main sensors/components	A/F sensor heater
	Related sensors/components	–
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P0031, P0051 (Low current):		
Battery voltage	10.5 V	–
A/F sensor heater duty ratio	50%	–
Time after engine start	10 sec.	–

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P0032, P0052 (High current):		
Time after engine start	10 sec.	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0031, P0051 (Low current):	
A/F sensor heater current	Less than 0.8 A
P0032, P0052 (High current):	
A/F sensor heater current	More than 10 A

COMPONENT OPERATING RANGE

Parameter	Standard Value
A/F sensor heater current	1.8 to 3.4 A at 20°C (68°F)

WIRING DIAGRAM

Refer to DTC P2195 on page DI–383.

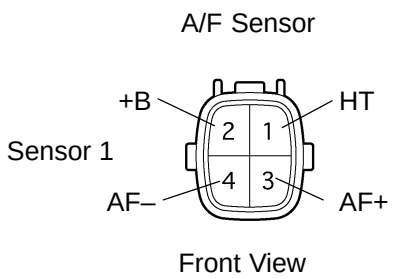
INSPECTION PROCEDURE

HINT:

Read freeze frame data using a hand–held tester or OBD II scan tool. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**Check resistance of air–fuel ratio (A/F) sensor heater.**

Component Side:



PREPARATION:

Disconnect the air–fuel ratio (A/F) sensor connector.

CHECK:

Measure resistance between the terminals of the A/F sensor connector.

OK:

Standard:

Tester Connection	Specified Condition
HT (1) – +B (2)	1.8 Ω to 3.4 Ω at 20°C (68°F)
HT (1) – AF– (4)	10 kΩ or higher

NG	**Replace air–fuel ratio (A/F) sensor.**

OK

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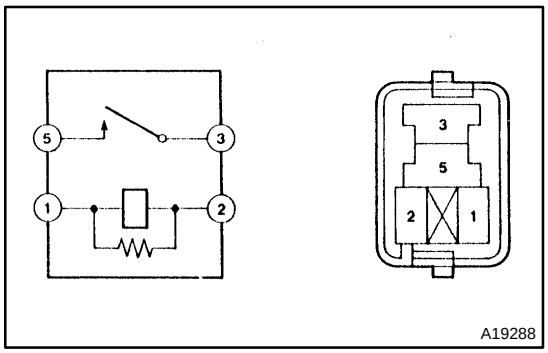
2	Check A/F relay.



PREPARATION:
Remove the A/F relay from the engine room R/B No.2.
CHECK:
Inspect the A/F relay.
OK:

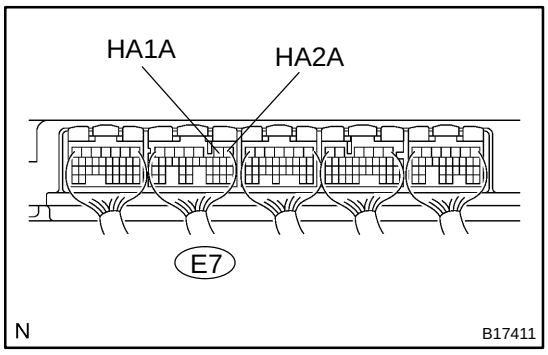
Standard:

Terminal No.	Condition	Specified Condition
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG	Replace A/F relay.

OK

3	Check voltage between terminals HA1A, HA2A of ECM connectors and body ground.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals of the ECM connectors and body ground.
HINT:
- ▶ Connect terminal HA1A to the bank 1 sensor 1.
- ▶ Connect terminal HA2A to the bank 2 sensor 1.

OK:

Standard:

Tester Connection	Specified Condition
HA1A (E7–2) – Body ground	9 V to 14 V
HA2A (E7–1) – Body ground	9 V to 14 V

OK	Replace ECM (See page SF–80).

NG

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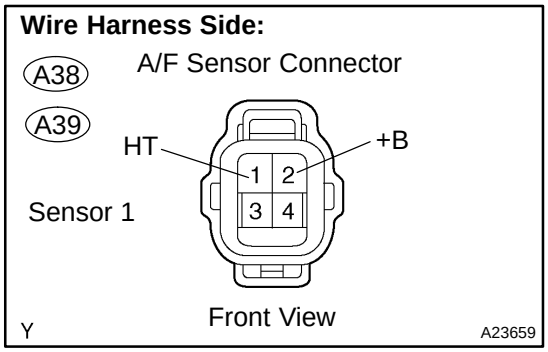
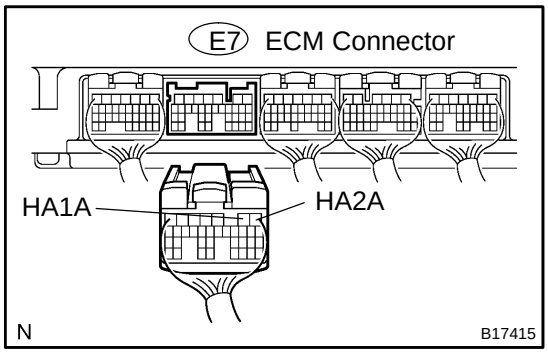
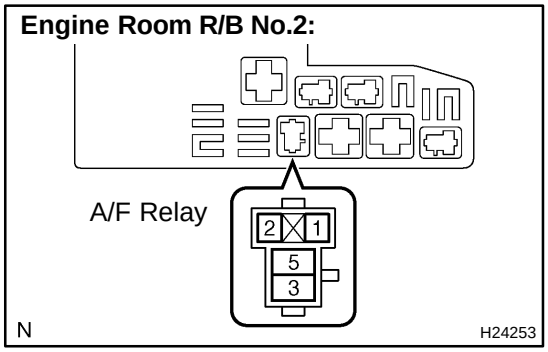
4	**Check for open and short in harness and connector between ECM and A/F sensor.**







PREPARATION:

(a) Turn the ignition switch to OFF.
(b) Disconnect the A38 or A39 A/F sensor connector.
(c) Disconnect the E7 ECM connector.

CHECK:

Check the resistance.

OK:

Standard (Check for open):

Tester Connections	Specified Conditions
HT (A38–1) – HA1A (E7–2) HT (A39–1) – HA2A (E7–1)	Below 1 Ω

Standard (Check for short):

Tester Connections	Specified Conditions
HT (A38–1) or HA1A (E7–2) – Body ground HT (A39–1) or HA2A (E7–1) – Body ground	10 kΩ or higher

PREPARATION:

(a) Turn the ignition switch to OFF.
(b) Disconnect the A38 or A39 A/F sensor connector.
(c) Remove A/F relay from engine room R/B No.2.

CHECK:

Check the resistance.

OK:

Standard (Check for open):

Tester Connections	Specified Conditions
+B (A38–2) – A/F relay (3) +B (A39–2) – A/F relay (3)	Below 1 Ω

Standard (Check for short):

Tester Connections	Specified Conditions
+B (A38–2) or A/F relay (3) – Body ground +B (A39–2) or A/F relay (3) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI–11).

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DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)

DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)

DTC	P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)

DTC	P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)

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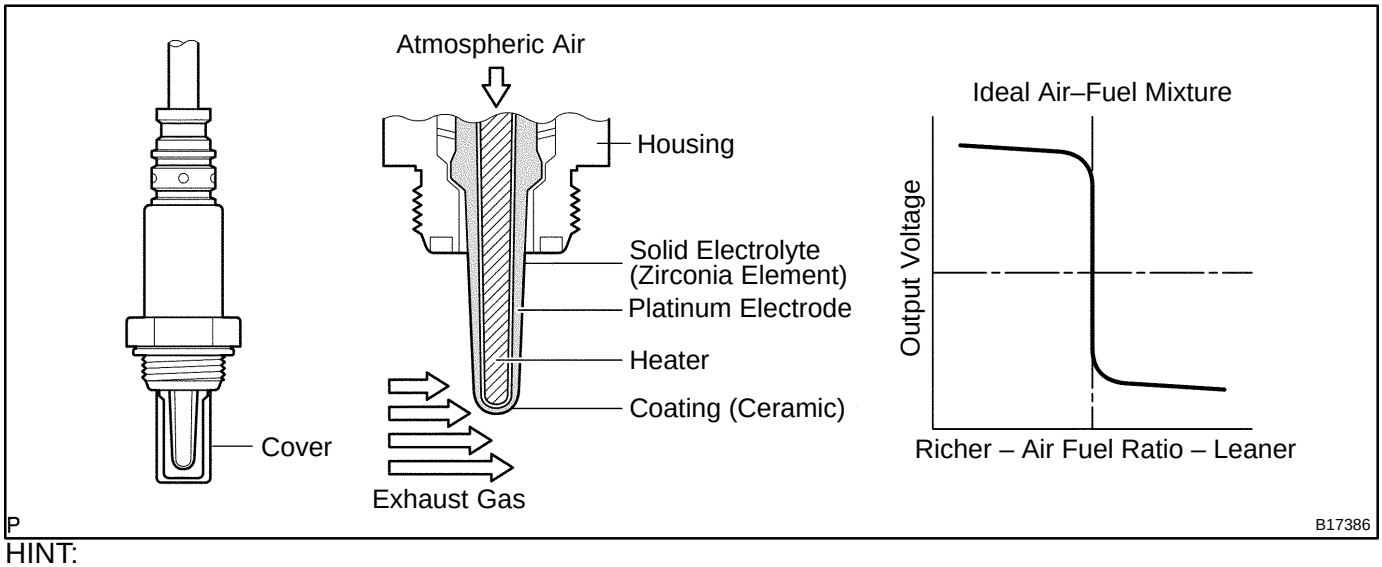
CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used, but for the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.

The heated oxygen sensor has the characteristic which its output voltage changes suddenly in the vicinity of the stoichiometric air–fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide the ECM with feedback to control the air–fuel ratio.

When the air–fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the heated oxygen sensor informs the ECM of the LEAN condition (low voltage, i.e. less than 0.45 V).

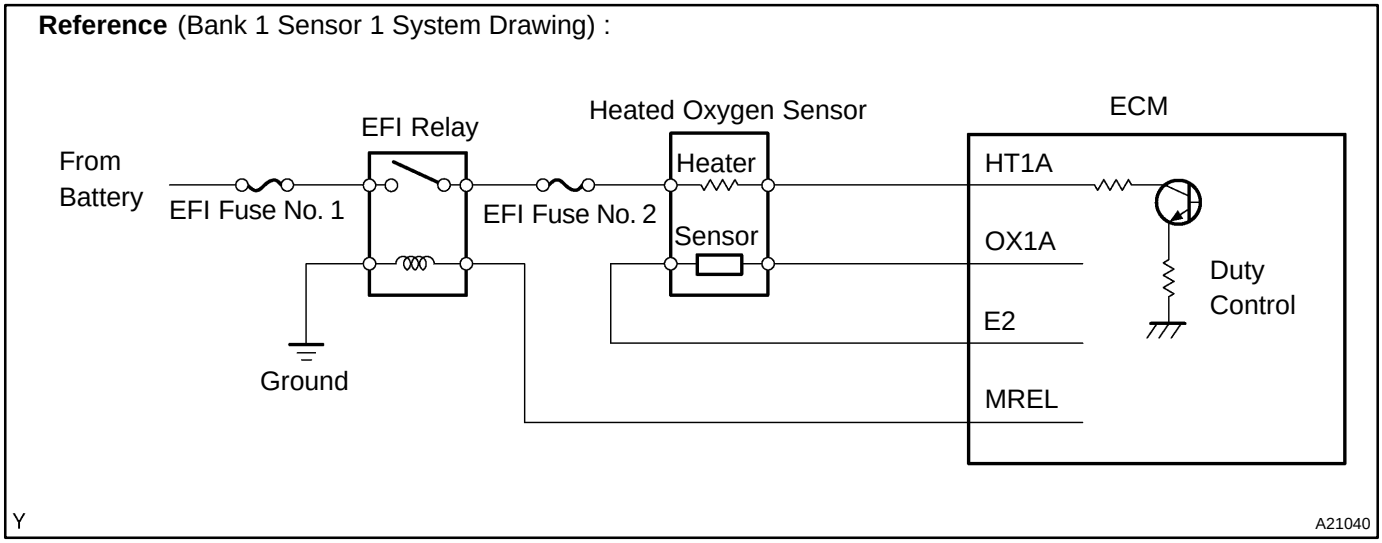
When the air–fuel ratio is RICHER than the stoichiometric air–fuel ratio, the oxygen concentration in the exhaust gas is reduced and the heated oxygen sensor informs the ECM of the RICH condition (high voltage, i.e. more than 0.45 V). The ECM judges by the voltage output from the heated oxygen sensor whether the air–fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the heated oxygen sensor causes output of abnormal voltage, this disables the ECM for performing an accurate air–fuel ratio control. The heated oxygen sensors include a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



HINT:

The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (Bank 1 Sensor 1 System Drawing) :



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DTC No.	DTC Detecting Condition	Trouble Area
P0037 P0057	Heater current is 0.25 A or less when the heater operates with more than 10.5 V positive battery voltage	▶Open in heater circuit of heated oxygen sensor ▶Heated oxygen sensor heater ▶EFI relay ▶ECM
P0038 P0058	When heater operates, heater current exceeds 2.0 A	▶Short in heater circuit of heated oxygen sensor ▶Heated oxygen sensor heater ▶EFI relay ▶ECM

HINT:

- ▶ Bank 1 refers to bank that includes cylinder No. 1.
- ▶ Bank 2 refers to bank that does not includes cylinder No. 1.
- ▶ Sensor 1 refers to the sensor closer to the engine assembly.
- ▶ Sensor 2 refers to the sensor farther away from the engine assembly.

MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element which is used to detect oxygen concentration in the exhaust. If the zirconia element is at the proper temperature and difference of the oxygen concentration between the inside and outside surface of sensor is large, the zirconia element will generate voltage signals. In order to increase the oxygen concentration detecting capacity in the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When current in the sensor is out of the standard operating range, the ECM interprets this as a fault in the heated oxygen sensor and sets a DTC.

Example:

The ECM will set a high current DTC if the current in the sensor is more than 2.0 A when the heater is OFF. Similarly, the ECM will set a low current DTC if the current is less than 0.3 A when the heater is ON.

MONITOR STRATEGY

Related DTCs	P0037	Rear HO2S heater (Bank 1) range check (Low Current)
	P0038	Rear HO2S heater (Bank 1) range check (High Current)
	P0057	Rear HO2S heater (Bank 2) range check (Low Current)
	P0058	Rear HO2S heater (Bank 2) range check (High Current)
Required sensors/components	Main sensors/components	HO2S heater
	Related sensors/components	Vehicle speed sensor (VSS)
Frequency of operation	Continuous	
Duration	0.3 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P0037, P0057 (Low current):		
Battery voltage	10.5 V	–
All heater is turned OFF and intrusive heating is operated when the following conditions are met	Condition (a) and (b)	
(a) Heater	ON	
(b) Heater current	–	0.3 A
P0038, P0058 (High current):		
Case 1:		
Battery voltage	10.5 V	–
Engine	Running	
Starter	OFF	
Intrusive heating	Not operating	
Case 2:		
Battery voltage	10.5 V	–
All heater is turned OFF and intrusive heating is operated when the following conditions are met	Condition (a) and (b)	
(a) Heater	ON	
(b) Heater current	2 A	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0037, P0057 (Low current):	
HO2S heater current during intrusive heating	Less than 0.3 A (when battery voltage is 10.5 V or more)
P0038, P0058 (High current):	
Case 1:	
HO2S heater current	2 A or more
Case 2:	
HO2S heater current during intrusive heating	More than 2 A

COMPONENT OPERATING RANGE

Parameter	Standard Value
HO2S heater current	0.4 to 1 A (at idle, warmed–up engine and +B: 11 to 14 V)

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MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page DI–27).

- TID (Test Identification Data) is assigned to each emissions–related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic tools.

TID $04: HO2S heater

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	$02	Multiply by 0.000076 (A)	Maximum HO2S heater current (Bank 1 Sensor 2)	Malfunction threshold for HO2S heater
1	$20	Multiply by 0.000076 (A)	Maximum HO2S heater current (Bank 2 Sensor 2)	Malfunction threshold for HO2S heater

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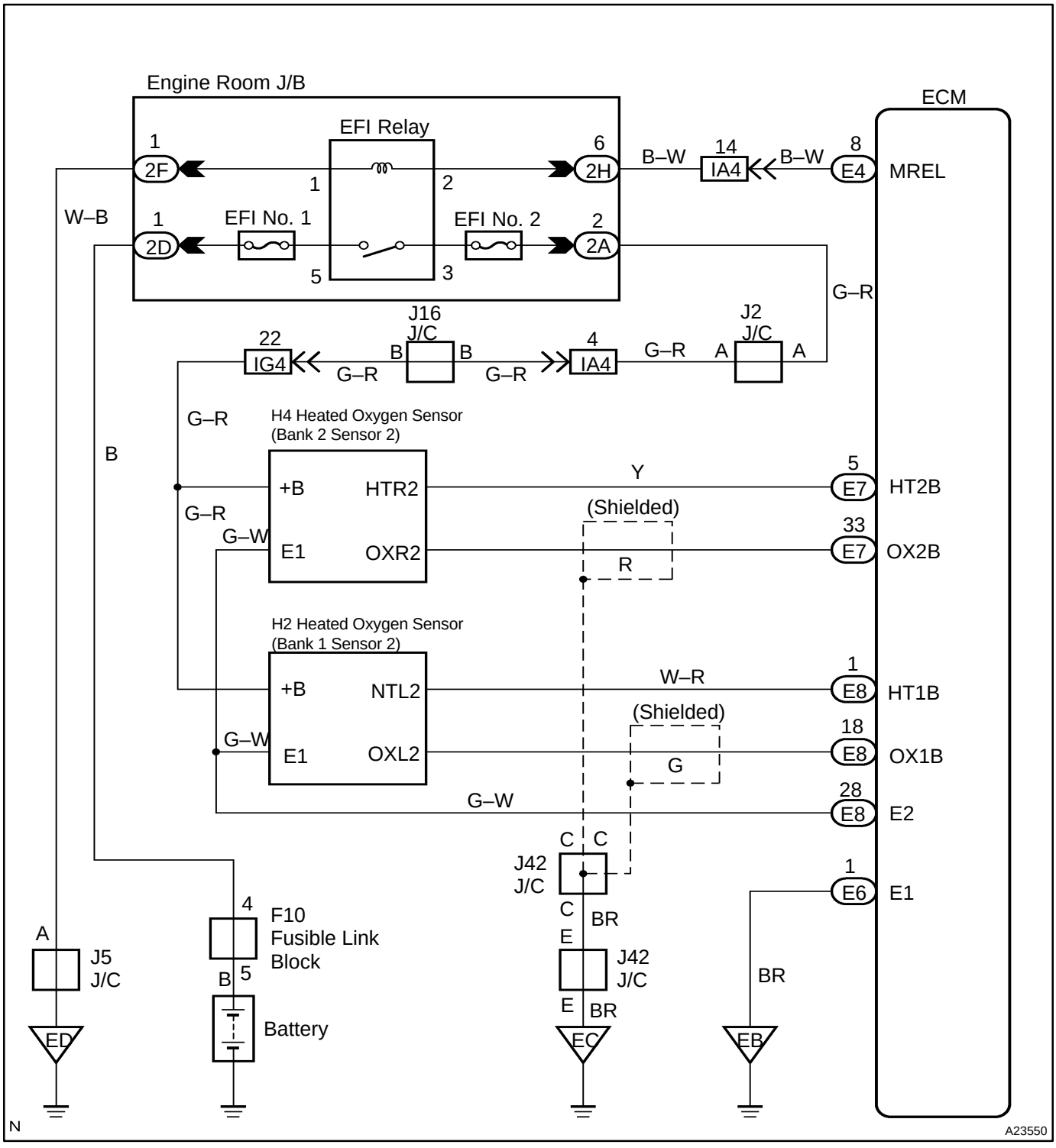
WIRING DIAGRAM



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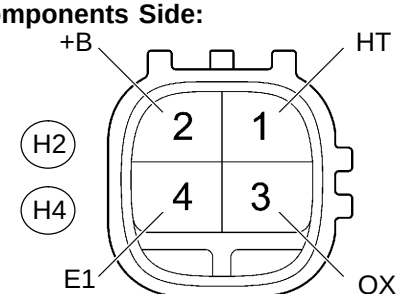
INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand–held tester. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting, it is useful to determine whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. when a malfunction occurred.

1	**Check resistance of heated oxygen sensor heater.**

Components Side:



PREPARATION:

Disconnect the H2 or H4 heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

OK:

Standard:

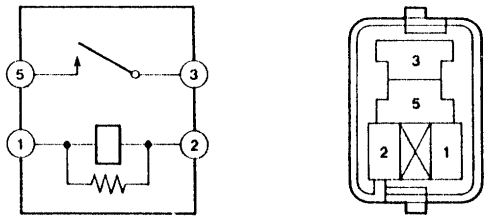
Tester Connection	Specified Condition
HTL2 (H2–1) – +B (H2–2)	11 to 16 Ω (20˚C)
HTR2 (H4–1) – +B (H4–2)	11 to 16 Ω (20˚C)

NG → **Replace heated oxygen sensor.**

OK

2	**Check EFI relay.**

EFI Relay



PREPARATION:

Remove the EFI relay from the engine room J/B.

CHECK:

Inspect the EFI relay.

OK:

Standard:

Terminal No.	Condition	Specified Condition
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace EFI relay.**

OK

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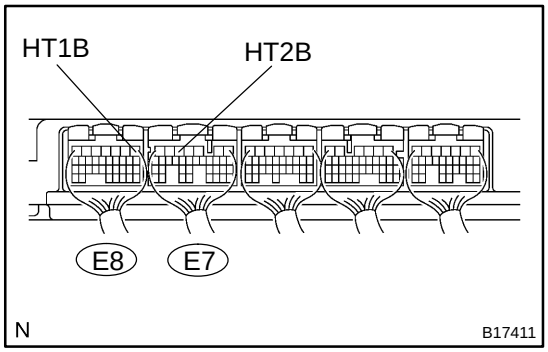
3	**Check voltage between terminals HT1B, HT2B of ECM connectors and body ground.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals of the ECM connectors and body ground.

HINT:

- ▶ Connect terminal HT1B to the bank 1 sensor 2.
- ▶ Connect terminal HT2B to the bank 2 sensor 2.

OK:

Standard:

Tester Connection	Specified Condition
HT1B (E8–1) – Body ground	9 to 14 V
HT2B (E7–5) – Body ground	9 to 14 V

OK → **Replace ECM (See page SF–80).**

NG

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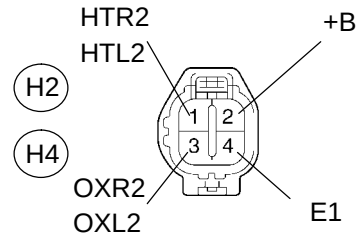
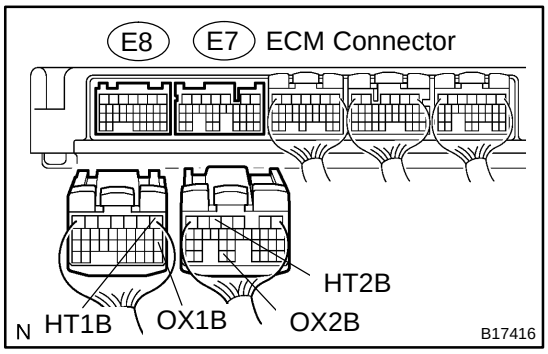
4	**Check for open and short in harness and connector between ECM and heated oxygen sensor, heated oxygen sensor – EFI relay.**

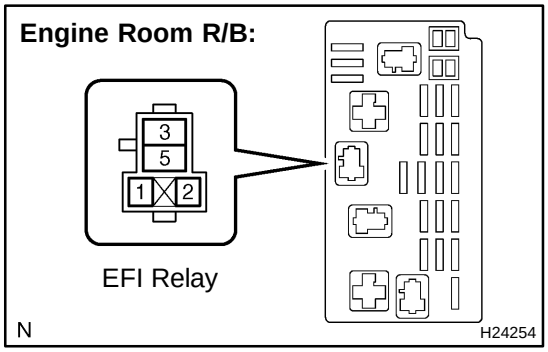
Wire Harness Side:



Bank 1 Sensor 2, Bank 2 Sensor 2 A23543



Engine Room R/B:



PREPARATION:

(a) Turn the ignition switch to OFF.
(b) Disconnect the H2 or H4 oxygen sensor connector.
(c) Disconnect the E7and E8 ECM connector.

CHECK:

Check the resistance.

OK:

Standard (Check for open):

Tester Connections	Specified Conditions
HTL2 (H2–1) – HT1B (E8–1)	Below 1 Ω
HTR2 (H4–1) – HT2B (E7–5)	Below 1 Ω

Standard (Check for short):

Tester Connections	Specified Conditions
HTL2 (H2–1) or HT1B (E8–1) – Body ground	10 kΩ or higher
HTR2 (H4–1) or HT2B (E7–5) – Body ground	10 kΩ or higher

PREPARATION:

(a) Turn the ignition switch to OFF.
(b) Disconnect the H2 or H4 oxygen sensor connector.
(c) Remove EFI relay from engine room R/B.

CHECK:

Check the resistance.

OK:

Standard (Check for open):

Tester Connections	Specified Conditions
+B (A21–2) –EFI relay (3) +B (A22–2) – EFI relay (3)	Below 1 Ω

Standard (Check for short):

Tester Connections	Specified Conditions
+B (H2–2) or EFI relay (3) – Body ground +B (H2–2) or EFI relay (3) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI–11).

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DTC	P0100	Mass or Volume Air Flow Circuit

DTC	P0102	Mass or Volume Air Flow Circuit Low Input

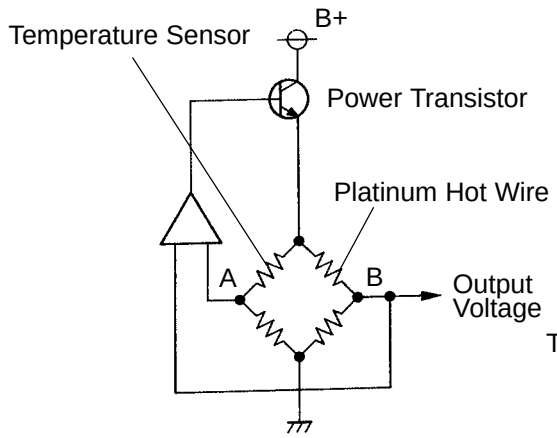
DTC	P0103	Mass or Volume Air Flow Circuit High Input

CIRCUIT DESCRIPTION

The Mass Air Flow (MAF) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor. The ECM interprets this voltage as the intake air amount.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



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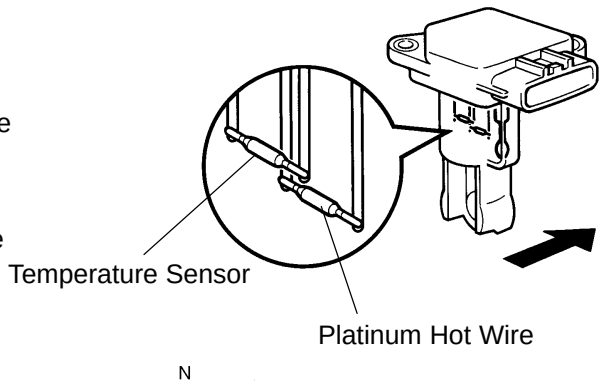

N

A09707

DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit for more than 3 sec.	▶Open or short in mass air flow meter circuit ▶Mass air flow meter ▶ECM
P0102	Open or short in mass air flow meter circuit for more than 3 sec.	
P0103	Open in mass air flow meter circuit for more than 3 sec. (EVG circuit) Short in mass air flow meter circuit for more than 3 sec. (+B circuit)	

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HINT:
After confirming DTC P0100, P0102 or P0103, use the hand–held tester or the OBD II scan tool to confirm the MAF ratio from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	▶Mass air flow meter power source circuit open ▶VG circuit open or short
271.0 or more	▶EVG circuit open

MONITOR DESCRIPTION

If there is a defect in the MAF (Mass Air Flow) meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.
Example:
When the MAF meter voltage output is less than 0.2 V, or more than 4.9 V, and if either the condition continues for more than 3 sec.

MONITOR STRATEGY

Related DTCs	P0100	Mass air flow meter circuit range check (Fluttering)
	P0102	Mass air flow meter circuit range check (Low voltage)
	P0103	Mass air flow meter circuit range check (High voltage)
Required sensors/components	Mass air flow meter	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (When engine speed is at less than 4,000 rpm) 2 driving cycles (When engine speed is at 4,000 rpm or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page DI–18
The typical enabling condition is not available	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0100:	
Mass air flow meter voltage	Less than 0.2 V, or more than 4.9 V
P0102:	
Mass air flow meter voltage	Less than 0.2 V
P0103:	
Mass air flow meter voltage	More than 4.9 V

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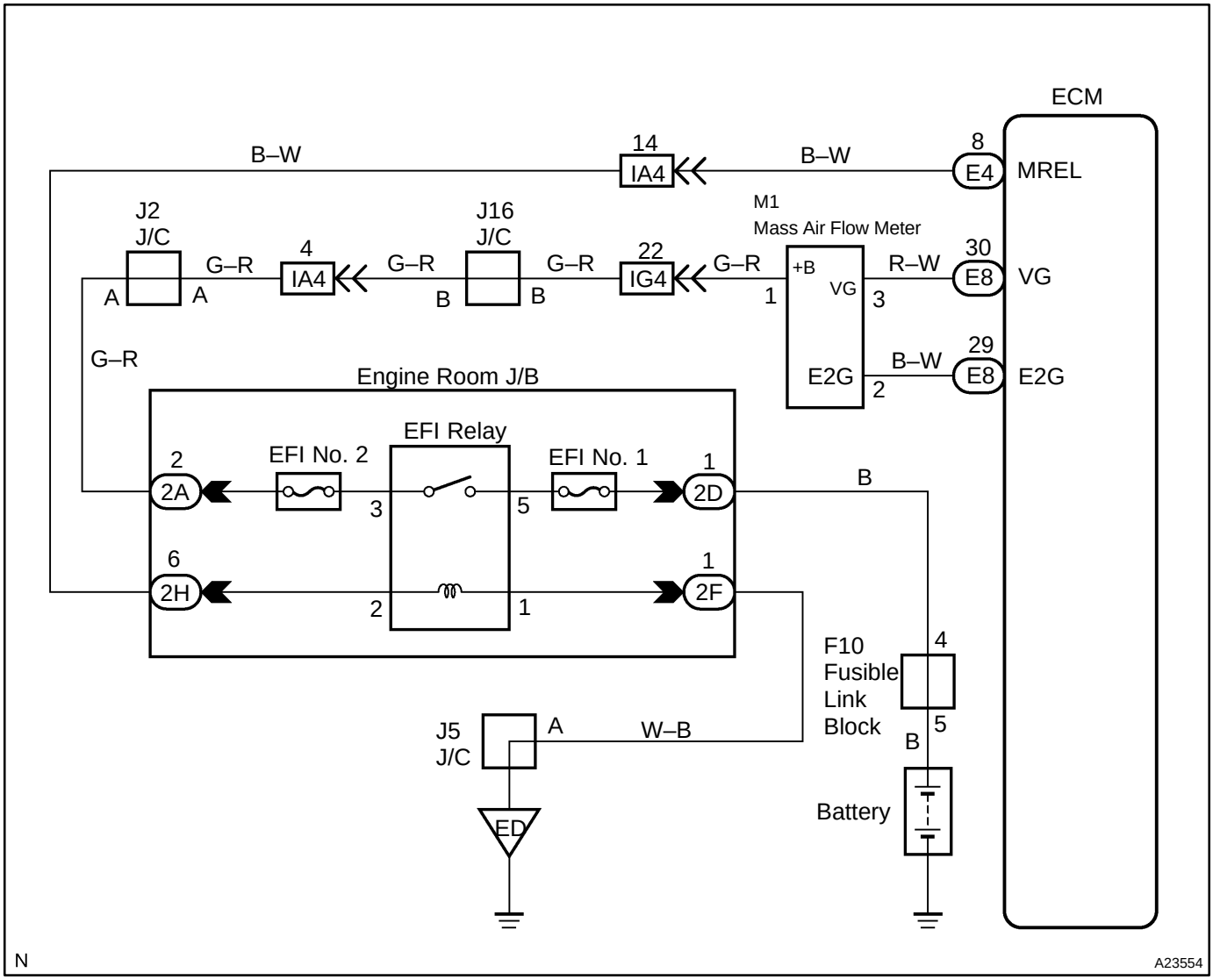
COMPONENT OPERATING RANGE

Parameter	Standard Value
Mass air flow meter voltage	0.4 to 2.2 V

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Connect hand–held tester, and read value of mass air flow rate.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and push the hand–held tester main switch ON.
(c) Start the engine.
(d) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF.

CHECK:

Read the mass air flow rate on the hand–held tester.

RESULT:

Air Flow Rate (gm/s)	Proceed to
0.0	A
271.0 or more	B
Between 1 and 270.0 (*1)	C

*1: The value must change when the throttle valve is opened or closed.

B	**Go to step 6.**
C	**Check for intermittent problems (See page DI–11).**

A

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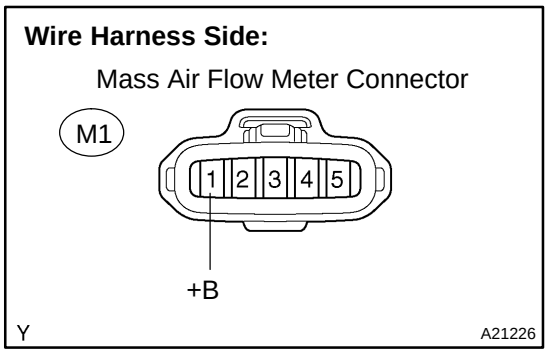
2	Check voltage of mass air flow meter power source.



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal 1 of the mass air flow meter connector and body ground.

OK:

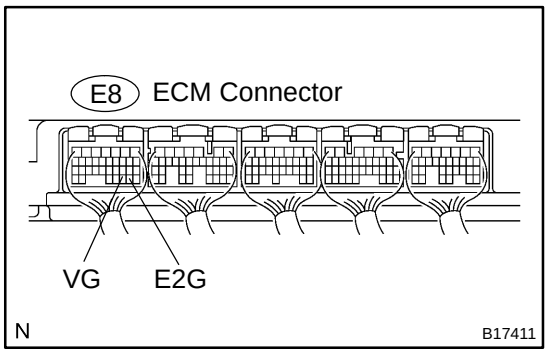
Standard:

Tester Connection	Specified Condition
+B (M1–1) – Body ground	9 to 14 V

NG → **Go to step 5.**

OK

3	Check voltage between terminal VG of ECM connector and body ground.



PREPARATION:

Start the engine.

CHECK:

Measure the voltage between the specified terminal of the E8 ECM connector.

HINT:

The shift position should be P or N and the A/C switch should be turned OFF.

OK:

Standard:

Tester Connection	Condition	Specified Condition
VG (E8–30) – E2G (E8–29)	Engine is idling	0.5 to 3.0 V

NG → **Replace ECM (See page SF–80).**

NG

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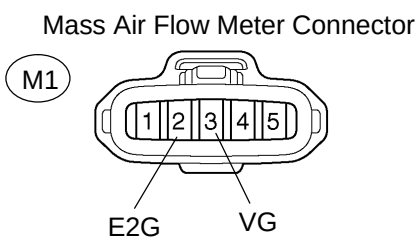
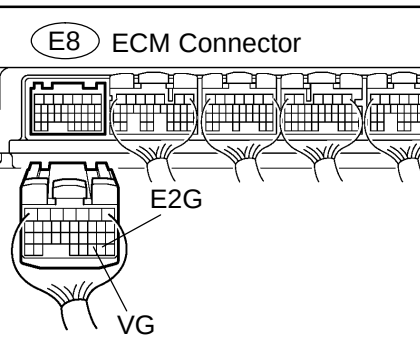
4	**Check for open and short in harness and connector between mass air flow meter and ECM.**

Wire Harness Side:





PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VG (M1–3) – VG (E8–30)	Below 1 Ω
E2G (M1–2) – E2G (E8–29)	Below 1 Ω
VG (M1–3) or VG (E8–30) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

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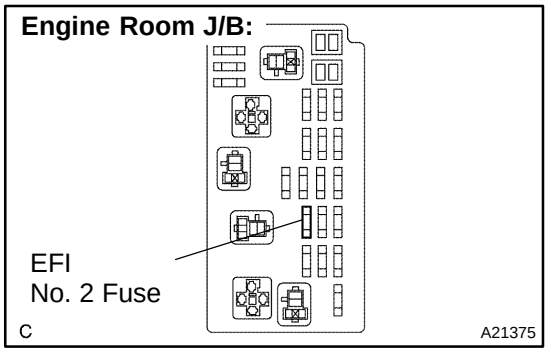
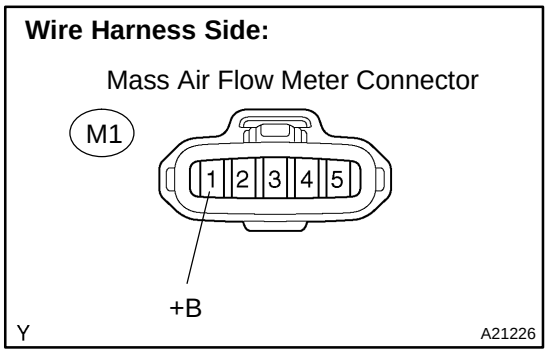
5	Check for open and short in harness and connector between mass air flow meter and EFI relay.



PREPARATION:
Remove the EFI No. 2 fuse from the engine room J/B.
CHECK:
Check the resistance in the EFI No. 2 fuse.
OK:

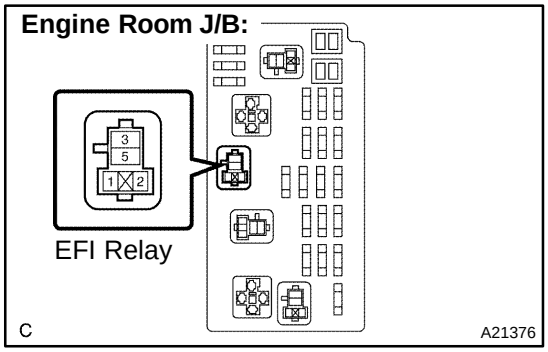
Standard:
Below 1 Ω



PREPARATION:
(a) Install the EFI No. 2 fuse.
(b) Disconnect the M1 mass air flow meter connector.
(c) Remove the EFI relay from the engine room J/B.
CHECK:
Check the resistance between the wire harness side connectors.
OK:

Standard:

Tester Connection	Specified Condition
+B (M1–1) – Engine Room J/B (EFI relay terminal 1)	Below 1 Ω
+B (M1–1) or Engine room J/B (EFI relay terminal 1) – Body ground	10 kΩ or higher



NG → **Repair or replace harness or connector.**

OK

Check ECM power source circuit (See page DI–493).

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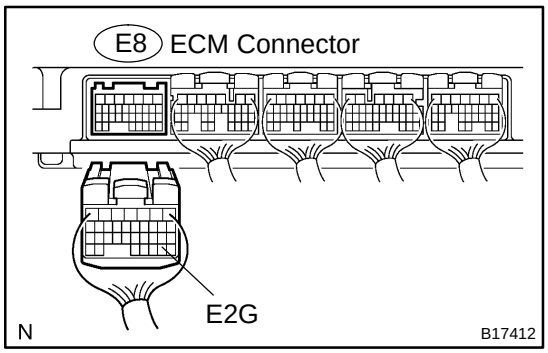
6	Check continuity between terminal E2G of ECM connector and body ground.



CHECK:

Check the resistance between terminal of the E8 ECM connector and body ground.

OK:

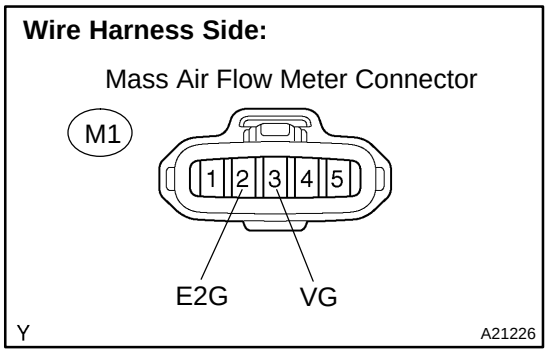
Standard:

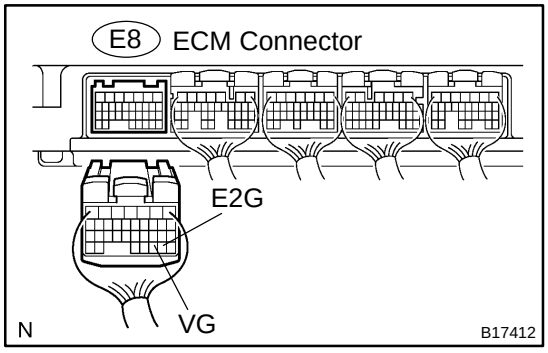
Tester Connection	Specified Condition
E2G (E8–29) – Body ground	Below 1 Ω

NG → **Replace ECM (See page SF–80).**

OK

7	Check for open in harness and connector between mass air flow meter and ECM.





PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VG (M1–3) – VG (E8–30)	Below 1 Ω
E2G (M1–2) – E2G (E8–29)	Below 1 Ω
VG (M1–3) or VG (E8–30) – Body ground	10 kΩ or higher
E2G (M1–2) or E2G (E8–29) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

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DTC	P0101	Mass or Volume Air Flow Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100, P0102 and P0103 on page DI–102.

DTC No.	DTC Detecting Condition	Trouble Area
P0101	After engine is warmed up, conditions (a), (b), (c) and (d) continue for more than 10 seconds: (2 trip detection logic) (a) Throttle valve fully closed (b) Voltage output of the mass air flow meter is more than 2.2 V. (c) Engine coolant temperature is more than 70 °C (158 °F). (d) Engine speed is less than 2,000 rpm.	▶Mass air flow meter
	Conditions (a), (b) and (c) continue for more than 10 seconds at engine speed: (2 trip detection logic) (a) Engine speed is more than 300 rpm. (b) Voltage output of the mass air flow meter is less than 1.0 V.	

MONITOR DESCRIPTION

The MAF (Mass Air Flow) meter helps the ECM calculate the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air. By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the air flow through the MAF meter. The ECM interprets this voltage as the intake air amount. If there is a defect in the MAF meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.

Example:

If the voltage is more than 2.2 V at idle or less than 1.0 V at idle OFF, the ECM interprets this as a defect in the MAF meter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0101	Mass air flow meter rationality (Low voltage)
		Mass air flow meter rationality (High voltage)
Required sensors/components	Main sensors/components	Mass air flow meter
	Related sensors/components	Engine speed sensor, Engine coolant temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
High voltage:		
Engine speed	–	2,000 rpm
MAF meter voltage	–	4.9 V
Engine coolant temperature	70°C (158°F)	–
Low voltage:		
Engine speed	300 rpm	–
MAF meter voltage	0.2 V	–
Fuel cut	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Mass air flow meter voltage (High voltage)	More than 2.2 V (varies with throttle position sensor voltage)
Mass air flow meter voltage (Low voltage)	Less than 1.0 V (varies with throttle position sensor voltage)

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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0101) being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS/ENHANCED OBD II/DTC INFO/ CURRENT CODES.

CHECK:

Read the DTC using the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
”P0101” and other DTCs	A
Only P0101	B

HINT:

If any other codes besides P0101 are output, perform the troubleshooting for those codes first.

B → **Replace mass air flow meter.**

A

Go to relevant DTC chart (See page DI–58).

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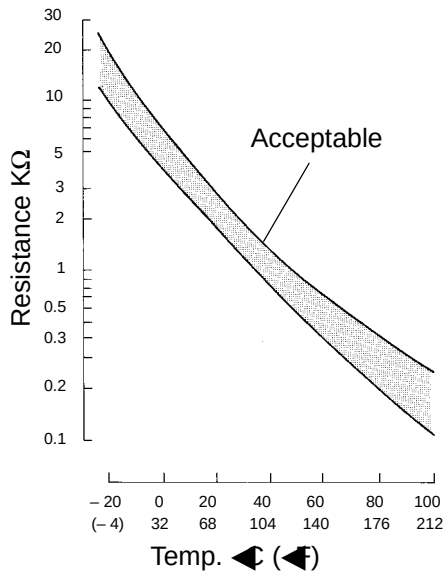
DTC	P0110	Intake Air Temperature Circuit

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

CIRCUIT DESCRIPTION

(Fig.1)



The intake air temperature (IAT) sensor, mounted on the mass air flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The resistance varies as voltage changes to the ECM terminal.
(See Fig. 1).
The intake air temperature sensor is connected to the ECM (See below). The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from terminal THA (THAR) via resistor R.
That is, the resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the voltage at terminal THA (THAR) also changes. Based on this signal, the ECM increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in intake air temperature sensor circuit for 0.5 sec.	▶Open or short in intake air temperature sensor circuit ▶Intake air temperature sensor (built in mass air flow meter) ▶ECM
P0112	Step 4	Short in intake air temperature sensor circuit for 0.5 sec.	
P0113	Step 2	Open in intake air temperature sensor circuit for 0.5 sec.	

HINT:
After confirming DTC "P0110, P0112 or P0113", use the hand–held tester to confirm the intake air temperature in the "DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL".

Temperature Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

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MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the IAT (Intake Air Temperature) sensor and sets a DTC.
Example:
When the sensor voltage output is equal to –40°C (–40°F), or more than 140°C (284°F).

MONITOR STRATEGY

Related DTCs	P0110	Intake air temperature sensor range check (Fluttering)
	P0112	Intake air temperature sensor range check (Low resistance)
	P0113	Intake air temperature sensor range check (High resistance)
Required sensors/components	Intake air temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page DI–18
The typical enabling condition is not available	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0110:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω, or more than 156 kΩ (More than 140°C (284°F), or less than –40°C (–40°F)
P0112:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω (More than 140°C (284°F))
P0113:	
Intake air temperature sensor resistance (Intake air temperature)	More than 156 kΩ (Less than –40°C (–40°F))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Intake air temperature sensor resistance	98.5 Ω (140°C (284°F)) to 156 kΩ (–40°C (–40°F))

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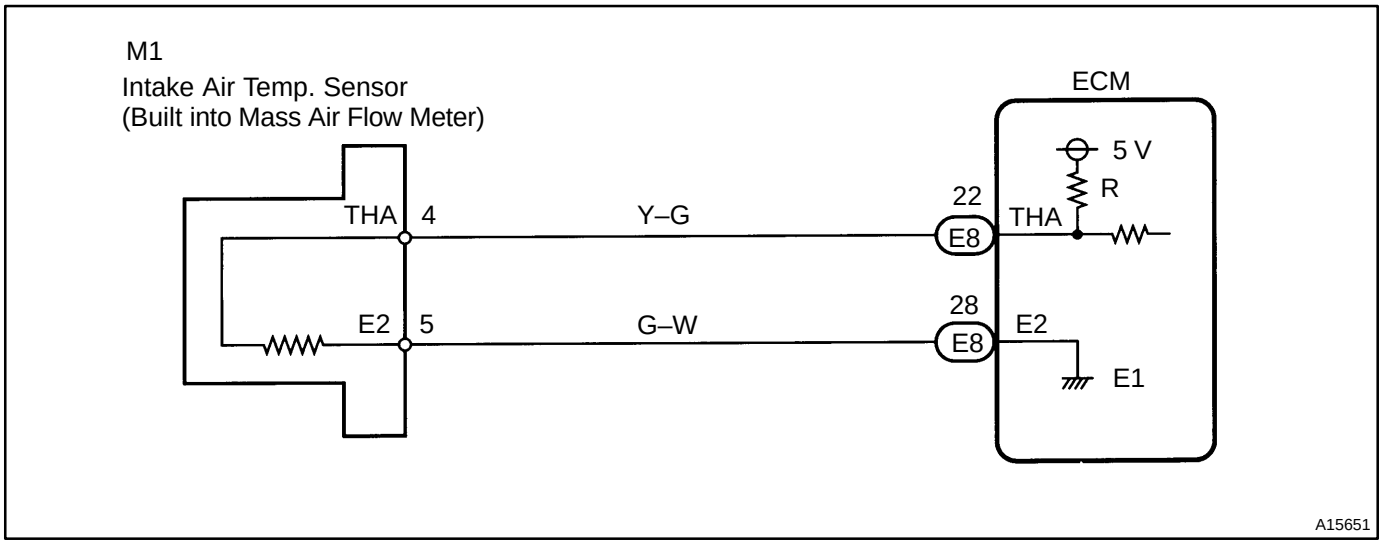
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

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1	**Connect hand–held tester, and read value of intake air temperature.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the hand–held tester.

OK:

Same as actual intake air temperature.

RESULT:

Displayed Temperature	Proceed to
–40°C (–40°F)	A
140°C (284°F) or more	B
OK (Same as present temperature)	C

HINT:

- If there is an open circuit, the hand–held tester indicates –40°C (–40°F).
- If there is a short circuit, the hand–held tester indicates 140°C (284°F) or more.

B → **Go to step 4.**

C → **Check for intermittent problems (See page DI–11).**

A

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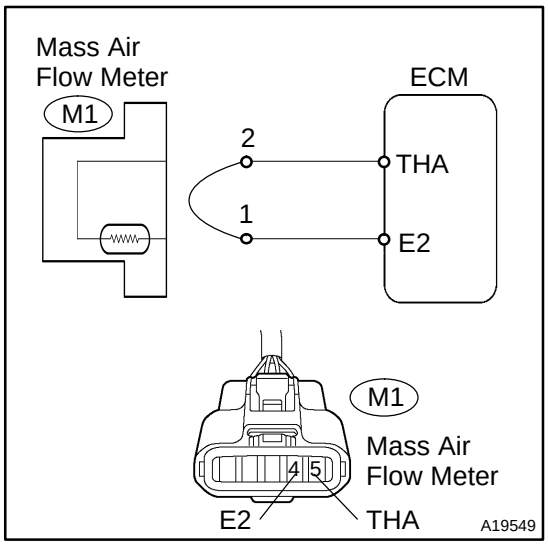
2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.
(b) Connect terminals 4 and 5 of the mass air flow meter wire harness side connector.
(c) Turn the ignition switch ON.
(d) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the hand–held tester.

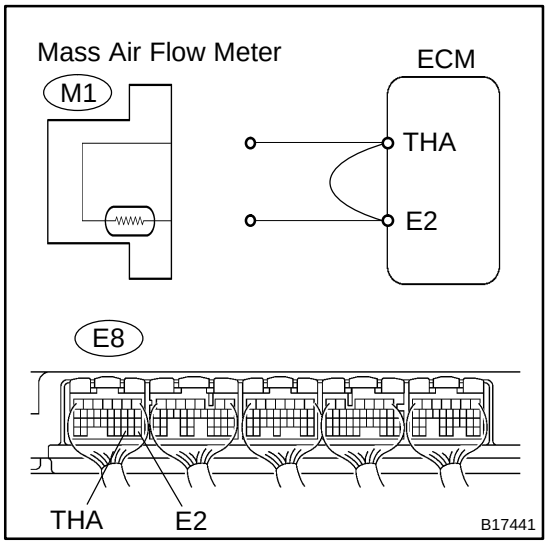
OK:

Standard: Temperature value: 140°C (284°F) or more

OK	Confirm good connection at sensor. If OK, replace mass air flow meter.

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Connect terminals THA and E2 of the E8 ECM connector.

HINT:

Before checking, do a visual and contact pressure check for the ECM connector.

(b) Turn the ignition switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the hand–held tester.

OK:

Standard: Temperature value: 140°C (284°F) or more

OK	Repair or replace harness or connector.

NG

Confirm good connection at ECM. If OK, replace ECM (See page SF–80).

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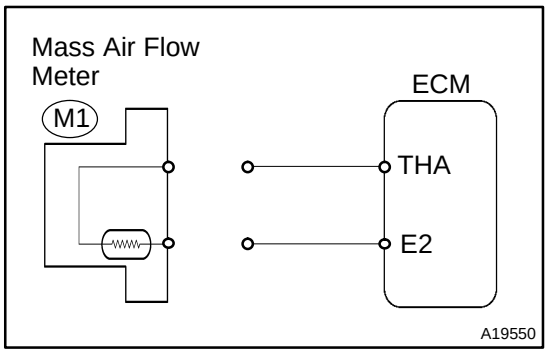
4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.
(b) Turn the ignition switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the hand–held tester.

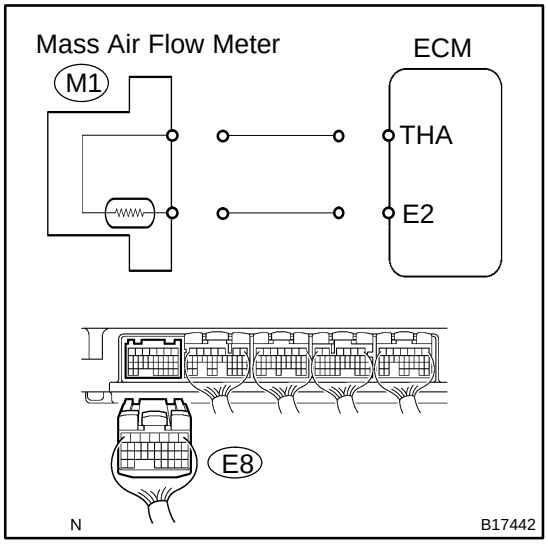
OK:

Standard: Temperature value: –40°C (–40°F)

OK	Replace mass air flow meter.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Disconnect the E8 ECM connector.
(b) Turn the ignition switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the hand–held tester.

OK:

Standard: Temperature value: –40°C (–40°F)

OK	Repair or replace harness or connector.

NG

Replace ECM (See page SF–80).

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DTC	P0115	Engine Coolant Temperature Circuit

DTC	P0117	Engine Coolant Temperature Circuit Low Input

DTC	P0118	Engine Coolant Temperature Circuit High Input

CIRCUIT DESCRIPTION

A thermistor is built in the Engine Coolant Temperature (ECT) sensor and changes the resistance value according to the engine coolant temperature.
The structure of the sensor and connection to the ECM is the same as the Intake Air Temperature (IAT) sensor.
HINT:
If the ECM detects the DTC ”P0115, P0117 or P0118”, it operates the fail–safe function in which the ECT is assumed to be 80◀C (176◀F).

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in engine coolant temperature sensor circuit for 0.5 sec.	▶Open or short in engine coolant temperature sensor circuit ▶Engine coolant temperature sensor ▶ECM
P0117	Step 4	Short in engine coolant temperature sensor circuit for 0.5 sec.	
P0118	Step 2	Open in engine coolant temperature sensor circuit for 0.5 sec.	

HINT:
After confirming DTC ”P0115, P0117 or P0118”, use the OBD II scan tool or the hand–held tester to confirm the engine coolant temperature from the DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL.

Displayed Temperature	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The resistance varies as output voltage from the sensor changes.
The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

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Example:
When the ECM calculates that the ECT is less than –40°C (–40°F), or more than 140°C (284°F), and if either the condition continues for 0.5 sec. or more, the ECM will set a DTC.

MONITOR STRATEGY

Related DTCs	P0115	Engine coolant temperature sensor range check (Fluttering)
	P0117	Engine coolant temperature sensor range check (Low resistance)
	P0118	Engine coolant temperature sensor range check (High resistance)
Required sensors/components	Engine coolant temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page DI–18
The typical enabling condition is not available	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0115:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω, or more than 156 kΩ (More than 140°C (284°F), or less than –40°C (–40°F))
P0117:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω (More than 140°C (284°F))
P0118:	
Engine coolant temperature sensor resistance (Coolant temperature)	More than 156 kΩ (Less than –40°C (–40°F))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Engine coolant temperature sensor resistance	79 Ω (140°C (284°F)) to 156 kΩ (–40°C (–40°F))

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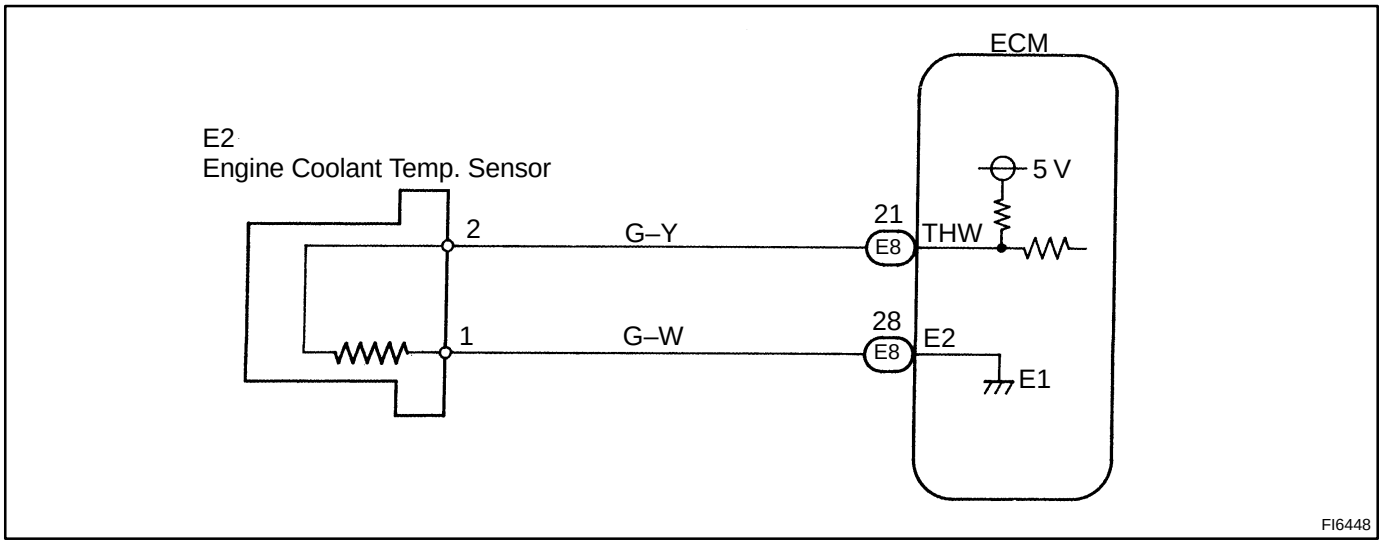
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

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1	**Connect hand–held tester, and read value of engine coolant temperature.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the the hand–held tester.

OK:

Same value as actual engine coolant temperature.

RESULT:

Displayed Temperature	Proceed to
–40°C (–40°F)	A
140°C (284°F) or more	B
OK (Same as present temperature)	C

HINT:

- If there is an open circuit, hand–held tester indicates –40°C (–40°F).
- If there is a short circuit, hand–held tester indicates 140°C (284°F) or more.

B	**Go to step 4.**
C	**Check for intermittent problems (See page DI–11).**

A

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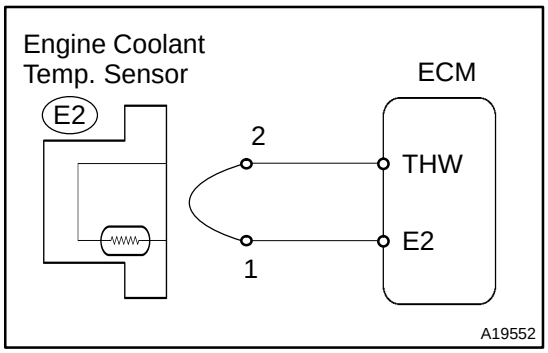
2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature (ECT) sensor connector.
(b) Connect terminals 1 and 2 of the engine coolant temperature sensor wire harness side connector.
(c) Turn the ignition switch ON.
(d) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the hand–held tester.

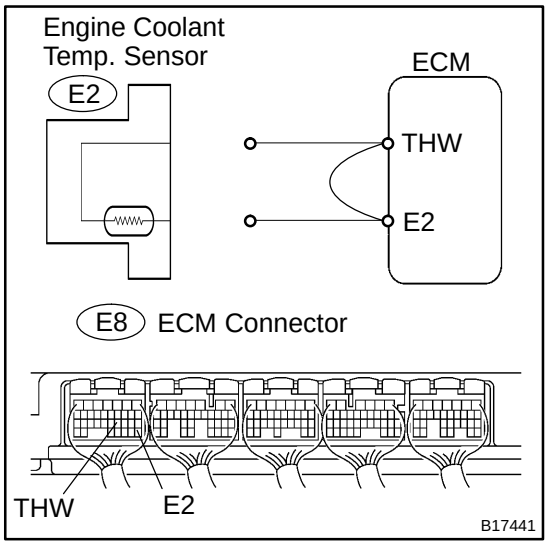
OK:

Standard: Temperature value: 140°C (284°F) or more

OK	Confirm good connection at sensor. If OK, replace engine coolant temperature sensor.

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature sensor connector.
(b) Connect terminals THW and E2 of the E8 ECM connector.

HINT:

Before checking, do a visual and contact pressure checks for the ECM connector.

(c) Turn the ignition switch ON.
(d) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or the hand–held tester.

OK:

Standard: Temperature value: 140°C (284°F) or more

OK	Repair or replace harness or connector.

NG

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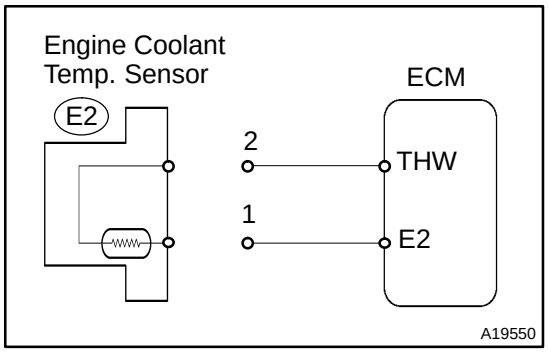
Confirm good connection at ECM. If OK, replace ECM (See page SF–80).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature sensor connector.
(b) Turn the ignition switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the hand–held tester.

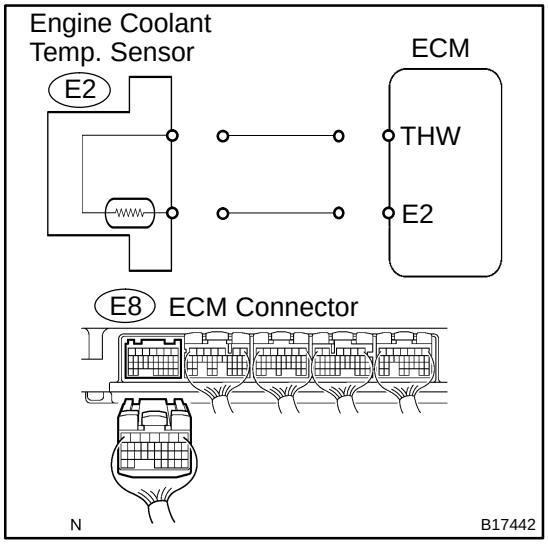
OK:

Standard: Temperature value: –40°C (–40°F)

OK	Replace engine coolant temperature sensor.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Disconnect the E8 ECM connector.
(b) Turn the ignition switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the hand–held tester.

OK:

Standard: Temperature value: –40°C (–40°F)

OK	Repair or replace harness or connector.

NG

Replace ECM (See page SF–80).

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DTC	P0116	Engine Coolant Temperature Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI–119.

DTC No.	DTC Detecting Condition	Trouble Area
P0116	If the engine coolant temperature was 35˚C (95˚F) or more but less than 60˚C (140˚F) when the engine is started, and if conditions (a) and (b) are met: (a) Vehicle has accelerated and decelerated. (b) Engine coolant temperature remains within 3˚C (5.4˚F) of the initial engine coolant temperature (2 trip detection logic)	▶Engine coolant temperature sensor
	If the engine coolant temperature is more than 60˚C (140˚F) when the engine is started, and if conditions (a) and (b) are met: (a) Vehicle has accelerated and decelerated. (b) If the engine coolant temperature sensor records a temperature variation below 1˚C (1.8˚F) successively 6 times (6 trip detection logic)	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Examples:

(1) Upon starting the engine, the ECT is between 35˚C (95˚F) and 60˚C (140˚F). If after driving for 250 sec., the ECT still remains within 3˚C (5.4˚F) of the starting temperature, a DTC will be set (2 trip detection logic).

(2) Upon starting the engine, the ECT is over 60˚C (140˚F). If after driving for 250 sec., the ECT still remains within 1˚C (1.8˚F) of the starting temperature, a DTC will be set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116	Engine coolant temperature sensor range check (Stuck)
Required sensors/components	Main sensors/components	Engine coolant temperature sensor
	Related sensors/components	Intake air temperature sensor, Crankshaft position sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	250 sec.	
MIL operation	2 driving cycles (When temperature is fixed between 35◀C (95◀F) and 60◀C (140◀F)) 6 driving cycles (When temperature is fixed at 60◀C (140◀F) or more)	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Case 1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):		
Cumulative idle off period	250 sec.	–
Speed increase 30 km/h (18.6 mph) or more	10 times	–
Engine coolant temperature	35°C (95°F)	60°C (140°F)
Intake air temperature	–6.7°C (20°F)	–
Case 2 (When temperature is fixed at 60°C (140°F) or more):		
Engine coolant temperature at engine start	60°C (140°F)	–
Intake air temperature	–6.7°C (20°F)	–
Stop and go	Once or more (Stop for 20 sec. or more and accelerate to more than 70 km/h (43.5 mph) with in 40 sec.)	
Steady driving and stop *	Once or more	

*: Vehicle is driven by 65 km/h (40.4 mph) or more for 30 sec. or more and the vehicle speed reaches 70 km/h (43.5 mph). The vehicle is decelerated from 65 km/h (40.4 mph) to 3 km/h (1.86 mph) or less within 35 sec. and stopped for 10 sec.

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):	
Change of engine coolant temperature value	Less than 3°C (5.4°F)
Case2 (When temperature is fixed at 60°C (140°F) or more):	
Change of engine coolant temperature value	1°C (1.8°F) or less

COMPONENT OPERATING RANGE

Standard Value
Engine coolant temperature changes with the actual engine coolant temperature.

INSPECTION PROCEDURE

HINT:

- If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, ECT sensor circuit may be open or shorted. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Replace engine coolant temperature sensor.

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DID84–01

DTC	P0120	Throttle/Pedal Position Sensor/Switch ”A” Circuit

DTC	P0122	Throttle/Pedal Position Sensor/Switch ”A” Circuit Low Input

DTC	P0123	Throttle/Pedal Position Sensor/Switch ”A” Circuit High Input

DTC	P0220	Throttle/Pedal Position Sensor/Switch ”B” Circuit

DTC	P0222	Throttle/Pedal Position Sensor/Switch ”B” Circuit Low Input

DTC	P0223	Throttle/Pedal Position Sensor/Switch ”B” Circuit High Input

DTC	P2135	Throttle/Pedal Position Sensor/Switch ”A”/”B” Voltage Correction

HINT:
This is the purpose for the ”throttle position sensor”.

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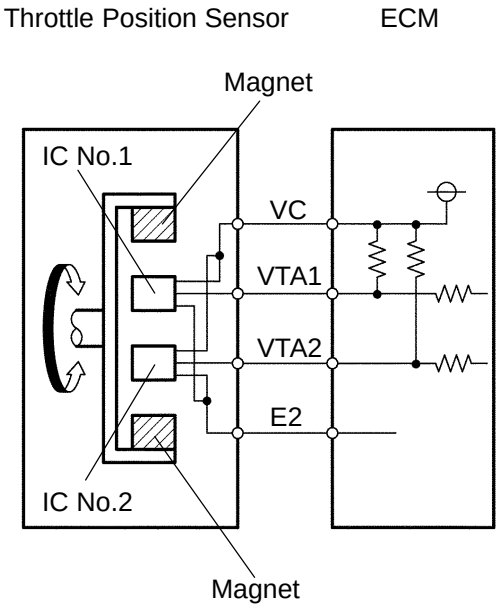
CIRCUIT DESCRIPTION

HINT:

- ▶ This Electrical Throttle Control System (ETCS) does not use a throttle cable.
- ▶ This throttle position sensor is a non–contact type.

The throttle position sensor is mounted on the throttle body. It detects the opening angle of the throttle valve. This sensor is electronically controlled and uses Hall–effect elements, so that accurate control and reliability can be obtained. The throttle position sensor has 2 sensor elements / signal outputs: VTA1 and VTA2. VTA1 used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. Voltage applied to VTA1 and VTA2 change between 0 V and 5 V in proportion to the opening angle of the throttle valve. There are several checks that the ECM performs to confirm proper operation of the throttle position sensor and VTA1.

The ECM judges the current opening angle of the throttle valve from these signals input from terminals VTA1 and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to driver inputs.



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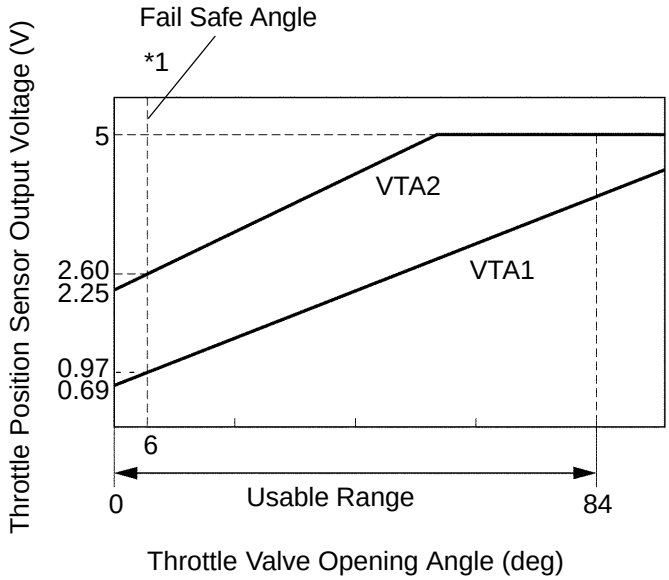

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Throttle Valve Fully Closed
(Throttle Position expressed as percentage
(VTA1) 10 to 20%)

Throttle Valve Fully Opened
(Throttle Position expressed as percentage
(VTA1) 64 to 96%)

*1: Fail Safe Angle 7°
(Throttle Position expressed as percentage
(VTA1) about 10 to 24%)

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DTC No.	DTC Detection Condition	Trouble Area
Condition (a) of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 2 sec. (Open or short in the throttle control motor and sensor circuit)		
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA1 is "0.2 V or less" or VTA1 is "4.8 V or more"	▶Open or short in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶ECM
P0122	(a) VTA1 is 0.2 V or less	▶Short in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Short in VTA1 circuit ▶Open in VC circuit ▶ECM
P0123	(a) VTA1 is 4.8 V or more	▶Open in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Open in VTA1 circuit ▶Open in E2 circuit ▶VC and VTA1 circuit are short–circuited ▶ECM
P0220	Detection conditions for DTCs P0222 and P0223 are not satisfied but condition (a) is satisfied (a) VTA2 is "0.5 V or less" or VTA2 is "4.8 V or more"	▶Throttle control motor and sensor ▶ECM
P0222	(a) VTA2 is 0.5 V or less	▶Throttle control motor and sensor ▶Short in VTA2 circuit ▶Open in VC circuit ▶ECM
P0223	(a) VTA2 is "4.8 V or more" and VTA1 is "0.2 V or more" and VTA1 is "1.8 V or less"	▶Throttle control motor and sensor ▶Open in VTA2 circuit ▶Open in E2 circuit ▶VC and VTA2 circuit are short–circuited ▶ECM
P2135	Condition (a) continues for 0.5 sec. or more, or condition (b) continues for 0.4 sec. or more: (a) Difference between VTA1 and VTA2 is 0.02 V or less (b) VTA1 is "0.2 V or less" and VTA2 is "0.5 V or less"	▶VTA1 and VTA2 circuit are short–circuited ▶Throttle control motor and sensor ▶ECM

HINT:

- ▶ After confirming DTCs, use the hand–held tester or the OBD II scan tool to confirm the throttle valve opening percentage and closed throttle position switch condition.
- ▶ THROTTLE POS means the VTA1 signal and the THROTTLE POS #2 means the VTA2 signal.

Reference (Normal condition):

Tester display	Accelerator pedal fully released	Accelerator pedal fully depressed
THROTTLE POS	10 to 24%	66 to 98%
THROTTLE POS #2	2.1 to 3.1 V	4.5 to 5.5 V

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MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.

(a) There is an expected specific voltage difference between VTA1 and VTA2 for each throttle opening angle.

▶ If the difference between VTA1 and VTA2 is incorrect the ECM interprets this as a fault and will set a DTC.

(b) VTA1 and VTA2 each have a specific voltage operating range.

▶ If VTA1 or VTA2 is out of the normal operating range the ECM interprets this as a fault and will set a DTC.

(c) VTA1 and VTA2 should never be close to the same voltage levels.

▶ If VTA1 is within the range of ± 0.02 V of VTA2 the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel–cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.

If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail–safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0120	Throttle position sensor (sensor 1) range check (Fluttering)
	P0122	Throttle position sensor (sensor 1) range check (Low voltage)
	P0123	Throttle position sensor (sensor 1) range check (High voltage)
	P0220	Throttle position sensor (sensor 2) range check (Fluttering)
	P0222	Throttle position sensor (sensor 2) range check (Low voltage)
	P0223	Throttle position sensor (sensor 2) range check (High voltage)
	P2135	Throttle position sensor range check (Correlation)
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	Accelerator pedal ON: 2 sec. Accelerator pedal OFF: 10 sec. P2135: 0.5 sec. or 0.4 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page DI–18
Throttle control motor power	ON

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0120:	
VTA1 voltage	0.2 V or less, or 4.8 V or more
P0122:	
VTA1 voltage	0.2 V or less
P0123:	
VTA1 voltage	4.8 V or more
P0220:	
VTA2 voltage	0.5 V or less, or 4.8 V or more
P0222:	
VTA2 voltage	0.5 V or less
P0223:	
Both of the following conditions are met for 2 sec. or more:	Condition 1 and 2
1. VTA1 voltage	0.2 to 1.8 V
2. VTA2 voltage	4.8 V or more
P2135:	
Different between VTA1 and VTA2 voltage	0.02 V or less
Both of the following conditions are met:	Condition 1 and 2
1. VTA1 voltage	0.2 V or less
2. VTA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle position sensor VTA1 voltage	0.6 to 3.96 V
Throttle position sensor VTA2 voltage	2.25 to 5.0 V

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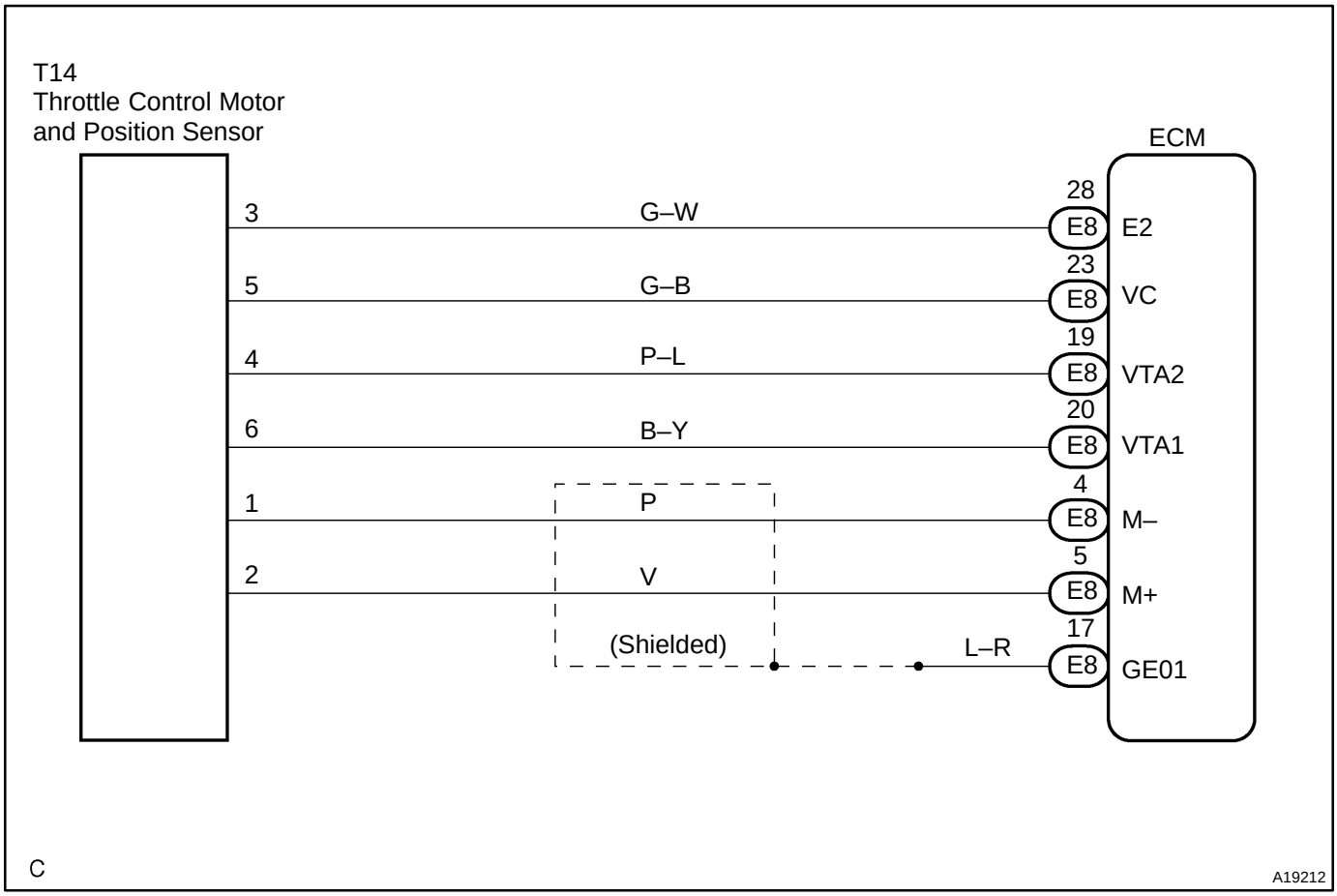
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

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1	**Connect hand–held tester, and read the voltage for throttle position sensor data.**

PREPARATION:

(a) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / THROTTLE POS and THROTTLE POS #2.

CHECK:

Read voltage value displayed on the hand–held tester.

OK:

RESULT:

Throttle position expressed as percentage and voltage				Trouble area	Proceed to
Accelerator pedal released		Accelerator pedal depressed			
THROTTLE POS (VTA1)	THROTTLE POS #2 (VTA2)	THROTTLE POS (VTA1)	THROTTLE POS #2 (VTA2)		
0 %	0 to 0.2 V	0 %	0 to 0.2 V	VC circuit open	A
100 %	4.5 to 5.5 V	100 %	4.5 to 5.5 V	E2 circuit open	
0 % or 100 %	2.1 to 3.1 V (Fail safe)	0 % or 100 %	2.1 to 3.1 V (Fail safe)	VTA1 circuit open or ground short	
about 16 % (Fail safe)	0 to 0.2 or 4.5 to 5.5 V	about 16 % (Fail safe)	0 to 0.2 or 4.5 to 5.5 V	VTA2 circuit open or ground short	
10 to 24 %	2.15 to 3.05 V	64 to 96 % (Does not fail safe)	4.5 to 5.5 V (Does not fail safe)	Throttle position sensor circuit is normal	B

B	**Go to step 5.**

A

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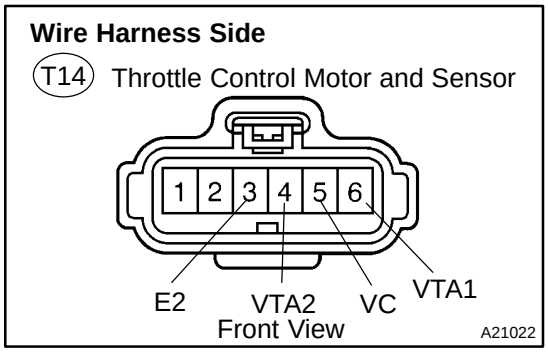
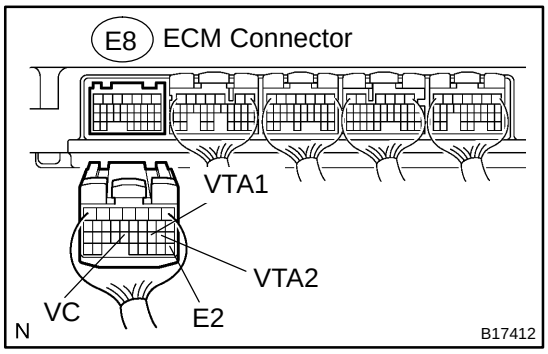
2	**Check for open and short in harness and connector between ECM and throttle position sensor.**





PREPARATION:

(a) Disconnect the T14 throttle control motor and sensor connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VC (T14–5) – VC (E8–18)	Below 1 Ω
VTA1 (T14–6) – VTA1 (E8–21)	Below 1 Ω
VTA2 (T14–4) – VTA2 (E8–31)	Below 1 Ω
E2 (T14–3) – E2 (E8–28)	Below 1 Ω
VC (T14–5) or VC (E8–18) – Body ground	10 kΩ or higher
VTA1 (T14–6) or VTA1 (E8–21) – Body ground	10 kΩ or higher
VTA2 (T14–4) or VTA2 (E8–31) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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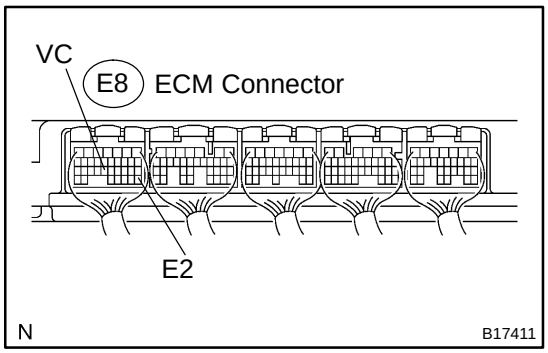
3	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:

(a) Disconnect the T14 throttle control motor and sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminals of the E8 ECM connector.

OK:

Standard:

Tester Connection	Specified Condition
VC (E8–23) – E2 (E8–28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF–80).**

OK

4	Replace throttle body (See page SF–42).

Go

5	Check if DTC output recur.

PREPARATION:

(a) Clear the DTC (See page DI–43).

(b) Start the engine.

(c) Run the engine at idle for 15 seconds or more.

CHECK:

Read the DTC.

RESULT:

Display (DTC Output)	Proceed to
”P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135” are output again	A
No DTC output	B

B → **System is OK.**

A

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Replace ECM (See page SF–80).

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DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

HINT:
This is the purpose of the ”throttle position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI–127.

DTC No.	DTC Detecting Condition	Trouble Area
P0121	Condition (a) continues for 2.0 sec.: (a) Difference between VTA1 and VTA2 deviates from the threshold	Throttle control motor and sensor

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.
This sensor includes two signals, VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. There are several checks that the ECM performs confirm proper operation of the throttle position sensor and VTA1.
There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle. If the voltage output difference of the VTA1 and VTA2 deviates from the normal operating range, the ECM interprets this as a malfunction of the throttle position sensor. The ECM will turn on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel–cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail–safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0121	Throttle position sensor rationality
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
VTA2 voltage	–	4.6 V

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TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Different between VTA1 and VTA2 |VTA1 – (VTA2 × 0.8 to 1.2)|* * Corrected by learning value	Less than 0.8 V and more than 1.6 V

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Replace throttle control motor and sensor (See page SF–42).

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DTC	P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI–119.

DTC No.	DTC Detection Condition	Trouble Area
P0125	If THW or THA is less than –19.45˚C (–3˚F) at engine start and 20 min. or more after starting engine, engine coolant temp. sensor value is 20˚C (68˚F) or less (2 trip detection logic)	▶Cooling system ▶Engine coolant temperature sensor ▶Thermostat
	If THW and THA is between –19.45˚C (–3˚F) and –8.34˚C (17˚F) at engine start, 5 min. or more after starting engine and engine coolant temp. sensor value is 20˚C (68˚F) or less (2 trip detection logic)	
	If THW and THA greater than –8.34˚C (17˚F) at engine start and 2 min. or more after starting engine, engine coolant temp. sensor value is 20˚C (68˚F) or less (2 trip detection logic)	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the temperature of the engine coolant. The resistance of the sensor varies with the actual coolant temperature. The ECM applies a voltage to the sensor and the varying resistance of the sensor cause the signal voltage to vary. The ECM monitors the ECT signal voltage after engine start–up. If, after sufficient time has passed, the sensor still reports that the engine is not warmed up enough for closed–loop fuel control after sufficient time has passed, the ECM interprets this as a fault in the sensor or cooling system and sets a DTC.

Example:

The engine coolant temperature was 0◀C (32◀F) at engine start. After 5 min. running time, the ECT sensor still indicates that the engine is not warmed up enough to begin air fuel ratio feedback control of the air–fuel ratio. The ECM interprets this as a fault in the sensor or cooling system and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0125	Insufficient coolant temperature for closed loop fuel control
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Cooling system, Thermostat
	Related sensors/components	Mass air flow meter
Frequency of operation	Continuous	
Duration	2 min. (at engine start, engine coolant or intake air temperature of –8.34˚C (17˚F) or more) 5 min. (at engine start, engine coolant or intake air temperature of –19.45 to –8.34˚C (–3 to 17˚F)) 20 min. (at engine start, engine coolant or intake air temperature of less than –19.45˚C (–3˚F))	
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Fuel cut	OFF	
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Time until ”engine coolant temperature” detection temperature reaches feedback start temperature	
When the temperature at the time of engine starting is –8.34˚C (17˚F) or more	Engine coolant temperature is less than ”closed–loop enable temperature” when 2 min. or more after engine start
When the temperature at the time of engine starting is –19.45 to –8.34˚C (–3 to 17˚F)	Engine coolant temperature is less than ”closed–loop enable temperature” when 5 min. or more after engine start
When the temperature at the time of engine starting is –19.45˚C (–3˚F) or less	Engine coolant temperature is less than ”closed–loop enable temperature” when 20 min. or more after engine start

INSPECTION PROCEDURE

HINT:

- If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, engine coolant temperature sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0125) being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTCs using the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
P0125	A
”P0125” and other DTCs	B

HINT:

If any other codes besides ”P0125” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI–58).**

A

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2	**Inspect thermostat (See page CO–12).**

CHECK:

Check the valve opening temperature of the thermostat.

OK:

Valve opening temperature is 80 to 84°C (176 to 183°F)

HINT:

Also check that the valve is completely closed under opening temperature as above.

NG → **Replace thermostat (See page CO–11).**

OK

3	**Check cooling system.**

CHECK:

Check that there is detect in the cooling system which causes overcool, such as abnormal radiator fan operation, modified cooling system and so on.

NG → **Repair or replace cooling system.**

OK

Replace engine coolant temperature sensor.

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DICEQ–02

DTC	P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

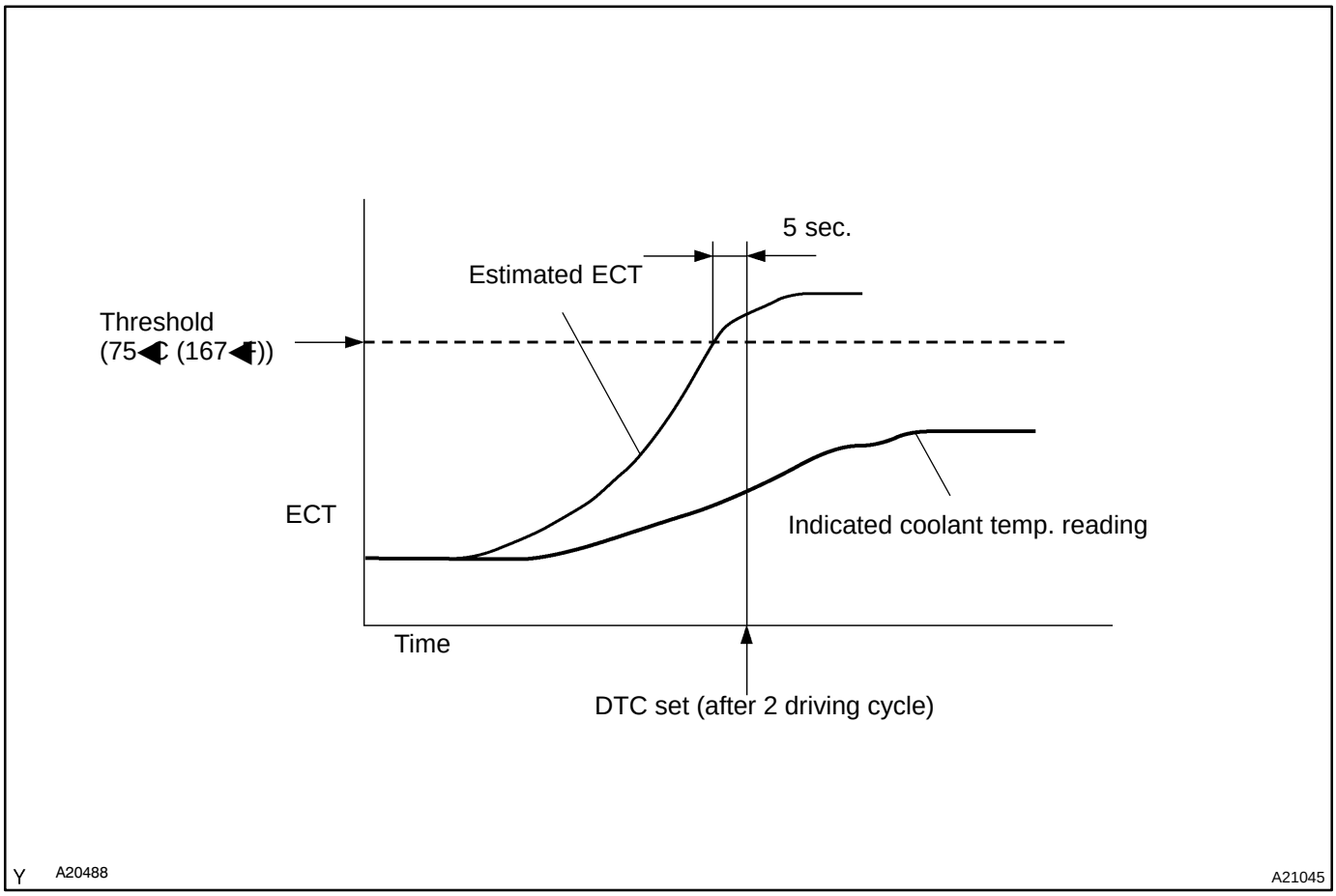
HINT:
This is the purpose of ”thermostat” malfunction detection.

CIRCUIT DESCRIPTION

If the engine coolant temperature does not reach 75˚C (167˚F) despite sufficient warm–up time has elapsed.

DTC No.	DTC Detection condition	Trouble Area
P0128	Condition (a), (b) and (c) are met: (a) Cold start (b) After sufficient warm–up time has elapsed (c) Engine coolant temperature greater than 75˚C (167˚F)	▶Thermostat ▶Cooling system ▶Engine coolant temperature sensor ▶ECM

MONITOR DESCRIPTION



The ECM estimates the coolant temperature based on starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT (Engine Coolant Temperature). When the estimated coolant temperature reaches 75◀C (167◀F), the ECM checks the actual ECT. If the actual ECT is less than 75◀C (167◀F), the ECM will interpret this as a fault in the thermostat or engine cooling system and set a DTC.

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MONITOR STRATEGY

Related DTCs	P0128	Thermostat
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Engine cooling system, Thermostat
	Related sensors/components	Intake air temperature sensor, Vehicle speed sensor
Frequency of operation	Once per driving cycle	
Duration	15 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Battery voltage	11.0 V	–
Throttle position learning	Completed	
Either of the following conditions is met	Condition 1 or 2	
1. All of the following conditions are met	Condition (a), (b) and (c)	
(a) ECT at engine start – IAT at engine start	–15 to 7°C (–27 to 12.6°F)	
(b) ECT at engine start	–10 to 56°C (14 to 133°F)	
(c) IAT at engine start	–10 to 56°C (14 to 133°F)	
2. All of the following conditions are met	Condition (a), (b) and (c)	
(a) ECT at engine start – IAT at engine start	–7°C (12.6°F)	–
(b) ECT at engine start	–	56°C (133°F)
(c) IAT at engine start	–10°C (14°F)	–
Accumulated time that vehicle speed is 80 mph (128 km/h) or more	–	20 sec.

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration that both of following conditions 1 and 2 are met	5 sec. or more
1. Estimated engine coolant temperature	75°C (167°F) or more
2. Engine coolant temperature sensor output	Less than 75°C (167°F)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Engine coolant temperature sensor output value after warm up	75°C (167°F) or more

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MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.
- ▶ Scaling is used to calculate the test value indicated on generic OBD ll scan tools.

Thermostat

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$E1	$E8	Multiply by 0.1 (˚C)	ECT sensor output when estimated ECT reached to malfunction criteria	Malfunction criterion	Maximum test limit

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0128) being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand–held tester.

RESULT:

Display (DTC Output)	Proceed to
P0128	A
P0128 and other DTCs	B

HINT:

If any other codes besides P0128 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI−58).**

A

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2	**Check cooling system.**

CHECK:

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or a modified cooling system.

(b) Check the valve opening temperature of the thermostat.

OK:

Valve opening temperature is 80 to 84°C (176 to 183°F)

HINT:

Also check that the valve is completely closed under opening temperature as above.

NG → **Repair or replace cooling system.**

OK

3	**Check thermostat (See page CO–12).**

CHECK:

Check the valve lift.

OK:

Valve lift: 10 mm (0.39 in.) or more at 95°C (203°F)

NG → **Replace thermostat.**

OK

Replace ECM (See page SF–80).

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DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0137	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)

DTC	P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)

DTC	P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)

DTC	P0157	Oxygen Sensor Circuit Low Voltage (Bank 2 Sensor 2)

DTC	P0158	Oxygen Sensor Circuit High Voltage (Bank 2 Sensor 2)

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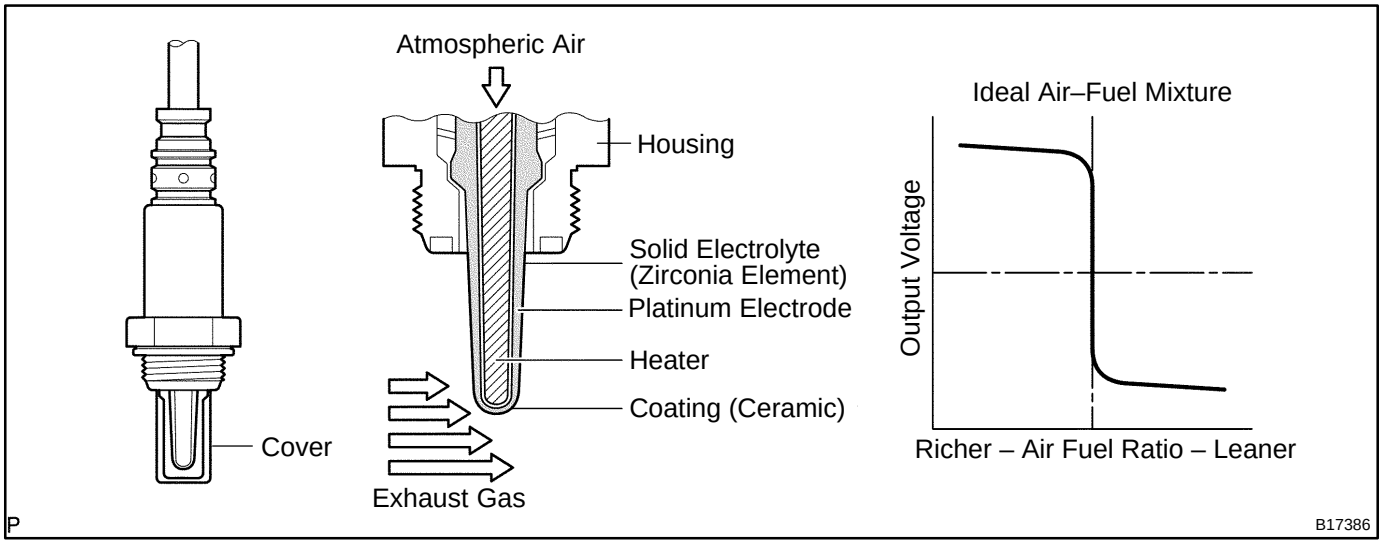
HINT:
Sensor 2 refers to the sensor mounted behind the Three–Way Catalytic Converter (TWC) and located far from the engine assembly.

CIRCUIT DESCRIPTION

In order to obtain a high purification rate of the carbon monoxide (CO), hydrocarbon (HC) and nitrogen oxide (NOx) components in the exhaust gas, a TWC is used. For the most efficient use of the TWC, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel level. For the purpose of helping the ECM to deliver accurate air–fuel ratio control, a Heated Oxygen (HO2) sensor is used.
The HO2 sensor is located behind the TWC, and detects the oxygen concentration in the exhaust gas. Since the sensor is integrated with the heater that heats the sensing portion, it is possible to detect the oxygen concentration even when the intake air volume is low (the exhaust gas temperature is low).
When the air–fuel ratio becomes lean, the oxygen concentration in the exhaust gas is rich. The HO2 sensor informs the ECM that the post–TWC air–fuel ratio is lean (low voltage, i.e. less than 0.45 V).
Conversely, when the air–fuel ratio is richer than the stoichiometric air–fuel level, the oxygen concentration in the exhaust gas becomes lean. The HO2 sensor informs the ECM that the post–TWC air–fuel ratio is rich (high voltage, i.e. more than 0.45 V). The HO2 sensor has the property of changing its output voltage drastically when the air–fuel ratio is close to the stoichiometric level.
The ECM uses the supplementary information from the HO2 sensor to determine whether the air–fuel ratio after the TWC is rich or lean, and adjusts the fuel injection time accordingly. Thus, if the HO2 sensor is work-

ing improperly due to internal malfunctions, the ECM is unable to compensate for deviations in the primary air–fuel ratio control.



DTC No.	DTC Detecting Condition	Trouble Area
P0136 P0156	During active air–fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic): (a) Heated Oxygen (HO2) sensor voltage does not decrease to less than 0.2 V (b) HO2 sensor voltage does not increase to more than 0.6 V	▶Open or short in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶HO2 sensor heater (sensor 2) ▶Air–Fuel Ratio (A/F) sensor (sensor 1) ▶EFI relay ▶Gas leakage from exhaust system
P0136 P0156	Sensor impedance less than 5 Ω for more than 30 seconds when ECM presumes sensor to being warmed up and operating normally (1 trip detection logic)	
P0137 P0157	During active air–fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic): (a) HO2 sensor voltage output less than 0.21 V (b) Target air–fuel ratio rich	▶Open in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶HO2 sensor heater (sensor 2) ▶EFI relay ▶Gas leakage from exhaust system
P0137 P0157	High impedance: Sensor impedance 348.1 MΩ or more for more than 90 seconds when ECM presumes sensor to being warmed up and operating normally (1 trip detection logic)	
P0138 P0158	During active air–fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic): (a) HO2 sensor voltage output 0.59 V or more (b) Target air–fuel ratio lean	▶Short in HO2 sensor (sensor 2) circuit ▶HO2 sensor (sensor 2) ▶ECM internal circuit malfunction
P0138 P0158	HO2 sensor voltage output exceeds 1.2 V for more than 30 seconds (1 trip detection logic)	

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MONITOR DESCRIPTION

Active Air–Fuel Ratio Control

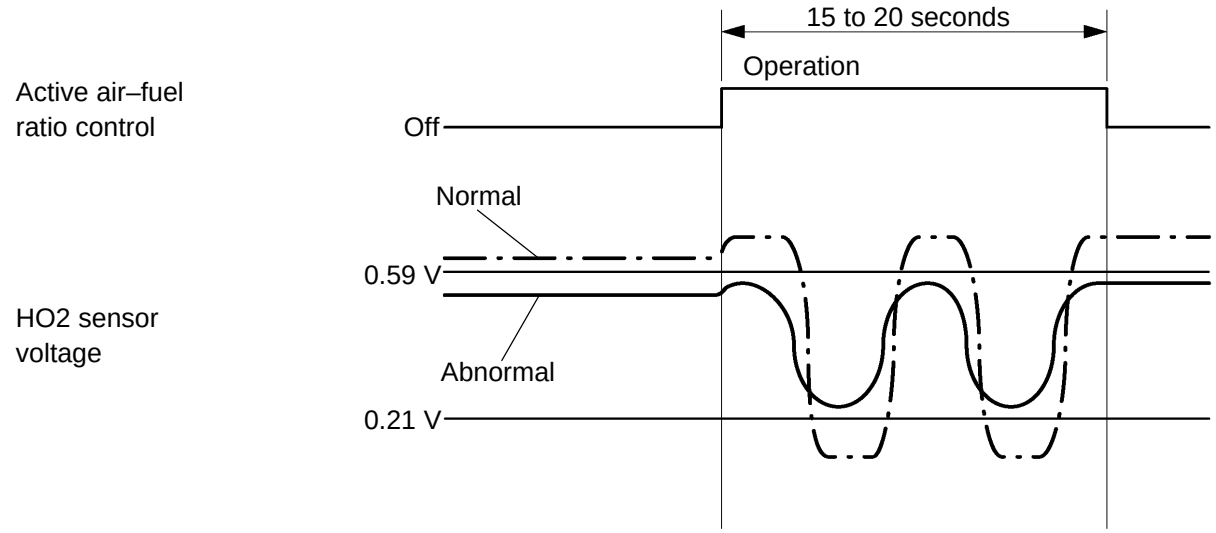
The ECM usually performs air–fuel ratio feedback control so that the Air–Fuel Ratio (A/F) sensor output indicates a near stoichiometric air–fuel level. This vehicle includes active air–fuel ratio control in addition to regular air–fuel ratio control. The ECM performs active air–fuel ratio control to detect any deterioration in the Three–Way Catalytic Converter (TWC) and Heated Oxygen (HO2) sensor malfunctions (refer to the diagram below).

Active air–fuel ratio control is performed for approximately 15 to 20 seconds while driving with a warm engine. During active air–fuel ratio control, the air–fuel ratio is forcibly regulated to become lean or rich by the ECM. If the ECM detects a malfunction, one of the following DTCs is set: DTC P0136, P0156 (abnormal voltage output), P0137, P0157 (open circuit) and P0138, P0158 (short circuit).

Abnormal Voltage Output of HO2 Sensor (DTC P0136, P0156)

While the ECM is performing active air–fuel ratio control, the air–fuel ratio is forcibly regulated to become rich or lean. If the sensor is not functioning properly, the voltage output variation is small. For example, when the HO2 sensor voltage does not decrease to less than 0.21 V and does not increase to more than 0.59 V during active air–fuel ratio control, the ECM determines that the sensor voltage output is abnormal and sets DTC P0136.

HO2 SENSOR CIRCUIT MALFUNCTION (P0136, P0156: ABNORMAL VOLTAGE)



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Open or Short in the Heated Oxygen (HO2) Sensor Circuit (DTC P0137, P0157, P0138 or P0158)

During active air–fuel ratio control, the ECM calculates the Oxygen Storage Capacity (OSC)* of the Three–Way Catalytic Converter (TWC) by forcibly regulating the air–fuel ratio to become rich or lean.

If the HO2 sensor has an open or short, or the voltage output of the sensor noticeably decreases, the OSC indicates an extraordinarily high value. Even if the ECM attempts to continue regulating the air–fuel ratio to become rich or lean, the HO2 sensor output does not change.

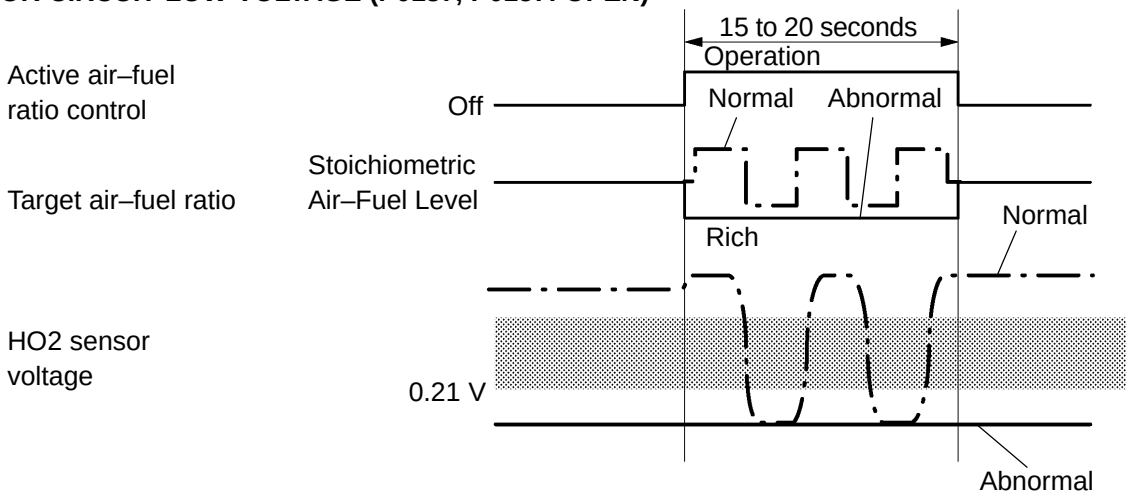
While performing active air–fuel ratio control, when the target air–fuel ratio is rich and the HO2 sensor voltage output is 0.21 V or less (lean), the ECM interprets this as an abnormally low sensor output voltage and sets DTC P0137 or P0157. When the target air–fuel ratio is lean and the voltage output is 0.59 V or more (rich) during active air–fuel ratio control, the ECM determines that the sensor voltage output is abnormally high, and sets DTC P0138 or P0158.

HINT:

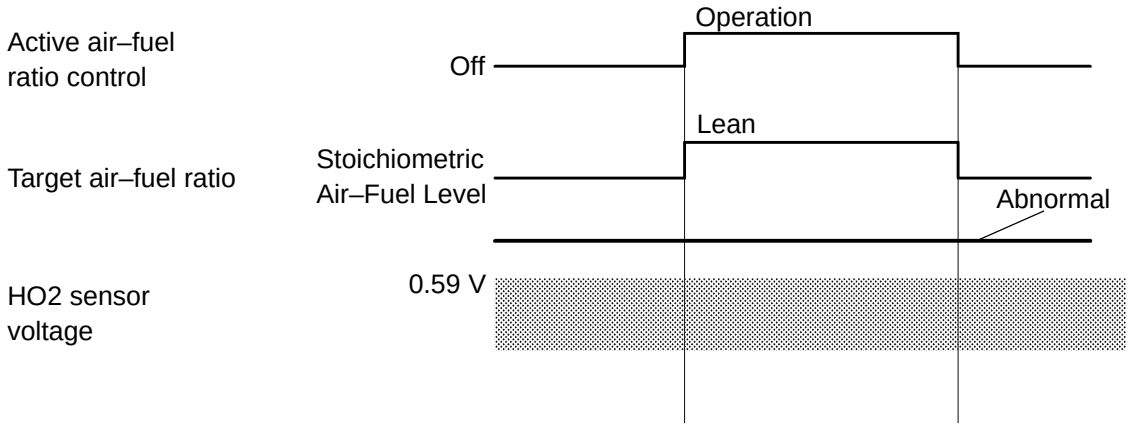
DTC P0138 or P0158 is also set if the HO2 sensor voltage output is more than 1.2 V for 30 seconds or more.

*: The TWC has the capability to store oxygen. The OSC and the emission purification capacity of the TWC are mutually related. The ECM determines whether the catalyst has deteriorated, based on the calculated OSC value (see page DI–249).

HO2 SENSOR CIRCUIT LOW VOLTAGE (P0137, P0157: OPEN)



HO2 SENSOR CIRCUIT HIGH VOLTAGE (P0138, P0158: SHORT)



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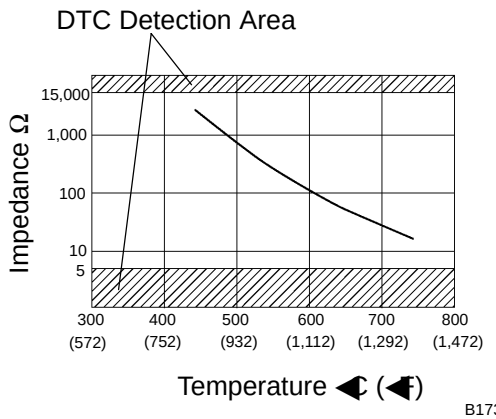
High or Low Impedance of Heated Oxygen (HO2) Sensor (DTC P0136, P0156, P0137 or P0157)

Interrelation between temperature of the element and impedance:



During normal air–fuel ratio feedback control, there are small variations in the exhaust gas oxygen concentration. In order to continuously monitor the slight variation of the HO2 sensor signal while the engine is running, the impedance* of the sensor is measured by the ECM. The ECM determines that there is a malfunction in the sensor when the measured impedance deviates from the standard range.

*: The effective resistance in an alternating current electrical circuit.

HINT:

- The impedance can not be measured using an ohmmeter.
- DTC P0136 or P0156 indicates the deterioration of the HO2 sensor. The ECM sets the DTC by calculating the impedance of the sensor when the typical enabling conditions are satisfied (1 driving cycle).
- DTC P0137 or P0157 indicates an open circuit in the HO2 sensor (1 driving cycle). The ECM sets this DTC when the impedance of the sensor exceeds the threshold 348.1 MΩ.

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MONITOR STRATEGY

Related DTCs	P0136	Heated rear oxygen sensor (Bank 1) output voltage (Output voltage)
		Heated rear oxygen sensor (Bank 1) impedance (Low)
	P0137	Heated rear oxygen sensor (Bank 1) output voltage (Low voltage)
		Heated rear oxygen sensor (Bank 1) impedance (High)
	P0138	Heated rear oxygen sensor (Bank 1) output voltage (High voltage)
		Heated rear oxygen sensor (Bank 1) output voltage (Extremely high)
	P0156	Heated rear oxygen sensor (Bank 2) output voltage (Output voltage)
		Heated rear oxygen sensor (Bank 2) impedance (Low)
	P0157	Heated rear oxygen sensor (Bank 2) output voltage (Low voltage)
		Heated rear oxygen sensor (Bank 2) impedance (High)
	P0158	Heated rear oxygen sensor (Bank 2) output voltage (High voltage)
		Heated rear oxygen sensor (Bank 2) output voltage (Extremely high)
Required sensors/components	Main sensors/components	Heated rear oxygen sensor
	Related sensors/components	Mass air flow meter
Frequency of operation	Once per driving cycle: Active air–fuel ratio control detection Continuous: Others	
Duration	20 sec.: Heated oxygen sensor output (Output voltage, High voltage, Low voltage) 30 sec.: Heated oxygen sensor impedance (Low) 90 sec.: Heated oxygen sensor impedance (High) 10 sec.: Heated oxygen sensor impedance (Extremely high)	
MIL operation	2 driving cycles Heated oxygen sensor output (Output voltage, High voltage, Low voltage) Immediate: Heated oxygen sensor impedance (Low, High, Extremely high)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Heated oxygen sensor output voltage (Output voltage, High voltage and Low voltage):		
Active air–fuel ratio control	Executing	
Active air–fuel ratio control being when all of following conditions met	–	
Battery voltage	11 V	–
Engine coolant temperature	75°C (167°F)	–
Idle	OFF	
Engine RPM	–	3,200 rpm

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A/F sensor status	Activated	
Fuel–cut	OFF	
Engine load	10 to 70%	
Shift position	4th	–
Heated oxygen sensor impedance (Low):		
Battery voltage	11 V	–
Estimated sensor temperature	–	700˚C (1,292˚F)
ECM monitor	Completed	
P0606	Not set	
Heated oxygen sensor impedance (High):		
Battery voltage	11 V	–
Estimated sensor temperature	450˚C (842˚F)	–
ECM monitor	Completed	
P0606	Not set	
Heated oxygen sensor output voltage (Extremely high):		
Battery voltage	11 V	–
Time after engine start	2 sec.	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Heated oxygen sensor output voltage (Output voltage):	
Either of the following conditions is met:	Condition 1 or 2
1. All of the following conditions are met:	Condition (a), (b) and (c)
(a) Commanded air–fuel ratio	14.3 or less
(b) Rear HO2S voltage	0.21 to 0.59 V
(c) OSC (Oxygen Storage Capacity of catalyst)	3 g or more
2. All of the following conditions are met:	Condition (a), (b) and (c)
(a) Commanded air–fuel ratio	14.9 or more
(b) Rear HO2S voltage	0.21 to 0.59 V
(c) OSC (Oxygen Storage Capacity of catalyst)	3 g or more
Heated oxygen sensor output voltage (Low voltage):	
All of the following conditions are met:	Condition 1, 2 and 3
1. Commanded air–fuel ratio	14.3 or less
2. Rear HO2S voltage	Less than 0.21 V
3. OSC (Oxygen Storage Capacity of catalyst)	3 g or more
Heated oxygen sensor output voltage (High voltage):	
All of the following conditions are met:	Condition 1, 2 and 3
1. Commanded air–fuel ratio	14.9 or more
2. Rear HO2S voltage	More than 0.59 V
3. OSC (Oxygen Storage Capacity of catalyst)	3 g or more
Heated oxygen sensor impedance (Low):	
Duration of following condition	30 sec. or more
Heated oxygen sensor impedance	Less than 5 Ω
Heated oxygen sensor impedance (High):	
Duration of following condition	90 sec. or more

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Heated oxygen sensor impedance	348.1 MΩ or more
Heated oxygen sensor output voltage (Extremely high):	
Duration of following condition	10 sec. or more
Heated oxygen sensor voltage	More than 1.2 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor voltage	Varies between 0.1 to 0.9 V

MONITOR RESULT

Refer to page DI–24 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.

HO2S bank 1 sensor 2

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$02	$07	Multiply by 0.001 (V)	Minimum sensor voltage	Minimum test limit	Maximum test limit
$02	$08	Multiply by 0.001 (V)	Maximum sensor voltage	Minimum test limit	Maximum test limit
$02	$8F	Multiply by 0.001 (g)	Maximum oxygen storage capacity	0	Maximum test limit

HO2S bank 2 sensor 2

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$06	$07	Multiply by 0.001 (V)	Minimum sensor voltage	Minimum test limit	Maximum test limit
$06	$08	Multiply by 0.001 (V)	Maximum sensor voltage	Minimum test limit	Maximum test limit
$06	$8F	Multiply by 0.001 (g)	Maximum oxygen storage capacity	0	Maximum test limit

WIRING DIAGRAM

Refer to DTC P2195 on page DI–383.

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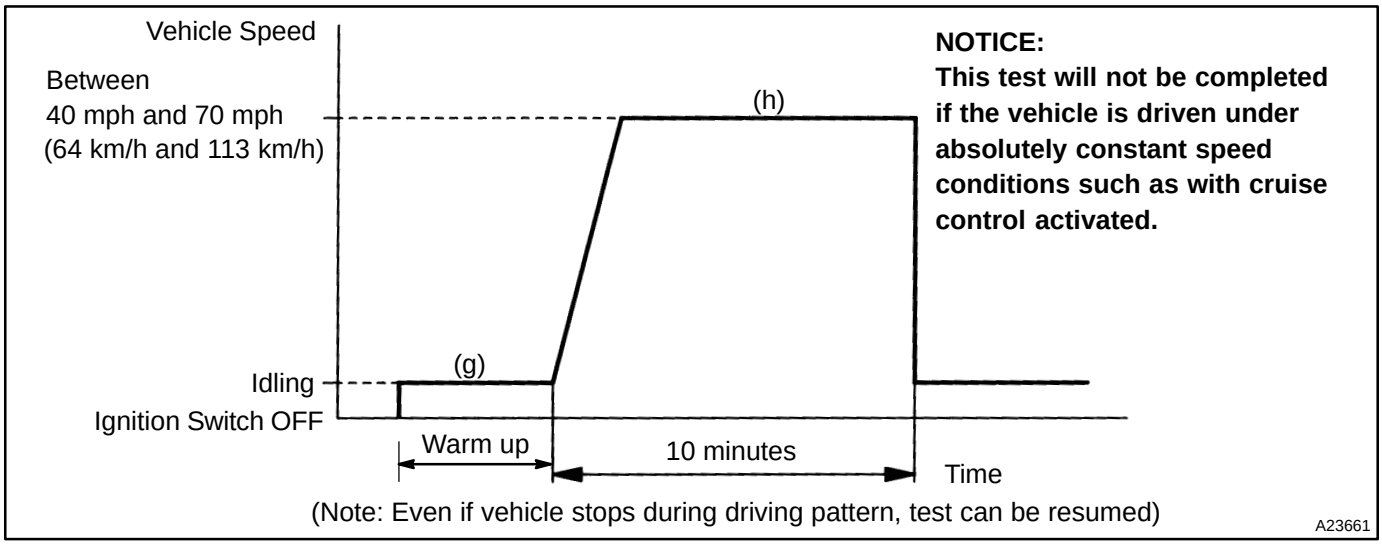
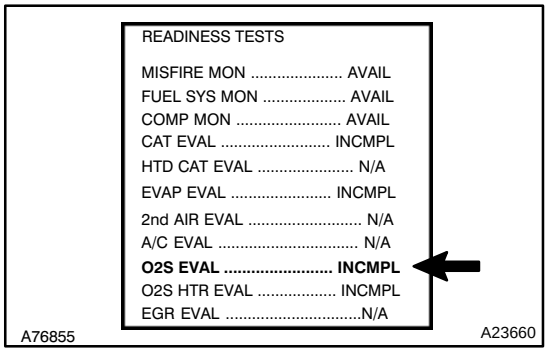
CONFIRMATION DRIVING PATTER

HINT:

- ▶ This confirmation driving pattern is used in steps 5, 8 and 11 of the following diagnostic troubleshooting procedure when using either a hand–held tester.
- ▶ Performing this confirmation pattern will activate the Heated Oxygen (HO2) sensor monitor. (The catalyst monitor is performed simultaneously.) This is very useful for verifying the completion of a repair.





(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Turn the tester or scan tool ON.
(d) Clear DTCs (where set) (see page DI–43).
(e) If using a hand–held tester, select the following menu items: DIAGNOSIS / CARB OBD II / READINESS TESTS.
(f) Check that O2S EVAL is INCMPL (incomplete).
(g) Start the engine and warm it up.
(h) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes.
(i) Note the state of the Readiness Tests items. Those items will change to COMPL (complete) as O2S EVAL monitor operates.
(j) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.

HINT:

If O2S EVAL does not change to COMPL, and any pending DTCs fail to set, extend the driving time.

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INSPECTION PROCEDURE

HINT:

Hand–held tester only:

Narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand–held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to –12.5 % or +25 %.

(1) Connect the hand–held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the menu ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
–12.5 % → lean output: Less than 0.4 V

NOTICE:

There is a few seconds delay in the sensor 1 (front sensor) output. And there is approximately 20 seconds delay in the sensor 2 (rear sensor).

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The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors.
For displaying the graph indication, first enter ”ACTIVE TEST / A/F CONTROL / USER DATA,” then select ”A/F B1,2S1and O2S B1,2S2” by pressing ”YES” button, and push ”ENTER” button before pressing ”F4” button.

	Output voltage of A/F sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspected trouble area
Case 1	Injection volume +25 % –12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % –12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % –12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean actual air–fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

HINT:

- If different DTCs that are related to different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. when a malfunction occurred.

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1	**Read output DTC.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand–held tester.

RESULT:

Display (DTC Output)	Proceed to
P0138, P0158	A
P0137, P0157	B
P0136, P0156	C

HINT:

If any other codes besides P0136, P0137, P0138, P0156, P0157 and/or P0158 are output, perform the troubleshooting for those DTCs first.

B	**Go to step 14.**
C	**Go to step 7.**

A

2	**Check output voltage of heated oxygen sensor.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) After warming up the engine, run the engine at 2,500 rpm for 3 minutes.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1S2 or B2S2.
(d) Allow the engine to idle.

CHECK:

Read the Heated Oxygen (HO2) sensor output voltage while idling.

RESULT:

HO2 Sensor Output Voltages	Proceed To
More than 1.2 V	A
Less than 1.0 V	B

B	**Go to step 5.**

A

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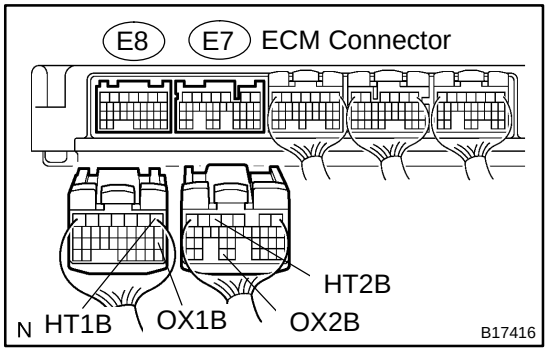
3	Check for short in harness and connector between terminal OX1B and HT1B, OX2B and HT2B of ECM.



PREPARATION:

(a) Turn the ignition switch to OFF and wait for 5 minutes.

(b) Disconnect the E7 and E8 ECM connector.

CHECK:

(a) Check the resistance.

OK:

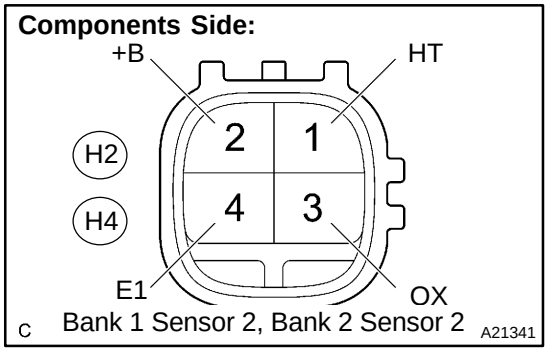
Standard:

Tester Connections	Specified Conditions
HT1B (E8–1) – OX1B (E8–18)	10 kΩ or higher
HT2B (E7–5) – OX2B (E5–33)	10 kΩ or higher

OK	Replace ECM (See page SF–80

NG

4	Check resistance of heated oxygen sensor heater.



PREPARATION:

Disconnect the heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

OK:

Standard:

Tester Connection	Specified Condition
HT (1) – +B (2)	11 to 16 Ω at 20°C (68°F)
+B (2) – OX (3)	10 kΩ or higher

NG	Replace heated oxygen sensor.

OK

Repair or replace harness or connector.

5	Perform confirmation driving pattern.

NEXT

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6	**Check whether DTC output recurs (DTC P0138, P0158)**

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P0138 or P0158	A
No output	B

B → **Check for intermittent problems (See page DI–11).**

A →

Replace heated oxygen sensor.

7	**Check output voltage of heated oxygen sensor.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to ON and turn the tester ON.

(c) Start the engine.

(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1S2.

(e) After warming up the engine, run the engine at an engine speed of 2,500 rpm for 3 minutes.

CHECK:

(a) Read the output voltage of the HO2 sensor when the engine rpm is suddenly increased.

HINT:

Quickly accelerate the engine to 4,000 rpm 3 times using the accelerator pedal.

Standard: Fluctuates between 0.4 V or less and 0.5 V or more.

NG → **Go to step 14.**

OK →

8	**Perform confirmation driving pattern.**

NEXT →

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9	**Check whether DTC output recurs (DTC P0136, P0156)**

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P0136 or P0156	A
No output	B

B → **Check for intermittent problems (See page DI–11).**

A

10	**Replace heated oxygen sensor.**

NEXT

11	**Perform confirmation driving pattern.**

NEXT

12	**Check whether DTC output recurs (DTC P0136, P0156)**

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P0136 or P0156	A
No output	B

B → **Repair completed.**

A

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13	Perform active test (injection volume).

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INJ VOL.

CHECK:

(a) Change the fuel injection volume using the tester, monitoring the voltage output of Air–Fuel Ratio (A/F) and HO2 sensors displayed on the tester.

HINT:

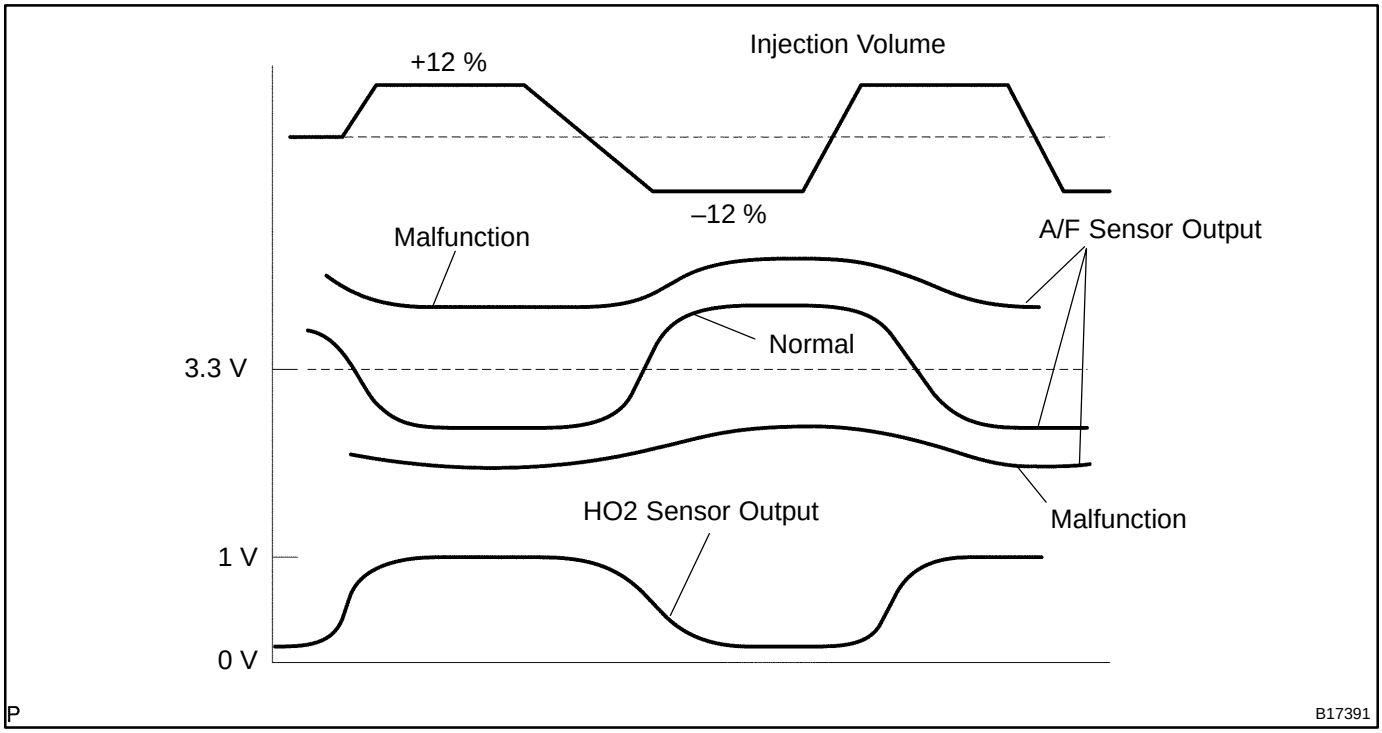
- Change the fuel injection volume within the range of –12 % and +12 %. The injection volume can be changed in 1 % graduations within the range.
- The A/F sensor is displayed as AFS B1S1 (AFS B2S1), and the HO2 sensor is displayed as O2S B1S2 (O2S B2S2), on hand–held testers.

RESULT:

Tester Display (Sensor)	Voltage Variations	Proceed To
AFS B1S1 (AFS B2S1) (A/F)	Alternates between more and less than 3.3 V	OK
AFS B1S1 (AFS B2S1) (A/F)	Remains at more than 3.3 V	NG
AFS B1S1 (AFS B2S1) (A/F)	Remains at less than 3.3 V	NG

HINT:

A normal HO2 sensor voltage (O2S B1S2 (O2S B2S2)) reacts in accordance with increases and decreases in fuel injection volumes. When the A/F sensor voltage remains at either less or more than 3.3 V despite the HO2 sensor indicating a normal reaction, the A/F sensor is malfunctioning.



NG → **Replace air–fuel ratio (A/F) sensor.**

OK

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check and repair extremely rich or lean actuarial air fuel ratio (injector, fuel pressure, gas leakages from exhaust system, etc.)

14	Check for exhaust gas leakage.

CHECK:

Check for exhaust gas leakage from the exhaust manifold and pipe.

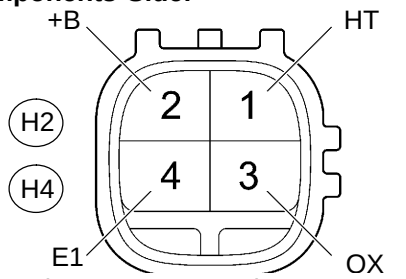
OK: No exhaust gas leakage.

NG → **Repair or replace exhaust gas leakage point.**

OK

15	Inspect heated oxygen sensor.

Components Side:



C Bank 1 Sensor 2, Bank 2 Sensor 2 A21341

PREPARATION:

Disconnect the HO2 sensor connector.

CHECK:

Measure the resistance between the terminals of the HO2 sensor connector.

OK:

Standard:

Tester Connections	Specified Conditions
HT (2) – +B (1)	11 to 16 Ω at 20°C (68°F)
HT (2) – E (3)	10 kΩ or higher

NG → **Replace heated oxygen sensor.**

OK

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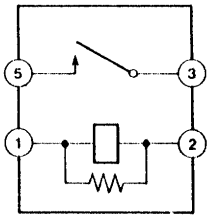
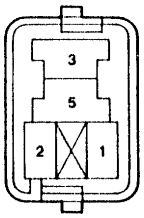
16	Check EFI relay.

EFI Relay





A19288

PREPARATION:

Remove the EFI relay from the engine room J/B.

CHECK:

Inspect the EFI relay.

OK:

Standard:

Terminal No.	Condition	Specified Condition
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace EFI relay.**

OK

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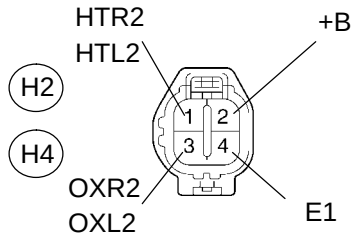
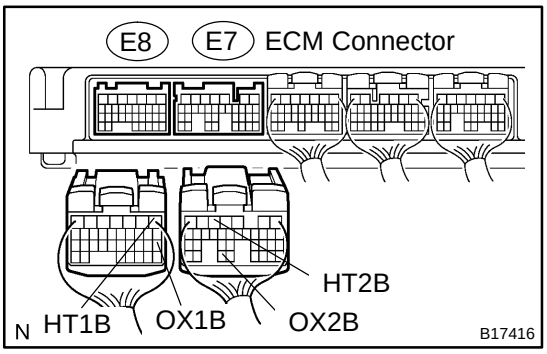
17	**Check for open and short in harness and connector between ECM and heated oxygen sensor.**

Wire Harness Side:



Bank 1 Sensor 2, Bank 2 Sensor 2 A23543



PREPARATION:

(a) Disconnect the heated oxygen sensor connector.

(b) Disconnect the E7 and E8 ECM connector.

CHECK:

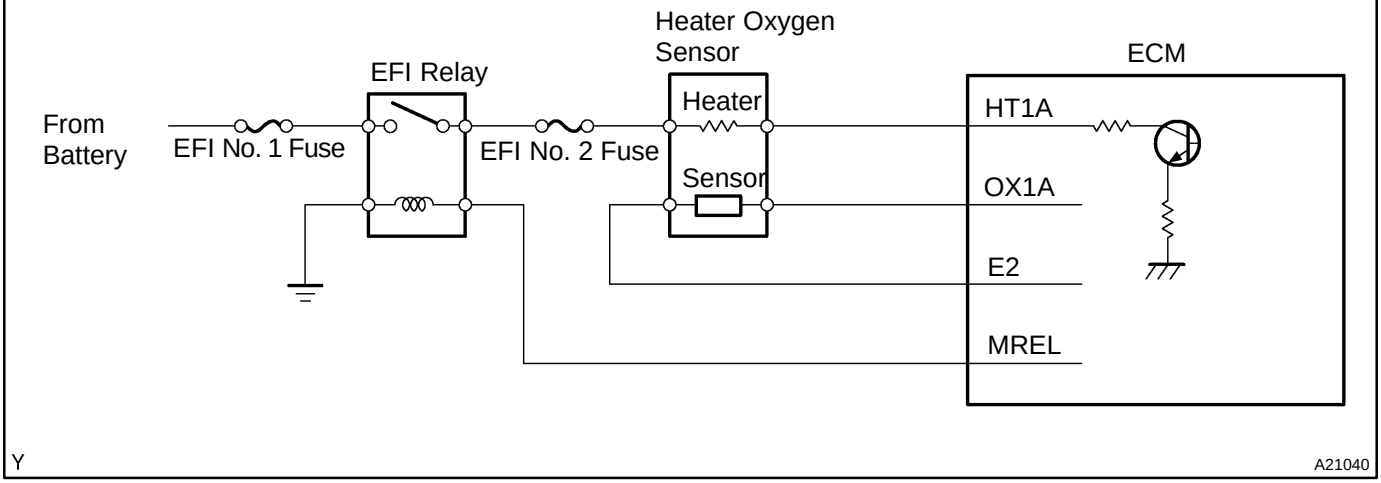
Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
OXL2 (H2–3) – OX1B (E8–18)	Below 1 Ω
HTL2 (H2–1) – HT1B (E8–1)	Below 1 Ω
OXR2 (H4–3) – OX2B (E7–33)	Below 1 Ω
HTR2 (H4–1) – HT2B (E7–5)	Below 1 Ω
OXL2 (H2–3) or OX1B (E8–18) – Body ground	10 kΩ or higher
HTL2 (H2–1) or HT1B (E8–1) – Body ground	10 kΩ or higher
OXR2 (H4–3) or OX2B (E7–33) – Body ground	10 kΩ or higher
HTR2 (H4–1) or HT2B (E7–5) – Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



NG → **Repair or replace harness or connector.**

OK →

Replace heated oxygen sensor.

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DIDFQ–01

DTC	P0171	System too Lean (Bank 1)

DTC	P0172	System too Rich (Bank 1)

DTC	P0174	System too Lean (Bank 2)

DTC	P0175	System too Rich (Bank 2)

CIRCUIT DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim consists of both the short–term and long–term fuel trims.

The short–term fuel trim is fuel compensation that is used to constantly maintain the air–fuel ratio at stoichiometric levels. The signal from the Air–Fuel Ratio (A/F) sensor indicates whether the air–fuel ratio is rich or lean compared to the stoichiometric ratio. This triggers a reduction in the fuel injection volume if the air–fuel ratio is rich and an increase in the fuel injection volume if it is lean.

Factors such as individual engine differences, wear over time and changes in operating environment cause short–term fuel trim to vary from the central value. The long–term fuel trim, which controls overall fuel compensation, compensates for long–term deviations in the fuel trim from the central value caused by the short–term fuel trim compensation.

If both the short–term and long–term fuel trims are lean or rich beyond predetermined values, it is interpreted as a malfunction, and the ECM illuminates the MIL and sets a DTC.

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DTC No.	DTC Detecting Condition	Trouble Area
P0171 P0174	When air–fuel ratio feedback is stable after warming up the engine, fuel trim is considered to be in error on LEAN side (2 trip detection logic)	▶Air induction system ▶Injector blockage ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Fuel pressure ▶Gas leakage in exhaust system ▶Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit ▶Heated oxygen sensor (bank 1, 2 sensor 1) ▶Heated oxygen sensor heater (bank 1, 2 sensor 1) ▶EFI relay ▶PCV piping ▶ECM
P0172 P0175	When air–fuel ratio feedback is stable after warming up the engine, fuel trim is considered to be in error on RICH side (2 trip detection logic)	▶Injector leak, blockage ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Ignition system ▶Fuel pressure ▶Gas leakage in exhaust system ▶Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit ▶Heated oxygen sensor (bank 1, 2 sensor 1) ▶ECM

HINT:

- ▶ When DTC P0171 or P0174 is recorded, the actual air–fuel ratio is on the LEAN side. When DTC P0172 or P0175 is recorded, the actual air–fuel ratio is on the RICH side.
- ▶ If the vehicle runs out of fuel, the air–fuel ratio is LEAN and DTC P0171 or P0174 may be recorded. The MIL then comes on.
- ▶ If the total of the short–term fuel trim value and long–term fuel trim value is within ≧ 35 % (engine coolant temperature is more than 75 ◀C (167◀F)), the system is functioning normally.

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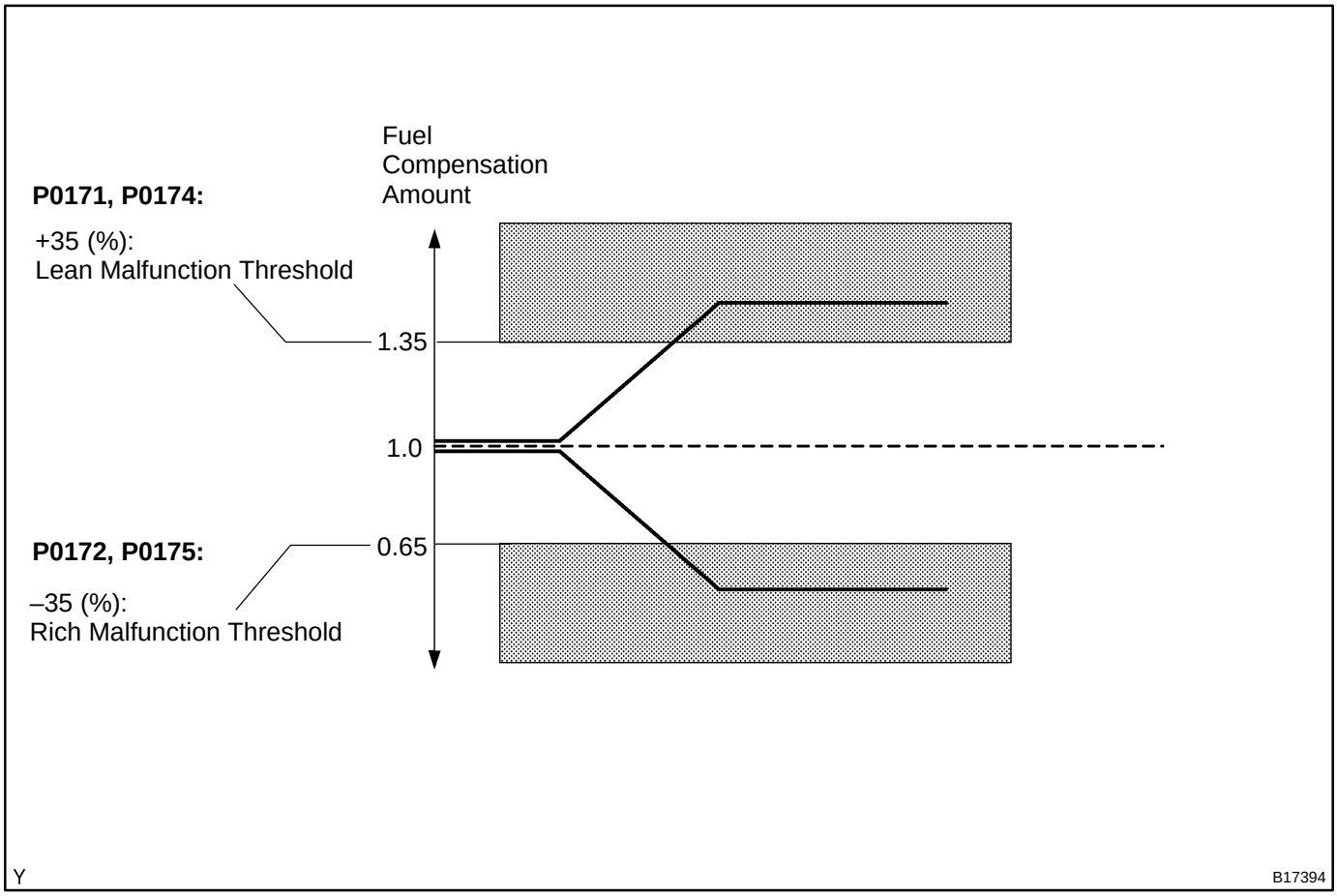
MONITOR DESCRIPTION

Under closed–loop fuel control, fuel injection volumes that deviate from those estimated by the ECM cause changes in the long–term fuel trim compensation value. The long–term fuel trim is adjusted when there are persistent deviations in the short–term fuel trim values. Deviations from the ECM's estimated fuel injection volumes also affect the average fuel trim learning value, which is a combination of the average short–term fuel trim (fuel feedback compensation value) and the average long–term fuel trim (learning value of the air–fuel ratio). If the average fuel trim learning value exceeds the malfunction thresholds, the ECM interprets this a fault in the fuel system and sets a DTC.

Example:

The average fuel trim leaning value is more than +35 % or less than –35 %, the ECM interprets this as a fuel system malfunction.



MONITOR STRATEGY

Related DTCs	P0171	Fuel system lean (Bank 1)
	P0172	Fuel system rich (Bank 1)
	P0174	Fuel system lean (Bank 2)
	P0175	Fuel system rich (Bank 2)
Required sensors/components	Main sensors/components	Front oxygen sensor
	Related sensors/components	Engine coolant temperature sensor, Mass air flow meter, Crankshaft position sensor
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Battery voltage	11 V	–
Fuel system status	Closed–loop	
Throttle position learning	Completed	
Either of the following conditions is met:	Condition 1 or 2	
1. Engine RPM	–	1,000 rpm
2. Intake air amount per revolution	0.26 g/sec.	–
Catalyst monitor	No executed	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Purge–cut	Executing
Either of the following conditions is met	Condition 1 or 2
1. Average between short–term fuel trim and long–term fuel trim	35% or more (varies with ECT)
2. Average between short–term fuel trim and long–term fuel trim	–35% or less (varies with ECT)

WIRING DIAGRAM

Refer to DTC P2195 on page DI–383.

INSPECTION PROCEDURE

HINT:

Hand–held tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air–Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using a hand–held tester.

(1) Connect a hand–held tester to the DLC3.
(2) Start the engine and turn the tester ON.
(3) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(4) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(6) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 (AFS B2S1) and OS2 B1S2 (O2S B2S2)) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

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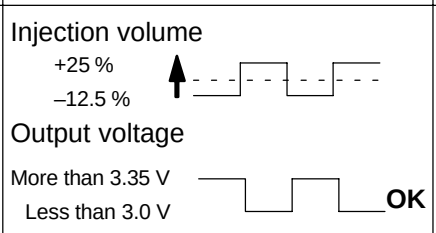
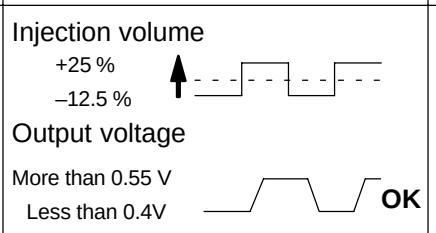
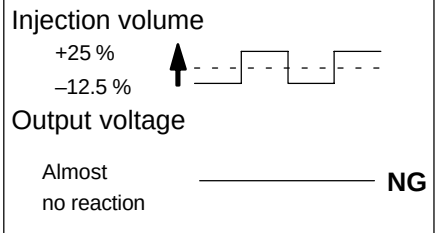
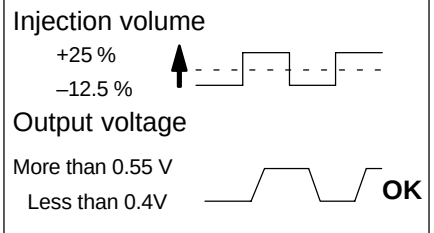
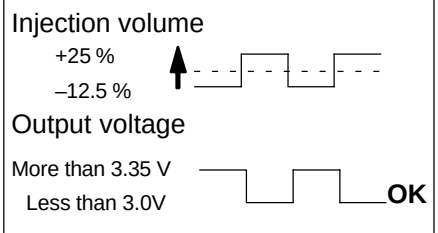
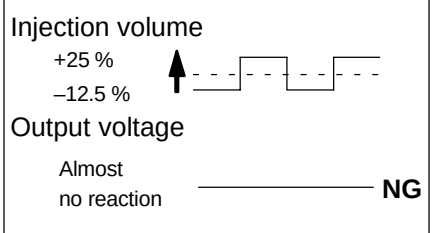
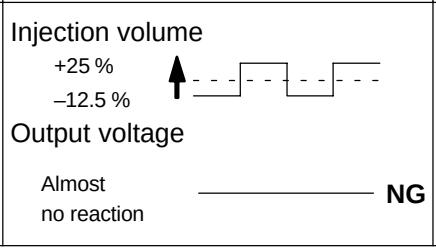
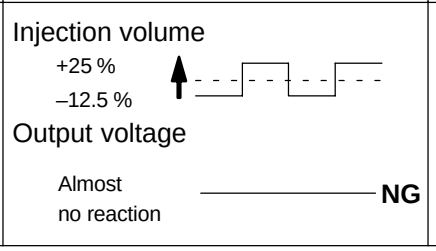
Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (AFS B2S1) (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (AFS B2S1) (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (O2S B2S2) (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (O2S B2S2) (HO2)	–12.5 %	Lean	Less than 0.4

NOTICE:

The Air–Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

- ▶ Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
- ▶ To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press the YES button and then the ENTER button followed by the F4 button.

Case	A/F Sensor (Sensor 1) Output Voltage	HO2 Sensor (Sensor 2) Output Voltage	Main Suspected Trouble Areas
1			—
2			● A/F sensor ● A/F sensor heater ● A/F sensor circuit
3			● HO2 sensor ● HO2 sensor heater ● HO2 sensor circuit
4			● Injector ● Fuel pressure ● Gas leakage from exhaust system (Air–fuel ratio extremely lean or rich)

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HINT:

- Read freeze frame data using a hand–held tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.
- A low A/F sensor voltage could be caused by a rich air–fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air–fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Check any other DTCs output (in addition to DTC P0171, P0172, P0174 or P0175).**

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

(a) Read DTCs.

Result:

Display (DTC Output)	Proceed To
P0171, P0172, P0174 or P0175	A
P0171, P0172, P0174 or P0175 and other DTCs	B

HINT:

If any DTCs other than P0171, P0172, P0174 or P0175 are output, troubleshoot those DTCs first.

B → **Go to DTC chart (See page DI–58).**

A

2	**Check connection of PCV piping.**

OK:

PCV hose is connected correctly and is not damaged.

NG → **Repair or replace PCV piping.**

OK

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3	**Check air induction system (See page SF–1).**

CHECK:

Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

4	**Perform active test (A/F control).**

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(f) Monitor the voltage outputs of A/F and HO2 sensors(AFS B1S1 (AFS B2S1) and O2S B1S2 (O2S B2S2)) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (AFS B2S1) (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (AFS B2S1) (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (O2S B2S2) (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (O2S B2S2) (HO2)	–12.5 %	Lean	Less than 0.4

Result:

Status AFS B1S1 (AFS B2S1)	Status O2S B1S2 (O2S B2S2)	A/F Condition and A/F Sensor Condition	Misfires	Suspected Trouble Areas	Proceed To
Lean/Rich	Lean/Rich	Normal	—	—	C
Lean	Lean	Actual air–fuel ratio lean	May occur	▶PCV valve and hose ▶PCV hose connections ▶Injector blockage ▶Gas leakage from exhaust system ▶Air induction system ▶Fuel pressure ▶Mass Air Flow (MAF) meter ▶Engine Coolant Temperature (ECT) sensor	A

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Rich	Rich	Actual air–fuel ratio rich	—	▶Injector leakage or blockage ▶Gas leakage from exhaust system ▶Ignition system ▶Fuel pressure ▶MAF meter ▶ECT sensor	A
Lean	Lean/Rich	A/F sensor malfunction	—	▶A/F sensor	B
Rich	Lean/Rich	A/F sensor malfunction	—	▶A/F sensor	B

Lean: During A/F CONTROL, the A/F sensor output voltage (AFS) is consistently more than 3.35 V, and the HO2 sensor output voltage (O2S) is consistently less than 0.4 V.
Rich: During A/F CONTROL, the AFS is consistently less than 3.0 V, and the O2S is consistently more than 0.55 V.

B	**Go to step 11.**
C	**Go to step 15.**

A

5	**Read value of engine coolant temperature.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:
(a) Read the COOLANT TEMP twice, when the engine is cold and also when warmed up.
Standard:
With cold engine: Same as ambient air temperature.
With warm engine: Between 75◀C and 95◀C (167◀F and 203◀F)

NG	**Replace engine coolant temperature sensor.**

OK

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6	**Read value of mass air flow meter.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF and COOLANT TEMP.
(d) Allow the engine to idle until the COOLANT TEMP reaches 75◀C (167◀F) or more.

CHECK:

(a) Read the MAF with the engine in an idling condition and at an engine speed of 2,500 rpm.
Standard:
MAF while engine idling: Between 1.4 gm/s and 2.3 gm/s (shift position: N, A/C: OFF).
MAF at engine speed of 2,500 rpm: Between 5.4 gm/s and 7.9 gm/s (shift position: N, A/C: OFF).

NG → **Replace mass air flow meter.**

OK

7	**Check fuel pressure (See page SF–7).**

CHECK:

Check the fuel pressure (high or low pressure).

NG → **Check and replace fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).**

OK

8	**Check exhaust system for gas leakage.**

OK:

No exhaust gas leakage.

NG → **Repair or replace exhaust gas leakage point.**

OK

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9	**Check for spark and ignition (See page IG–1).**

HINT:
If the spark plugs or ignition system malfunction, engine misfire may occur. The misfire counter can be read with the hand–held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL#1 (to CYL#8).

NG → **Repair or replace ignition system.**

OK

10	**Check injector injection (See page SF–29).**

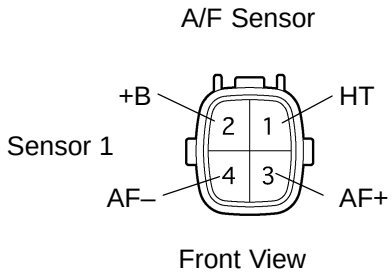
HINT:
If the injectors malfunction, engine misfires may occur. The misfire counter can be read with the hand–held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL#1 (to CYL#8).

NG → **Replace injector.**

OK

11	**Check resistance of air–fuel ratio (A/F) sensor heater.**

Component Side:



PREPARATION:
Disconnect the air–fuel ratio (A/F) sensor connector.

CHECK:
Measure resistance between the terminals of the A/F sensor connector.

OK:

Standard:

Tester Connection	Specified Condition
HT (1) – +B (2)	1.8 to 3.4 Ω at 20°C (68°F)
HT (1) – AF– (4)	10 kΩ or higher

NG → **Replace air–fuel ratio (A/F) sensor.**

OK

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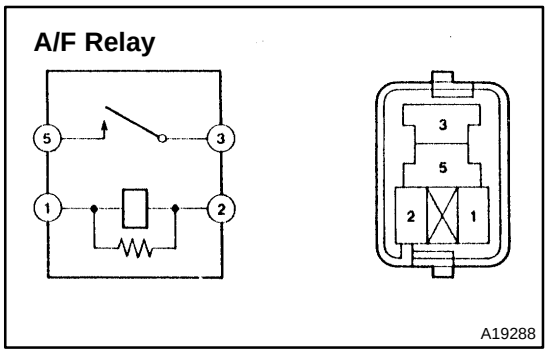
12	Check A/F relay.



PREPARATION:

Remove the A/F relay from the engine room J/B.

CHECK:

Inspect the A/F relay.

OK:

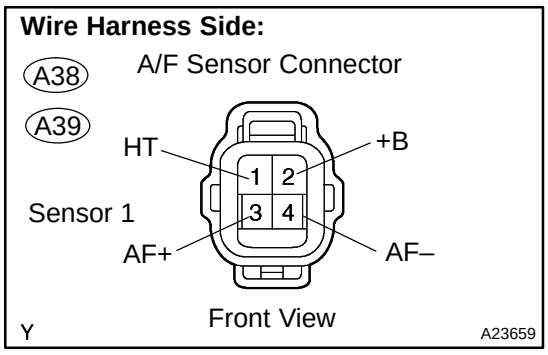
Standard:

Terminal No.	Condition	Specified Condition
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace A/F relay.**

OK

13	Check for open and short in harness and connector between ECM and A/F sensor.



PREPARATION:

(a) Disconnect the A38 or A39 A/F sensor connector.

(b) Turn the ignition switch to ON.

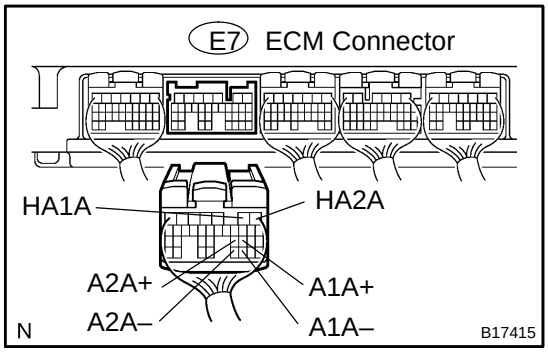
CHECK:

(a) Measure the voltage between the +B terminal of the A/F sensor connector and body ground.

OK:

Standard:

Tester Connections	Specified Conditions
+B (2) – Body ground	9 to 14 V



PREPARATION:

(a) Turn the ignition switch to OFF.

(b) Disconnect the E7 ECM connector.

CHECK:

(a) Check the resistance.

OK:

Standard (Check for open):

Tester Connections	Specified Conditions
HT (A38–1) – HA1A (E7–2) HT (A39–1) – HA2A (E7–1)	Below 1 Ω
AF+ (A38–3) – A1A+ (E7–22) AF+ (A39–3) – A2A+ (E7–23)	Below 1 Ω
AF– (A38–4) – A1A– (E7–30) AF– (A39–4) – A2A– (E7–31)	Below 1 Ω

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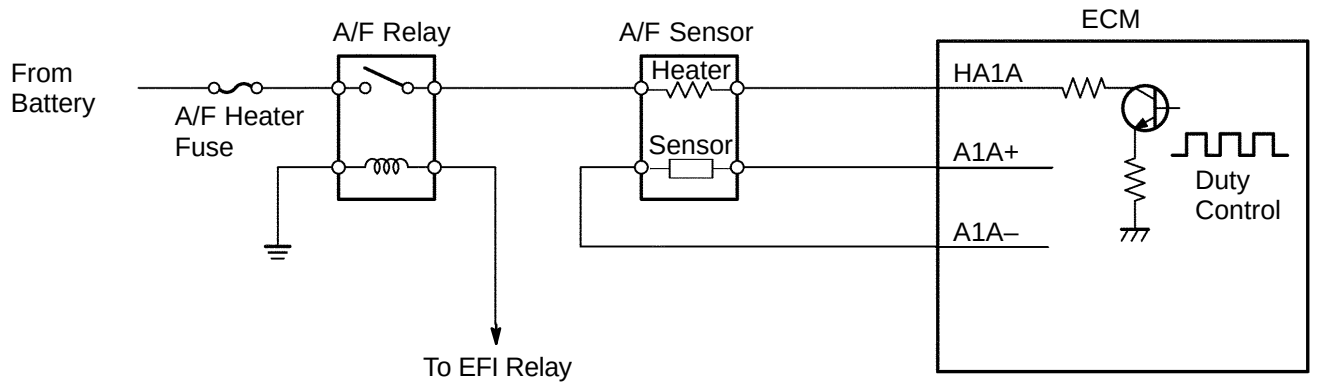
Standard (Check for short):

Tester Connections	Specified Conditions
HT (A38–1) or HA1A (E7–2) – Body ground HT (A39–1) or HA2A (E7–1) – Body ground	10 kΩ or higher
AF+ (A38–3) or A1A+ (E7–22) – Body ground AF+ (A39–3) or A2A+ (E7–23) – Body ground	10 kΩ or higher
AF– (A38–4) or A1A– (E7–30) – Body ground AF– (A39–4) or A2A– (E7–31) – Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing):



NG → **Replace or replace harness or connector.**

OK

14	**Replace air fuel ratio sensor.**

NEXT

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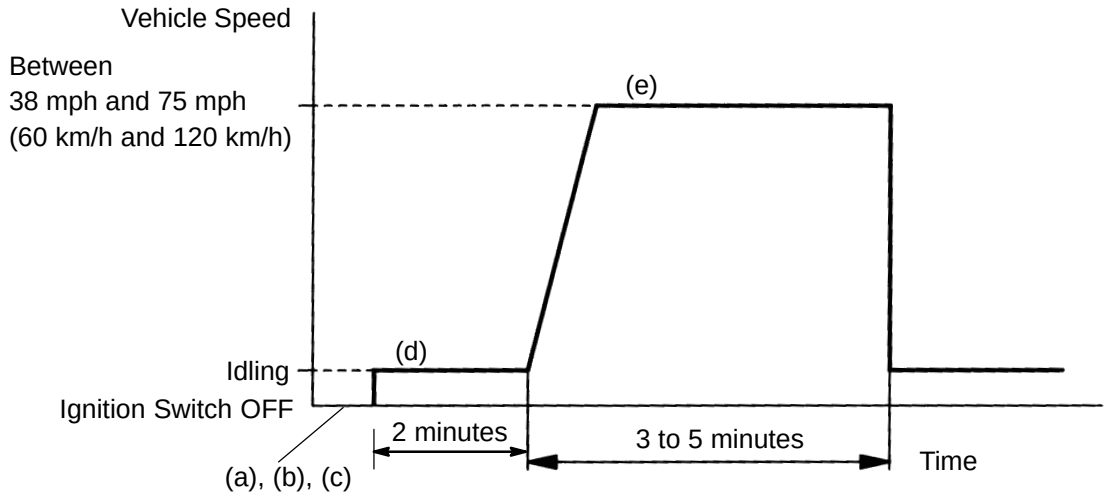
15	Perform confirmation driving pattern.



(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Clear DTCs (see page DI–43).
(d) Switch the ECM from normal mode to check mode using the tester (see page DI–44).
(e) Start the engine and warm it up with all the accessories switched OFF.
(f) Drive the vehicle at between 38 mph and 75 mph (60 km/h and 120 km/h) and at an engine speed of between 1,400 rpm and 3,200 rpm for 3 to 5 minutes.

HINT:
If the system is still malfunctioning, the MIL will be illuminated during step (e).

NOTICE:
If the conditions in this test are not strictly followed, no malfunction will be detected.

NEXT

16	Check whether DTC output recurs (DTC P0171, P0172, P0174 or P0175)

CHECK:
(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P0171, P0172, P0174 or P0175	A
No output	B

B → **Go to step 5.**

A

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END

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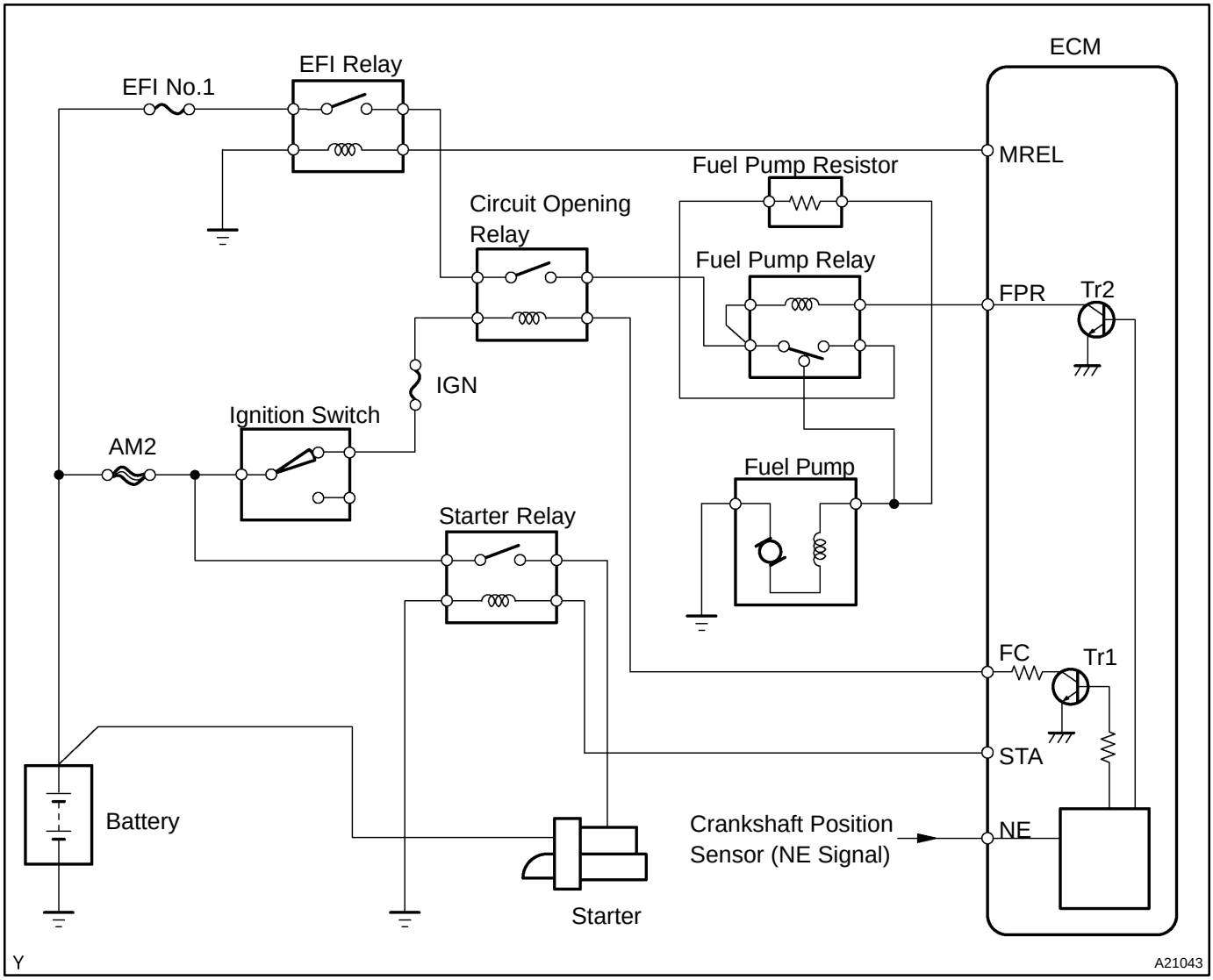
DICEW–02

DTC	P0230	Fuel Pump Primary Circuit

CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal STAR of the ECM to the starter relay coil and also current flows to terminal STA of the ECM (STA signal).
When the STA signal and NE signal are input to the ECM, the Tr1 is turned ON, current flows to the coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump, and the fuel pump operates.
While the NE signal is generated (engine running), the ECM keeps the Tr1 ON (circuit opening relay ON) and the fuel pump also keeps operating.
The fuel pump speed is controlled at two levels (high speed or low speed) by the condition of the engine (starting, light load, heavy load). When the engine starts (STA ON), the Tr2 in the ECM is OFF, so the fuel pump relay closes and battery positive voltage is applied directly to the fuel pump. The fuel pump operates at high speed.
After the engine starts while idling or light loads, since the Tr2 goes ON, power is supplied to the fuel pump via the fuel pump resistor. The fuel pump operates at low speed.



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DTC No.	DTC Detecting Condition	Trouble Area
P0230	Open or short in fuel pump relay circuit	▶Open or short in fuel pump relay circuit ▶Fuel pump relay ▶Circuit opening relay ▶Fuel pump ▶ECM

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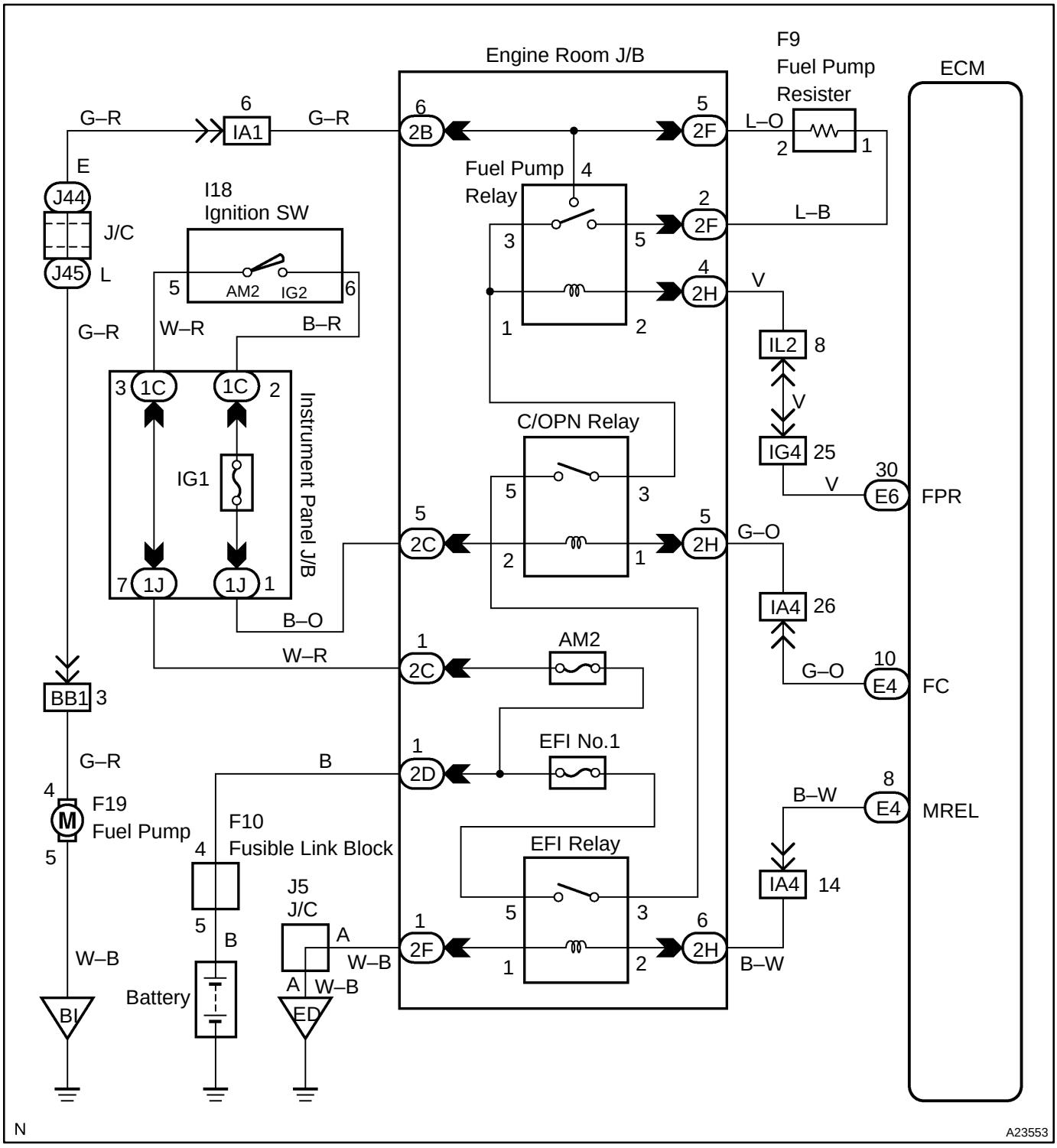
WIRING DIAGRAM



HINT:
This diagnostic chart is based on premise that engine is started. If the engine is not started, proceed to problem symptoms table on DI–33.

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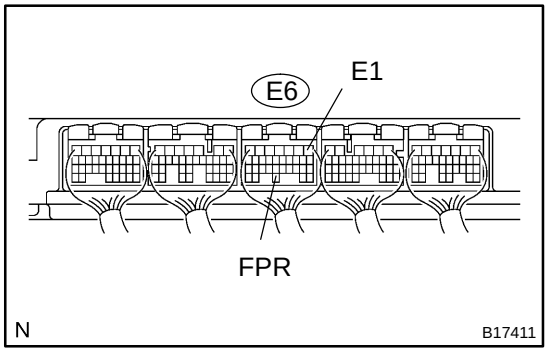
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	Check voltage between terminal FPR and E1 of ECM.



CHECK:

Measure the voltage between terminals of E6 and E6 ECM connectors.

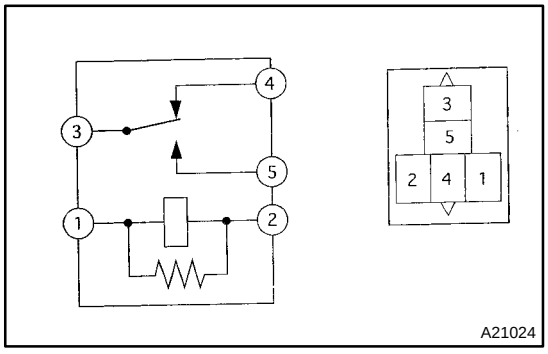
OK:

Tester Connection	Condition	Specified Condition
FPR (E6–30) – E1 (E6–1)	STA signal ON	9 to 14 V
FPR (E6–30) – E1 (E6–1)	STA signal OFF	0 to 3 V

OK → **Replace ECM (See page SF–80).**

NG

2	Check fuel pump relay.



PREPARATION:

Remove the fuel pump relay from the engine room R/B.

CHECK:

Inspect the fuel pump relay.

OK:

Terminal No.	Condition	Specified Condition
3 – 4	Apply B+ between terminals 1 and 2	10 KΩ or higher
3 – 4	Always	Below 1 Ω
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace fuel pump relay.**

OK

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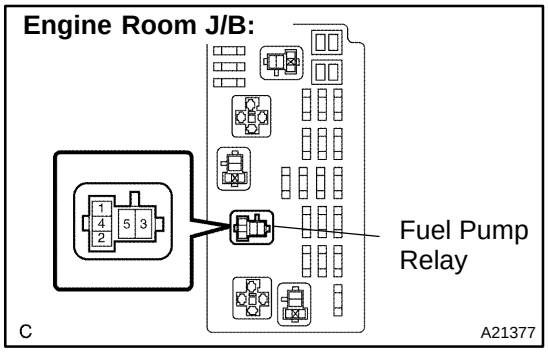
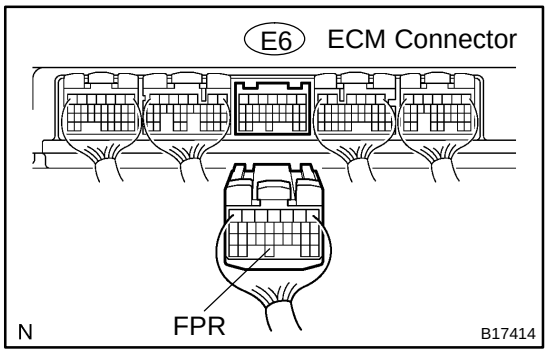
3	Check for open and short in harness and connector between fuel pump relay and ECM.





PREPARATION:

(a) Remove the fuel pump relay from the engine room J/B.

(b) Disconnect the E6 ECM connector.

CHECK:

Measure the resistance between wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
Engine Room J/B (Fuel pump relay terminal 1) – FPR (E6–30)	Below 1 Ω
Engine Room J/B (Fuel pump relay terminal 1) or FPR (E6–30) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Replace ECM (See page SF–80).

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DID85–01

DTC	P0300	Random/Multiple Cylinder Misfire Detected
DTC	P0301	Cylinder 1 Misfire Detected
DTC	P0302	Cylinder 2 Misfire Detected
DTC	P0303	Cylinder 3 Misfire Detected
DTC	P0304	Cylinder 4 Misfire Detected
DTC	P0305	Cylinder 5 Misfire Detected
DTC	P0306	Cylinder 6 Misfire Detected
DTC	P0307	Cylinder 7 Misfire Detected
DTC	P0308	Cylinder 8 Misfire Detected

CIRCUIT DESCRIPTION

When a misfire occurs in the engine, hydrocarbons (HC) enter the exhaust in high concentrations. If this HC concentration is high enough, there could be an increase in exhaust emission levels. High concentrations of HC can also cause the temperature of the catalyst to increase, possibly damaging the catalyst. To prevent this increase in emissions and limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the catalyst reaches a point of thermal degradation, the ECM will blink the MIL. For monitoring misfire, the ECM uses both the camshaft position sensor and the crankshaft position sensor. The camshaft position sensor is used to identify misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. The misfire counter increments when crankshaft rotation speed variations exceed threshold values.

If the misfiring rate exceeds the threshold value, which could cause emissions deterioration, the ECM illuminates the MIL.

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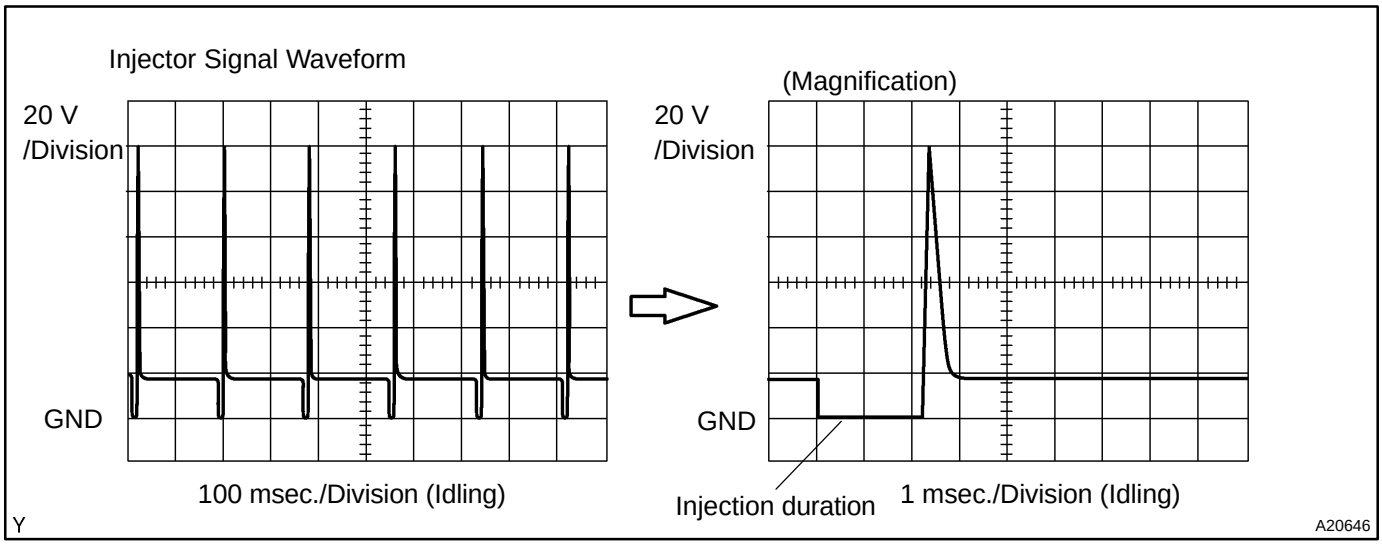
DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected	▶Open or short in engine wire ▶Connector connection ▶Vacuum hose connection ▶Ignition system ▶Injector ▶Fuel pressure ▶Mass air flow meter ▶Engine coolant temperature sensor ▶Compression pressure ▶Valve clearance ▶Valve timing ▶PCV piping ▶ECM
P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308	Misfiring of each cylinder is detected	

HINT:
When several codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires have been detected and recorded at different times.
Reference: Inspection using the oscilloscope.
With the engine idling, check the waveform between terminals #1 to #8 and E01 of the ECM connectors.
HINT:
The correct waveform is as shown in the illustration.



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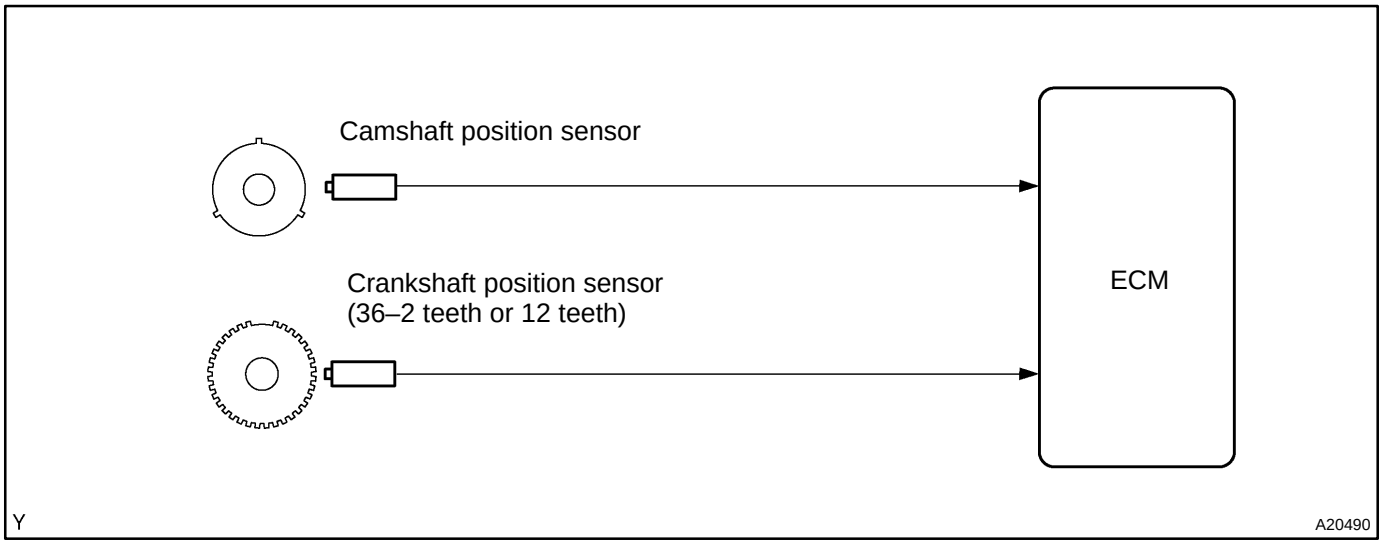
MONITOR DESCRIPTION



The ECM illuminates the MIL (2 trip detection logic) if:
The ECM will illuminate the MIL when the percentage of misfire exceeds the specified limit per 1,000 engine revolutions. One occurrence of excessive misfire during engine start will set the MIL. Four occurrences are required to set the MIL 1,000 revolutions after engine start.
The ECM blinks the MIL (the MIL blinks immediately) if:

- ▶ Within 200 engine revolutions at a high rpm, the threshold for ”percentage of misfire causing catalyst damage” is reached 1 time.
- ▶ Within 200 engine revolutions at a normal rpm, the threshold for ”percentage of misfire causing catalyst damage” is reached 3 time.

MONITOR STRATEGY

Related DTCs	P0300	Random/Multiple cylinder misfire detected
	P0301	Cylinder 1 misfire detected
	P0302	Cylinder 2 misfire detected
	P0303	Cylinder 3 misfire detected
	P0304	Cylinder 4 misfire detected
	P0305	Cylinder 5 misfire detected
	P0306	Cylinder 6 misfire detected
	P0307	Cylinder 7 misfire detected
	P0308	Cylinder 8 misfire detected
Required sensors/components	Main sensors/components	Camshaft position sensor, Crankshaft position sensor
	Related sensors/components	Engine coolant temperature sensor, Intake air temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	Every 1,000 revolutions (soon after engine is started: 1 time, other: 4 times) (emission related misfire) Every 200 revolutions (1 or 3 times) (catalyst deteriorating misfire)	
MIL operation	2 driving cycles MIL ON Immediate MIL blinking (Catalyst deteriorating misfire)	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Battery voltage	8 V	–
Throttle position learning	Completed	
VVT system	Normal operate by scan–tool	
Engine RPM	400 to 5,700rpm	
All of the following conditions are met:	Condition 1 and 2	
1. Engine coolant temperature	–10°C (14°F)	–
2. Either of the following conditions is met:	Condition (a) or (b)	
(a) Engine coolant temperature at engine start	–7°C (19°F)	–
(b) Engine coolant temperature	20°C (68°F)	–
Fuel–cut	OFF	
Emission–related–misfire:		
First 1,000 revolutions after engine start, or check mode	Crankshaft 1,000 revolutions	
Except above	Crankshaft 1,000 revolutions x 4	
Catalyst–damage–misfire (MIL blinks):		
All of the following conditions 1, 2 and 3 are met	Crankshaft 200 revolutions	
1. Driving cycle	1st	
2. Check mode	OFF	
3. Engine RPM	–	2,800 rpm
Except above	Crankshaft 200 revolutions x 3	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Emission–related–misfire:	
Misfire rate:	1.2 % or more
Catalyst–damage–misfire (MIL blinks):	
Number of misfire per 200 revolutions	93 or more (varies with intake air amount and RPM)
Multiple cylinders misfire	Detected

MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.
- ▶ Scaling is used to calculate the test value indicated on generic OBD II scan tools.

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Misfire monitor – All cylinders

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A1	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A1	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

Misfire monitor – Cylinder 1

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A2	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A2	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

Misfire monitor – Cylinder 2

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A3	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A3	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

Misfire monitor – Cylinder 3

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A4	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A4	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

Misfire monitor – Cylinder 4

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A5	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A5	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

Misfire monitor – Cylinder 5

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A6	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A6	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

Misfire monitor – Cylinder 6

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A7	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A7	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

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Misfire monitor – Cylinder 7

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A8	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A8	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

Misfire monitor – Cylinder 8

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$A9	$0B	Multiply by 1 (time)	Exponential Weighted Moving Average misfire counts for last 10 driving cycles – total	0	65535
$A9	$0C	Multiply by 1 (time)	Misfire counts for last and current driving cycles – total	0	65535

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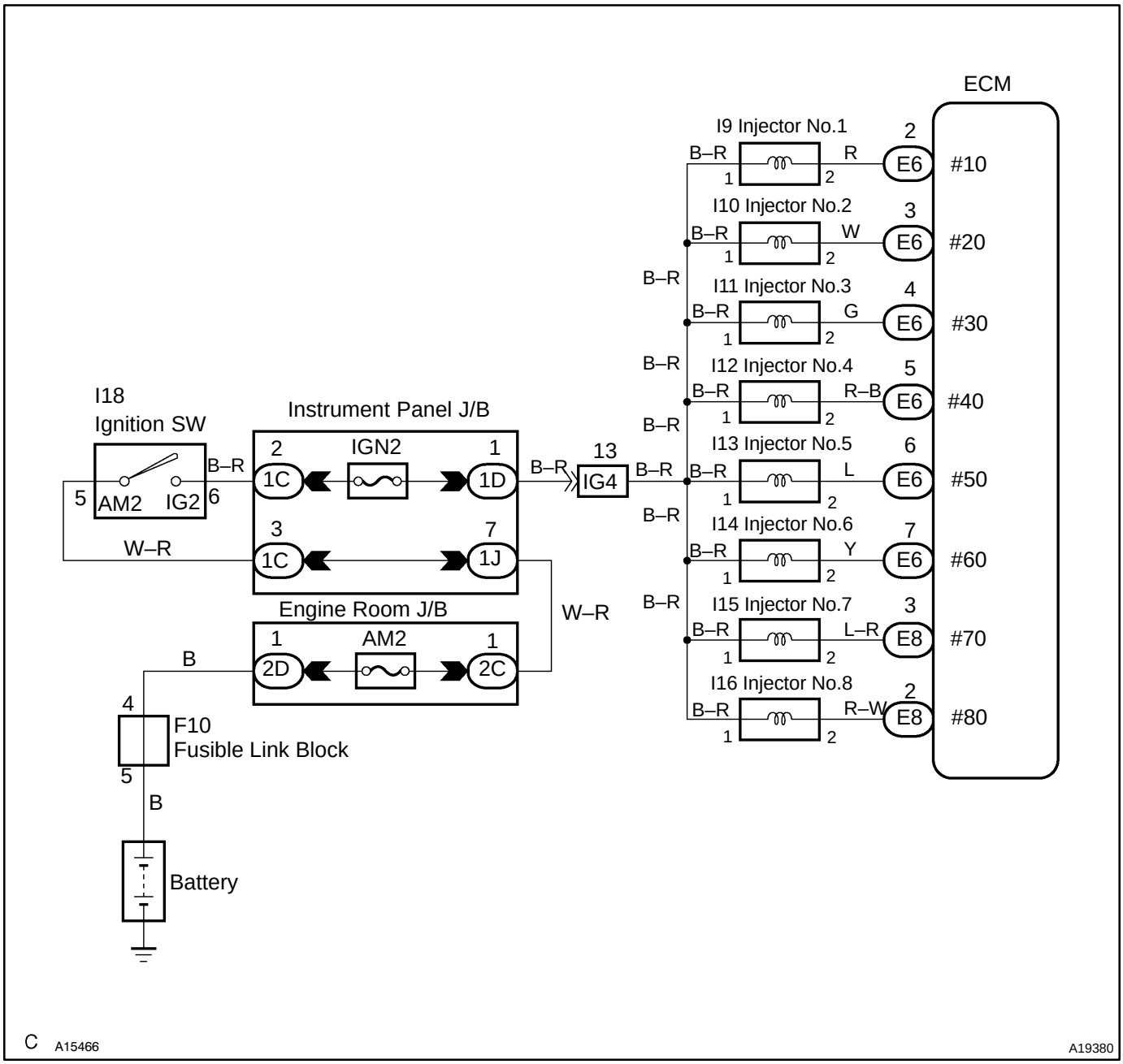
WIRING DIAGRAM

Refer to DTC P0351 on page DI–221 for the wiring diagram of the ignition system.



CONFIRMATION DRIVING PATTERN

(a) Connect the hand–held tester to the DLC3.
(b) Record DTC and the freeze frame data.
(c) Use the hand–held tester to set the check mode (See page DI–44).
(d) Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
(e) Drive the vehicle several times with the engine speed, load and surrounding range shown as ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the DATA LIST.

If you have no hand–held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

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HINT:
In order to memorize the DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the DATA LIST for the following period of time. Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode, and all DTCs, etc., are erased.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(f) Check if there is misfire, and the DTC and the freeze frame data. Record the DTC's, freeze frame data and misfire counter data.
(g) Turn the ignition switch OFF and wait for at least 5 seconds.

INSPECTION PROCEDURE

HINT:
- If DTCs besides misfire DTCs are memorized simultaneously, troubleshoot the non–misfire DTCs first.
- If the misfire does not occur when the vehicle is brought to the workshop, the misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See confirmation driving pattern).
- On 6 or 8 cylinder engines, misfiring cylinder identification is disabled at high engine speed and only a general misfire fault code P0300 is stored instead of a cylinder specific misfire fault code (P0301 to P0308).
  If the misfire starts in a high engine speed area or the misfire occurs only in a high engine speed area, only code P0300 may be stored.

  When only a general misfire fault code like P0300 is stored:
- Erase the general misfire fault code using the hand–held tester
- Start the engine and drive the confirmation patten.
- Read the value of the misfire ratio for each cylinder. Or read the DTC.
- Repair the cylinder that has a high misfire ratio. Or repair the cylinder indicated by the DTC.
- After finishing repairs, drive the confirmation pattern again and confirm that no misfire occurs.
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is over the range of ±20 %, there is a possibility that the air–fuel ratio is becoming RICH (–20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility of misfire only during engine warm–up.
- If the misfire cannot be reproduced, the following reasons may apply: 1) the vehicle has low fuel, 2) improper fuel is being used, or 3) the ignition plug is contaminated.
- Be sure to check the value on the misfire counter after the repair.

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1	**Are there any other codes (besides DTC P0300, P0301, P0302, P0303, P0304 P0305, P0306, P0307 or P0308) being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTCs using hand–held tester.

RESULT:

Display (DTC Output)	Proceed to
”P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 and/or P0308”	A
”P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308” and other DTCs	B

HINT:

If any other codes besides ”P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308” are output, perform the troubleshooting for those DTCs.

B → **Go to relevant DTC chart (See page DI–58).**

A

2	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:

(a) Check the connection conditions of the wire harness and connector.
(b) Check for the disconnection, piping and brake of the vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).**

OK

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3	**Check connection of PCV piping.**

OK:

PCV hose is connected correctly and is not damaged.

NG → **Repair or replace PCV piping.**

OK

4	**Connect hand–held tester, and read the number of misfire.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Start the engine.
(d) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / CYL#1 to CYL#8.

CHECK:

Read the number of misfire on the hand–held tester.

HINT:

When a misfire is not reproduced, be sure to branch below based on the stored DTC.

RESULT:

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 15.**

A

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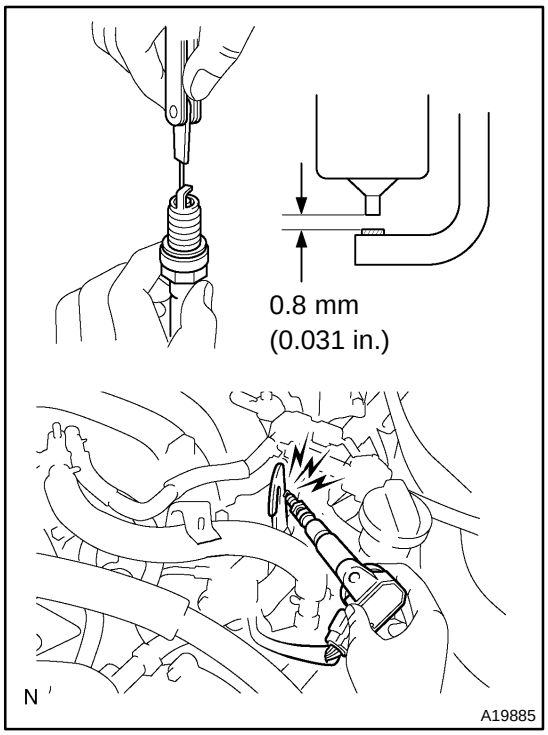
5	Check spark plug and spark of misfiring cylinder.



PREPARATION:

(a) Remove the ignition coil assembly.
(b) Remove the spark plug.

CHECK:

(a) Check the electrode for carbon deposits.
(b) Check the spark plug type (See page IG–1).
(c) Check electrode gap.

OK:

No large carbon deposit present.
Not wet with gasoline or oil.
Electrode gap: 0.8 mm (0.031 in.)

NOTICE:

If adjusting the gap of a new spark plug, bend only "the base / ground" electrode. Do not touch the tip. Never attempt to adjust the gap of a used plug.

PREPARATION:

(a) Install the spark plug to the ignition coil assembly.
(b) Disconnect the injector connector.
(c) Ground spark plug.

CHECK:

Check if spark occurs while engine is being cracked.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

OK:

Spark occurs across electrode gap.

OK	Go to step 8.

NG

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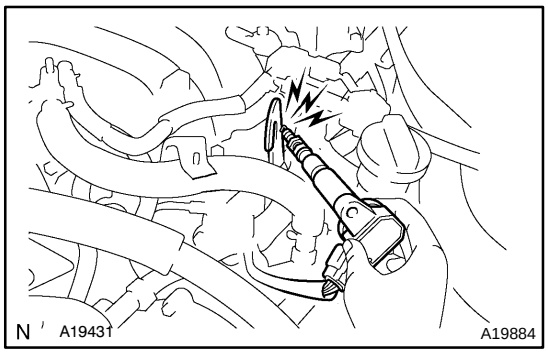
6	Change normal spark plug and check spark of misfiring cylinder.



PREPARATION:

(a) Change to the normal spark plug.
  (1) Remove the spark plug that may be faulty from the ignition coil assembly.
  (2) Install another spark plug to the ignition coil assembly.

(b) Disconnect the injector connector.

(c) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

OK:

Spark jumps across electrode gap.

OK	Replace spark plug.

NG

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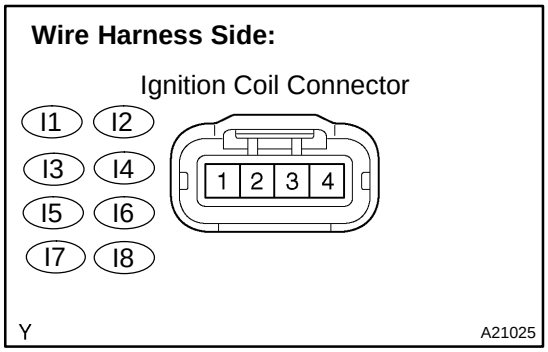
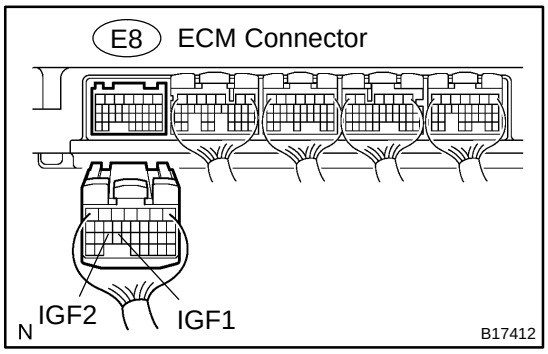
7	Check for open and short in harness and connector between ignition coil and ECM.





Check the harness and connector between the ignition coil and the ECM (IGF terminal) connectors:

PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
Ignition coil (I1–2) – IGF1 (E8–24)	Below 1 Ω
Ignition coil (I2–2) – IGF2 (E8–25)	Below 1 Ω
Ignition coil (I3–2) – IGF1 (E8–24)	Below 1 Ω
Ignition coil (I4–2) – IGF2 (E8–25)	Below 1 Ω
Ignition coil (I5–2) – IGF1 (E8–24)	Below 1 Ω
Ignition coil (I6–2) – IGF2 (E8–25)	Below 1 Ω
Ignition coil (I7–2) – IGF1 (E8–24)	Below 1 Ω
Ignition coil (I8–2) – IGF2 (E8–25)	Below 1 Ω
Ignition coil (I1–2) or IGF1 (E8–24) – Body ground	10 kΩ or higher
Ignition coil (I2–2) or IGF2 (E8–25) – Body ground	10 kΩ or higher
Ignition coil (I3–2) or IGF1 (E8–24) – Body ground	10 kΩ or higher
Ignition coil (I4–2) or IGF2 (E8–25) – Body ground	10 kΩ or higher
Ignition coil (I5–2) or IGF1 (E8–24) – Body ground	10 kΩ or higher
Ignition coil (I6–2) or IGF2 (E8–25) – Body ground	10 kΩ or higher
Ignition coil (I7–2) or IGF1 (E8–24) – Body ground	10 kΩ or higher
Ignition coil (I8–2) or IGF2 (E8–25) – Body ground	10 kΩ or higher

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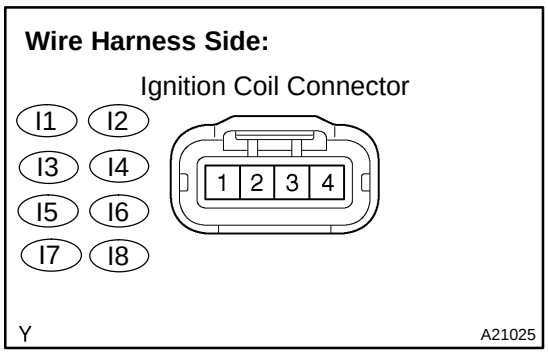

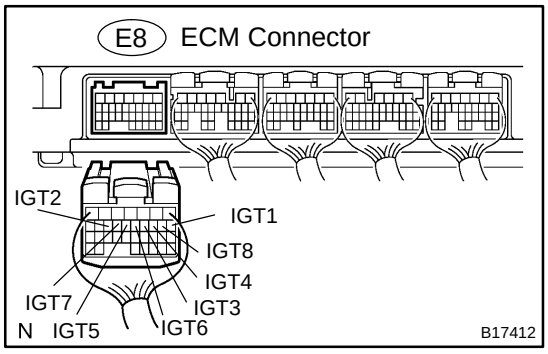

Check the harness and connector between the ignition coil and the ECM (IGT terminal) connectors:

PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
Ignition coil (I1–3) – IGT1 (E8–8)	Below 1 Ω
Ignition coil (I2–3) – IGT2 (E8–15)	Below 1 Ω
Ignition coil (I3–3) – IGT3 (E8–11)	Below 1 Ω
Ignition coil (I4–3) – IGT4 (E8–10)	Below 1 Ω
Ignition coil (I5–3) – IGT5 (E8–13)	Below 1 Ω
Ignition coil (I6–3) – IGT6 (E8–12)	Below 1 Ω
Ignition coil (I7–3) – IGT7 (E8–14)	Below 1 Ω
Ignition coil (I8–3) – IGT8 (E8–9)	Below 1 Ω
Ignition coil (I1–3) or IGT1 (E8–8) – Body ground	10 kΩ or higher
Ignition coil (I2–3) or IGT2 (E8–15) – Body ground	10 kΩ or higher
Ignition coil (I3–3) or IGT3 (E8–11) – Body ground	10 kΩ or higher
Ignition coil (I4–3) or IGT4 (E8–10) – Body ground	10 kΩ or higher
Ignition coil (I5–3) or IGT5 (E8–13) – Body ground	10 kΩ or higher
Ignition coil (I6–3) or IGT6 (E8–12) – Body ground	10 kΩ or higher
Ignition coil (I7–3) or IGT7 (E8–14) – Body ground	10 kΩ or higher
Ignition coil (I8–3) or IGT8 (E8–9) – Body ground	10 kΩ or higher

OK → **Replace ignition coil with igniter, then confirm that there is no misfire.**

NG

Repair or replace harness or connector.

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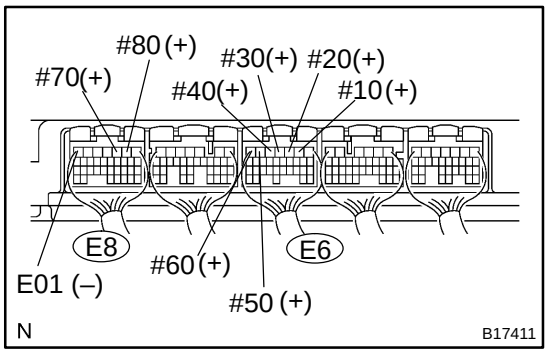
8	Check ECM terminal of misfiring cylinder.



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between the terminals of the E6 and E8 ECM connectors.

OK:

Standard:

Tester Connection	Specified Condition
#10 (E6–2) – E01 (E8–7)	9 to 14 V
#20 (E6–3) – E01 (E8–7)	9 to 14 V
#30 (E6–4) – E01 (E8–7)	9 to 14 V
#40 (E6–5) – E01 (E8–7)	9 to 14 V
#50 (E6–6) – E01 (E8–7)	9 to 14 V
#60 (E6–7) – E01 (E8–7)	9 to 14 V
#70 (E8–3) – E01 (E8–7)	9 to 14 V
#80 (E8–2) – E01 (E8–7)	9 to 14 V

OK	Go to step 11.

NG

9	Check injector resistance of misfiring cylinder (See page SF–24).

NG	Replace injector.

OK

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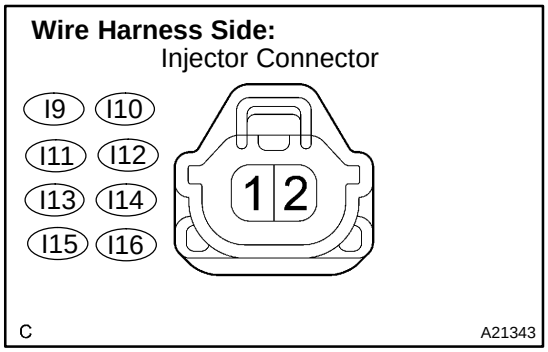
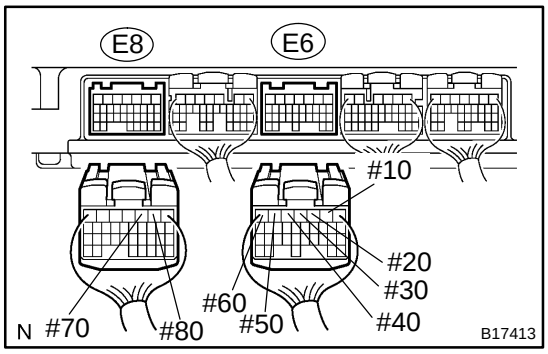
10	**Check for open and short in harness and connector between ignition SW and injector, injector and ECM of misfiring cylinder.**





PREPARATION:

(a) Disconnect the I9, I10, I11, I12, I13, I14, I15 or I16 injector connector.

(b) Disconnect the E6 or E8 ECM connector.

CHECK:

Measure the resistance of the wire harness side connectors between the ECM and injector.

OK:

Standard:

Tester Connection	Specified Condition
Injector (I9–2) – #10 (E6–2)	Below 1 Ω
Injector (I10–2) – #20 (E6–3)	Below 1 Ω
Injector (I11–2) – #30 (E6–4)	Below 1 Ω
Injector (I12–2) – #40 (E6–5)	Below 1 Ω
Injector (I13–2) – #50 (E6–6)	Below 1 Ω
Injector (I14–2) – #60 (E6–7)	Below 1 Ω
Injector (I15–2) – #70 (E8–3)	Below 1 Ω
Injector (I16–2) – #80 (E8–2)	Below 1 Ω
Injector (I9–2) or #10 (E6–2) – Body ground	10 kΩ or higher
Injector (I10–2) or #20 (E6–3) – Body ground	10 kΩ or higher
Injector (I11–2) or #30 (E6–4) – Body ground	10 kΩ or higher
Injector (I12–2) or #40 (E6–5) – Body ground	10 kΩ or higher
Injector (I13–2) or #50 (E6–6) – Body ground	10 kΩ or higher
Injector (I14–2) or #60 (E6–7) – Body ground	10 kΩ or higher
Injector (I15–2) or #70 (E8–3) – Body ground	10 kΩ or higher
Injector (I16–2) or #80 (E8–2) – Body ground	10 kΩ or higher

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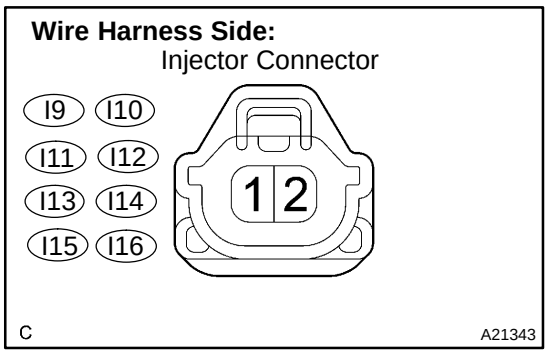

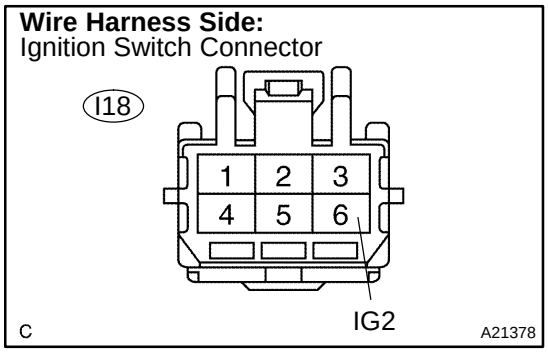

PREPARATION:

(a) Disconnect the I9, I10, I11, I12, I13, I14, I15 or I16 injector connector.

(b) Disconnect the I18 ignition switch connector.

CHECK:

Measure the resistance the wire harness side connectors between the injector and ignition switch.

OK:

Standard:

Tester Connection	Specified Condition
Injector (I9–1) – IG2 (I18–6)	Below 1 Ω
Injector (I10–1) – IG2 (I18–6)	Below 1 Ω
Injector (I11–1) – IG2 (I18–6)	Below 1 Ω
Injector (I12–1) – IG2 (I18–6)	Below 1 Ω
Injector (I13–1) – IG2 (I18–6)	Below 1 Ω
Injector (I14–1) – IG2 (I18–6)	Below 1 Ω
Injector (I15–1) – IG2 (I18–6)	Below 1 Ω
Injector (I16–1) – IG2 (I18–6)	Below 1 Ω
Injector (I9–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Injector (I10–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Injector (I11–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Injector (I12–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Injector (I13–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Injector (I14–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Injector (I15–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Injector (I16–1) or IG2 (I18–6) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

11	**Check injector injection of misfiring cylinder (See page SF–29).**

NG → **Replace injector.**

OK

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12	Check compression pressure of misfiring cylinder (See page EM–3).

NG → Repair or replace.

OK

13	Check valve clearance of misfiring cylinder (See page EM–4).

NG → Adjust valve clearance.

OK

14	Switch step by number of misfire cylinder (Refer to the result of step 4).

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → Check for intermittent problems (See page DI–11).

A

15	Check valve timing (Check for looseness or a jumped tooth of timing belt) (See page EM–9).

NG → Adjust valve timing (Repair or replace timing belt).

OK

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16	**Check fuel pressure (See page SF–7).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).**

OK

17	**Check intake air temperature and mass air flow rate.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

Check the intake air temperature.

(1) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

(2) Read its value displayed on the hand–held tester.

OK:

Equivalent to ambient temperature

CHECK:

Check the air flow rate.

(1) When using hand–held tester, enter the following menu: DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/MAF.

(2) Read its value displayed on the hand–held tester.

OK:

Condition	Air Flow Rate (gm/s)
Ignition switch ON (do not start engine)	0
Idling	4 to 6
Running without load (2,500 rpm)	13 to 20
Idling to quickly accelerating	Air flow rate fluctuates

NG → **Replace mass air flow meter.**

OK

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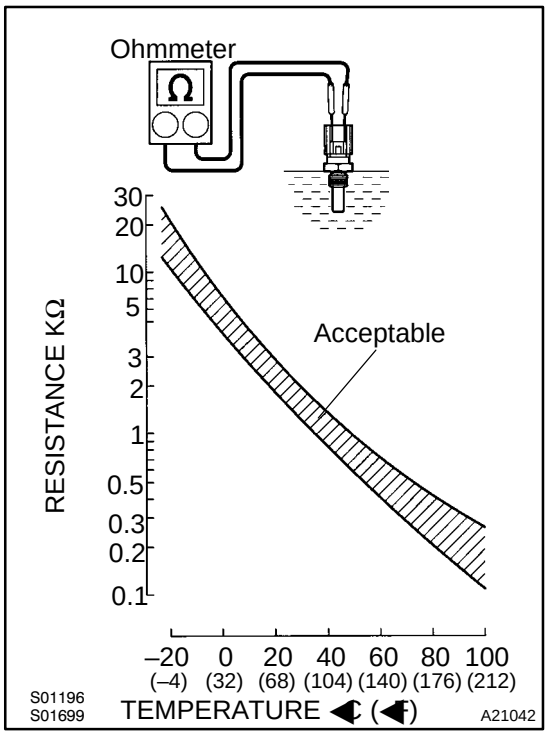
18	Check engine coolant temperature sensor.



PREPARATION:

Remove the engine coolant temperature sensor.

CHECK:

Measure the resistance between the terminals of the engine coolant temperature sensor.

Resistance:

Tester Connection	Specified Condition
1 – 2	2.32 to 2.59 kΩ (20◀C (68◀F))
1 – 2	0.310 to 0.326 kΩ (80◀C (176◀F))

NOTICE:

In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (by warming up or cooling down) and repeat the test.

NG → **Replace engine coolant temperature sensor.**

OK

19	Switch step by number of misfire cylinder (Refer to the result of step 4).

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 5.**

A

Check for intermittent problems (See page DI–11).

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DIDFS–01

DTC	P0325	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)

DTC	P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)

DTC	P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)

DTC	P0330	Knock Sensor 2 Circuit (Bank 2)

DTC	P0332	Knock Sensor 2 Circuit Low Input (Bank 2)

DTC	P0333	Knock Sensor 2 Circuit High Input (Bank 2)

CIRCUIT DESCRIPTION

A flat type knock sensor (non–resonant type) has the structure that can detect the vibration in a wider band of frequency from about 6 kHz to 15 kHz and has the following features.
Knock sensors are fitted on the right bank and left bank of the cylinder block to detect engine knocking. Each knock sensor contains a piezoelectric element which generates voltage when it becomes deformed. Generation of the voltage occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, the ignition timing is retarded in order to suppress the knocking.

DTC No.	DTC Detection Condition	Trouble Area
P0325 P0330	Knock sensor signal level remains at low (1 trip detection logic)	▶Knock sensor 1 or 2 ▶Knock sensor 1 or 2 (looseness) ▶ECM
P0327 P0332	Output voltage of the knock sensor 1 or 2 is 0.5 V or less (1 trip detection logic)	▶Short in knock sensor 1 or 2 circuit ▶Knock sensor 1 or 2 ▶ECM
P0328 P0333	Output voltage of the knock sensor 1 or 2 is 4.5 V or more (1 trip detection logic)	▶Open in knock sensor 1 or 2 circuit ▶Knock sensor 1 or 2 ▶ECM

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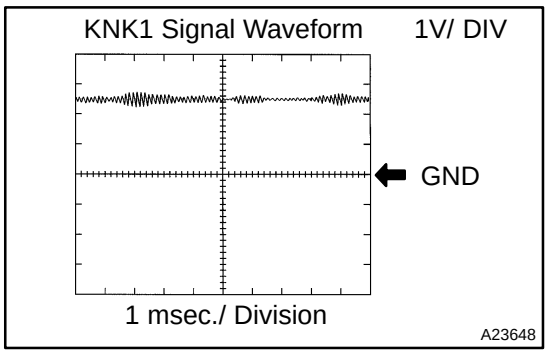

Reference: Inspection using the oscilloscope.
The correct waveform is as shown.

Item	Details
Terminal	KNK1 – EKNK or KNK2 – EKN2
Equipment Settings	0.01 to 10 V/Division, 0.01 to 10 msec./Division
Condition	After warming up the engine, keep the engine speed at 4,000 rpm.

MONITOR DESCRIPTION

The knock sensor located on the cylinder block detects spark knock.
When spark knock occurs, the sensor pick–up vibrates in a specific frequency range. When the ECM detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.
If there is a defect in the knock sensor or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the knock sensor and sets a DTC.
Example:
When the knock sensor voltage output is less than 0.5 V, or more than 4.5 V, and if either the condition continues for more than 3 sec.

MONITOR STRATEGY

Related DTCs	P0325	Knock sensor (Bank 1) range check (Chattering)
	P0327	Knock sensor (Bank 1) range check (Low voltage)
	P0328	Knock sensor (Bank 1) range check (High voltage)
	P0330	Knock sensor (Bank 2) range check (Chattering)
	P0327	Knock sensor (Bank 2) range check (Low voltage)
	P0328	Knock sensor (Bank 2) range check (High voltage)
Required sensors/components	Main sensors/components	Knock sensor
	Related sensors/components	Crankshaft position sensor, Camshaft position sensor, Engine coolant temperature sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Battery voltage	10.5 V	–
Time after engine start	5 sec.	–

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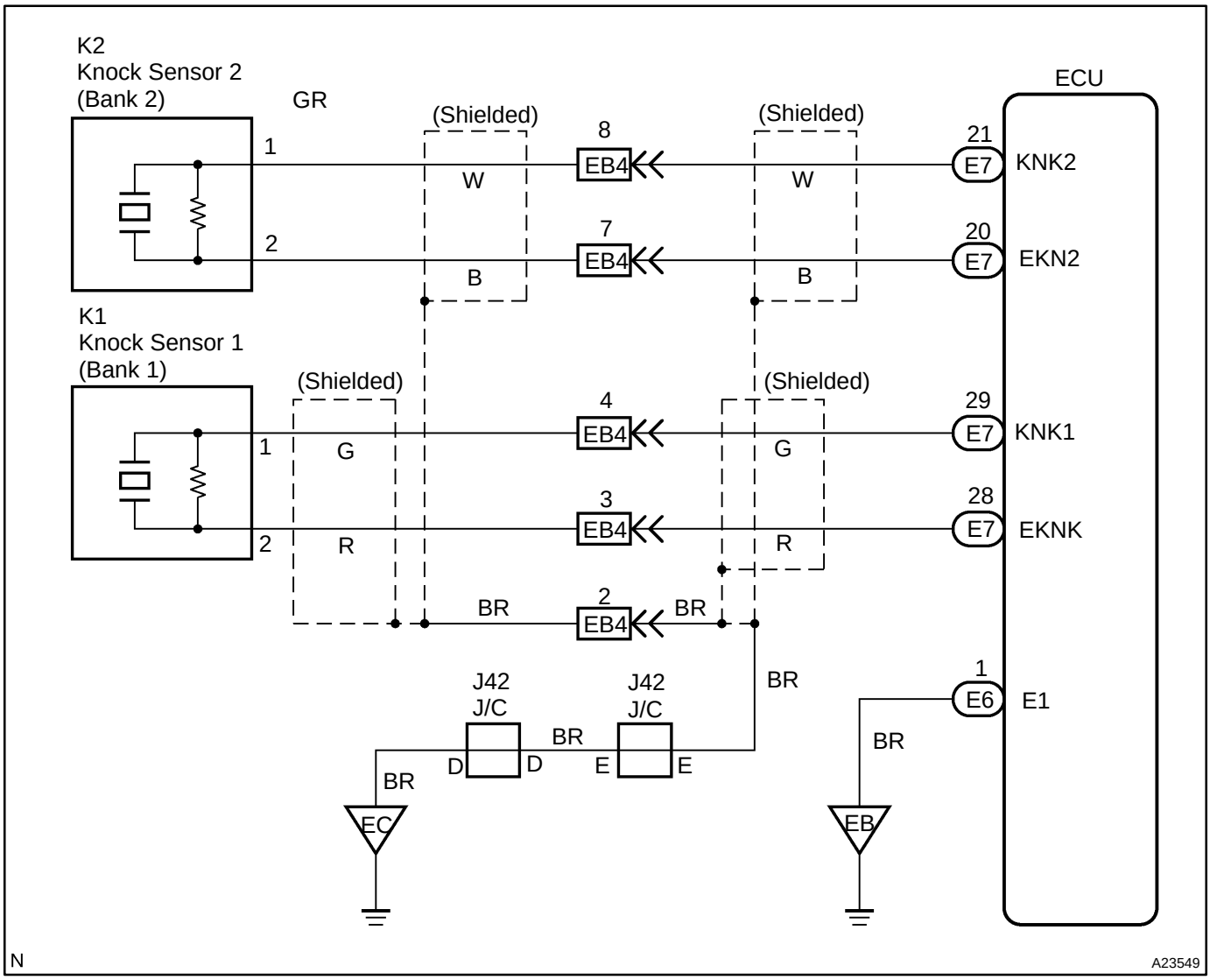
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Knock sensor range check (Chattering) P0325, P0330:	
Knock sensor voltage	Less than 0.5 V, or more than 4.5 V
Knock sensor range check (Low voltage) P0327, P0332:	
Knock sensor voltage	Less than 0.5 V
Knock sensor range check (High voltage) P0328, P0333:	
Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- DTC P0325, P0327 and P0328 are for the bank 1 knock sensor circuit.
- DTC P0330, P0332 and P0333 are for the bank 2 knock sensor circuit.
- Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

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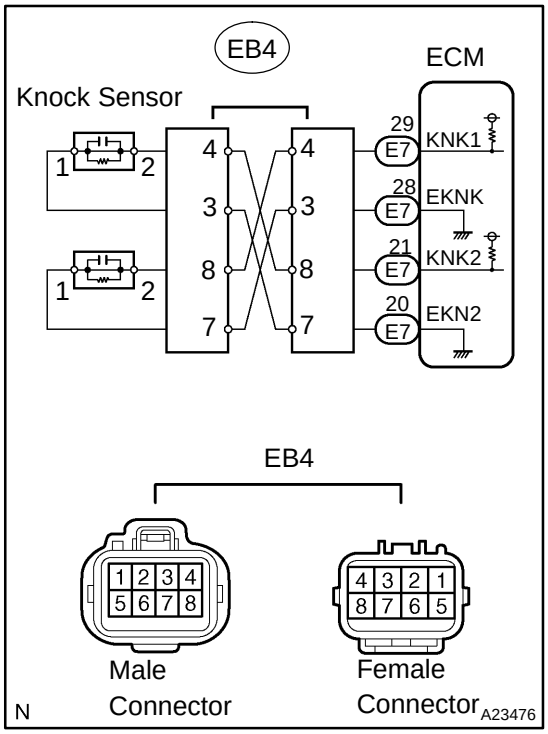
1	**Connect hand–held tester, and check knock sensor circuit.**



PREPARATION:

(a) Disconnect the EB4 connector.

(b) Using lead wires, connect the EB4 connectors as follows.

Male Connector – Female Connector
Terminal 4 – Terminal 8
Terminal 3 – Terminal 7
Terminal 8 – Terminal 4
Terminal 7 – Terminal 3

(c) Warm up the engine.

(d) Run the engine at 3,000 rpm for 10 seconds or more.

CHECK:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to ON and turn the hand–held tester ON.

(c) Select the item: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

(d) Read DTCs.

Result :

Display	Proceed to
DTCs same as when vehicle brought in P0325, P0327, P0328 → P0325, P0327, P0328 or P0330, P0332, P0333 → P0330, P0332, P0333	A
DTC different from when vehicle brought in P0325 → P0330 or P0330 → P0325	B
DTCs different from when vehicle brought in P0327, P0328 → P0332, P0333 or P0332, P0333 → P0327, P0328	C

(e) Reconnect the EB4 connector.

B	**Go to step 4.**
C	**Go to step 5.**

A

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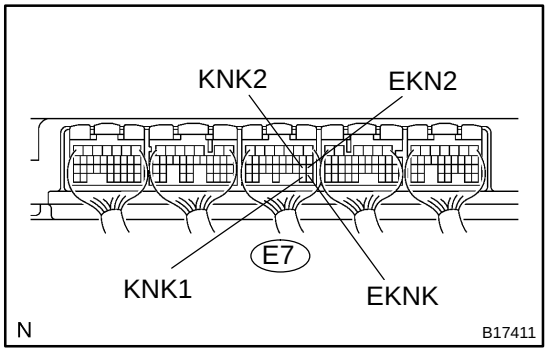
2	**Check for open and short in harness and connector between EB4 connector and ECM (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

3	**Measure voltage between terminals KNK1 and EKNK, KNK2 and EKN2 of ECM.**



PREPARATION:

(a) Disconnect the E7 ECM connector.

(b) Turn the ignition switch to ON.

CHECK:

(a) Measure the voltage between the specified ECM terminals.

OK:

Standard:

Tester Connection	Specified Condition
KNK1 (E7–29) – EKNK (E7–28)	4.5 to 5.5 V
KNK2 (E7–21) – EKN2 (E7–20)	4.5 to 5.5 V

(b) Reconnect the ECM connector.

NG → **Replace ECM (See page SF–80).**

OK

Check for intermittent problems (See page DI–11).

4	**Check knock sensor installation.**

CHECK:

Check the knock sensor installation.

OK:

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

NG → **Tighten the sensor.**

OK

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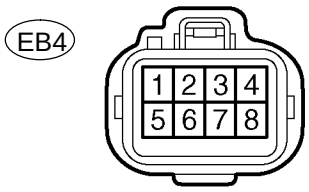
Replace knock sensor (See page SF–66).

5	Check knock sensor.

Wire Harness Side:
Male Connector



PREPARATION:

(a) Disconnect the EB4 connector.

CHECK:

(a) Check the resistance between the terminals of the EB4 male connector.

OK:

Standard:

Tester Connection	Specified Condition
EB4 male connector 3 –4	120 to 280 kΩ
EB4 male connector 7 – 8	120 to 280 kΩ

(b) Reconnect the EB4 connector.

OK → **Check for intermittent problems (See page DI–11).**

NG

6	Check for open and short in harness and connector between EB4 connector and knock sensor (See page IN–35).

HINT:

- If DTC P0327 or P0328 has changed to P0332 or P0333, check the knock sensor circuit on the right bank side.
- If DTC P0332 or P0333 has changed to P0327 or P0328, check the knock sensor circuit on the left bank side.

NG → **Repair or replace harness or connector.**

OK

Replace knock sensor.

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DID86–01

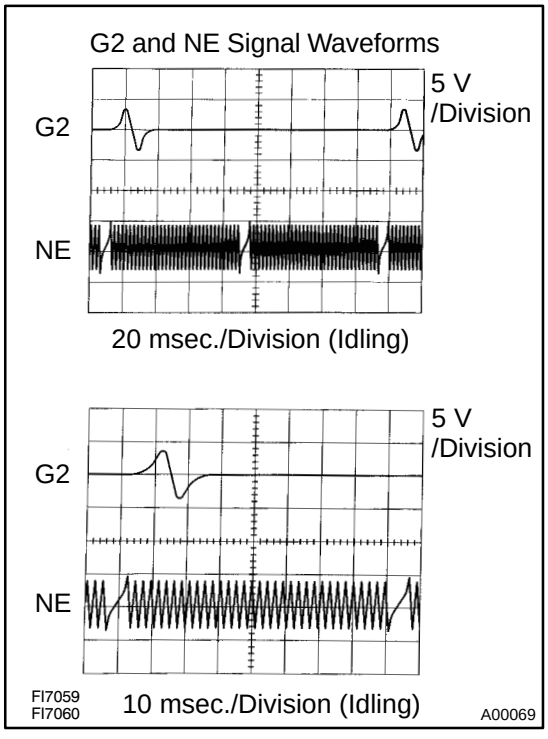
DTC	P0335	Crankshaft Position Sensor ”A” Circuit

DTC	P0339	Crankshaft Position Sensor ”A” Circuit Intermittent

CIRCUIT DESCRIPTION

The crankshaft position sensor system consists of a crankshaft position sensor plate and a pick–up coil. The sensor plate has 32 teeth and is installed on the crankshaft. The pick–up coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pick–up coil, a pulse signal is created. The pick–up coil generates 32 signals for each engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

DTC No.	DTC Detecting Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic) No crankshaft position sensor signal to ECM with engine speed 450 rpm or more (1 trip detection logic)	▶Open or short in crankshaft position sensor circuit ▶Crankshaft position sensor ▶Signal plate ▶ECM
P0339	In condition (a), (b) and (c), when no crankshaft position sensor (NE) signal is input for 0.05 sec. or more. : (1 trip detection logic) (c) Engine revolution 1,000 rpm or more (d) STA signal is OFF (e) 3 sec. or more has lapsed after STA signal is switched from ON to OFF.	▶Open or short in crankshaft position sensor circuit ▶Crankshaft position sensor ▶Signal plate ▶ECM



Reference: Inspection using the oscilloscope.

The correct waveform is as shown in the illustration.

Tester Connection	Specified Condition
VV1+ (E6–25) – VV1– (E6–24)	Correct waveform is as shown
VV2+ (E6–18) – VV2– (E6–28)	
NE+ (E6–21) – NE– (E6–20)	

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MONITOR DESCRIPTION

If there are no signals from the crankshaft sensor even though the engine is revolving, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0335	Crankshaft position sensor range check or rationality
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Engine speed sensor
Frequency of operation	Continuous	
Duration	Case 1: 0.016 sec. Case 2: 3 times	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Case 1:		
Engine speed	450 rpm	–
Starter	OFF	
Time after starter ON to OFF	3 sec.	–
Case 2:		
Time after starter ON to OFF	0.3 sec.	–
Number of camshaft position sensor signal pulse	3	–
Battery voltage	7 V	–
Ignition switch	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1:	
Engine speed signal	No signal for 0.016 sec.
Case 2:	
Number of crankshaft position sensor signal pulse	44 or less, or 58 or more

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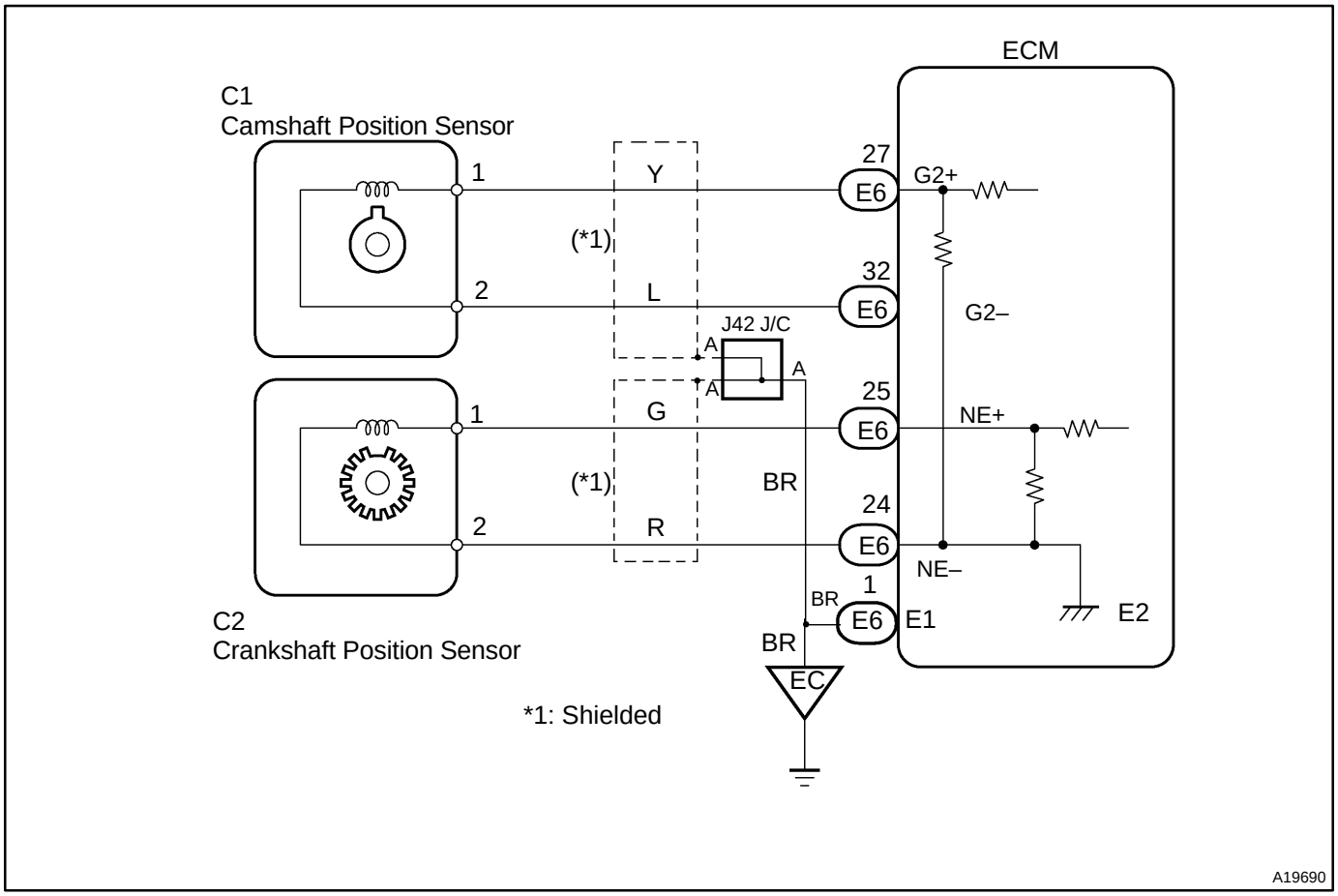
WIRING DIAGRAM



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INSPECTION PROCEDURE

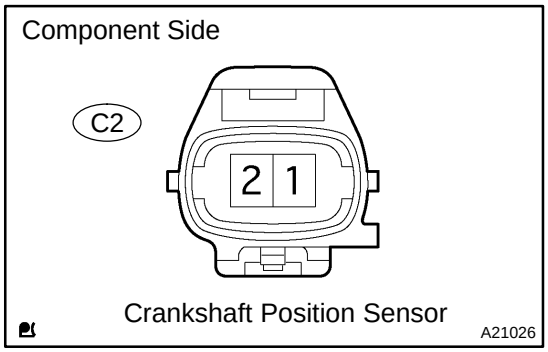
HINT:

- ▶ Read freeze frame data using the hand–held tester. Freeze frame records the engine conditions when a malfunction is detected. When troubleshooting it is useful for determining whether the vehicle was running or stopped. the engine was warmed up or not, the air–fuel ratio lean or rich, etc. at the time of the malfunction.
- ▶ READ VALUE ON HAND–HELD TESTER

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and push the hand–held tester tool main switch ON.
(c) When using hand–held tester, enter the following menu: ”DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ENGINE SPD”.

- ▶ The engine speed can be confirmed in DATA LIST using the hand–held tester. If there are no NE signals from the crankshaft position sensor despite the engine revolving, the engine speed will be indicated as zero. If voltage output of the crankshaft position sensor is insufficient, the engine speed will be indicated as lower RPM (than the actual RPM).

1	**Check resistance of crankshaft position sensor.**



PREPARATION:

Disconnect the C2 crankshaft position sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

Standard:

Tester Connection	Specified Condition
1 – 2	985 to 1,600 Ω at cold
1 – 2	1,265 to 1,890 Ω at hot

NOTICE:

” Cold” and ”Hot” shown above mean the temperature of the coils themselves. ”Cold” is form –10˚C (14˚F) to 50˚C (122˚F) and ”Hot” is from 50˚C (122˚F) to 100˚C (212˚F).

NG → **Replace crankshaft position sensor.**

OK

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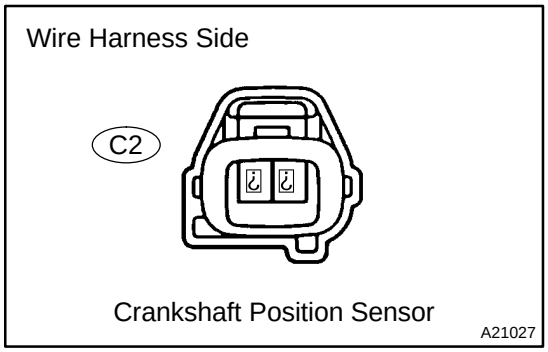
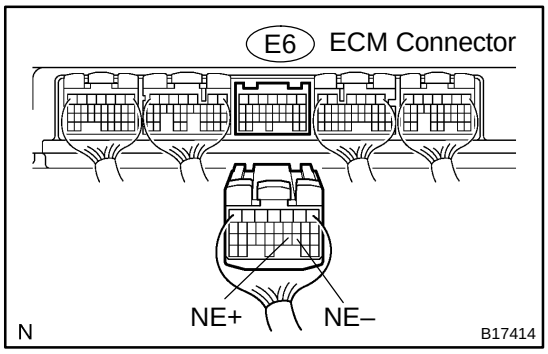
2	Check for open and short in harness and connector between ECM and crankshaft position sensor.





PREPARATION:

(a) Disconnect the C2 crankshaft position sensor connector.

(b) Disconnect the E6 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

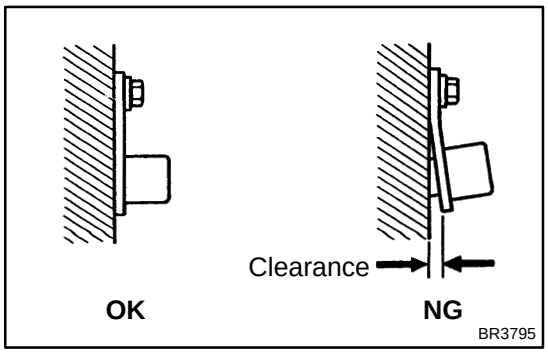
Standard:

Tester Connection	Specified Condition
Crankshaft position sensor (C2–1) – NE+ (E6–21)	Below 1 Ω
Crankshaft position sensor (C2–2) – NE– (E6–20)	Below 1 Ω
Crankshaft position sensor (C2–1) or NE+ (E6–21) – Body ground	10 kΩ or higher
Crankshaft position sensor (C2–2) or NE– (E6–20) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

3	Check sensor installation (crankshaft position sensor).



CHECK:

Check the crankshaft position sensor installation.

OK:

The crankshaft position sensor is installed properly.

NG → **Tighten sensor installation bolt.**

OK

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4	**Inspect teeth of sensor plate.**

PREPARATION:

Remove the crankshaft angle sensor plate (See page EM–99).

CHECK:

Check the teeth of sensor plate.

NG → **Replace sensor plate.**

OK

Replace ECM (See page SF–80).

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DTC	P0340	Camshaft Position Sensor ”A” Circuit (Bank 1 or Single Sensor)

DTC	P0341	Camshaft Position Sensor ”A” Circuit Range/Performance (Bank 1 or Single Sensor)

DTC	P0345	Camshaft Position Sensor ”A” Circuit (Bank 2)

DTC	P0346	Camshaft Position Sensor ”A” Circuit Range/Performance (Bank 2)

CIRCUIT DESCRIPTION

The camshaft position sensor consists of a magnet, an iron core and a pick–up coil. This sensor monitors a timing rotor located on the camshaft and is used by the ECM to detect the camshaft angle. The camshaft rotation synchronizes with the crankshaft rotation, and this sensor communicates the rotation of the camshaft timing rotor as a pulse signal to the ECM. Based on the signal, the ECM controls fuel injection time and ignition timing.

If there is no signal from the camshaft position sensor even though the engine is turning or the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction in the sensor and sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0340 P0345	No camshaft position sensor signal to ECM during cranking (2 trip detection logic)	▶Open or short in camshaft position sensor circuit ▶VVT sensor ▶Camshaft ▶Jumping teeth of timing belt ▶ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)	
P0341 P0346	While crankshaft rotates twice, camshaft position sensor signal will be input to ECM 12 times or more (1 trip detection logic) ▶Hint: Under normal condition, the camshaft position signal is input into the ECM 3 times per 2 engine revolutions	

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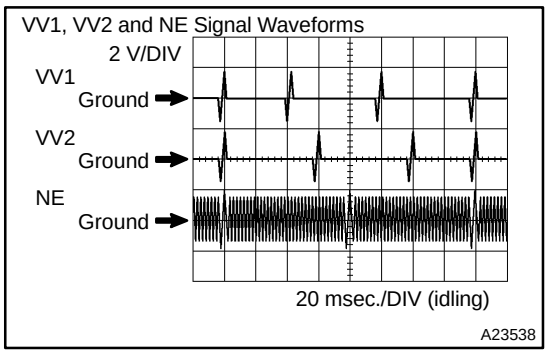

Reference: Inspection using the oscilloscope.
The correct waveform is as shown.

Tester Connection	Specified Condition
G2+ (E5–27) – G2– (E5–32)	Correct waveform is as shown
NE+ (E5–25) – NE– (E5–24)	

MONITOR DESCRIPTION

If there are no signals from the camshaft position sensor even though the engine is turning, or if the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0340	VVT sensor (Bank 1) range check or rationality
	P0341	VVT sensor (Bank 1) range check or rationality
	P0345	VVT sensor (Bank 2) range check or rationality
	P0346	VVT sensor (Bank 2) range check or rationality
Required sensors/components	Main sensors/components	VVT sensor
	Related sensors/components	Crankshaft position sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	P0340, P0345 case 1: 2 driving cycles P0340, P0345 case 2, P0341, P0346: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P0340, P0345 Case 1:		
Starter	ON	
Minimum battery voltage while starter ON	–	11 V
P0340, P0345 Case 2:		
Engine RPM	600 rpm	–
Starter	OFF	
Battery voltage	8 V	–
Ignition switch	ON	
P0341, P0346:		
Starter	After OFF to ON timing	
Engine revolution	720°CA	

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TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0340, P0345 Case 1:	
VVT sensor signal	No signal
P0340, P0345 Case 2:	
VVT sensor signal	No signal
P0341, P0346:	
VVT sensor count	12 or more / 720°CA (= Engine 2 revolutions)

COMPONENT OPERATING RANGE

Parameter	Standard Value
VVT sensor signal input during every 720°CA	3

WIRING DIAGRAM

Refer to DTC P0335 on page DI–210.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check resistance of camshaft position sensor (See page SF–76).**

NG → **Repair or replace harness or connector.**

OK

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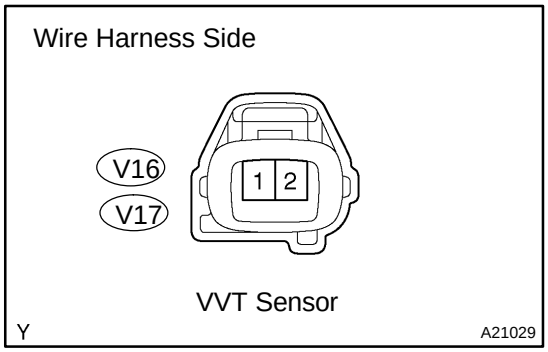
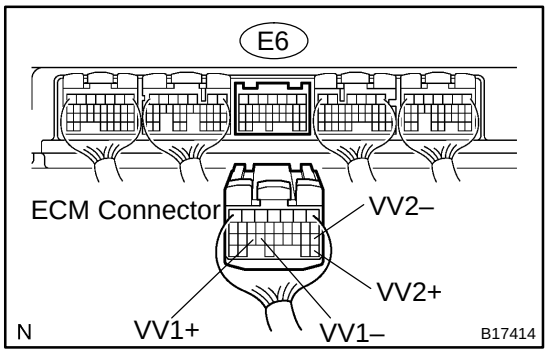
2	Check for open and short in harness and connector between ECM and VVT sensor.





PREPARATION:

(a) Disconnect the VVT sensor connector.

(b) Disconnect the E6 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

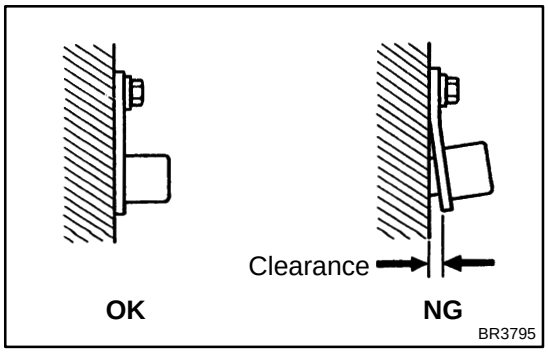
Standard:

Tester Connection	Specified Condition
VVT sensor (V16–1) – VV1+ (E6–25)	Below 1 Ω
VVT sensor (V16–2) – VV1– (E6–24)	Below 1 Ω
VVT sensor (V17–1) – VV2+ (E6–18)	Below 1 Ω
VVT sensor (V17–2) – VV2– (E6–28)	Below 1 Ω
VVT sensor (V16 –1) or VV1+ (E6–25) – Body ground	10 kΩ or higher
VVT sensor (V16–2) or VV1– (E6–24) – Body ground	10 kΩ or higher
VVT sensor (V17 –1) or VV2+ (E6–18) – Body ground	10 kΩ or higher
VVT sensor (V17–2) or VV2– (E6–28) – Body ground	10 kΩ or higher

NG	Repair or replace harness or connector.

OK

3	Check sensor installation (VVT position sensor).



CHECK:

Check the VVT position sensor installation.

OK:

The VVT sensor is installed properly.

NG	Tighten sensor installation bolt.

OK

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4	**Inspect teeth of camshaft.**

PREPARATION:
Remove the cylinder head cover (See page EM–29).
CHECK:
Check the camshaft.

NG → **Replace camshaft.**

OK

Replace Camshaft position sensor (See page IG–7).

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DICF0–02

DTC	P0351	Igniter Coil ”A” Primary/Secondary Circuit

DTC	P0352	Igniter Coil ”B” Primary/Secondary Circuit

DTC	P0353	Igniter Coil ”C” Primary/Secondary Circuit

DTC	P0354	Igniter Coil ”D” Primary/Secondary Circuit

DTC	P0355	Igniter Coil ”E” Primary/Secondary Circuit

DTC	P0356	Igniter Coil ”F” Primary/Secondary Circuit

DTC	P0357	Igniter Coil ”G” Primary/Secondary Circuit

DTC	P0358	Igniter Coil ”H” Primary/Secondary Circuit

HINT:

- These DTCs indicate a malfunction related to primary circuit.
- If DTC P0351 is displayed, check No. 1 ignition coil with igniter circuit.
- If DTC P0352 is displayed, check No. 2 ignition coil with igniter circuit.
- If DTC P0353 is displayed, check No. 3 ignition coil with igniter circuit.
- If DTC P0354 is displayed, check No. 4 ignition coil with igniter circuit.
- If DTC P0355 is displayed, check No. 5 ignition coil with igniter circuit.
- If DTC P0356 is displayed, check No. 6 ignition coil with igniter circuit.
- If DTC P0357 is displayed, check No. 7 ignition coil with igniter circuit.
- If DTC P0358 is displayed, check No. 8 ignition coil with igniter circuit.

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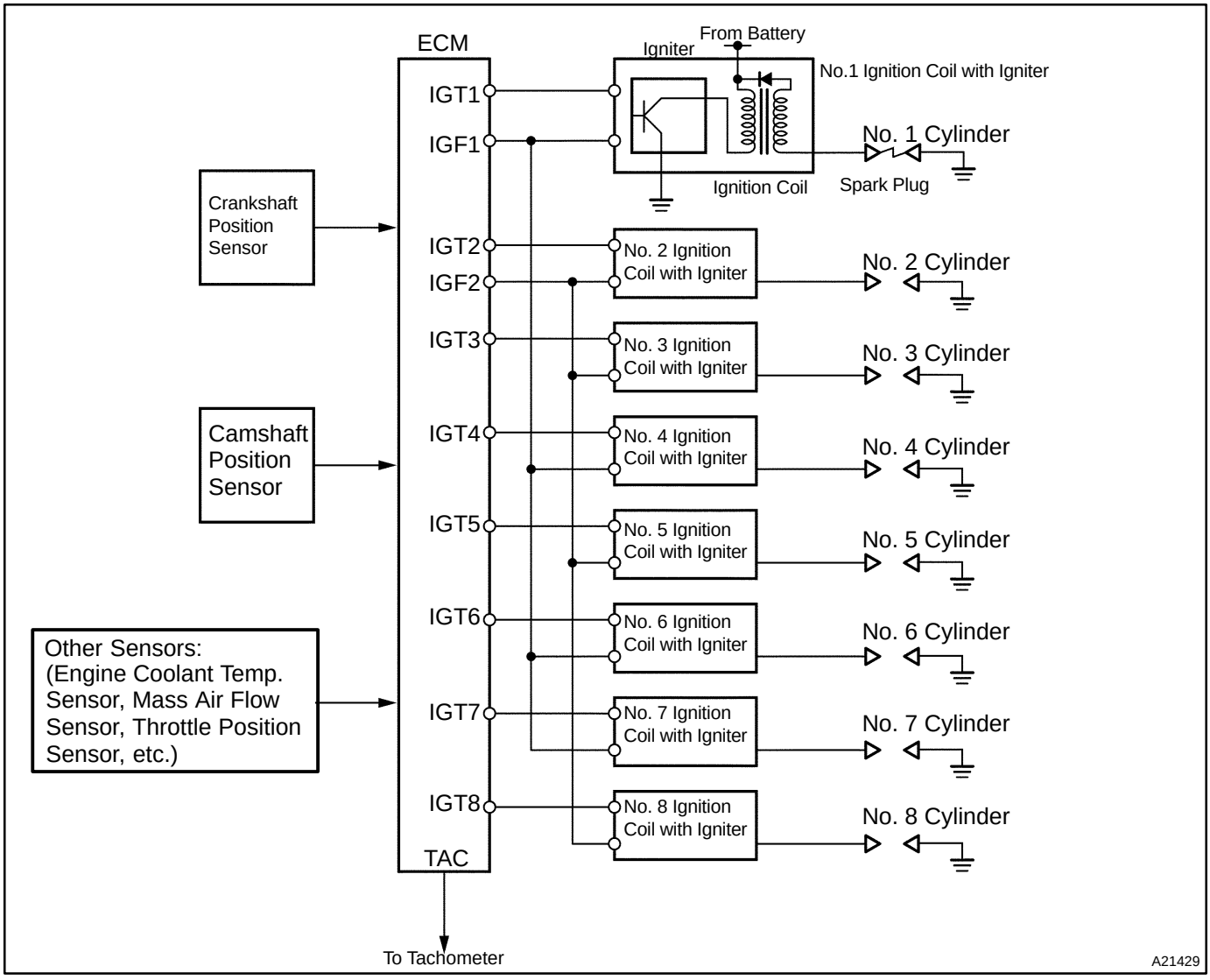
CIRCUIT DESCRIPTION

These DTCs indicate a malfunction related to primary circuit.

The DIS is a 1–cylinder ignition system which ignites one cylinder with one ignition coil. In the 1–cylinder ignition system, the one spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug passes from the center electrode to the ground electrode.

The ECM determines the ignition timing and outputs the ignition signals (IGTs) for each cylinder. Using the IGT, the ECM turns on and off the power transistor inside the igniter and this switches on and off the current to the primary coil. When the current to the primary coil is cut off, high–voltage is generated in the secondary coil and this voltage is applied to the spark plugs to create sparks inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back the ignition confirmation signal (IGF) for each cylinder ignition to the ECM.



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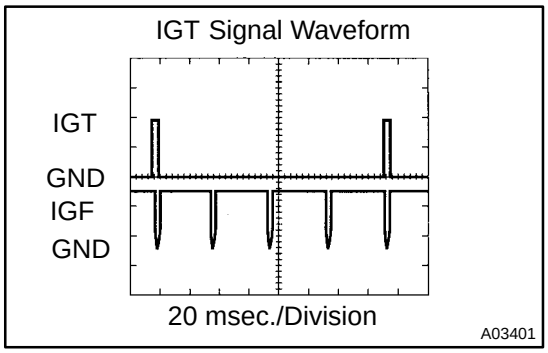
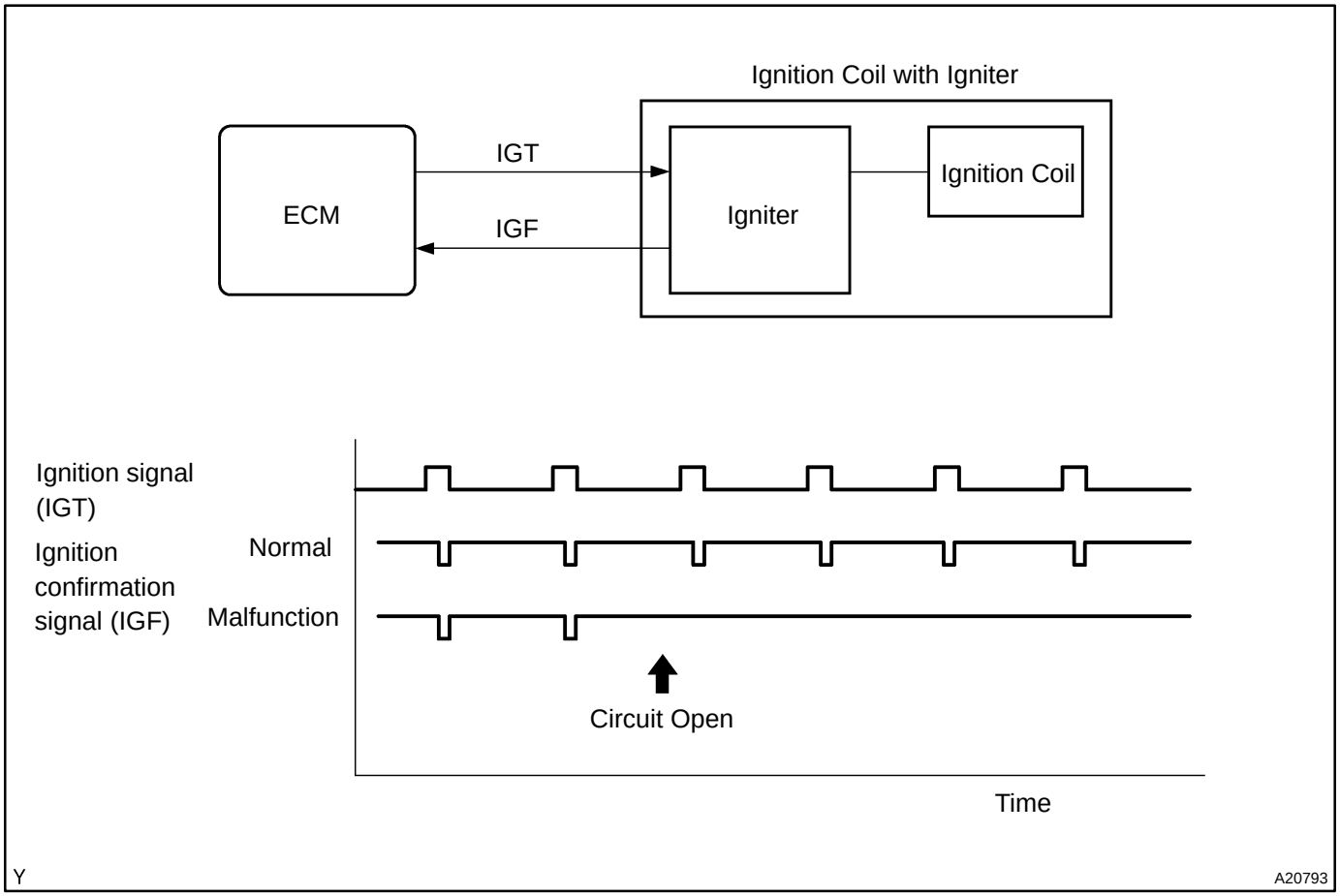
DTC No.	DTC Detecting Condition	Trouble Area
P0351 P0352 P0353 P0354 P0355 P0356 P0357 P0358	No IGF signal to ECM while engine is running	▶Open or short in IGF1 or IGF2 and IGT1 to IGT8 circuit from ignition coil with igniter to ECM ▶No. 1 to No. 8 ignition coil with igniter (primary ignition) ▶Ignition system ▶ECM



Reference: Inspection using the oscilloscope.
During cranking or idling, check the waveform between terminals IG1 to IG8 and E1, and IGF1, IGF2 and E1 of the E6 and E8 ECM connectors.

MONITOR DESCRIPTION



If the ECM does not receive the IGF after sending the IGT it interprets this as a fault in the igniter and sets a DTC.

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MONITOR STRATEGY

Related DTCs	P0351	No. 1 ignition coil with igniter circuit malfunction
	P0352	No. 2 ignition coil with igniter circuit malfunction
	P0353	No. 3 ignition coil with igniter circuit malfunction
	P0354	No. 4 ignition coil with igniter circuit malfunction
	P0355	No. 5 ignition coil with igniter circuit malfunction
	P0356	No. 6 ignition coil with igniter circuit malfunction
	P0357	No. 7 ignition coil with igniter circuit malfunction
	P0358	No. 8 ignition coil with igniter circuit malfunction
Required sensors/components	Igniter	
Frequency of operation	Continuous	
Duration	0.256 sec. + 4 sparks	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Engine speed	–	1,500 rpm
Either of the following conditions is met:	Condition 1 or 2	
1. Following conditions are met:	Condition (a) and (b)	
(a) Engine speed	–	500 rpm
(b) Battery voltage	6 V	–
2. Following conditions are met:	Condition (a) and (b)	
(a) Engine speed	500 rpm	–
(b) Battery voltage	10 V	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
”Ignition signal fail count”	More than 2
”Ignition signal fail count” is on the right:	When IGF does not return despite sending IGT.

COMPONENT OPERATING RANGE

Standard Value
Confirmed signal number = ignition signal number

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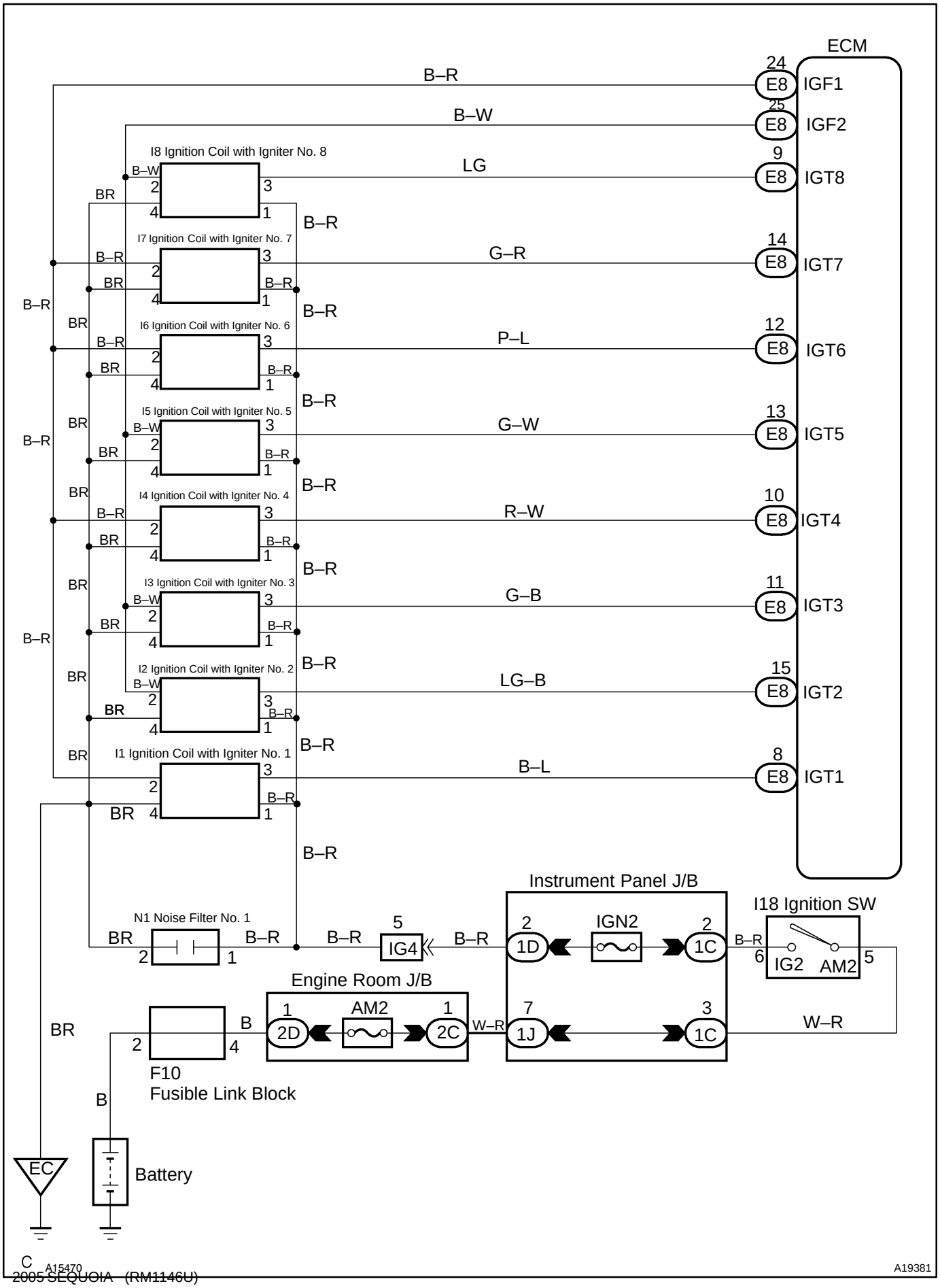
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- If DTCs P0351, P0354, P0356 and P0357 are output simultaneously, IGF1 circuit may be open or short.
- If DTCs P0352, P0353, P0355 and P0358 are output simultaneously, IGF2 circuit may be open or short.
- Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check spark plug and spark (See page IG–1).**

NG → **Go to step 4.**

OK

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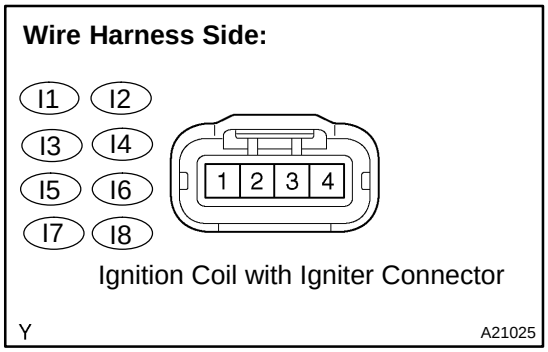
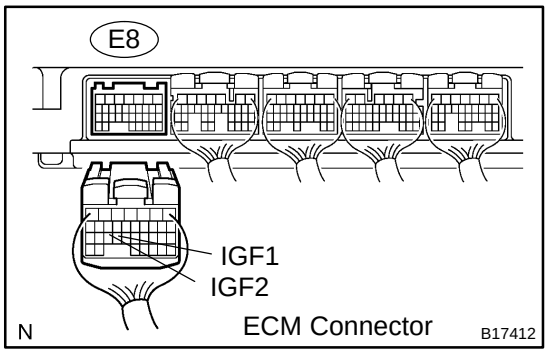
2	**Check for open and short in harness and connector in IGF signal circuits between ECM and ignition coil with igniter.**





PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
Ignition coil (I1–2) – IGF1 (E8–24)	Below 1 Ω
Ignition coil (I2–2) – IGF2 (E8–25)	Below 1 Ω
Ignition coil (I3–2) – IGF1 (E8–24)	Below 1 Ω
Ignition coil (I4–2) – IGF2 (E8–25)	Below 1 Ω
Ignition coil (I5–2) – IGF1 (E8–24)	Below 1 Ω
Ignition coil (I6–2) – IGF2 (E8–25)	Below 1 Ω
Ignition coil (I7–2) – IGF1 (E8–24)	Below 1 Ω
Ignition coil (I8–2) – IGF2 (E8–25)	Below 1 Ω
Ignition coil (I1–2) or IGF1 (E8–24) – Body ground	10 kΩ or higher
Ignition coil (I2–2) or IGF2 (E8–25) – Body ground	10 kΩ or higher
Ignition coil (I3–2) or IGF1 (E8–24) – Body ground	10 kΩ or higher
Ignition coil (I4–2) or IGF2 (E8–25) – Body ground	10 kΩ or higher
Ignition coil (I5–2) or IGF1 (E8–24) – Body ground	10 kΩ or higher
Ignition coil (I6–2) or IGF2 (E8–25) – Body ground	10 kΩ or higher
Ignition coil (I7–2) or IGF1 (E8–24) – Body ground	10 kΩ or higher
Ignition coil (I8–2) or IGF2 (E8–25) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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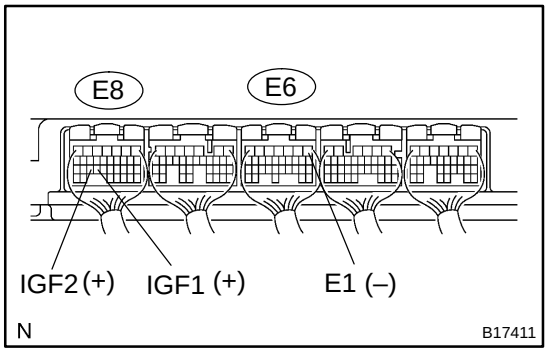
3	Disconnect ignition coil with igniter connector, and check voltage between terminals IGF1, IGF2 and E1 of ECM connector.



PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the E8 and E6 ECM connectors.

OK:

Standard:

Tester Connection	Specified Condition
IGF1 (E8–24) – E1 (E6–1)	4.5 to 5.5 V
IGF2 (E8–25) – E1 (E6–1)	4.5 to 5.5 V

NG → **Replace ECM (See page SF–80).**

OK →

Replace ignition coil with igniter.

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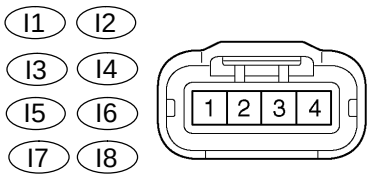
4	**Check for open and short in harness and connector in IGT signal circuit between ECM and ignition coil with igniter.**

Wire Harness Side:



Ignition Coil with Igniter Connector

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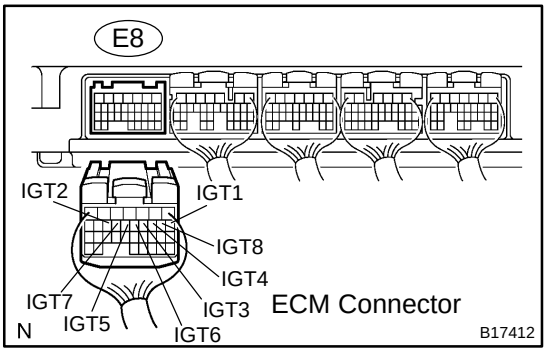

PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition with igniter coil connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
Ignition coil (I1–2) – IGT1 (E8–8)	Below 1 Ω
Ignition coil (I2–2) – IGT2 (E8–15)	Below 1 Ω
Ignition coil (I3–2) – IGT3 (E8–11)	Below 1 Ω
Ignition coil (I4–2) – IGT4 (E8–10)	Below 1 Ω
Ignition coil (I5–2) – IGT5 (E8–13)	Below 1 Ω
Ignition coil (I6–2) – IGT6 (E8–12)	Below 1 Ω
Ignition coil (I7–2) – IGT7 (E8–14)	Below 1 Ω
Ignition coil (I8–2) – IGT8 (E8–9)	Below 1 Ω
Ignition coil (I1–2) or IGT1 (E8–8) – Body ground	10 kΩ or higher
Ignition coil (I2–2) or IGT2 (E8–15) – Body ground	10 kΩ or higher
Ignition coil (I3–2) or IGT3 (E8–11) – Body ground	10 kΩ or higher
Ignition coil (I4–2) or IGT4 (E8–10) – Body ground	10 kΩ or higher
Ignition coil (I5–2) or IGT5 (E8–13) – Body ground	10 kΩ or higher
Ignition coil (I6–2) or IGT6 (E8–12) – Body ground	10 kΩ or higher
Ignition coil (I7–2) or IGT7 (E8–14) – Body ground	10 kΩ or higher
Ignition coil (I8–2) or IGT8 (E8–9) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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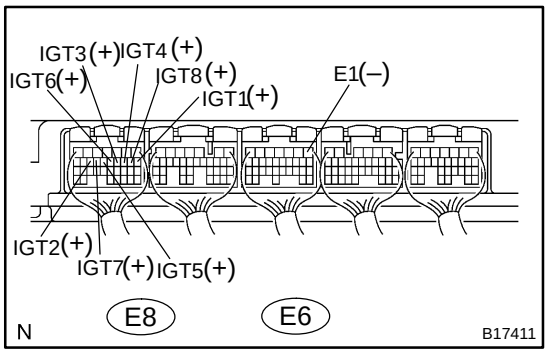
5	Check voltage between terminals IGT1 – IGT8 and E1 of ECM connector.



PREPARATION:

Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminals the E8 and E6 ECM connectors when the engine is cranked.

OK:

Standard:

Tester Connection	Specified Condition
IGT1 (E8–8) – E1 (E6–1)	More than 0.1 V or less than 4.5 V
IGT2 (E8–15) – E1 (E6–1)	More than 0.1 V or less than 4.5 V
IGT3 (E8–11) – E1 (E6–1)	More than 0.1 V or less than 4.5 V
IGT4 (E8–10) – E1 (E6–1)	More than 0.1 V or less than 4.5 V
IGT5 (E8–13) – E1 (E6–1)	More than 0.1 V or less than 4.5 V
IGT6 (E8–12) – E1 (E6–1)	More than 0.1 V or less than 4.5 V
IGT7 (E8–14) – E1 (E6–1)	More than 0.1 V or less than 4.5 V
IGT8 (E8–9) – E1 (E6–1)	More than 0.1 V or less than 4.5 V

NG → **Replace ECM (See page SF–80).**

OK

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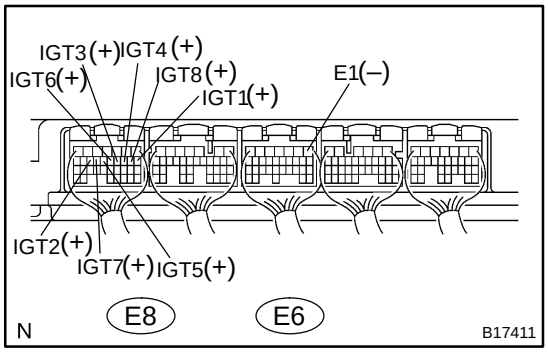
6	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGT1 – IGT8 and E1 of ECM connector.**



PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminals the E6 and E8 ECM connectors when the engine is cranked.

OK:

Standard:

Tester Connection	Specified Condition
IGT1 (E8–8) – E1 (E6–1)	4.5 V or more
IGT2 (E8–15) – E1 (E6–1)	4.5 V or more
IGT3 (E8–11) – E1 (E6–1)	4.5 V or more
IGT4 (E8–10) – E1 (E6–1)	4.5 V or more
IGT5 (E8–13) – E1 (E6–1)	4.5 V or more
IGT6 (E8–12) – E1 (E6–1)	4.5 V or more
IGT7 (E8–14) – E1 (E6–1)	4.5 V or more
IGT8 (E8–9) – E1 (E6–1)	4.5 V or more

NG → **Replace ECM (See page SF–80).**

OK →

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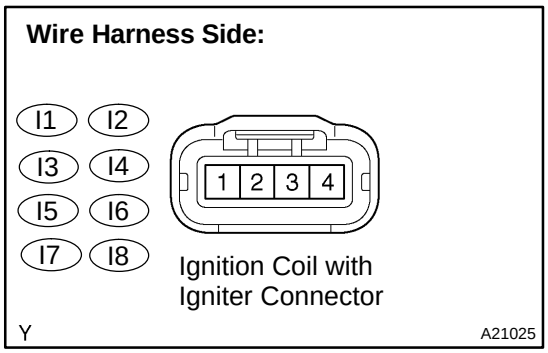
7	Check ignition coil with igniter power source circuit.



PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Turn the ignition switch to ON.

CHECK:

Measure the voltage between the terminal of the wire harness side connector and body ground.

OK:

Standard:

Tester Connection	Specified Condition
I1–1 – Body ground	9 to 14 V
I2–1 – Body ground	
I3–1 – Body ground	
I4–1 – Body ground	
I5–1 – Body ground	
I6–1 – Body ground	
I7–1 – Body ground	
I8–1 – Body ground	

OK → **Repair ignition coil with igniter.**

NG

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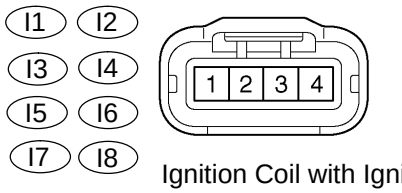
8	**Check for open and short in harness and connector between ignition switch and ignition coil with igniter.**

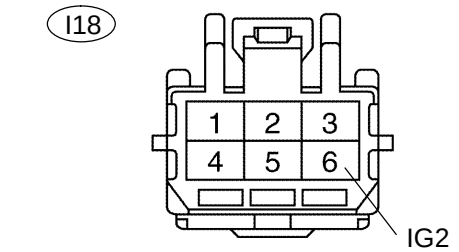
Wire Harness Side:



Ignition Coil with Igniter

Y A21025

Wire Harness Side:



Ignition Switch

C A21378

PREPARATION:

(a) Disconnect the I1, 2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Disconnect the I18 ignition switch connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
Ignition coil (I1–1) – IG2 (I18–6)	Below 1 Ω
Ignition coil (I2–1) – IG2 (I18–6)	Below 1 Ω
Ignition coil (I3–1) – IG2 (I18–6)	Below 1 Ω
Ignition coil (I4–1) – IG2 (I18–6)	Below 1 Ω
Ignition coil (I5–1) – IG2 (I18–6)	Below 1 Ω
Ignition coil (I6–1) – IG2 (I18–6)	Below 1 Ω
Ignition coil (I7–1) – IG2 (I18–6)	Below 1 Ω
Ignition coil (I8–1) – IG2 (I18–6)	Below 1 Ω
Ignition coil (I1–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Ignition coil (I2–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Ignition coil (I3–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Ignition coil (I4–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Ignition coil (I5–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Ignition coil (I6–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Ignition coil (I7–1) or IG2 (I18–6) – Body ground	10 kΩ or higher
Ignition coil (I8–1) or IG2 (I18–6) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Replace ignition coil with igniter.

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DIDMV–01

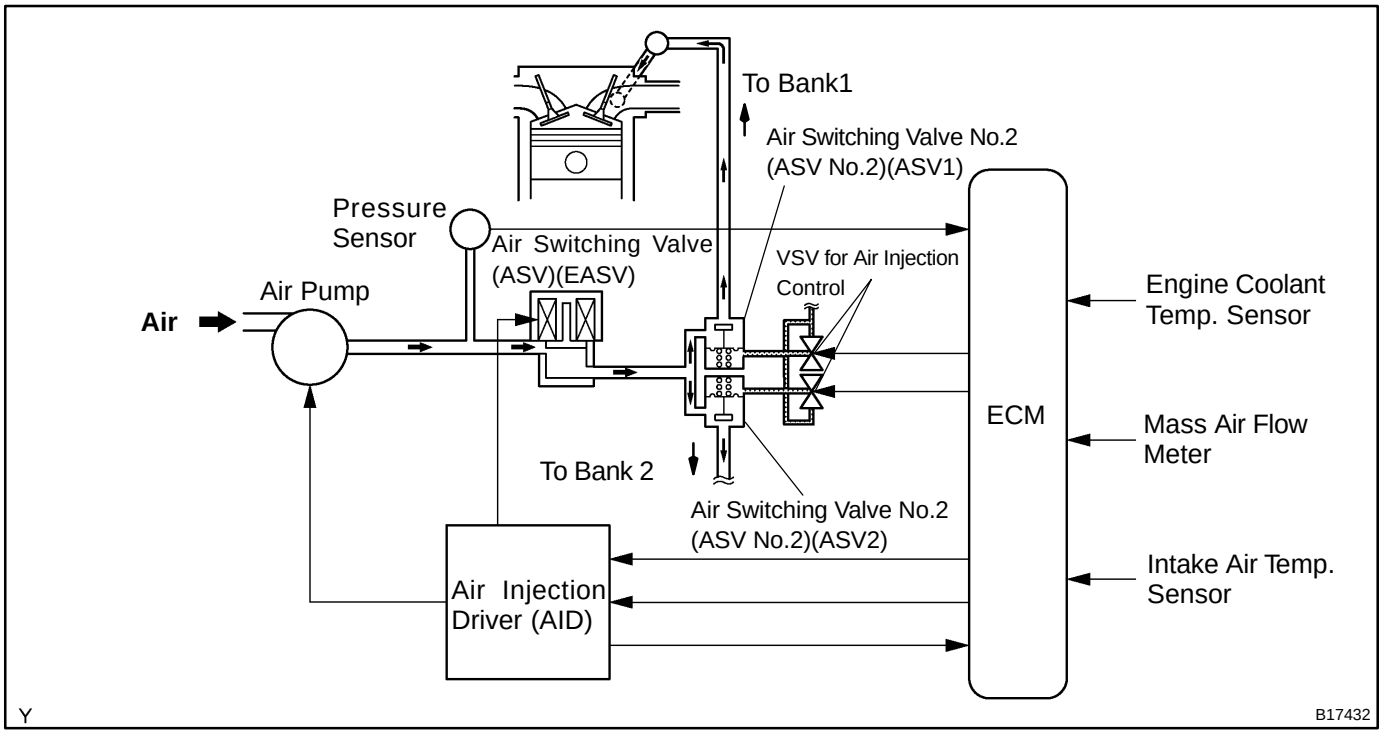
DTC	P0412	Secondary Air Injection System Air Switching Valve ”A” Circuit

CIRCUIT DESCRIPTION

The secondary air injection system pumps air to the exhaust port to accelerate the activation of the catalyst. The secondary air injection system consists of the ECM, air pump, Air Switching Valve (ASV) (EASV), Air Switching Valve No.2 (ASV No.2) (ASV1, 2), pressure sensor and air injection driver (AID). The Air Switching Valve (ASV)(EASV) is an electromagnetic type and Air Switching Valve No.2 (ASV No.2)(ASV1,2) is a vacuum type.

The secondary air injection system pumps pressurized air to the exhaust port by the air pump through the ASV and ASV No.2. The ASV assists the ASV No.2. The ASV No.2 also controls air supply.

The ECM sends signals to the AID, and then the AID operates the air pump and ASV. The pressure sensor detects pressure and exhaust pulsation in the system when the system operates and when it does not operate, and sends the data to the ECM.



DTC No.	DTC Detection Condition	Trouble Area
P0412	All of the following conditions are met when engine is idling just after cold start (1 trip detection logic): (a) Air injection system does not operate (Air pump OFF and all ASVs OFF) (b) Air injection driver diagnostic signal duty is 40%.	▶Open in air switching valve drive circuit ▶Short between air switching valve circuit and +B circuit ▶Air injection driver ▶Air switching valve ▶ECM
P0412	All of the following conditions are met when engine is idling just after cold start (1 trip detection logic): (a) Air injection system operates (Air pump ON and all ASVs ON) (b) Air injection driver diagnostic signal duty is 40%.	▶Short between air switching valve circuit and body ground ▶Air injection driver ▶Air switching valve ▶ECM

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MONITOR DESCRIPTION

The air injection driver (AID) detects an open or short in the circuit according to the voltage of the air pump terminal (VP) and electromagnetic air switching valve terminal (VV), and sends a signal as diagnostic information to the ECM.

The AID outputs the air switching valve terminal malfunction signal to the ECM if: 1) VV terminal voltage is low despite the AID receiving the command signal from the ECM to drive the air switching valve terminal or 2) VV terminal voltage is high despite the AID not receiving the command signal from the ECM.

The ECM stores the DTC based on the diagnostic signal from the AID and illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0412	Air switching valve circuit malfunction (Secondary air injection system)
Required sensors/components	Air injection driver, Air switching valve	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Case 1:		
Air pump	Operating	
Air switching valve	Operating	
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	
Case 2:		
Air pump	Not operating	
Air switching valve	Not operating	
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1, 2:	
Diagnostic signal duty ratio from air injection driver	31 to 48 %

COMPONENT OPERATING RANGE

Parameter	Standard Value
Diagnostic signal duty ratio from air injection driver	70 to 90% when secondary air injection system operating and 0% when secondary air injection system not operating

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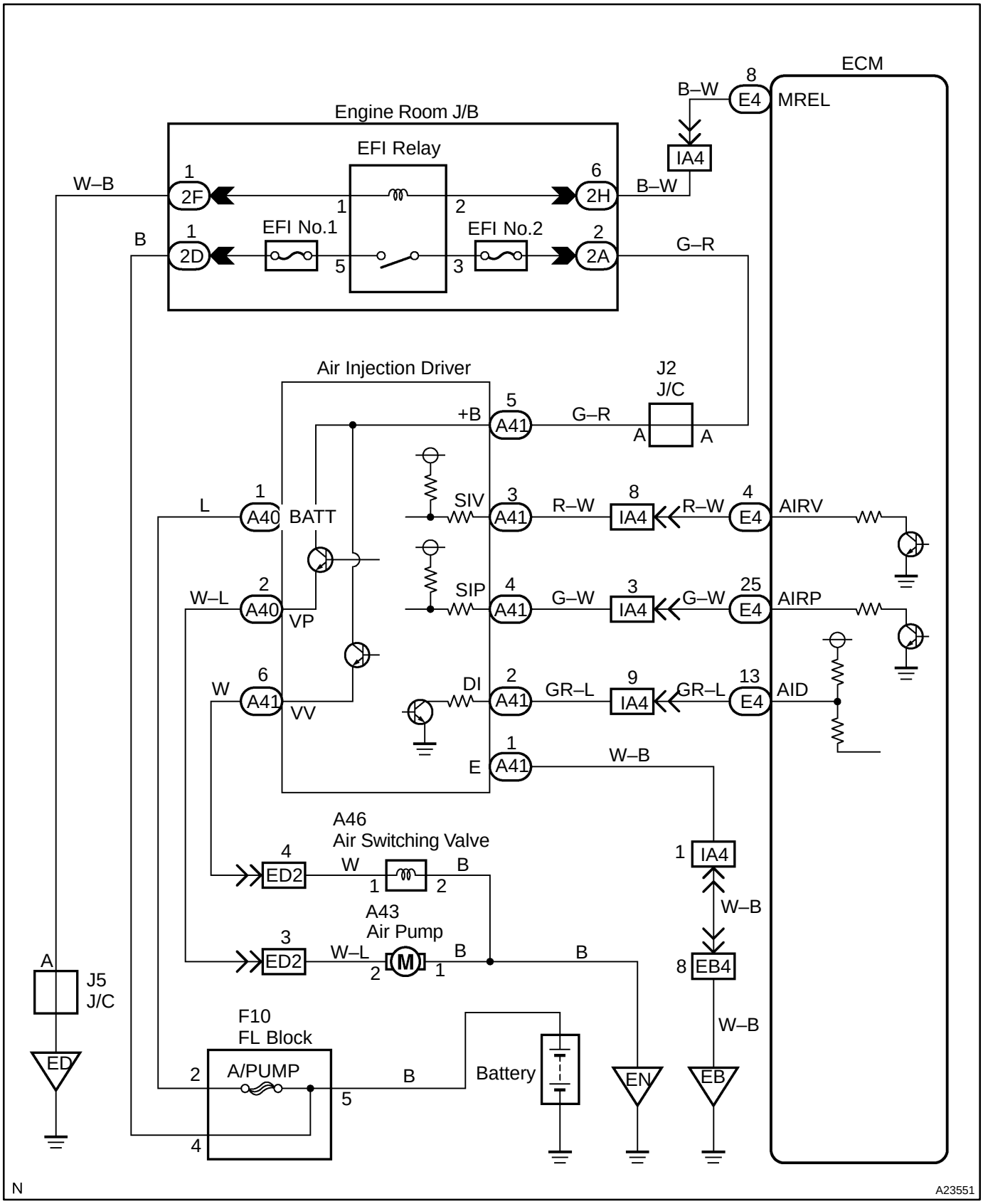
WIRING DIAGRAM



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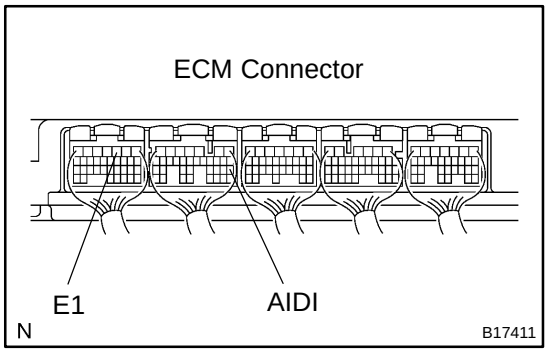
INSPECTION PROCEDURE

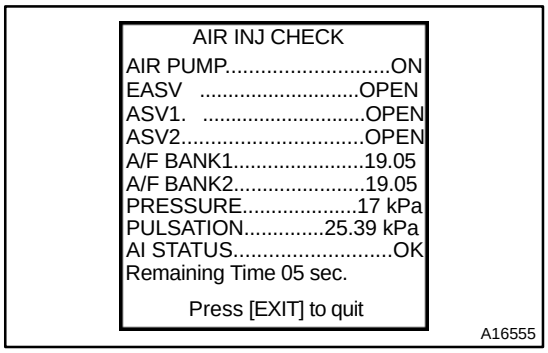
HINT:

The diagnostic information output from the AID can be confirmed by connecting an oscilloscope to the diagnostic information terminal of the AID. It narrows the trouble area to read the waveform on the oscilloscope when performing the AI system intrusive operation function provided in the SYSTEM CHECK.

(1) Start the engine and warm it up.
(2) Turn the ignition switch to OFF.
(3) Connect a hand–held tester to the DLC3.



(4) Connect an oscilloscope probe to the AIDI terminal of the ECM.
(5) Start the engine and turn the tester ON.

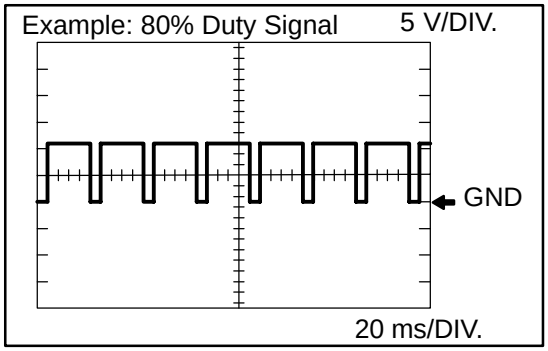


(6) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ CHECK / MANUAL OPERATION / OPERATION 1 and 2.

HINT:

OPERATION 1: AP: OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

OPERATION 2: AP: ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN



(7) Monitor the voltage output of the AID (duty ratio signal).

Oscilloscope range:

Items	Contents
Terminals	CH1: AIDI – E1
Equipment Settings	5 V/Division, 20 to 40 ms/Division
Conditions	Idling

NOTICE:

- **This AIR INJECTION CHECK only allows technicians to operate the AI system for 5 seconds. Furthermore, the check can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between checks.**
  While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again.
- **Performing the AIR INJ CHECK over and over again may cause the damage in the secondary air injection system. If necessary, put an interval of several minutes between tests to prevent overheating the system.**

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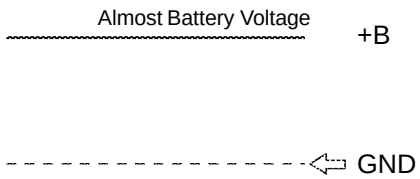
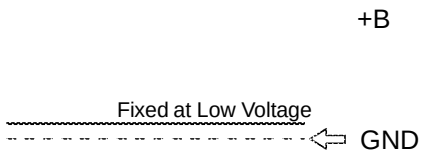
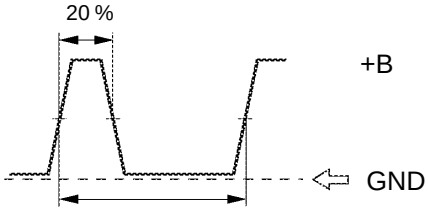
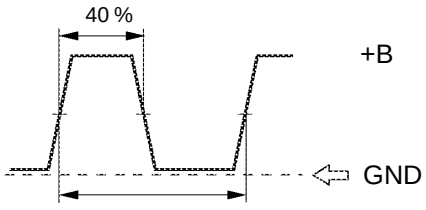
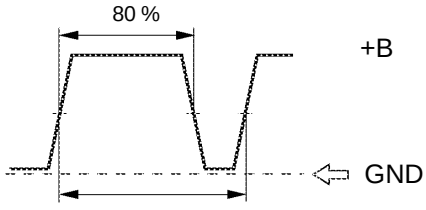
AID Diagnostic Signal Waveforms	ECM Commands	DTCs (ECM Output)	Suspected Trouble Areas
100 % Duty ratio 	Any Air Injection (AI) System operation	**P1613**	• Open in diagnostic signal circuit • Air Injection Control Driver (AID) • Open in AID+B circuit (AID power source) • Short between +B circuit and diagnostic signal circuit
0 % Duty ratio 	AI System: ON (Air pump ON, ASV ON)	**P1613**	• Open or short in air pump or Air Switching Valve (ASV) command signal circuit (ECM–AID) • Open in AID ground circuit • Short between diagnostic signal circuit and body ground • AID • ECM
	AI System: OFF (Air pump OFF, ASV OFF)	–	Normal
20 % Duty ratio 	Air Pump: ON	**P0418**	Short between air pump drive circuit and body ground • Harness & connector (AID–Pump) • Air Pump • AID • ECM
	Air Pump: OFF	**P0418**	Open in air pump drive circuit (AID–Pump) , or short between air pump drive circuit and +B • Harness & connector (AID–Pump) • Air Pump • AID • ECM
40 % Duty ratio 	ASV: ON	**P0412**	Short between ASV drive circuit and body ground • Harness & connector (AID–ASV) • ASV • AID • ECM
	ASV: OFF	**P0412**	Open in ASV drive circuit (AID–ASV), or short between ASV drive circuit and +B • Harness & connector (AID–ASV) • AID • ASV • ECM
80 % Duty ratio 	AI System: OFF (Air pump OFF, ASV OFF)	**P1613**	• AID • ECM
	AI System: ON (Air pump ON, ASV ON)	—	Normal
Excluding above (excluding 0, 20, 40, 80, 100 % duty)	—	**P1613**	• AID • Open in AID ground circuit

A23464

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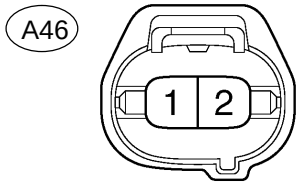
HINT:

- Using the AIR INJ CHECK operation of the SYSTEM CHECK provided in the hand–held tester function, conditions for air–fuel ratio and pressure in the secondary air injection system passage can be checked while the secondary air injection system operating. It helps technicians to troubleshoot the system when it malfunctioning.
- Read freeze frame data using a hand–held tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**Check voltage between terminal 1 of air switching valve connector and body ground.**

Wire Harness Side:



Air Switching Valve Connector

N B17440

PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A46 air switching valve connector.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.

CHECK:

(a) When the air switching valve is operated using the hand–held tester, measure voltage between terminal A46–1 of the air switching valve connector and body ground.
(b) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/ AIR INJ CHECK/ MANUAL OPERATION/OPERATION 1 and 4

HINT:

OPERATION 1: AP:OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

OPERATION 4: AP:OFF, EASV:OPEN, ASV1:CLOSE, ASV2:CLOSE

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Standard:

Tester operation	Tester Connection	Specified Condition
Operation 4	A46–1 – Body ground	10 V or more
Operation 1	A46–1 – Body ground	Below 1.0 V

NG	**Go to step 4.**

OK

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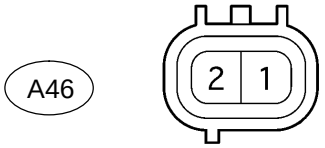
2	Check air switching valve.

Component Side:

ASV Connector



Front View

A23465

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the ASV connector.
(c) Measure the resistance of the ASV.

Standard:

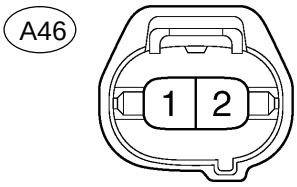
Tester Connections	Specified Conditions
A46–1 – A46–2	4.5 to 5.5 Ω

NG → **Replace air switching valve.**

OK

3	Check for open in harness and connector between air switching valve and body ground.

Wire Harness Side:



Air Switching Valve Connector

N B17440

PREPARATION:
(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A46 air switching valve connector.

CHECK:
Measure the resistance between the wire harness side connectors and body ground.

OK:

Standard:

Tester Connection	Specified Condition
A46–2 – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI–11).

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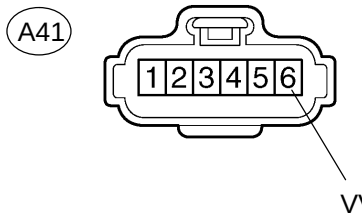
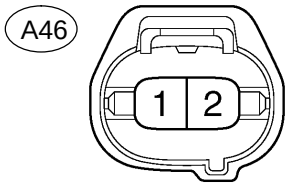
4	**Check for open and short in harness and connector between air injection driver and air switching valve.**

Wire Harness Side:

Air Injection Driver Connector



Wire Harness Side:



Air Switching Valve Connector

PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A41 air injection driver connector.
(c) Disconnect the A46 air switching valve connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VV (A41–6) – A46–1	Below 1 Ω
VV (A41–6) or A46–1 – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace air injection driver.

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DIDMW–01

DTC	P0418	Air Injection System Air Pump Malfunction

CIRCUIT DESCRIPTION

Refer to DTC P0412 on page DI–234.

DTC No.	DTC Detection Condition	Trouble Area
P0418	All of the following conditions are met, when idling just after cold start. (1 trip detection logic): (a) Air injection system not operate (b) Air injection driver outputs air pump malfunction signal (20% duty signal)	▶Open in air pump drive circuit ▶Short between air pump circuit and +B circuit ▶Air injection driver ▶ECM
P0418	All of the following conditions are met, when idling just after cold start. (1 trip detection logic): (a) Air injection system operates (b) Air injection driver outputs air pump malfunction signal (20% duty signal)	▶Short between air pump circuit and body ground ▶Air injection driver ▶ECM

MONITOR DESCRIPTION

Air Injection Driver (AID) detects an open or short in the air pump and Air Switching Valve (ASV) circuit according to the terminal voltage and sends a signal as diagnostic information to the ECM.
When the air injection system operation is required while the engine is warming up, the ECM transmits command signals to the AID to drive the air pump and ASV.
The AID inputs the command signal from ECM if: 1) VP terminal voltage is low despite the AID inputting the command signal from the ECM to drive the ASV or 2) VP terminal voltage is high despite the AID not inputting the command signal from the ECM.
The ECM sets the DTC based on the diagnostic information from the AID.

MONITOR STRATEGY

Related DTCs	P0418	Air pump range check
Required sensors/components	Air injection driver, Air pump	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Case 1:		
Air pump	Operating	
Air switching valve	Operating	
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	
Case 2:		
Air pump	Not operating	
Air switching valve	Not operating	
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1, 2:	
Diagnostic signal duty ratio from air injection driver	11 to 29 %

COMPONENT OPERATING RANGE

Parameter	Standard Value
Diagnostic signal duty ratio from air injection driver	70 to 90% when secondary air injection system operating and 0% when secondary air injection system not operating

WIRING DIAGRAM

Refer to DTC P0412 on page DI–234.

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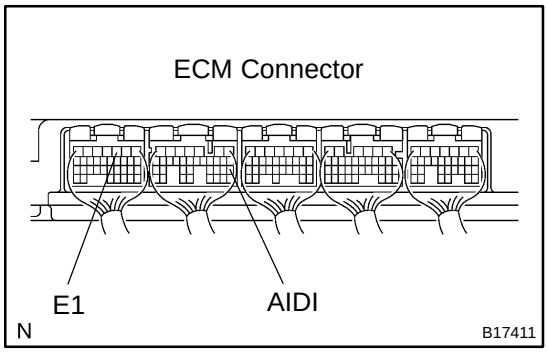
INSPECTION PROCEDURE

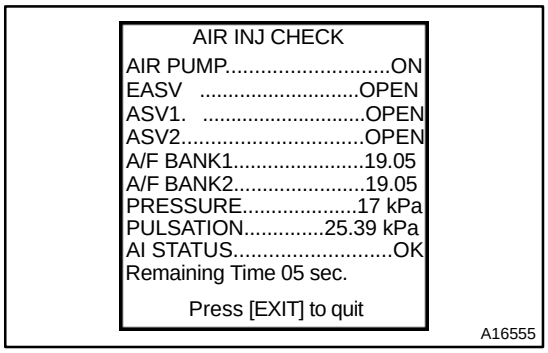
HINT:

The diagnostic information output from the AID can be confirmed by connecting an oscilloscope to the diagnostic information terminal of the AID. It narrows the trouble area search to read the waveform on the oscilloscope when performing the AI system intrusive operation function provided in the SYSTEM CHECK.

(1) Start the engine and warm it up.
(2) Turn the ignition switch to OFF.
(3) Connect a hand–held tester to the DLC3.



(4) Connect an oscilloscope probe to the AIDI terminal of the ECM.
(5) Start the engine and turn the tester ON.
(6) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ SYSTEM.

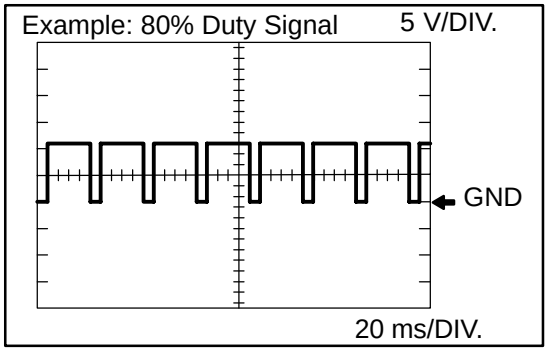


(7) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ CHECK / MANUAL OPERATION / OPERATION 1 and 2.

HINT:

OPERATION 1: AP: OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

OPERATION 2: AP: ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN



(8) Monitor the voltage output of the AID (duty ratio signal).

Oscilloscope range:

Items	Contents
Terminals	CH1: AIDI – E1
Equipment Settings	5 V/Division, 20 to 40 ms/Division
Conditions	Idling

NOTICE:

- **This AIR INJECTION CHECK only allows technicians to operate the AI system for 5 seconds. Furthermore, the check can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between checks.**
  While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (AI STATUS NG) or ERROR. At this time stop the engine for 10 minutes and then try again.
- **Performing the AIR INJ CHECK over and over again may cause the damage in the secondary air injection system. If necessary, put an interval of several minutes between tests to prevent overheating the system.**

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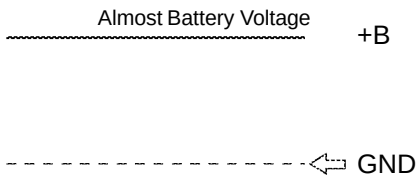
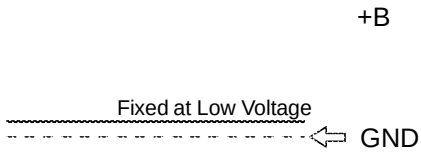
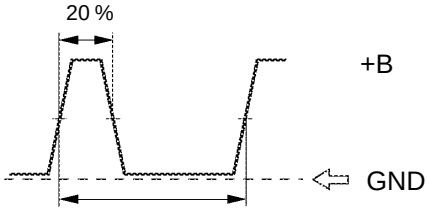
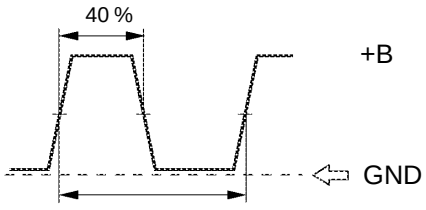
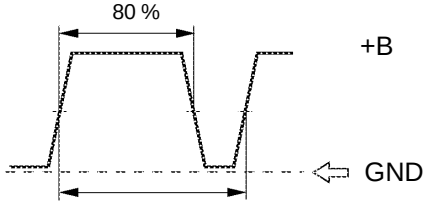
AID Diagnostic Signal Waveforms	ECM Commands	DTCs (ECM Output)	Suspected Trouble Areas
100 % Duty ratio 	Any Air Injection (AI) System operation	**P1613**	• Open in diagnostic signal circuit • Air Injection Control Driver (AID) • Open in AID+B circuit (AID power source) • Short between +B circuit and diagnostic signal circuit
0 % Duty ratio 	AI System: ON (Air pump ON, ASV ON)	**P1613**	• Open or short in air pump or Air Switching Valve (ASV) command signal circuit (ECM–AID) • Open in AID ground circuit • Short between diagnostic signal circuit and body ground • AID • ECM
	AI System: OFF (Air pump OFF, ASV OFF)	–	Normal
20 % Duty ratio 	Air Pump: ON	**P0418**	Short between air pump drive circuit and body ground • Harness & connector (AID–Pump) • Air Pump • AID • ECM
	Air Pump: OFF	**P0418**	Open in air pump drive circuit (AID–Pump) , or short between air pump drive circuit and +B • Harness & connector (AID–Pump) • Air Pump • AID • ECM
40 % Duty ratio 	ASV: ON	**P0412**	Short between ASV drive circuit and body ground • Harness & connector (AID–ASV) • ASV • AID • ECM
	ASV: OFF	**P0412**	Open in ASV drive circuit (AID–ASV), or short between ASV drive circuit and +B • Harness & connector (AID–ASV) • AID • ASV • ECM
80 % Duty ratio 	AI System: OFF (Air pump OFF, ASV OFF)	**P1613**	• AID • ECM
	AI System: ON (Air pump ON, ASV ON)	—	Normal
Excluding above (excluding 0, 20, 40, 80, 100 % duty)	—	**P1613**	• AID • Open in AID ground circuit

A23464

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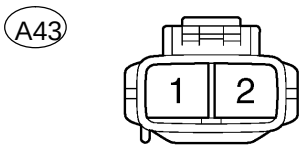
HINT:

- Using the AIR INJ CHECK operation of the SYSTEM CHECK provided in the hand–held tester function, conditions for air–fuel ratio and pressure in the secondary air injection system passage can be checked while the secondary air injection system operating. It helps technicians to troubleshoot the system when it malfunctioning.
- Read freeze frame data using a hand–held tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**Check voltage between terminal 2 of air pump and body ground.**

Wire Harness Side:



Air Pump Connector

N B17438

PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A43 air pump connector.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.

CHECK:

(a) When the air pump is operated using the hand–held tester, measure the voltage between terminal A43–2 of the air injection driver connector and body ground.
(b) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/ AIR INJ CHECK/ MANUAL OPERATION/OPERATION 1 and 3

HINT:

OPERATION 1: AP:OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

OPERATION 3: AP:ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Standard:

Tester operation	Tester Connection	Specified Condition
Operation 3	A43–2 – Body ground	10 V or more
Operation 1	A43–2 – Body ground	Below 1.0 V

NG → **Go to step 4.**

OK

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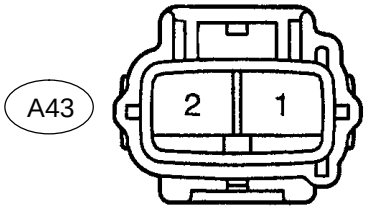
2	Check air pump resistance.

Component Side:
Air Pump Connector



Front View
A23498

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the air pump connector.
(c) Measure the resistance of the air pump.

Standard:

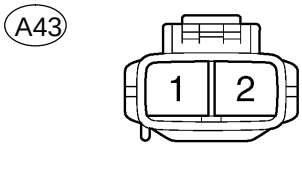
Tester Connections	Specified Conditions
A43–1 – A43–2	0.4 to 1.0 Ω

NG → **Replace air pump assembly.**

OK

3	Check for open in harness and connector between air pump and body ground.

Wire Harness Side:



Air Pump Connector
N
B17438

PREPARATION:
(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A43 air pump connector.

CHECK:
Measure the resistance between the wire harness side connectors and body ground.

OK:

Standard:

Tester Connection	Specified Condition
A43–1 – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI–11).

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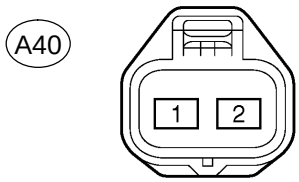
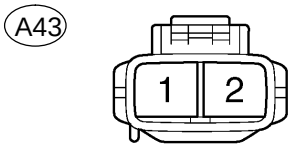
4	**Check for open and short in harness and connector between air injection driver and air pump.**

Wire Harness Side:
Air Injection Driver Connector



N B17443

Wire Harness Side:



Air Pump Connector

N B17438

PREPARATION:
(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A40 air injection driver connector.
(c) Disconnect the A43 air pump connector.

CHECK:
Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VP (A40–2) – A43–2	Below 1 Ω
VP (A40–2) or A43–2 – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Replace air injection driver.

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DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

DTC	P0430	Catalyst System Efficiency Below Threshold (Bank 2)

MONITOR DESCRIPTION

The ECM uses the two sensors, mounted in front of and behind the Three–way Catalytic Converter (TWC), to monitor its efficiency.

The first sensor, the Air–Fuel Ratio (A/F) sensor (sensor 1), sends pre–catalyst information to the ECM. The second sensor, the Heated Oxygen (HO2) sensor (sensor 2), sends post–catalyst information to the ECM. The ECM compares the information transmitted by these two sensors to determine the efficiency of the TWC performance and its ability to store oxygen.

When the TWC is functioning properly, the variation in the oxygen concentration in the exhaust gas, after it has passed through the TWC, is small. In this condition, the voltage output of sensor 2 slowly alternates between the rich and lean signal voltages (shown in the illustration below). As the TWC performance efficiency deteriorates, its oxygen storage capacity decreases, and the variation in the oxygen concentration in the exhaust gas increases. As a result, the sensor voltage output fluctuates frequently.

While the catalyst monitor is running, the ECM measures the signal lengths of both sensors 1 and 2, and calculates the ratio of the signal lengths to determine the extent of the TWC deterioration. If the deterioration level exceeds the preset threshold, the ECM interprets this as the TWC malfunction. The ECM then illuminates the MIL and sets the DTC.

DTC No.	DTC Detecting Condition	Trouble Area
P0420 P0430	OSC value smaller than standard value under active air–fuel ratio control (2 trip detection logic)	◀Gas leakage on exhaust system ◀A/F sensor (Bank 1, 2 sensor 1) ◀Heated oxygen sensor (bank 1, 2 sensor 2) ◀Three–way catalytic converter

HINT:

- ◀ Bank 1 refers to the bank that includes cylinder No.1.
- ◀ Bank 2 refers to the bank that does not include cylinder No.1.
- ◀ Sensor 1 refers to the sensor mounted in front of the Three–Way Catalytic Converter (TWC) and located near the engine assembly.
- ◀ Sensor 2 refers to the sensor mounted behind the TWC and located far from the engine assembly.

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MONITOR STRATEGY

Related DTCs	P0420	Bank 1 catalyst is deteriorated
	P0430	Bank 2 catalyst is deteriorated
Required sensors/components	Main sensors/components	Front and rear heated oxygen sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor, Engine speed sensor, Intake air temperature sensor
Frequency of operation	Once per driving cycle	
Duration	20 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Battery voltage	11 V	–
Intake air temperature	–10°C (14°F)	–
Engine coolant temperature	75°C (167°F)	–
Atmospheric pressure coefficient	0.75	–
Idle	OFF	
Engine RPM	–	3,200 rpm
A/F sensor	Activated	
Fuel system status	Closed loop	
Engine load	10 to 70 %	
All of the following conditions are met	Condition 1, 2 and 3	
1. MAF	6 to 75 g/sec	
2. Front catalyst temperature (estimated)	620 to 830°C (1,148 to 1,526°F)	
3. Rear catalyst temperature (estimated)	410 to 830°C (770 to 1,526°F)	
Rear HO2S monitor	Completed	
Shift position	4th	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Oxygen storage capacity (OSC) of catalyst	Less than 0.16

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MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- MID (Monitor Identification Data) is assigned to each emissions–related component.
- TID (Test Identification Data) is assigned to each test value.
- Scaling is used to calculate the test value indicated on generic tools.

Catalyst bank 1 – Active A/F control method

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$21	$A9	Multiply by 0.0003 (no dimension)	Oxygen storage capacity of catalyst	Minimum test limit for catalyst	Maximum test limit for catalyst

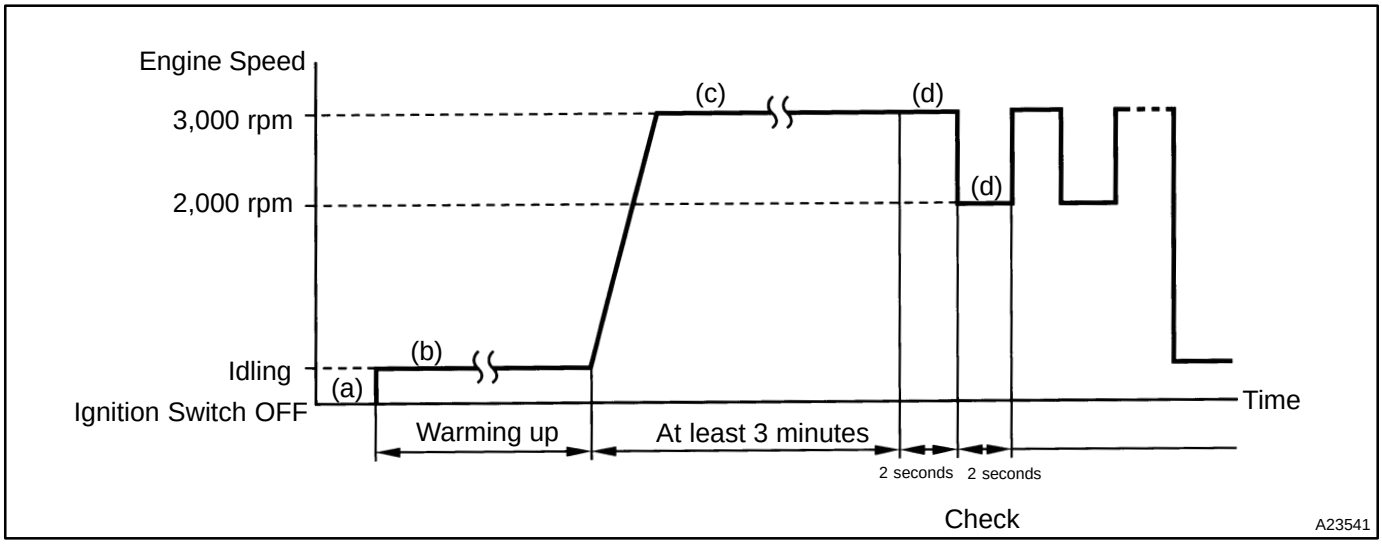
Catalyst bank 2 – Active A/F control method

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$22	$A9	Multiply by 0.0003 (no dimension)	Oxygen storage capacity of catalyst	Minimum test limit for catalyst	Maximum test limit for catalyst

WAVEFORMS OF AIR–FUEL RATIO (A/F) AND HEATED OXYGEN (HO2) SENSORS

HINT:

Perform the operation with the engine speeds and time durations described below prior to check the waveforms of the A/F and HO2 sensors. This is in order to activate the sensors sufficiently to obtain the appropriate inspection results.



(a) Connect the hand–held tester to the DLC3.

(b) Start the engine and warm it up with all the accessories switched OFF, until the engine coolant temperature stabilizes.

(c) Run the engine at an engine speed of between 2,500 rpm and 3,000 rpm for at least 3 minutes.

(d) After confirming that the waveform of the heated oxygen sensor (bank 1, 2 sensor 1 (HA1A, HA2A)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)).

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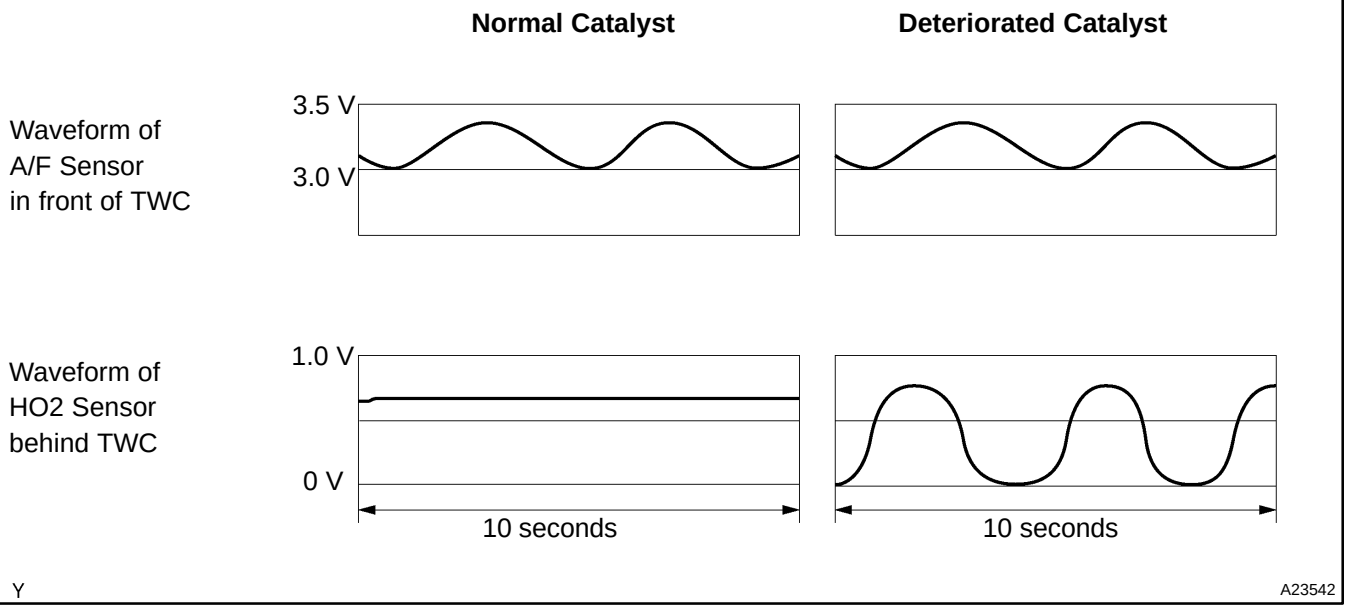
HINT:

- If either of the voltage outputs of the Air–Fuel Ratio (A/F) or Heated Oxygen (HO2) sensors does not fluctuate, or either of the sensors makes a noise, the sensor may be malfunctioning.
- If the voltage outputs of both the sensors remain lean or rich, the air–fuel ratio may be extremely lean or rich. In such cases, perform the following A/F CONTROL using a hand–held tester.
- If the Three–Way Catalytic Converter (TWC) has deteriorated, the HO2 sensor (located behind the TWC) voltage output fluctuates up and down frequently, even under normal driving conditions (active air–fuel ratio control is not performed).

Voltage output when active air–fuel ratio control not performed



A/F CONTROL

HINT:

Hand–held tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air–Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using a hand–held tester.

(1) Connect a hand–held tester to the DLC3.
(2) Start the engine and turn the tester ON.
(3) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(4) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(6) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 and OS2 B1S2) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

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Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (HO2)	–12.5 %	Lean	Less than 0.4

NOTICE:

The Air–Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage	HO2 Sensor (Sensor 2) Output Voltage	Main Suspected Trouble Areas
1	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
2	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	• A/F sensor • A/F sensor heater • A/F sensor circuit
3	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
4	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• Injector • Fuel pressure • Gas leakage from exhaust system (Air–fuel ratio extremely lean or rich)

◀ Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.

◀ To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press the YES button and then the ENTER button followed by the F4 button.

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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0420 or P0430) being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand–held tester.

RESULT:

Display (DTC Output)	Proceed to
”P0420 and/or P0430”	A
”P0420 or P0430” and other DTCs	B

HINT:

If any other codes besides ”P0420 and/or P0430” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI–58).**

A

2	**Check A/F sensor (bank 1, 2 sensor 1).**

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(f) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 and O2S B1S2) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

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Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (HO2)	–12.5 %	Lean	Less than 0.4

RESULT:

Status A/F S1	Status O2S S2	A/F Condition and A/F and HO2 Sensors Condition	Misfires	Main Suspected Trouble Areas	Proceed To
Lean/Rich	Lean/Rich	Normal	–	◀Three–way Catalytic Converter (TWC) ◀Gas leakage from exhaust system	A
Lean	Lean/Rich	A/F sensor malfunction	–	◀A/F sensor	B
Rich	Lean/Rich	A/F sensor malfunction	–	◀A/F sensor	B
Lean/Rich	Lean	HO2 sensor malfunction	–	◀HO2 sensor ◀Gas leakage from exhaust system	C
Lean/Rich	Rich	HO2 sensor malfunction	–	◀HO2 sensor ◀Gas leakage from exhaust system	C
Lean	Lean	Actual air–fuel ratio lean	May occur	◀Extremely rich or lean actual air–fuel ratio ◀Gas leakage from exhaust system	A
Rich	Rich	Actual air–fuel ratio lean	–	◀Extremely rich or lean actual air–fuel ratio ◀Gas leakage from exhaust system	A

Lean: During A/F CONTROL, the A/F sensor output voltage (AFS) is consistently more than 3.35 V, and the HO2 sensor output voltage (O2S) is consistently less than 0.4 V.
Rich: During A/F CONTROL, the AFS is consistently less than 3.0 V, and the O2S is consistently more than 0.55 V.

B → **Check and replace A/F sensor.**

C → **Check and replace heated oxygen sensor and check and repair exhaust gas leakage.**

A

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3	Check gas leakage on exhaust system.

OK:

No exhaust gas leakage.

NG → Repair or replace exhaust gas leakage point.

OK →

Replace front and rear three–way catalytic converter in the bank a malfunction is detected.

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DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

DTC	P0430	Catalyst System Efficiency Below Threshold (Bank 2)

MONITOR DESCRIPTION

The ECM uses the two sensors, mounted in front of and behind the Three–way Catalytic Converter (TWC), to monitor its efficiency.

The first sensor, the Air–Fuel Ratio (A/F) sensor (sensor 1), sends pre–catalyst information to the ECM. The second sensor, the Heated Oxygen (HO2) sensor (sensor 2), sends post–catalyst information to the ECM. The ECM compares the information transmitted by these two sensors to determine the efficiency of the TWC performance and its ability to store oxygen.

When the TWC is functioning properly, the variation in the oxygen concentration in the exhaust gas, after it has passed through the TWC, is small. In this condition, the voltage output of sensor 2 slowly alternates between the rich and lean signal voltages (shown in the illustration below). As the TWC performance efficiency deteriorates, its oxygen storage capacity decreases, and the variation in the oxygen concentration in the exhaust gas increases. As a result, the sensor voltage output fluctuates frequently.

While the catalyst monitor is running, the ECM measures the signal lengths of both sensors 1 and 2, and calculates the ratio of the signal lengths to determine the extent of the TWC deterioration. If the deterioration level exceeds the preset threshold, the ECM interprets this as the TWC malfunction. The ECM then illuminates the MIL and sets the DTC.

DTC No.	DTC Detecting Condition	Trouble Area
P0420 P0430	OSC value smaller than standard value under active air–fuel ratio control (2 trip detection logic)	◀Gas leakage on exhaust system ◀A/F sensor (Bank 1, 2 sensor 1) ◀Heated oxygen sensor (bank 1, 2 sensor 2) ◀Three–way catalytic converter

HINT:

- ◀ Bank 1 refers to the bank that includes cylinder No.1.
- ◀ Bank 2 refers to the bank that does not include cylinder No.1.
- ◀ Sensor 1 refers to the sensor mounted in front of the Three–Way Catalytic Converter (TWC) and located near the engine assembly.
- ◀ Sensor 2 refers to the sensor mounted behind the TWC and located far from the engine assembly.

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MONITOR STRATEGY

Related DTCs	P0420	Bank 1 catalyst is deteriorated
	P0430	Bank 2 catalyst is deteriorated
Required sensors/components	Main sensors/components	Front and rear heated oxygen sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor, Engine speed sensor, Intake air temperature sensor
Frequency of operation	Once per driving cycle	
Duration	20 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Battery voltage	11 V	–
Intake air temperature	–10°C (14°F)	–
Engine coolant temperature	75°C (167°F)	–
Atmospheric pressure coefficient	0.75	–
Idle	OFF	
Engine RPM	–	3,200 rpm
A/F sensor	Activated	
Fuel system status	Closed loop	
Engine load	10 to 70 %	
All of the following conditions are met	Condition 1, 2 and 3	
1. MAF	6 to 75 g/sec	
2. Front catalyst temperature (estimated)	620 to 830°C (1,148 to 1,526°F)	
3. Rear catalyst temperature (estimated)	410 to 830°C (770 to 1,526°F)	
Rear HO2S monitor	Completed	
Shift position	4th	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Oxygen storage capacity (OSC) of catalyst	Less than 0.16

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MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- MID (Monitor Identification Data) is assigned to each emissions–related component.
- TID (Test Identification Data) is assigned to each test value.
- Scaling is used to calculate the test value indicated on generic tools.

Catalyst bank 1 – Active A/F control method

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$21	$A9	Multiply by 0.0003 (no dimension)	Oxygen storage capacity of catalyst	Minimum test limit for catalyst	Maximum test limit for catalyst

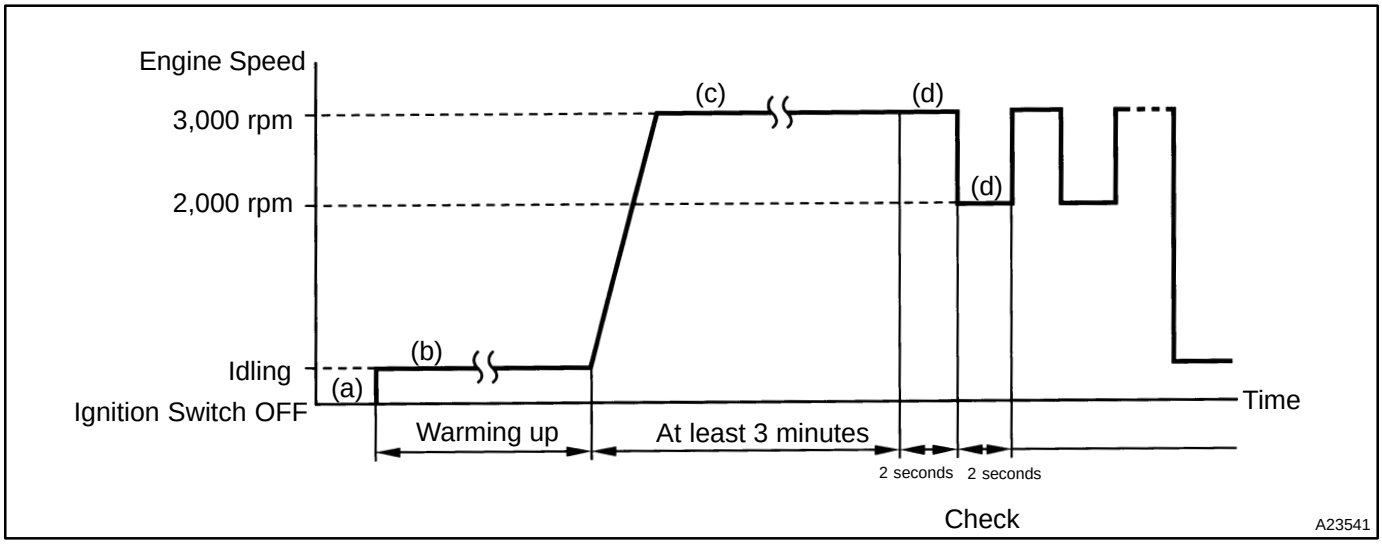
Catalyst bank 2 – Active A/F control method

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$22	$A9	Multiply by 0.0003 (no dimension)	Oxygen storage capacity of catalyst	Minimum test limit for catalyst	Maximum test limit for catalyst

WAVEFORMS OF AIR–FUEL RATIO (A/F) AND HEATED OXYGEN (HO2) SENSORS

HINT:

Perform the operation with the engine speeds and time durations described below prior to check the waveforms of the A/F and HO2 sensors. This is in order to activate the sensors sufficiently to obtain the appropriate inspection results.



(a) Connect the hand–held tester to the DLC3.

(b) Start the engine and warm it up with all the accessories switched OFF, until the engine coolant temperature stabilizes.

(c) Run the engine at an engine speed of between 2,500 rpm and 3,000 rpm for at least 3 minutes.

(d) After confirming that the waveform of the heated oxygen sensor (bank 1, 2 sensor 1 (HA1A, HA2A)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)).

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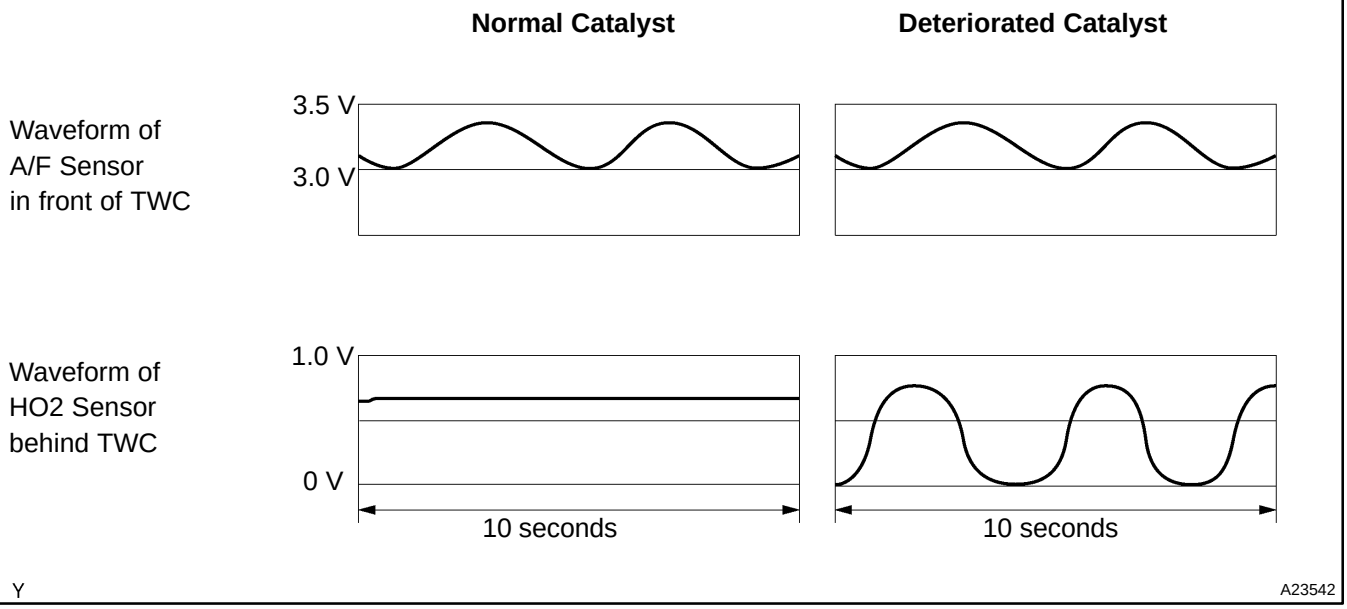
HINT:

- If either of the voltage outputs of the Air–Fuel Ratio (A/F) or Heated Oxygen (HO2) sensors does not fluctuate, or either of the sensors makes a noise, the sensor may be malfunctioning.
- If the voltage outputs of both the sensors remain lean or rich, the air–fuel ratio may be extremely lean or rich. In such cases, perform the following A/F CONTROL using a hand–held tester.
- If the Three–Way Catalytic Converter (TWC) has deteriorated, the HO2 sensor (located behind the TWC) voltage output fluctuates up and down frequently, even under normal driving conditions (active air–fuel ratio control is not performed).

Voltage output when active air–fuel ratio control not performed



A/F CONTROL

HINT:

Hand–held tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air–Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using a hand–held tester.

(1) Connect a hand–held tester to the DLC3.
(2) Start the engine and turn the tester ON.
(3) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(4) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(6) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 and OS2 B1S2) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

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Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (HO2)	–12.5 %	Lean	Less than 0.4

NOTICE:

The Air–Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage	HO2 Sensor (Sensor 2) Output Voltage	Main Suspected Trouble Areas
1	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
2	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	• A/F sensor • A/F sensor heater • A/F sensor circuit
3	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
4	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• Injector • Fuel pressure • Gas leakage from exhaust system (Air–fuel ratio extremely lean or rich)

◀ Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.

◀ To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press the YES button and then the ENTER button followed by the F4 button.

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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0420 or P0430) being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand–held tester.

RESULT:

Display (DTC Output)	Proceed to
”P0420 and/or P0430”	A
”P0420 or P0430” and other DTCs	B

HINT:

If any other codes besides ”P0420 and/or P0430” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI–58).**

A

2	**Check A/F sensor (bank 1, 2 sensor 1).**

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(f) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 and O2S B1S2) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

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Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (HO2)	–12.5 %	Lean	Less than 0.4

RESULT:

Status A/F S1	Status O2S S2	A/F Condition and A/F and HO2 Sensors Condition	Misfires	Main Suspected Trouble Areas	Proceed To
Lean/Rich	Lean/Rich	Normal	–	◀Three–way Catalytic Converter (TWC) ◀Gas leakage from exhaust system	A
Lean	Lean/Rich	A/F sensor malfunction	–	◀A/F sensor	B
Rich	Lean/Rich	A/F sensor malfunction	–	◀A/F sensor	B
Lean/Rich	Lean	HO2 sensor malfunction	–	◀HO2 sensor ◀Gas leakage from exhaust system	C
Lean/Rich	Rich	HO2 sensor malfunction	–	◀HO2 sensor ◀Gas leakage from exhaust system	C
Lean	Lean	Actual air–fuel ratio lean	May occur	◀Extremely rich or lean actual air–fuel ratio ◀Gas leakage from exhaust system	A
Rich	Rich	Actual air–fuel ratio lean	–	◀Extremely rich or lean actual air–fuel ratio ◀Gas leakage from exhaust system	A

Lean: During A/F CONTROL, the A/F sensor output voltage (AFS) is consistently more than 3.35 V, and the HO2 sensor output voltage (O2S) is consistently less than 0.4 V.
Rich: During A/F CONTROL, the AFS is consistently less than 3.0 V, and the O2S is consistently more than 0.55 V.

B → **Check and replace A/F sensor.**

C → **Check and replace heated oxygen sensor and check and repair exhaust gas leakage.**

A

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3	Check gas leakage on exhaust system.

OK:

No exhaust gas leakage.

NG → Repair or replace exhaust gas leakage point.

OK →

Replace front and rear three–way catalytic converter in the bank a malfunction is detected.

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DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P0441	Purge VSV (Vacuum Switching Valve) stuck open	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If stabilized pressure higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that purge VSV stuck open	▶Purge VSV ▶Connector/wire harness (Purge VSV – ECM) ▶ECM ▶Pump module ▶Leakage from EVAP system	While ignition Switch OFF	2 trip
P0441	Purge VSV stuck closed	After EVAP leak check performed, purge VSV turned ON (open), and atmospheric air introduced into EVAP system. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If pressure does not return to near atmospheric pressure, ECM determines that purge valve stuck closed	▶Purge VSV ▶Connector/wire harness (Purge VSV – ECM) ▶ECM ▶Pump module ▶Leakage from EVAP system	While ignition Switch OFF	2 trip
P0441	Purge flow	While engine running, following conditions successively met: ▶Negative pressure not created in EVAP system when purge VSV turned ON (open) ▶EVAP system pressure change less than 0.5 kPa (3.75 mmHg) when vent valve turned ON (closed) ▶Atmospheric pressure change before and after purge flow monitor less than 0.1 kPa (0.75 mmHg)	▶Purge VSV ▶Connector/wire harness (Purge VSV – ECM) ▶Leakage from EVAP line (Purge VSV – Intake manifold) ▶ECM	While engine running	2 trip

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page DI–460).

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MONITOR DESCRIPTION

The two monitors, Key–Off and Purge Flow, are used to detect malfunctions relating to DTC P0441. The Key–Off monitor is initiated by the ECM internal timer, known as the soak timer, 5 hours* after the ignition switch is turned to OFF. The purge flow monitor runs while the engine is running.

1. KEY–OFF MONITOR

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

HINT:

*: If the engine coolant temperature is not below 35◀C (95◀F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◀C (95◀F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
–	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	–
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	–

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

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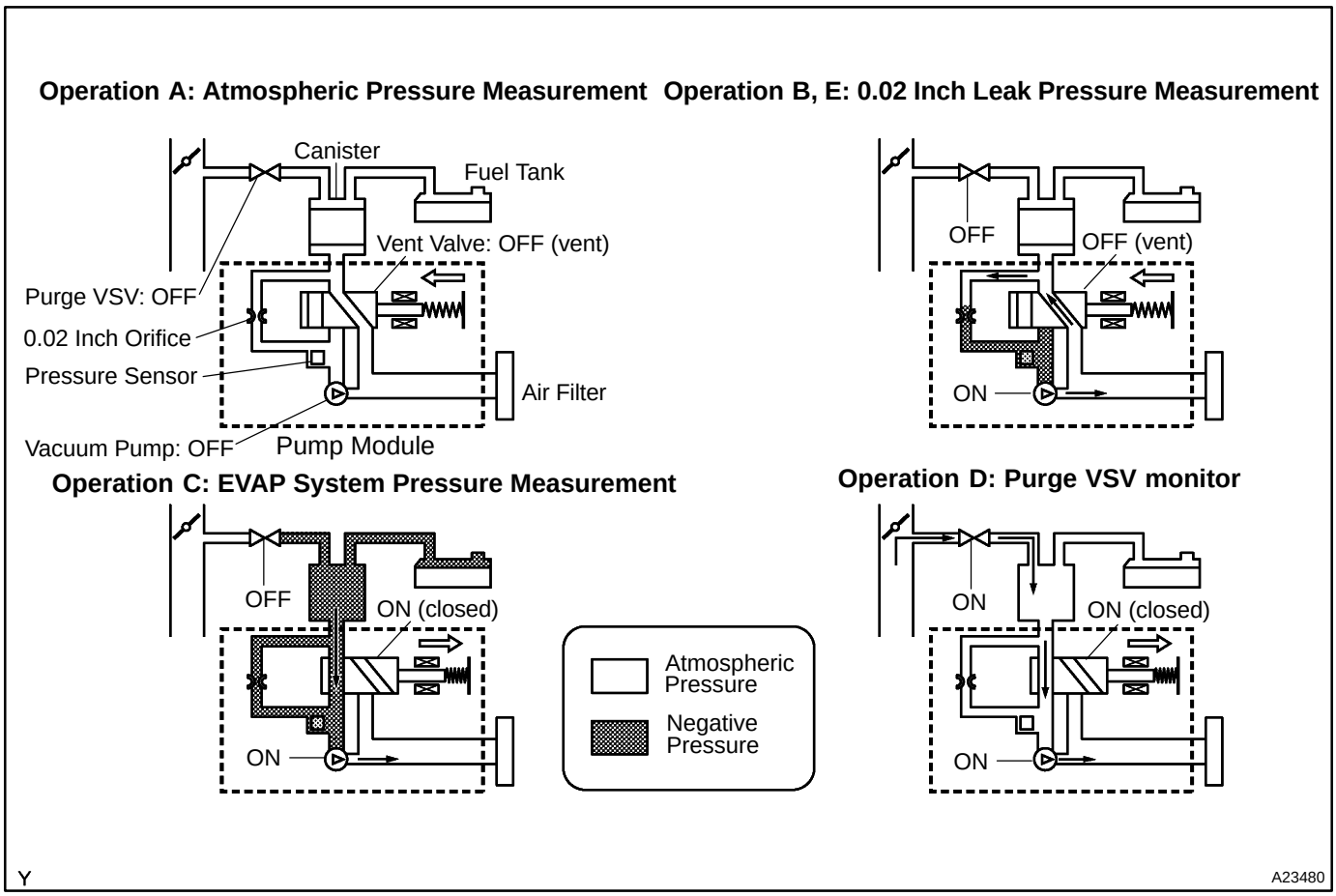
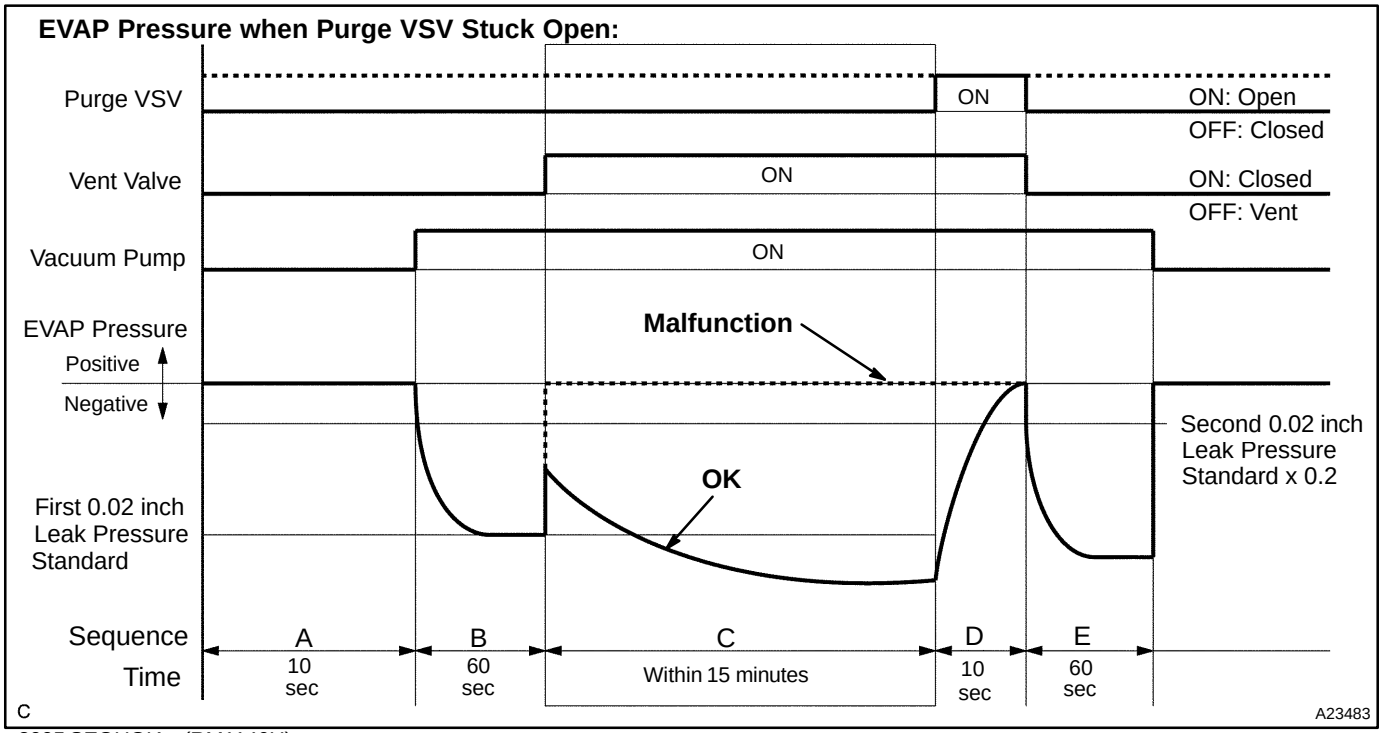


(a) Purge VSV stuck open

In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The EVAP system pressure is then measured by the ECM using the pressure sensor. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2], the ECM interprets this as the purge VSV (Vacuum Switching Valve) being stuck open. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).



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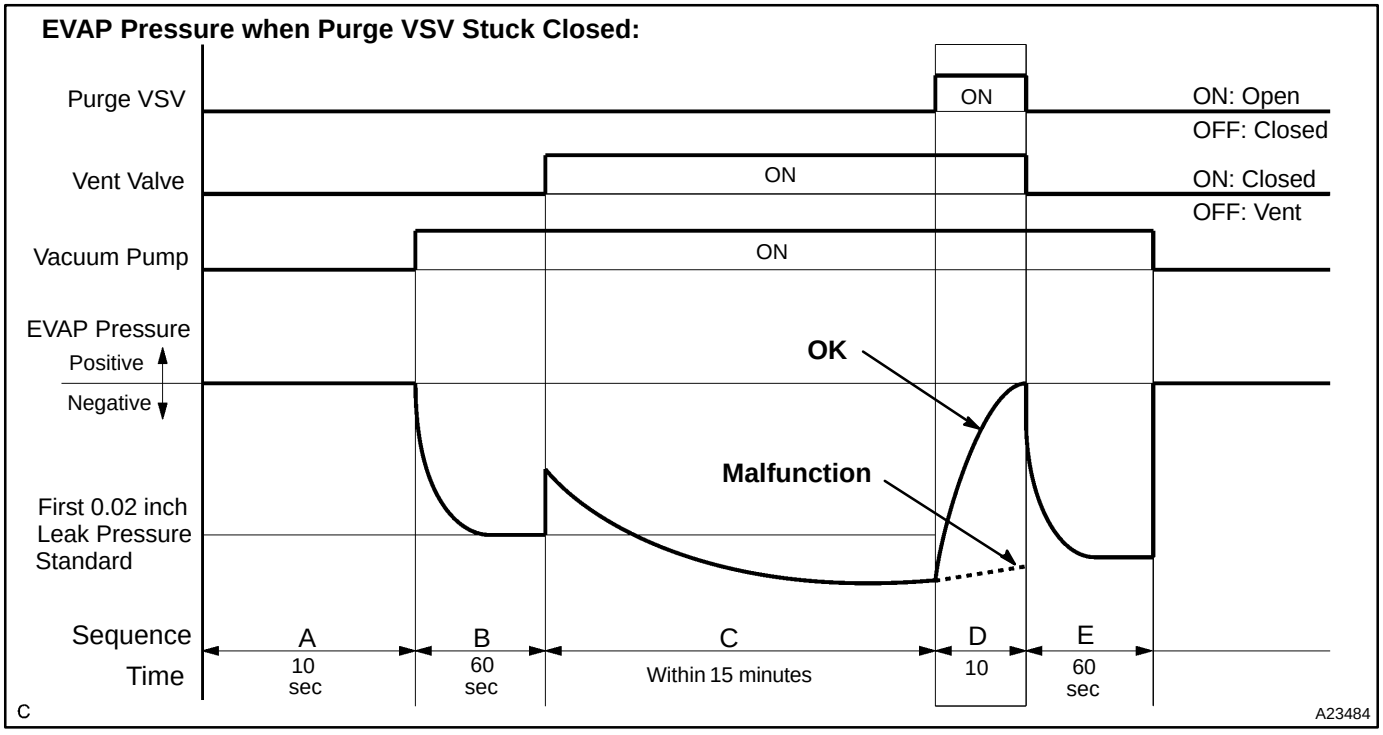
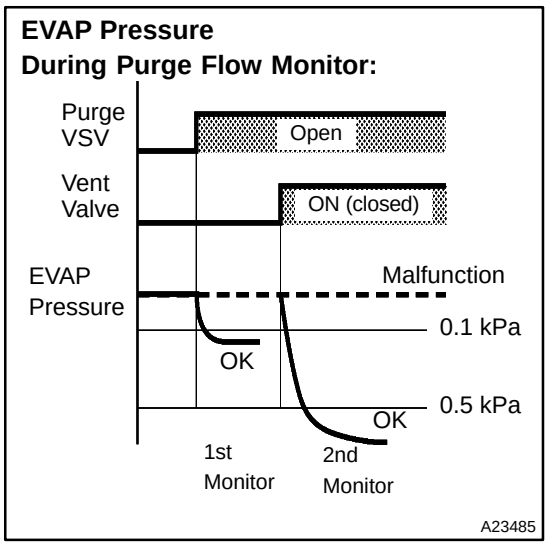
(b) Purge VSV stuck closed

In operation D, the pressure sensor measures the EVAP system pressure. The pressure measurement for purge VSV monitor is begun when the purge VSV is turned ON (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa (2.25 mmHg) or more, the purge VSV is functioning normally. If the pressure does not increase, the ECM interprets this as the purge VSV being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).





2. PURGE FLOW MONITOR

The purge flow monitor consists of the two step monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
  While the engine is running and the purge VSV (Vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa (3.75 mmHg), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

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MONITOR STRATEGY

Related DTCs	P0441	Purge VSV stuck open
		Purge VSV stuck closed
		Purge flow
Required sensors/components	Purge VSV, Pump module	
Frequency of operation	Once per driving cycle	
Duration	Purge VSV stuck open and closed: Within 2 min. (varies with amount of fuel in tank) Purge flow: Within 30 sec.	
MIL operation	2 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Purge VSV stuck open and closed:		
Following values are when atmospheric is 760 mmHg (100 kPa)	–	
EVAP key–off monitor runs when all of the following conditions met:	–	
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)	
Battery voltage	10.5 V	–
Vehicle speed	–	4 km/h (2.5 mph)
Ignition switch	OFF	
Engine condition	Not running	
Time after engine stopped	5 hours	
FTP sensor malfunction (P0450, P0452, P0453)	Not detected	
Purge VSV	Not operated by scan tool	
Vent valve	Not operated by scan tool	
Leak detection pump	Not operated by scan tool	
Both of the following conditions are met before IG switch OFF	Condition 1 and 2	
1. Duration that vehicle is driven	5 min.	–
2. Purge flow	Executed	
ECT	4.4 to 35˚C (40 to 95˚F)	
IAT	4.4 to 35˚C (40 to 95˚F)	
Example of re–start time	–	
First time	7 hours	
Second time	9 hours and 30 min.	
Key–off monitor sequence	1 to 8	
1. Atmospheric pressure	–	
Next sequence is run if following condition set	–	
Atmospheric pressure change for 10 sec.	–	2.25 mmHg (0.3 kPa) for 1 sec.
2. First reference pressure	–	

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Next sequence is run if all of following conditions set	Condition 1, 2 and 3	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1057 kPa)	
3. Reference pressure	Saturated	
3. Vent valve stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa)	–
4. Vacuum introduction and leak	–	
Next sequence is run if both of following conditions set	Condition 1 and 2	
1. Vacuum introduction time	–	15 min.
2. FTP	FTP was saturated	
5. Purge VSV stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa)	–
6. Second reference pressure measurement	–	
Next sequence is run if all of following conditions set	Condition 1, 2, 3 and 4	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1057 kPa)	
3. Reference pressure	Saturated	
4. Reference pressure difference between first and second	–	5.25 mmHg (0.7 kPa)
7. Leak check	–	
Next sequence is run if following condition set	–	
FTP when vacuum introduction was complete	–	Second reference pressure
8. Atmospheric pressure	–	
Monitor is complete if following	–	
Atmospheric pressure difference between sequence 1 and 8	–	2.25 mmHg (0.3 kPa)
Purge flow:		
Engine condition	Running	
ECT	4.4˚C (40˚F)	–
IAT	4.4˚C (40˚F)	–
FTP sensor malfunction	Not detected	
Purge VSV	Not operated by scan tool	
EVAP system check	Not operated by scan tool	

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Battery voltage	10 V	–
Purge duty cycle	8 %	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Purge VSV stuck open:	
FTP when vacuum introduction was compleat	Higher than reference pressure x 0.2
Purge VSV stuck closed:	
FTP change for 10 sec. after purge VSV ON	Less than 2.25 mmHg (0.3 kPa)
Purge flow:	
Both of the following conditions are met	Condition 1 or 2
1. FTP change when purge operation is started	Less than 0.75 mmHg (0.1 kPa)
2. FTP change during purge operation when vent valve is closed	Less than 3.75 mmHg (0.5 kPa)

MONITOR RESULT (MODE 06 DATA)

Refer to page DI–26 for detailed information on Monitor Result.

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page DI–460).

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DID89–01

DTC	P0450	Evaporative Emission Control System Pressure Sensor/Switch

DTC	P0451	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor/Switch Low Input

DTC	P0453	Evaporative Emission Control System Pressure Sensor/Switch High Input

DTC SUMMARY

DTC	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P0450	Pressure sensor voltage abnormal fluctuation	Sensor output voltage rapidly fluctuates beyond upper and lower malfunction thresholds for 0.5 seconds.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	▶EVAP monitoring (ignition OFF) ▶Ignition ON	1 trip
P0451	Pressure sensor noising	Sensor output voltage fluctuates frequently in certain time period.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	▶EVAP monitoring (ignition OFF) ▶Engine running	2 trip
P0451	Pressure sensor stuck	Sensor output voltage does vary in certain time period.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	▶EVAP monitoring (ignition OFF)	2 trip
P0452	Pressure sensor voltage low	Sensor output voltage is less than 0.45 V for 0.5 seconds.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	▶Ignition ON ▶EVAP monitoring (ignition OFF)	1 trip
P0453	Pressure sensor voltage high	Sensor output voltage is more than 4.9 V for 0.5 seconds.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	▶Ignition ON ▶EVAP monitoring (ignition OFF)	1 trip

HINT:
The pressure sensor is built into the pump module.

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page DI–460).

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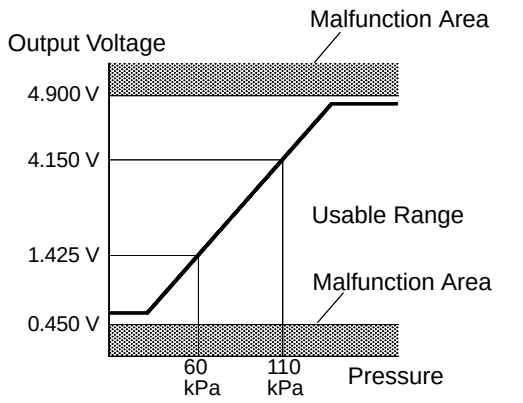
MONITOR DESCRIPTION

Pressure Sensor Specification:



HINT:
Standard atmospheric pressure is 101.3 kPa

(a) DTC P0450: Pressure sensor voltage abnormal fluctuation.
If the pressure sensor voltage output rapidly fluctuates between less than 0.45 V and more than 4.9 V, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP (Evaporative Emission) system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

(b) DTC P0451: Pressure sensor noising or stuck
If the pressure sensor voltage output fluctuates rapidly for 10 seconds, the ECM stops the EVAP system monitor. The ECM interprets this as noise from the pressure sensor, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.
Alternatively, if the sensor voltage output does not change for 10 seconds, the ECM interprets this as the sensor being stuck, and stops the monitor. The ECM then illuminates the MIL and sets the DTC.
(Both the malfunctions are detected by 2 trip detection logic)

(c) DTC P0452: Pressure sensor voltage low
If the pressure sensor voltage output is below 0.45 V, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

(d) DTC P0453: Pressure sensor voltage high
If the pressure sensor voltage output is 4.9 V or more, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

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MONITOR STRATEGY

Related DTCs	P0450	Evaporative emission control system pressure sensor/switch chattering
	P0451	Evaporative emission control system pressure sensor noise
		Evaporative emission control system pressure sensor stuck
	P0452	Evaporative emission control system pressure sensor/switch low input
	P0453	Evaporative emission control system pressure sensor/switch high input
Required sensors/components	Pump module	
Frequency of operation	Once per driving cycle	
Duration	0.5 sec.: P0450, P0452, P0453 10 sec.: P0451	
MIL operation	Immediate: P0450, P0452, P0453 2 driving cycles: P0451	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Pressure sensor noise:		
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)	
Battery voltage	10.5 V	–
IAT	4.4 to 35°C (40 to 95°F)	
FTP sensor malfunction (P0450, P0452, P0453)	Not detected	
Either of the following conditions is met	Condition 1 or 2	
1. Time after engine stopped	5 hours	
2. Engine condition	Running	
Example of re–start time	–	
First time	7 hours	
Second time	9 hours and 30 min.	
Pressure sensor stuck:		
Battery voltage	10.5 V	–
IAT	4.4 to 35°C (40 to 95°F)	
FTP sensor malfunction (P0450, P0452, P0453)	Not detected	
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)	
Time after engine stopped	5 hours	
Example of re–start time	–	
First time	7 hours	
Second time	9 hours and 30 min.	

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Pressure sensor chattering, low/high voltage:		
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Pressure sensor noise:	
Frequency that FTP change is 0.3 kPa or more	10 times or more for 10 sec.
Pressure sensor stuck:	
FTP change for 10 sec. during EVAP monitor (0.02 inch reference pressure)	Less than 4.9 mmHg (0.65 kPa)
Pressure sensor chattering:	
Pressure sensor voltage	Less than 0.45 V, or more than 4.9 V
Pressure sensor low voltage:	
Pressure sensor voltage	Less than 0.45 V
Pressure sensor high voltage:	
Pressure sensor voltage	More than 4.9 V

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INSPECTION PROCEDURE

NOTICE:

- **When a vehicle is brought into the workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel tank cap.**
- **Do not disassemble the pump module.**
- **A hand–held tester is required to conduct the following diagnostic troubleshooting procedure.**

1	**Confirm DTC and EVAP pressure.**

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON (do not start the engine).
(c) Turn the tester ON.

CHECK:

(a) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read DTCs.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / VAPOR PRESS.
(d) Read the EVAP (Evaporative Emission) pressure displayed on the tester.

RESULT:

Display (DTC Output)	Test Results	Suspected Trouble Areas	Proceed To
P0451	—	▶Pressure sensor	C
P0452	Less than 45 kpa (430 mmHg)	▶Wire harness/connector (ECM – pressure sensor) ▶Pressure sensor ▶Short in ECM circuit	A
P0453	More than 120 kPa (900 mmHg)	▶Wire harness/connector (ECM – pressure sensor) ▶Pressure sensor ▶Open in ECM circuit	B

B	**Go to step 4.**
C	**Go to EVAP inspection procedure (See page DI–460).**

A

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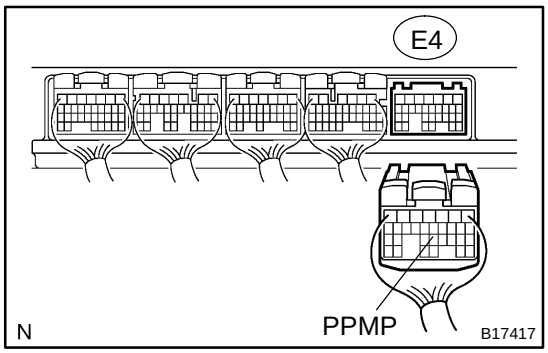
2	Measure resistance between terminal PPMP of ECM and body ground.



PREPARATION:

(a) Turn the ignition switch to OFF.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance between PPMP terminal of the ECM connector and the body ground.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
10 Ω or less	▶Wire harness/connector (ECM – pressure sensor) ▶Short in pressure sensor circuit	A
10 kΩ or more	▶Wire harness/connector (ECM – pressure sensor) ▶Short in ECM circuit	B

B	Go to step 7.

A

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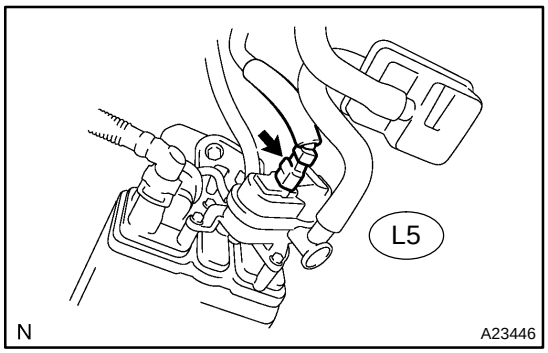
3	Measure resistance between terminal PPMP of ECM and body ground.



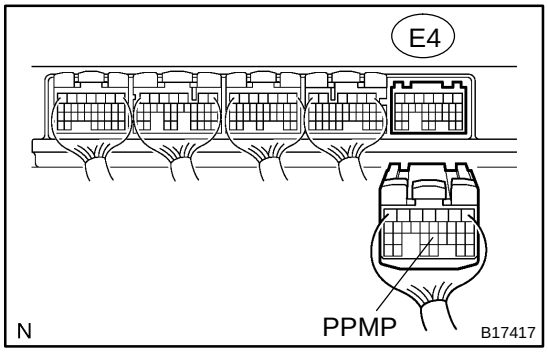
PREPARATION:

(a) Disconnect the L5 canister connector.

(b) Disconnect the E4 ECM connector.

CHECK:

Check the resistance between PPMP terminal of the ECM connector and the body ground.



Result:

Test Results	Suspected Trouble Areas	Proceed To
10 kΩ or more	▶Short in pressure sensor circuit	A
10 Ω or less	▶Short in wire harness/connector (ECM – pressure sensor)	B

A	**Go to step 5.**
B	**Go to step 6.**

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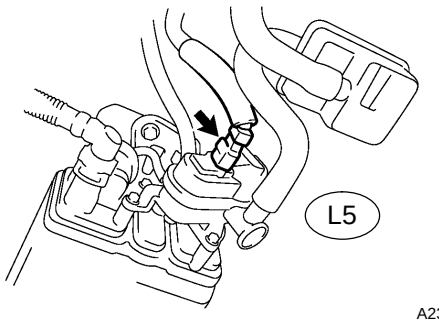
4	Measure voltage and resistance of pump module connector.



PREPARATION:

(a) Disconnect the L5 canister connector.

(b) Turn the ignition switch to ON.

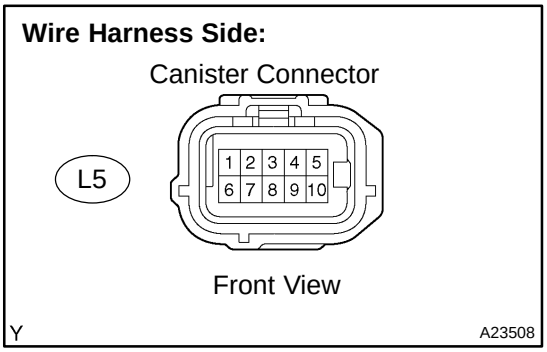
CHECK:

Measure the voltage and resistance of the L5 connector.

OK:

Standard:

Tester Connections	Specified Conditions
L5–4 – Body ground	Between 4.5 V and 5.5 V
L5–3 – Body ground	Between 4.5 V and 5.5 V
L5–2 – Body ground	100 Ω or less



RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Voltage and resistance within standard ranges	▶Open in pressure sensor circuit	A
Voltage and resistance outside standard ranges	▶Open in wire harness/connector (ECM – pressure sensor)	B

B → **Go to step 6.**

A

5	Replace charcoal canister assembly.

NEXT → **Go to step 8.**

6	Repair or replace wire harness and connectors.

HINT:

If the exhaust tail pipe has been removed, go to the next step before reinstalling it.

NEXT → **Go to step 8.**

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7	**Replace ECM (See page SF–80).**

NEXT

8	**Check whether DTC output recurs.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Wait for at least 60 seconds.

CHECK:

(a) On the tester, select the following menu items: DIAGNOSIS/ENHANCED OBD II/DTC INFO/PENDING CODES.

HINT:

If no pending DTC is displayed on the tester, the repair has been successfully completed.

NEXT

Completed

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DTC	P0455	Evaporative Emission Control System Leak Detected (Gross Leak)

DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

DTC SUMMARY

DTC	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P0455	EVAP gross leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If stabilized pressure higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that EVAP system has large leakage.	▶Fuel tank cap (loose) ▶Leakage from EVAP line (Canister – Fuel tank) ▶Leakage from EVAP line (Purge VSV – Canister) ▶Pump module ▶Leakage from fuel tank ▶Leakage from canister	While ignition switch OFF	2 trip
P0456	EVAP small leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If stabilized pressure larger than second 0.02 inch leak pressure, ECM determines that EVAP system has small leakage.	Same above	While ignition switch OFF	2 trip

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page DI–460).

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MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

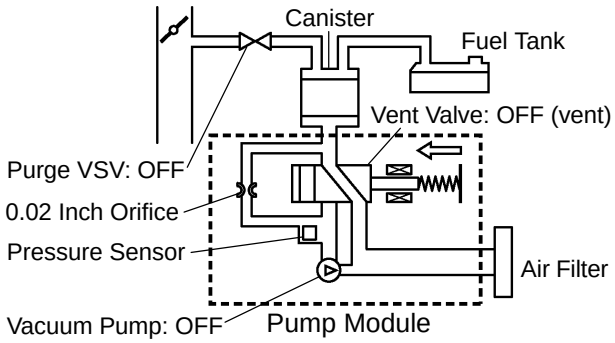
HINT:

*: If the engine coolant temperature is not below 35◀C (95◀F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◀C (95◀F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

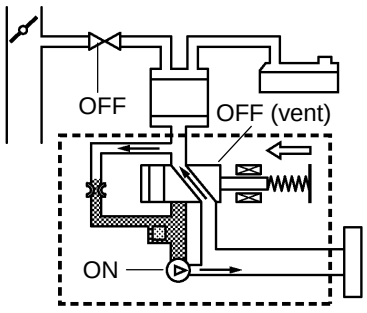
Sequence	Operations	Descriptions	Duration
–	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	–
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and them ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	–

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

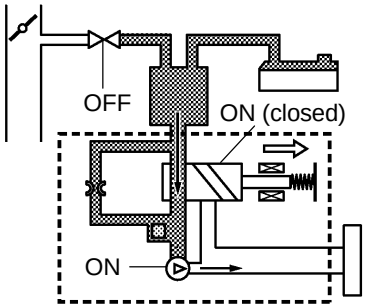
Operation A: Atmospheric Pressure Measurement

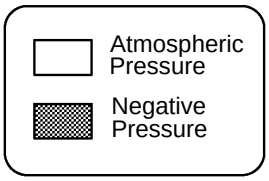


Operation B: 0.02 Inch Leak Pressure Measurement

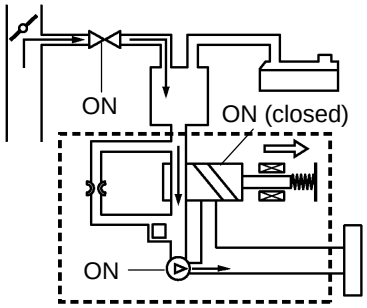


Operation C: EVAP Leak Check





Operation D: Purge VSV monitor



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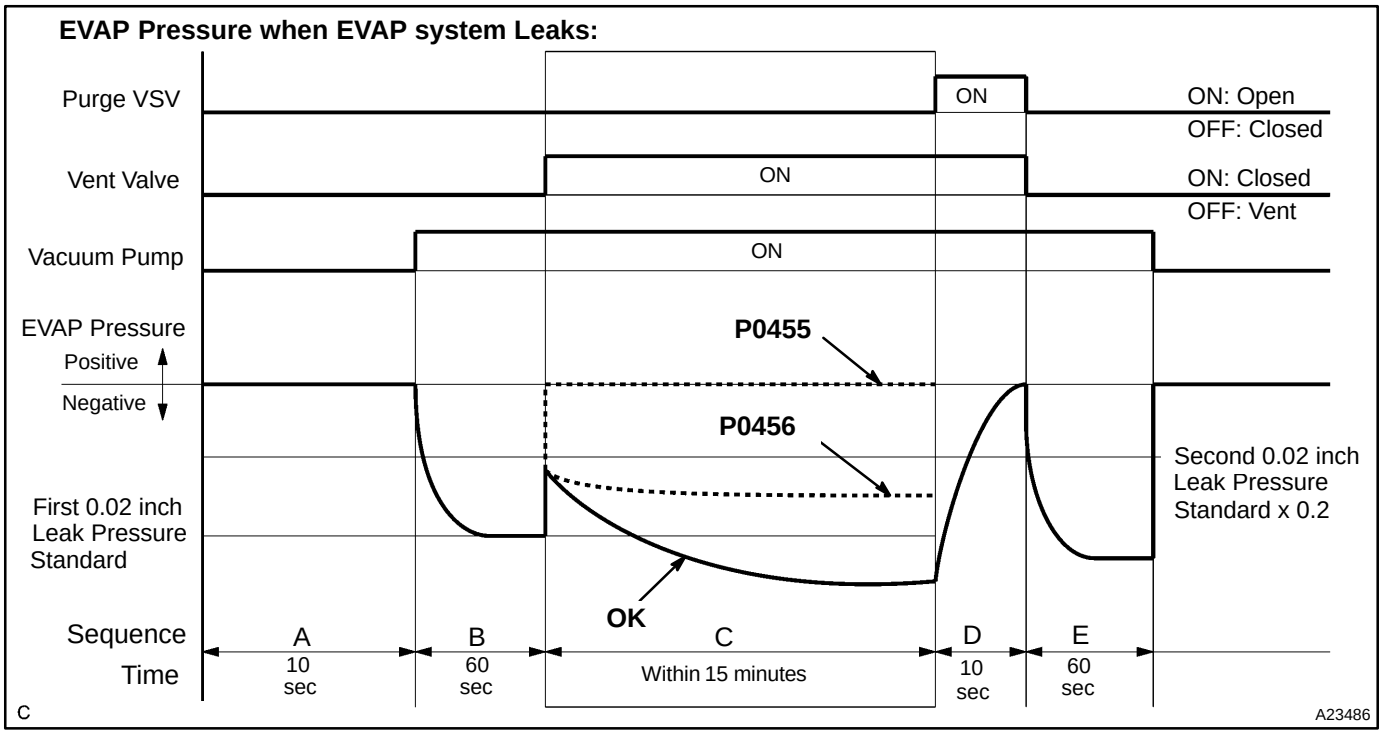
(a) P0455: EVAP (Evaporative Emission) gross leak
In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2] (near atmospheric pressure), the ECM determines that the EVAP system has a large leakage, illuminates the MIL and sets the DTC (2 trip detection logic).
(b) P0456: EVAP very small leak
In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than second 0.02 inch leak pressure standard, the ECM determines that the EVAP system has a small leakage, illuminates the MIL and sets the DTC (2 trip detection logic).



MONITOR STRATEGY

Related DTCs	P0455	Gross leak detected
	P0456	Very small leak (0.020 inch hole) detected
Required sensors/components	Purge VSV, Pump module	
Frequency of operation	Once per driving cycles	
Duration	Within 15 min. (varies with amount of fuel in tank)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Following values are when atmospheric is 760 mmHg (100 kPa)	–	
EVAP key–off monitor runs when all of the following conditions met:	–	

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Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)	
Battery voltage	10.5 V	–
Vehicle speed	–	4 km/h (2.5 mph)
Ignition switch	OFF	
Engine condition	Not running	
Time after engine stopped	5 hours	
FTP sensor malfunction (P0450, P0452, P0453)	Not detected	
Purge VSV	Not operated by scan tool	
Vent valve	Not operated by scan tool	
Leak detection pump	Not operated by scan tool	
Both of the following conditions are met before IG switch OFF	Condition 1 and 2	
1. Duration that vehicle is driven	5 min.	–
2. Purge flow	Executed	
ECT	4.4 to 35˚C (40 to 95˚F)	
IAT	4.4 to 35˚C (40 to 95˚F)	
Example of re–start time	–	
First time	7 hours	
Second time	9 hours and 30 min.	
Key–off monitor sequence	1 to 8	
1. Atmospheric pressure	–	
Next sequence is run if following condition set	–	
Atmospheric pressure change for 10 sec.	–	2.25 mmHg (0.3 kPa) for 1 sec.
2. First reference pressure	–	
Next sequence is run if all of following conditions set	Condition 1, 2 and 3	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1.057 kPa)	
3. Reference pressure	Saturated	
3. Vent valve stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa)	–
4. Vacuum introduction and leak	–	
Next sequence is run if both of following conditions set	Condition 1 and 2	
1. Vacuum introduction time	–	15 min.
2. FTP	FTP was saturated	
5. Purge VSV stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa)	–

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6. Second reference pressure measurement	–	
Next sequence is run if all of following conditions set	Condition 1, 2, 3 and 4	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1.057 kPa)	
3. Reference pressure	Saturated	
4. Reference pressure difference between first and second	–	5.25 mmHg (0.7 kPa)
7. Leak check	–	
Next sequence is run if following condition set	–	
FTP when vacuum introduction was complete	–	Second reference pressure
8. Atmospheric pressure	–	
Monitor is complete if following	–	
Atmospheric pressure difference between sequence 1 and 8	–	2.25 mmHg (0.3 kPa)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Small leak (0.020 inch) malfunction detection:	
FTP when vacuum introduction was compleat	Between 1 and 2
Condition 1.	Higher than second reference pressure
Condition 2.	Lower than reference pressure x 0.2
Gross leak detection:	
FTP when vacuum introduction was compleat	Higher than reference pressure x 0.2

MONITOR RESULT (MODE 06 DATA)

Refer to page DI–26 for detailed information on Monitor Result.

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page DI–460).

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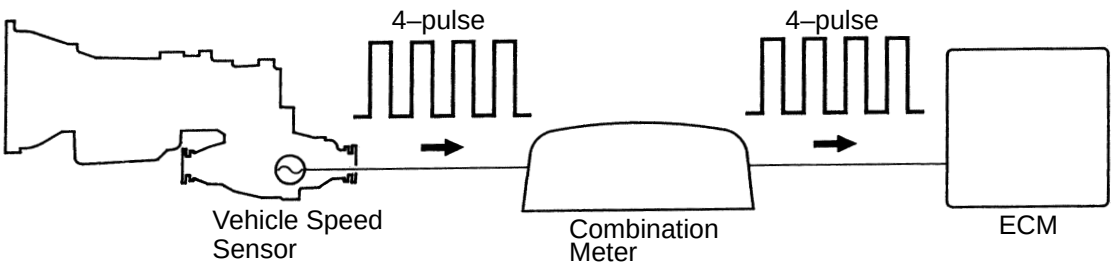
DID8B–01

DTC	P0500	Vehicle Speed Sensor ”A”

DTC	P0503	Vehicle Speed Sensor ”A” Intermittent/ Erratic/High

CIRCUIT DESCRIPTION

The No.1 vehicle speed sensor outputs a 4–pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



P22487

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0500	Step 1	No vehicle speed sensor signal to ECM under following conditions: (2 trip detection logic) ▶Vehicle is being driven	▶Combination meter ▶Open or short in vehicle speed sensor circuit ▶Vehicle speed sensor ▶ECM
P0503	DI–11	Intermittent problem in the vehicle speed sensor circuit	

MONITOR DESCRIPTION

The ECM assumes that the vehicle is driven when the park/neutral position switch is OFF and it has been over 4 sec. since the actual vehicle speed was 9 km/h (6 mph) or more.
If there is no signal from the vehicle speed sensor when these conditions are satisfied, the ECM concludes that there is a fault in the vehicle speed sensor. The ECM will turn on the MIL and a DTC is set.

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MONITOR STRATEGY

Related DTCs	P0500	Vehicle speed sensor ”A” pulse input error
Required sensors/components	Main sensors	Vehicle speed sensor
	Related sensors	Park/Neutral position switch, Engine coolant temperature sensor, Combination meter
Frequency of operation	Continuous	
Duration	500 times	
MIL operation	Immediate	
Sequence of operation	None	

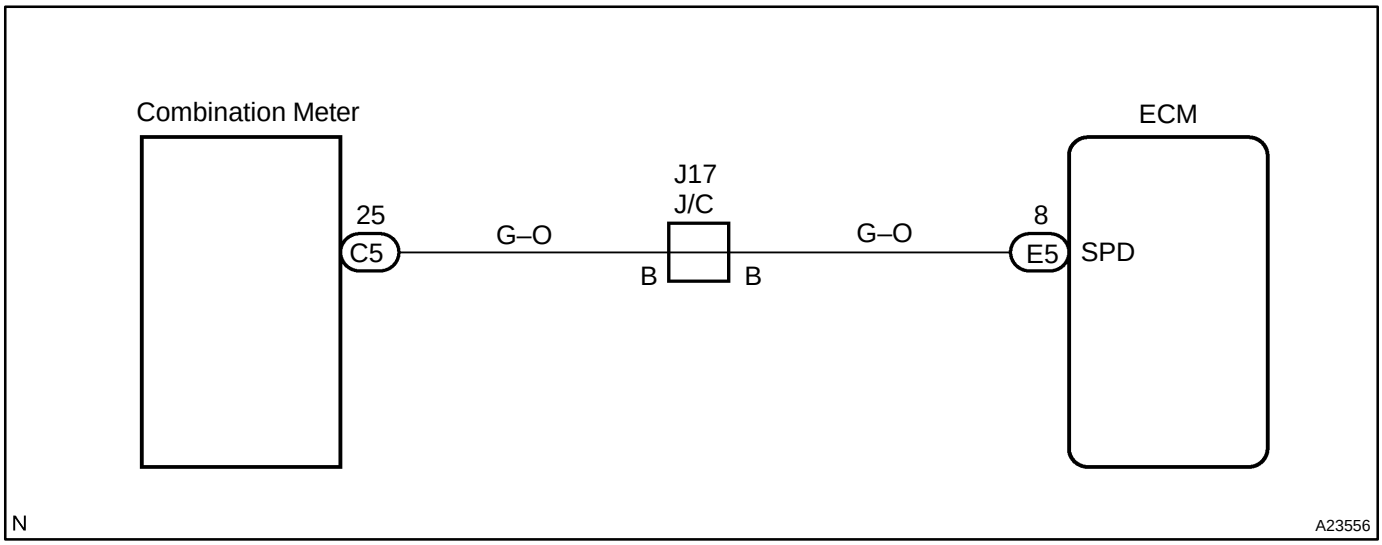
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Vehicle speed is 9 km/h (5.59 mph) or more	4 sec.	–
Park/neutral position switch	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor signal	No pulse input

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check operation of speedometer.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and push the hand–held tester main switch ON.
(c) Start the engine.
(d) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / VEHICLE SPD.

CHECK:

Read the mass air flow rate on the hand–held tester.

RESULT:

Vehicle speed	Proceed to
Vehicle speed remains 0 km/h (0 mph)	A
Vehicle speed is lower than actual speed	A
Vehicle speed is same as actual speed	B

B → **Check for intermittent problems (See page DI–11).**

A

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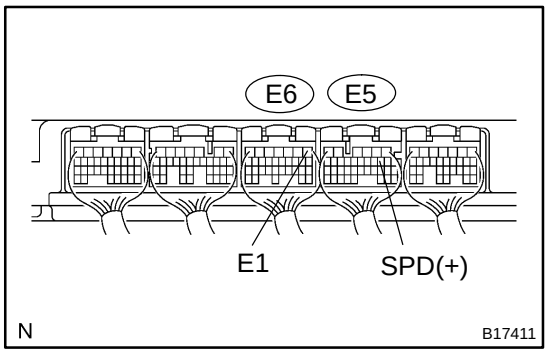
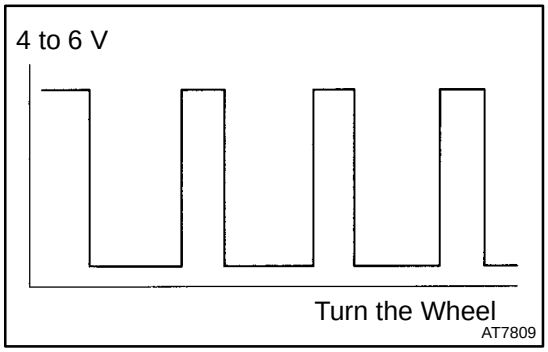
2	Check voltage between terminal SPD and E1 of ECM connector.





PREPARATION:

(a) Shift the shift lever to neutral.
(b) Jack up the rear wheel on one side.
(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminal of the E5 and E6 ECM connector when the wheel is turned slowly.

OK:

Standard:

Tester Connection	Specified Condition
SPD (E5–8) – E1 (E6–1)	Generated intermittently

HINT:

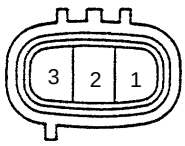
The output voltage should fluctuate up and down similarly to the diagram on the left when the wheel is turned slowly.

OK → **Replace ECM (See page SF–80).**

NG

3	Check vehicle speed sensor.

Component Side Connector:



Vehicle Speed Sensor

I25536

PREPARATION:

(a) Disconnect the vehicle speed sensor connector.
(b) Connect the battery positive (+) lead to terminal 1 and the battery negative (–) lead to terminal 2.
(c) Connect the tester positive (+) lead to terminal 3 and the tester negative (–) lead to terminal 2.
(d) Shift the shift lever to N position.
(e) Rotate the shaft.

CHECK:

Check that there is voltage change between terminals 2 and 3.

OK:

Standard: 0 V to 10 V or more

NG → **Replace vehicle speed sensor.**

OK

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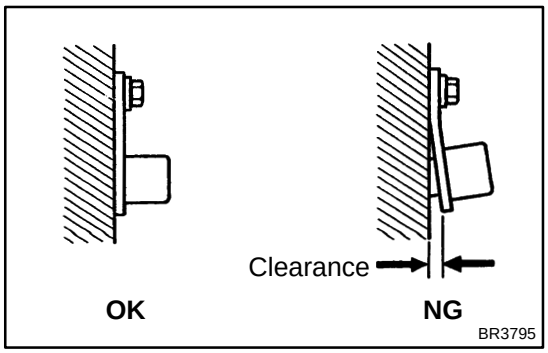
4	Check sensor installation (Vehicle speed sensor).



CHECK:

Check the vehicle speed sensor installation.

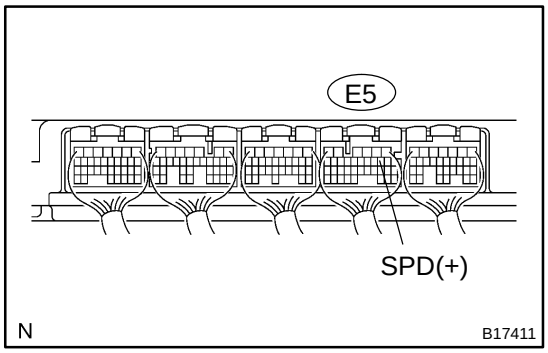
OK:

The vehicle speed sensor is installed properly.

NG → **Tighten sensor installation bolt.**

OK

5	Check for open and short in harness and connector between combination meter and ECM.



PREPARATION:

(a) Disconnect the C5 combination meter connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check for resistance between the wire harness side connectors.

OK:

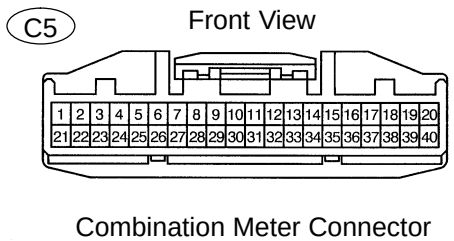
Standard (Check for open):

Symbols (Terminal No.)	Specified condition
SPD (E5–8) – C5–25	Below 1 Ω

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
SPD (E5–8) or C5–25 – Body ground	10 kΩ or higher

Wire Harness Side:



NG → **Repair or replace harness or connector.**

OK

Check combination meter circuit (See page DI–1632

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DID8C–01

DTC	P0504	Brake Switch ”A”/”B” Correlation

CIRCUIT DESCRIPTION

In addition to turning on the stop lamps, the stop lamp switch signals are used for a variety of engine, transmission, and suspension functions as well as being an input for diagnostic checks. It is important that the switch operates properly, therefore this switch is designed with two complementary signal outputs: STP and ST1–. The ECM analyzes these signal outputs to detect malfunctions in the stop lamp switch.

HINT:

Normal condition is as shown in the table.

Signal	Brake pedal released	In transition	Brake pedal depressed
STP	OFF	ON	ON
ST1–	ON	ON	OFF

DTC No.	DTC Detection Condition	Trouble Area
P0504	Conditions (a), (b) and (c) continue for 0.5 sec. or more: (a) Ignition switch ON (b) Brake pedal released (c) STP signal is OFF when the ST1– signal is OFF	▶Short in stop lamp switch signal circuit ▶Stop lamp fuse ▶Stop lamp switch ▶ECM

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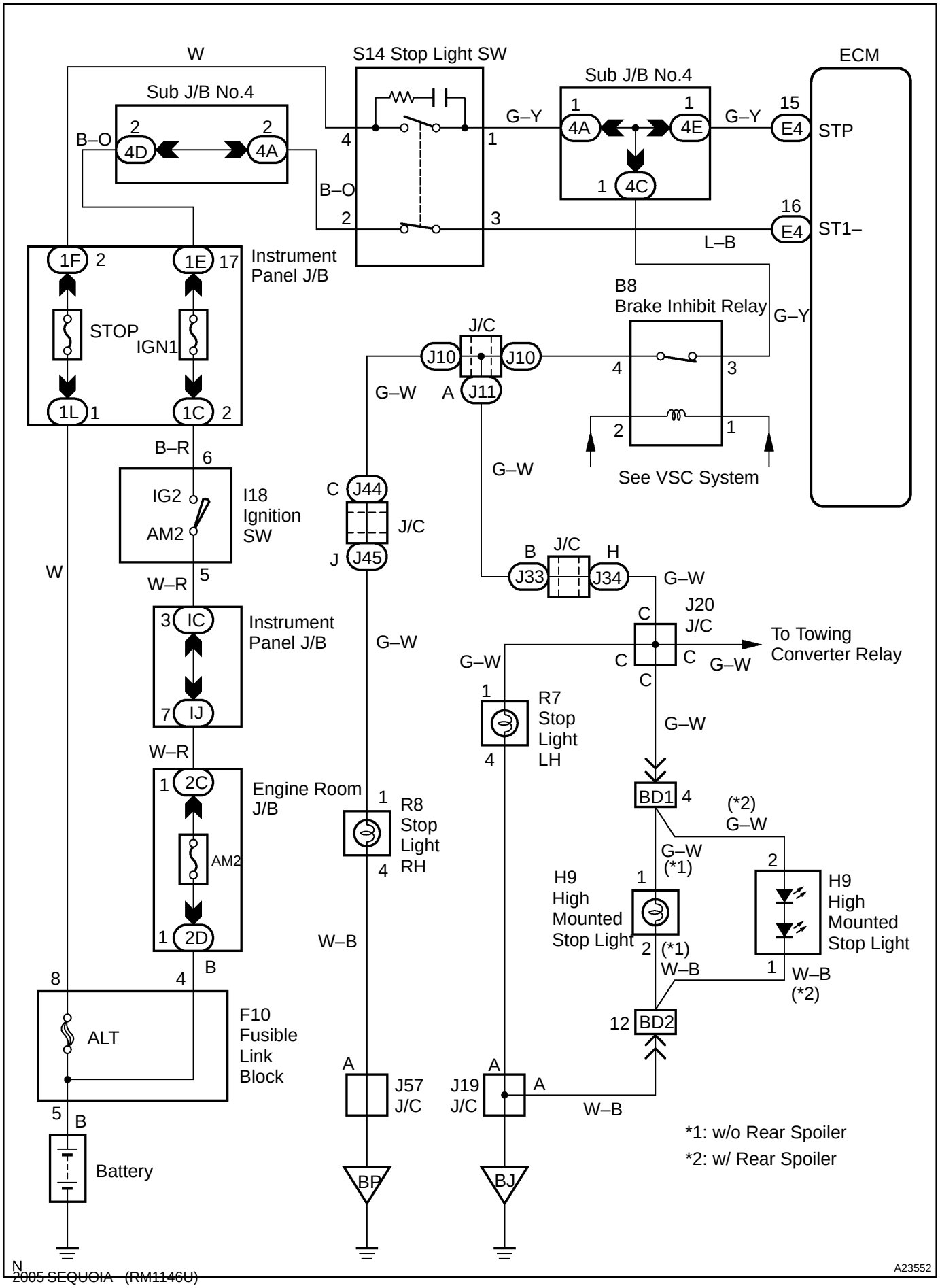
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check operation of stop light.**

CHECK:

Check if the stop lights come on and go off normally when the brake pedal is operated and released.

NG → **Check and repair stop light circuit.**

OK ↓

2	**Check stop light switch (See page BE–47).**

NG → **Replace stop light switch.**

OK ↓

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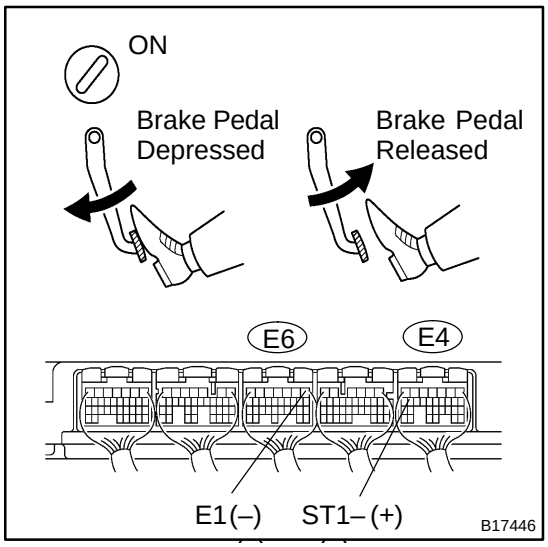
3	Check STP signal and ST1– voltage.



PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) Select the item "DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STOP LIGHT SW".

CHECK:

Read the signal displayed on the hand–held tester.

OK:

Standard:

Brake Pedal	Specified Condition
Depressed	STP Signal ON
Released	STP Signal OFF

CHECK:

Measure the voltage between the specified terminals of the E4 and E6 ECM connectors.

OK:

Standard:

Tester Connection	Brake Pedal	Specified Condition
ST1– (E4–12) – E1 (E6–1)	Depressed	Below 1.5 V
ST1– (E4–12) – E1 (E6–1)	Released	7.5 to 14 V

OK → **Check for intermittent problems (See page DI–11).**

NG

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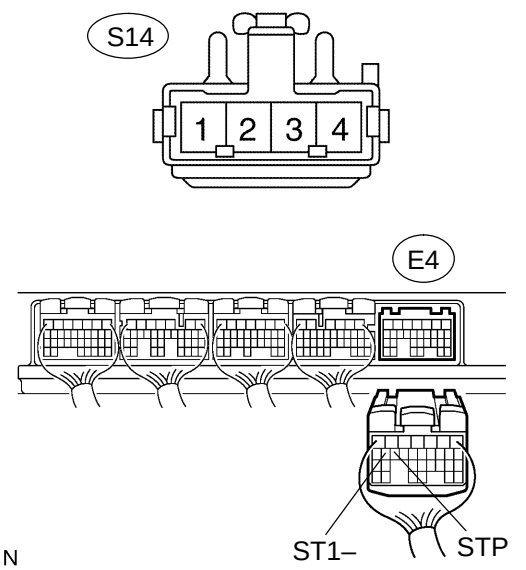
4	Check harness and connector between ECM and stop light switch.



PREPARATION:

(a) Disconnect the S14 stop light switch connector.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
Stop light switch (S14–1) – STP (E4–15)	Below 1 Ω
Stop light switch (S14–3) – ST1– (E4–16)	Below 1 Ω
Stop light switch (S14–1) or STP (E4–15) – Body ground	10 kΩ or higher
Stop light switch (S14–3) or ST1– (E4–16) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF–80).

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DICF6–02

DTC	P0505	Idle Air Control System

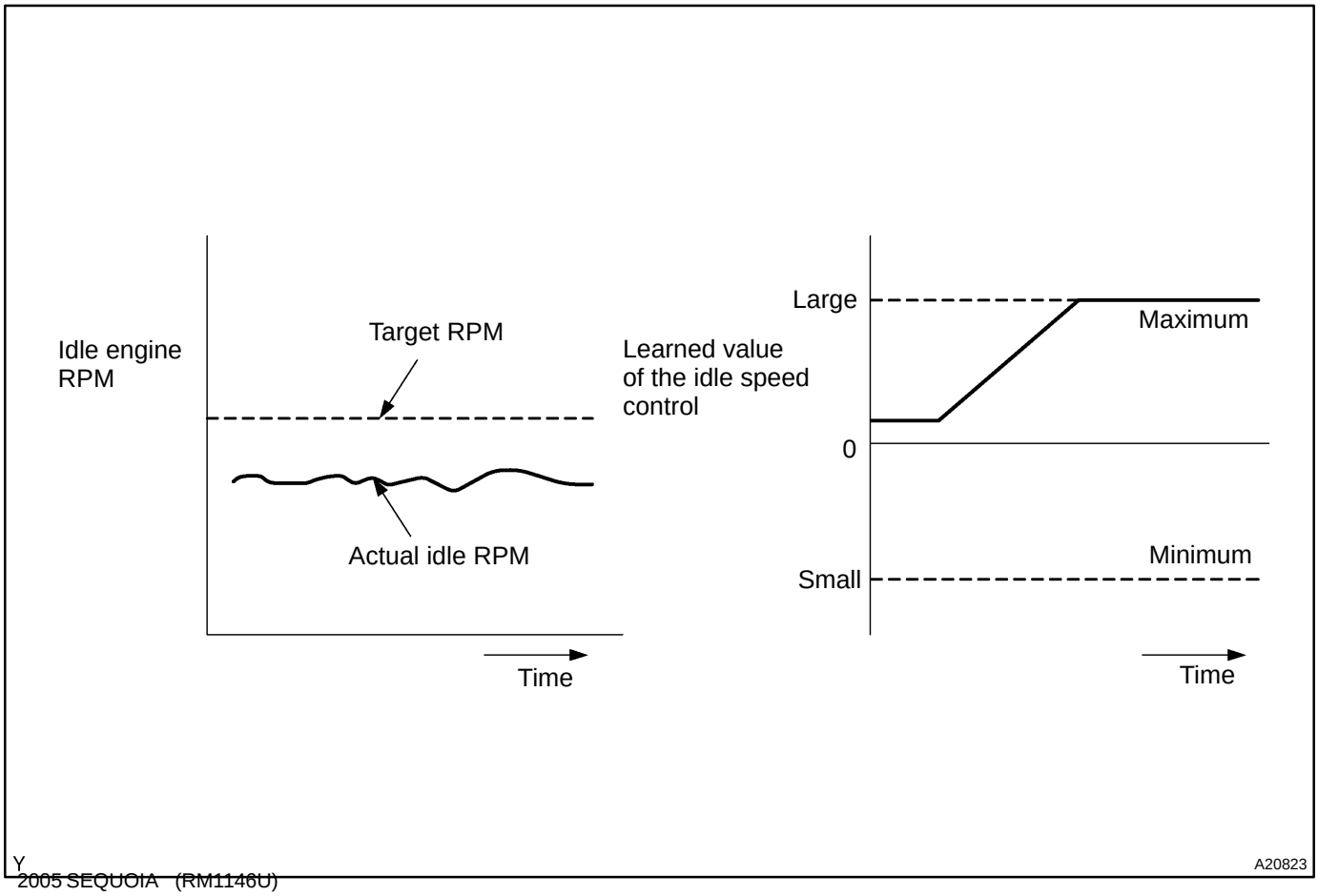
CIRCUIT DESCRIPTION

The idle speed is controlled by the ETCS (Electronic Throttle Control System).
The ETCS is composed of the throttle motor which operates the throttle valve, and the throttle position sensor, which detects the opening angle of the throttle valve.
The ECM controls the throttle motor to provide the proper throttle valve opening angle to obtain the target idle speed.

DTC No.	DTC Detection Condition	Trouble Area
P0501	Idle speed continues to vary greatly from target speed (2 trip detection logic)	▶ETCS ▶Air induction system ▶PCV hose connection ▶ECM

MONITOR DESCRIPTION

The ECM regulates the idle speed by opening and closing the throttle valve using the ETCS. The ECM concludes that the idle speed control ECM function is malfunctioning if: 1) the actual idle RPM varies more than the specified amount, or 2) a learning value of the idle speed control remains at the maximum or minimum five times or more during a driving cycle. The ECM will turn on the MIL and set a DTC.
Example:
If the actual idle RPM varies from the target idle RPM by more than 100 (*1) rpm five times during a driving cycle, the ECM will turn on the MIL and a DTC is set.
HINT:
*1: RPM threshold varies with engine load.



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MONITOR STRATEGY

Related DTCs	P0505	Idle air control malfunction
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Vehicle speed sensor, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	10 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Either of the following conditions is met:	Condition 1 or 2
1. Frequency that both of the following conditions (a) and (b) are met:	5 times or more
(a) Engine RPM – target engine RPM	Less than –100 rpm or more than 150 rpm
(b) Vehicle condition	Stop after vehicle was driven by 10 km/h (6.25 mph) or more
2. Frequency that both of the following conditions (a) and (b) are met:	Once
(a) Engine RPM – target engine RPM	Less than –100 rpm or more than 150 rpm
(b) Intake air control flow rate learning value	2.48 L/sec. or less, or 11 L/sec. or more

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INSPECTION PROCEDURE

HINT:

- When the throttle position is slightly opened (the accelerator pedal is slightly depressed) because a floor carpet is overlapped on the accelerator pedal, or if the accelerator pedal is not fully released, etc., DTC P0505 will possibly be detected.
- Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides P0505) being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand–held tester.

RESULT:

Display (DTC Output)	Proceed to
P0505	A
”P0505” and other DTCs	B

HINT:

If any other codes besides P0505 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI–58).**

A

2	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

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3	**Check air induction system (See page SF–1).**

CHECK:

Check for vacuum leaks in air induction system.

OK:

No leakage.

NG → **Repair or replace air induction system.**

OK

Check electric throttle control system (See page SF–39).

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DICF7–02

DTC	P0560	System Voltage

MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is OFF. This electricity allows the ECM to store data such as DTC history, freeze frame data, fuel trim values, and other data.
If the battery voltage falls below a minimum level, the ECM will conclude that there is a fault in the power supply circuit. The next time the engine starts, the ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detecting Condition	Trouble Area
P0560	Open in back up power source circuit	▶Open in back–up power source circuit ▶EFI fuse ▶ECM

HINT:
If DTC P0560 present, the ECM will not store another DTC.

MONITOR STRATEGY

Related DTCs	P0560	System voltage malfunction
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (*1)	
Sequence of operation	None	

*1: The DTC is set immediate. The MIL will be illuminated after the engine starts in the next time.

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Stand–by RAM	Initialized	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Battery voltage	Less than 3.5 V

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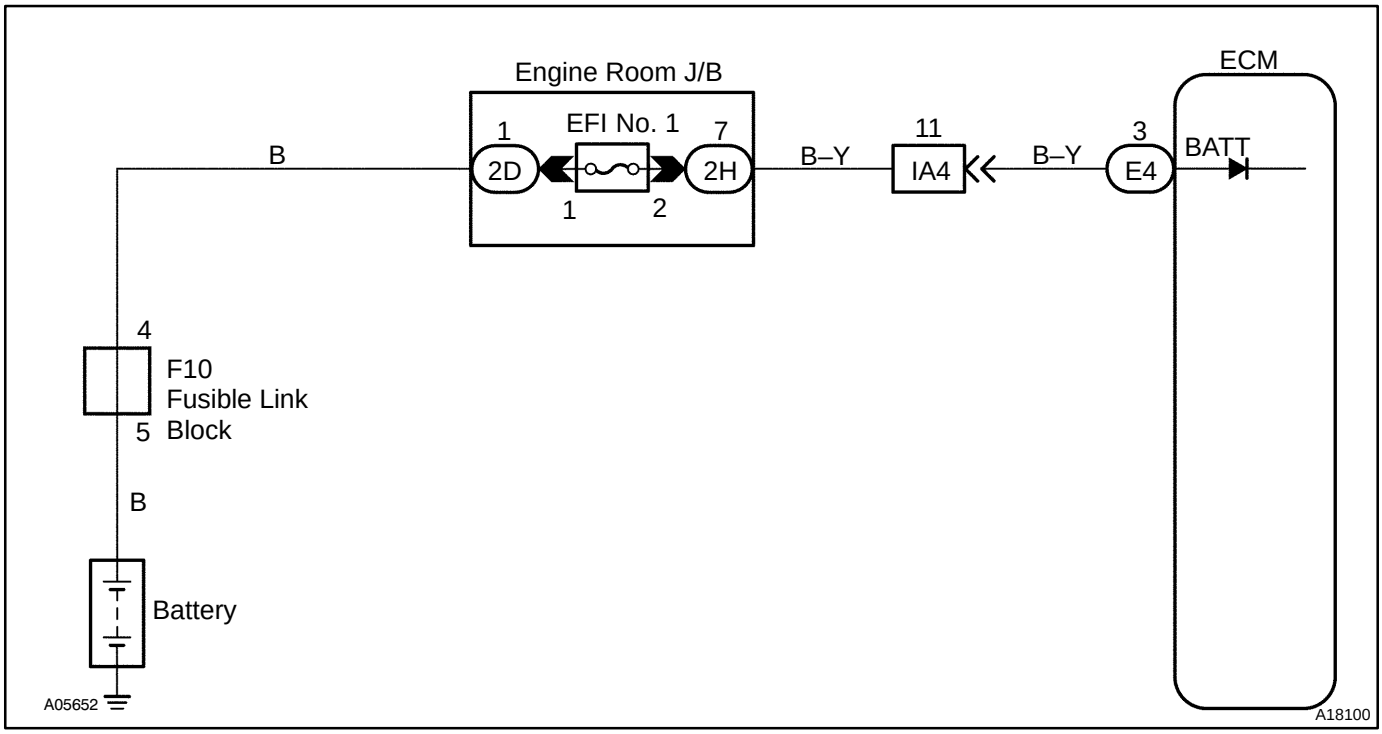
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check battery voltage.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Select the item: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / BATTERY VOLTAGE.

CHECK:

Read the battery voltage on the hand–held tester

RESULT:

Battery voltage	Proceed to
0 V	A
Except 0 V	B

B → **Go to step 5.**

A

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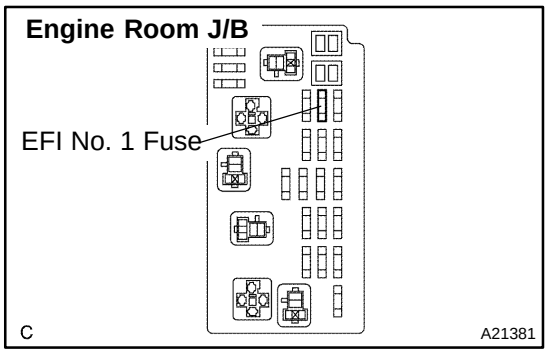
2	Check EFI No. 1 fuse of engine room J/B.

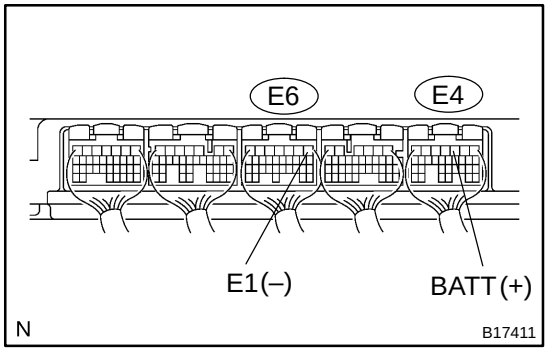


PREPARATION:
Remove the EFI No. 1 fuse from the engine room J/B.
CHECK:
Check the resistance of the EFI No. 1 fuse.
OK:
Standard: Below 1 Ω

NG → **Check for short in all harness and components connected to EFI No. 1 fuse.**

OK

3	Check voltage between terminal BATT and E1 of ECM connector.



CHECK:
Measure the voltage between terminals of the E6 and E4 ECM connector.
OK:
Standard:

Tester Connection	Specified Condition
BATT (E4–3) – E1 (E6–1)	9 to 14 V

OK → **Check for intermittent problems (See page DI–11).**

NG

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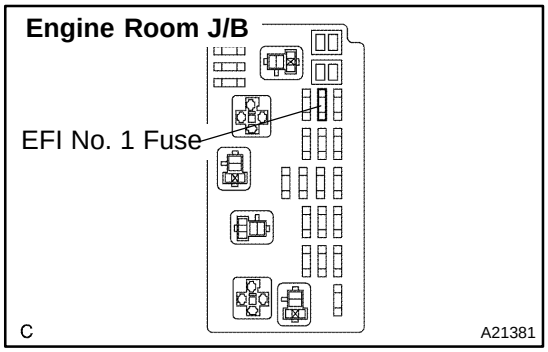
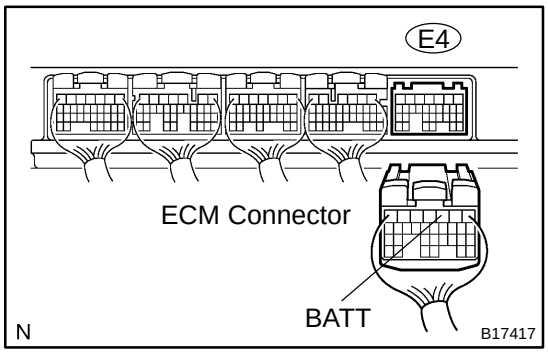
4	Check for open and short in harness and connector between ECM and EFI No. 1 fuse, EFI No. 1 fuse and battery.





PREPARATION:

(a) Remove the EFI No. 1 fuse from the engine room J/B.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Standard:

Tester Connection	Specified Condition
Engine Room J/B (EFI No. 1 fuse terminal 2) – BATT (E4–3)	Below 1 Ω
Engine Room J/B (EFI No. 1 fuse terminal 2) or BATT (E4–3) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

5	Check the battery (See page CH–1).

NG → **Replace battery.**

OK

Check and replace engine room J/B.

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DTC	P0604	Internal Control Module Random Access Memory (RAM) Error

DTC	P0606	ECM/PCM Processor

DTC	P0607	Control Module Performance

DTC	P0657	Actuator Supply Voltage Circuit / Open

MONITOR DESCRIPTION

The ECM continuously monitors its internal memory status, internal circuits, and output signals to the throttle actuator. This self–check insures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the MIL.

The ECM memory status is diagnosed by internal ”mirroring” of the main CPU and the sub CPU to detect RAM (Random Access Memory) errors. The two CPUs also perform continuous mutual monitoring.

The ECM sets a DTC if: 1) outputs from the 2 CPUs are different and deviate from the standards, 2) the signals to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detecting Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM malfunction	▶ECM

MONITOR STRATEGY

Related DTCs	P0604	Random access memory (RAM) error
	P0606	CPU malfunction
	P0607	ECM range check
	P0657	ETCS power supply
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	Within 1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page DI–18
The typical enabling condition is not available	–

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TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0604:	
RAM	RAM check failure
P0606:	
Either of the following conditions is met	Condition 1 or 2
1. Difference between TP of main CPU and TP of sub CPU	0.3 V or more
2. Difference between APP of main CPU and APP of sub CPU	0.3 V or more
P0607:	
Either of the following conditions is met	Condition 1 or 2
1. All of the following conditions are met	Condition (a), (b) and (c)
(a) CPU reset	1 time or more
(b) Difference between TP and APP learned	0.4 V or more
(c) Electronic throttle actuator	OFF
2. CPU reset	2 times or more
P0657:	
ECTS power supply when ignition switch OFF to ON	7 V or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

Replace ECM (See page SF–80).

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DID8D–01

DTC	P0617	Starter Relay Circuit High

MONITOR DESCRIPTION

While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. If the vehicle is being driven and the ECM detects the starter control signal (STA), the ECM concludes that the starter control circuit is malfunctioning. The ECM will turn on the MIL and a DTC is set.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When all conditions (a), (b) and (c) are satisfied for 20 seconds with battery (+B) voltage 10.5 V or more (a) Vehicle speed ≧ 20 km/h (12.4 mph) (b) Engine revolution ≧ 1,000 rpm (c) STA signal ON	▶Park/neutral position switch ▶Starter relay circuit ▶Ignition switch ▶ECM

MONITOR STRATEGY

Related DTCs	P0617	Starter signal error
Required sensors/components	Main sensors/components	Starter signal
	Related sensors/components	Vehicle speed sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	20 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Battery voltage	10.5 V	–
Vehicle speed	20 km/h (12.4 mph)	–
Engine RPM	1,000 rpm	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Starter signal	ON (at ”more than 20 km/h (12.4 mph) and more than 1,000 rpm”)

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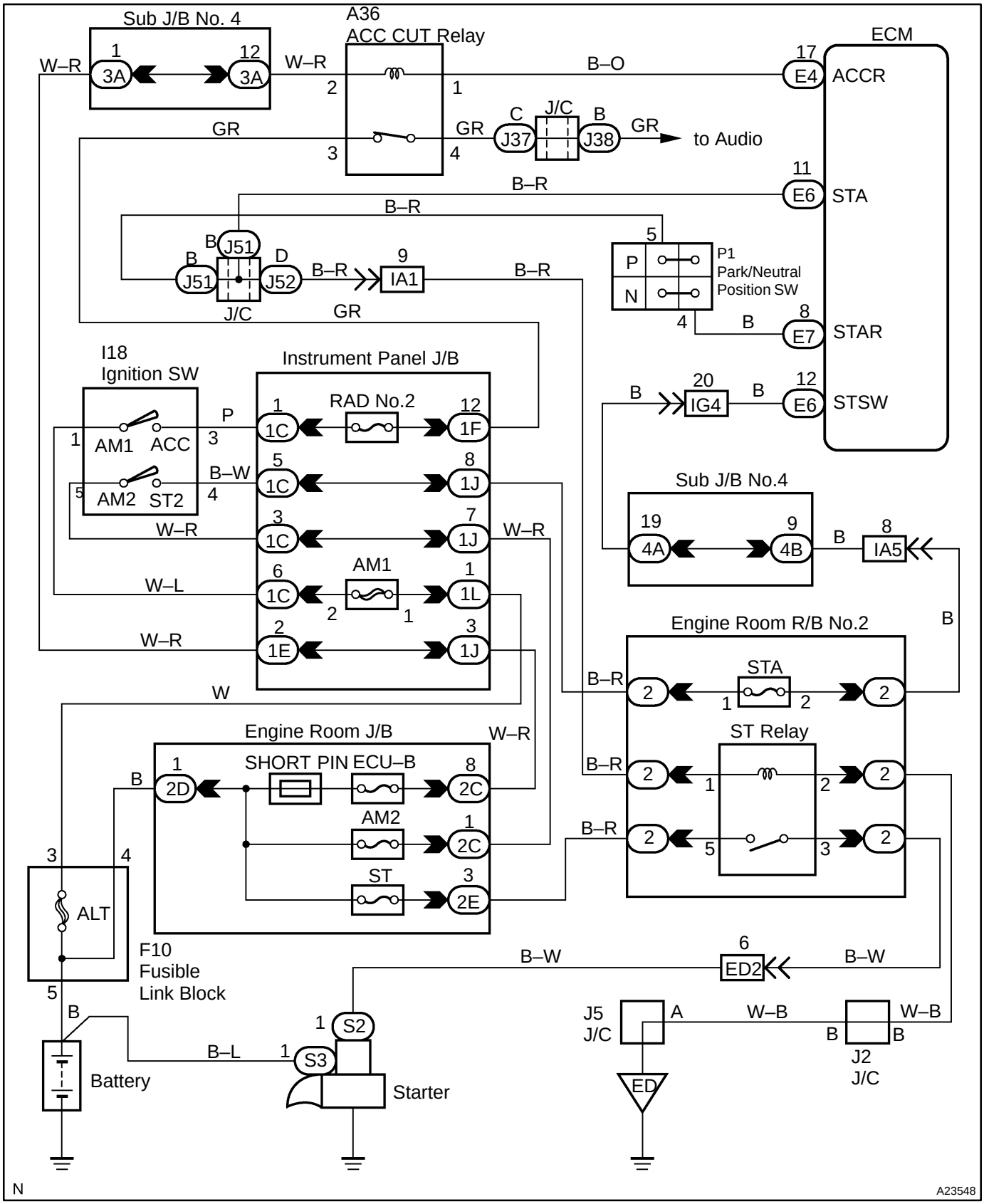
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Connect hand–held tester, and check STA signal.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand–held tester while the starter operates.

OK:

Standard:

Ignition Switch Position	ON	START
STARTER SIG	OFF	ON

OK → **Go to step 5.**

NG

2	**Check park/neutral position switch (See page DI–576).**

NG → **Replace park/neutral position switch. Go to next step 5 after the replacement.**

OK

3	**Check ignition switch (See page BE–24).**

NG → **Replace ignition switch. Go the next step 5 after the replacement.**

OK

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4	**Connect hand–held tester, and check STA signal.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.
(c) On the hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand–held tester while the starter operates.

OK:

Standard:

Ignition Switch Position	ON	START
STARTER SIG	OFF	ON

NG → **Repair or replace harness or connector.**

OK →

5	**Check DTC reoccur**

PREPARATION:

(a) Connect the hand–held tester.
(b) Turn the ignition switch ON and hand–held tester main switch ON.
(c) Clear DTC (See page DI–43).
(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.

CHECK:

Check DTC reoccur.

RESULT:

Display (DTC Output)	Proceed to
P0617	A
No DTC output	B

A → **Replace ECM (See page SF–80).**

B →

Check for intermittent problems (See page DI–11).

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DID8E–01

DTC	P0630	VIN not Programmed or Mismatch ECM/PCM

CIRCUIT DESCRIPTION

DTC P0630 is set when the Vehicle Identification Number (VIN) is not stored in the Engine Control Module (ECM) or the input VIN is not accurate. Input the VIN with the hand–held tester.

DTC No.	DTC Detecting Condition	Trouble Area
P0630	▶VIN is not stored in ECM. ▶Input VIN in ECM is not accurate.	ECM

MONITOR STRATEGY

Related DTCs	P0630	VIN not programmed
Required sensors/components	Main sensors/components	ECM
	Related sensors/components	–
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
VIN code	Not programmed

COMPONENT OPERATING RANGE

Parameter	Standard Value
VIN code	Programmed

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INSPECTION PROCEDURE

1	**Read current DTC.**

NOTICE:
If P0630 is present, the VIN must be input to the ECM using the hand–held tester. However, all DTCs are cleared automatically by the tester when inputting the VIN. If DTCs other than P0630 are present, check them first.

NEXT

2	**Input VIN with hand–held tester (See page DI–14).**

NEXT

END

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DID8F–01

DTC	P1340, P1341	Camshaft Position Sensor ”A” (Bank Sensor 1)

CIRCUIT DESCRIPTION

Camshaft position sensor (G signal) consists of a magnet, iron core and pickup coil.
The camshaft drive gear (LH) has 3 teeth on its inner circumference. When the camshaft gear rotates, air gap changes between the protrusion on the gear and the pickup coil. The change affects the magnetic field and result in change in the resistance of the MRE element.
The crankshaft signal plate has 32 teeth and is mounted on the crankshaft. The crankshaft position sensor generates 32 signals at every engine revolution. The ECM detects the standard crankshaft angle based on the G signal and the actual crankshaft angle and the engine speed by the NE signal.

DTC No.	DTC Detecting Condition	Trouble Area
P1340 P1341	No camshaft position sensor signal to ECM during cranking (2 trip detection logic)	▶Open or short in camshaft position sensor circuit ▶Camshaft position sensor ▶LH camshaft timing pulley ▶ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more	

MONITOR DESCRIPTION

The camshaft position sensor (G signal) consists of a magnet and MRE element.
The camshaft drive gear has 5 teeth on its inner circumference. When the camshaft gear rotates, air gap changes between the protrusion on the gear and the pickup coil. The change affects the magnetic field and result in change in the resistance of the MRE element. The crankshaft angle sensor plate has 32 teeth and output 32 signals every engine revolution. The ECM detects the standard crankshaft angle based on the G signal and actual crankshaft angle and engine speed by NE signal.

MONITOR STRATEGY

Related DTCs	P1340	Camshaft position sensor (Bank 1) range check or rationality
	P1341	Camshaft position sensor (Bank 1) range check or rationality
Required sensors/components	Main sensors/components	Camshaft position sensor
	Related sensors/components	Crankshaft position sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	P1340 case 1 (no signal): 2 driving cycles P1340 case 2 (mis–aligned), P1341: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P1340 Case 1 (No signal):		
Starter	ON	
Minimum battery voltage while starter ON	–	11 V

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P1340 Case 2 (Mis–aligned):		
Engine RPM	600 rpm	–
Starter	OFF	
P1341:		
Starter	After OFF to ON timing	

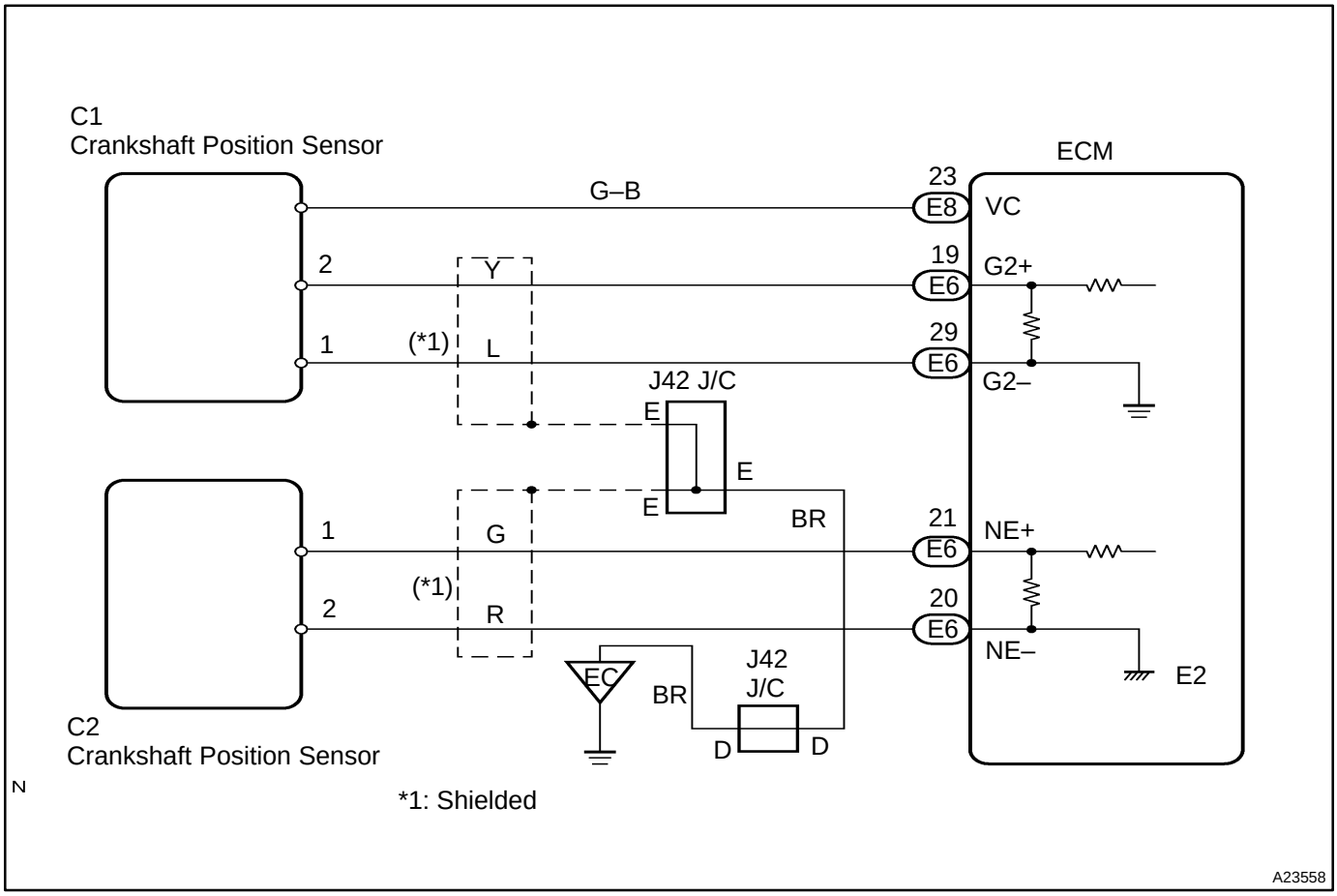
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P1340 Case 1 (No signal):	
Camshaft position sensor signal	No signal
P1340 Case 2 (Mis–aligned):	
Crankshaft/camshaft alignment is mis–aligned (judged by comparing the crankshaft position to the camshaft position)	
Camshaft position sensor signal: No input in appropriate timing.	
P1341:	
Crankshaft/Camshaft alignment	Mis–aligned
Camshaft position sensor count	12 or more / 720°CA (= Engine 2 revolutions)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Camshaft position sensor signal input at every 720°CA	3

WIRING DIAGRAM



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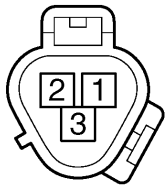
INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand–held tester. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check voltage of camshaft position sensor power source circuit.**

Wire Harness Side:



Camshaft Position Sensor

N B17445

PREPARATION:

(a) Disconnect the Camshaft position sensor connector.

(b) Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminal 3 of the camshaft position sensor connector and body ground.

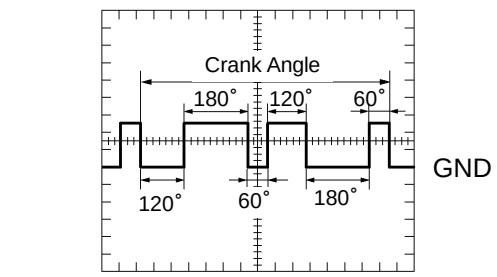
OK:

Standard: 4.5 to 5.5 V

NG → **Repair or replace harness or connector.**

OK

2	**Check camshaft position sensor signal.**



PREPARATION:

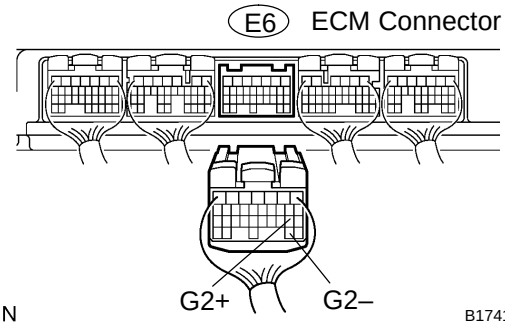
Start the engine.

CHECK:

Check the waveform between the G2+ (E6–19) and G2– (E6–29) of the ECM connector.

OK:

Standard: Correct waveform is as shown.



OK → **Replace ECM (See page IN–35).**

NG

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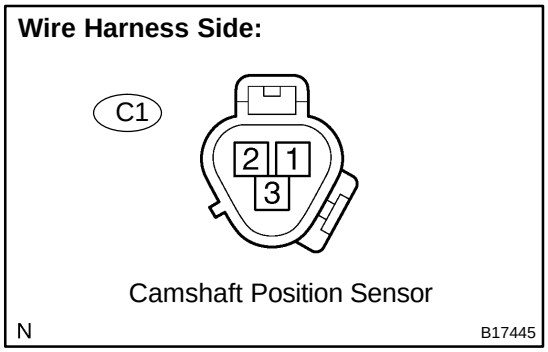
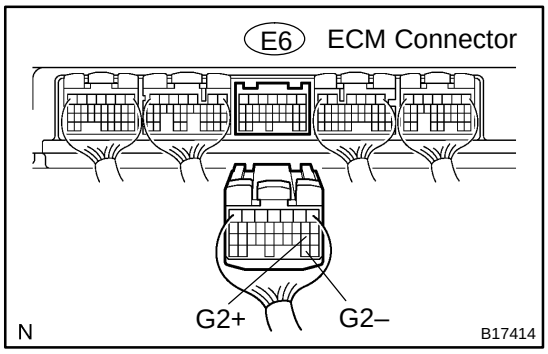
3	Check for open and short in harness and connector between ECM and camshaft position sensor.





PREPARATION:

(a) Disconnect the Camshaft position sensor connector.

(b) Disconnect the E6 ECM connector.

CHECK:

Measure the resistance between wire harness side connectors.

OK:

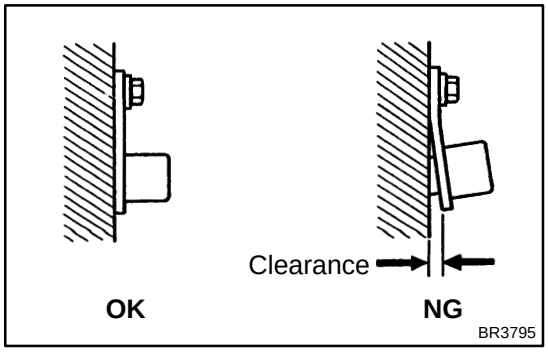
Standard:

Tester Connection	Specified Condition
Camshaft position sensor (C1–2) – G2+ (E6–19)	Below 1 Ω
Camshaft position sensor (C1–1) – G2– (E6–29)	Below 1 Ω
Camshaft position sensor (C1–2) or G2+ (E6–19) – Body ground	10 kΩ or higher
Camshaft position sensor (C1–1) or G2– (E6–29) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

4	Inspect sensor installation and signal plate tooth of LH camshaft timing pulley.



CHECK:

Check the camshaft position sensor installation.

OK:

The camshaft position sensor is installed properly.

NG → **Tighten sensor installation bolt.**

OK

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5	Inspect signal plate tooth of LH camshaft timing pulley.

NG → Replace LH camshaft timing pulley.

OK →

Replace camshaft position sensor.

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DTC	P1440	Secondary Air Injection System Control Valve Circuit Bank 1

DTC	P1443	Secondary Air Injection System Control Valve Circuit Bank 2

CIRCUIT DESCRIPTION

Refer to DTC P0412 on page DI–234.

DTC No.	DTC Detection Condition	Trouble Area
P1440	AIV1 terminal voltage becomes less than half of the +B voltage while the VSV for air injection control is not operating. (1 trip detection logic)	▶Open or short in VSV for air injection control circuit (Bank 1) ▶VSV power source ▶VSV for air injection control (Bank 1) ▶ECM
P1443	AIV2 terminal voltage becomes less than half of the +B voltage while the VSV for air injection control is not operating. (1 trip detection logic)	▶Open or short in VSV for air injection control circuit (Bank 2) ▶VSV power source ▶VSV for air injection control (Bank 2) ▶ECM

MONITOR DESCRIPTION

The ECM detects an open or short in the circuit of the VSV for air injection control according to the AIV1 (AIV2) terminal voltage, stores the DTC, and then illuminates the MIL. When the AIV1 (AIV2) terminal voltage is less than half of the +B voltage while the VSV for air injection control is not operating, the ECM determines it as a malfunction.

MONITOR STRATEGY

Related DTCs	P1440	Secondary air injection system control valve circuit (Bank 1) range check
	P1443	Secondary air injection system control valve circuit (Bank 2) range check
Required sensors/components	VSV for air injection control	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P1440:		
Engine	Running	
Air switching valve No. 2 (Bank 1)	Not operating	
P1443:		
Engine	Running	
Air switching valve No. 2 (Bank 2)	Not operating	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P1440:	
Air switching valve No. 2 (Bank 1) output terminal level	Low
P1443:	
Air switching valve No. 2 (Bank 2) output terminal level	Low

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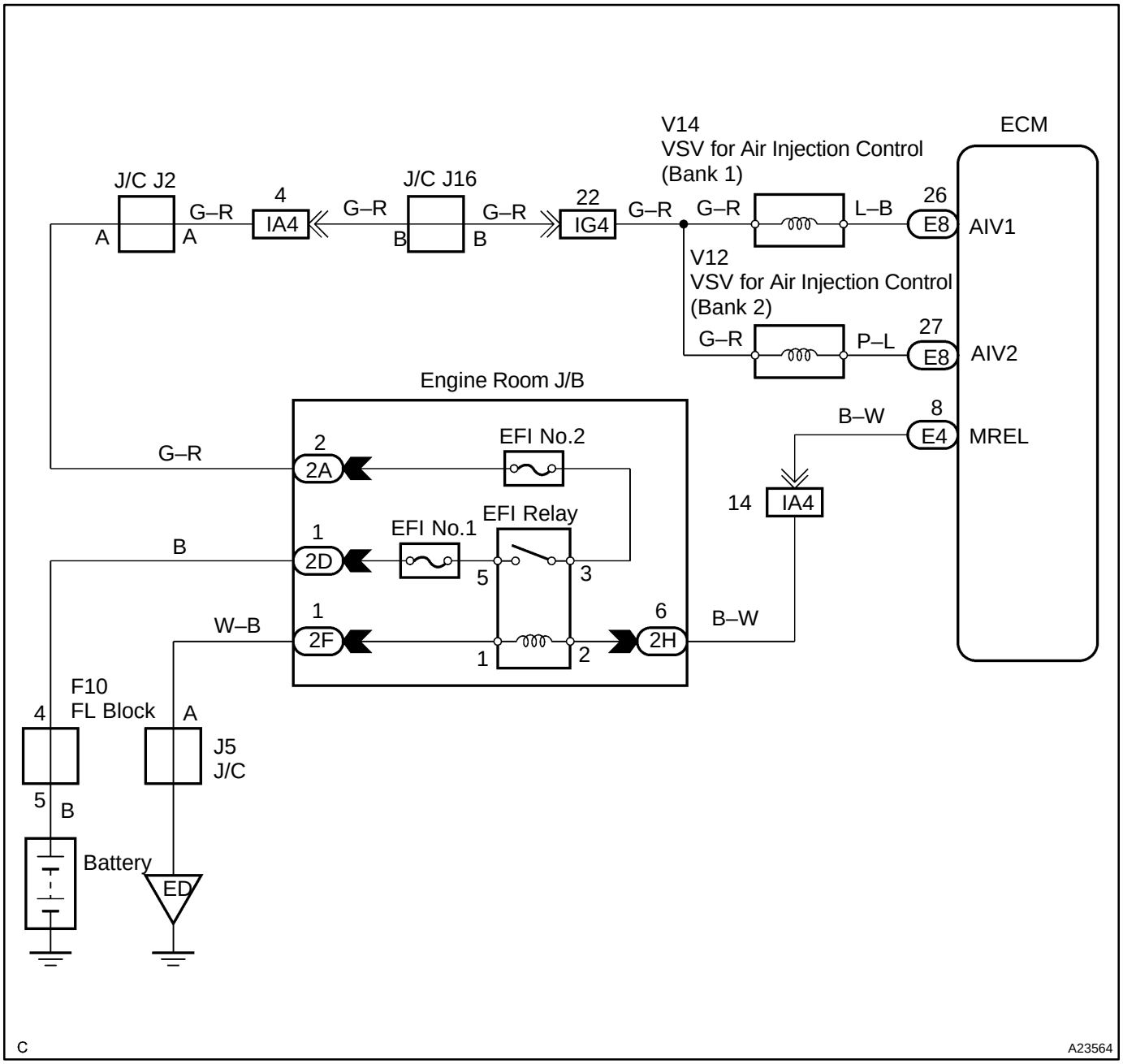
WIRING DIAGRAM



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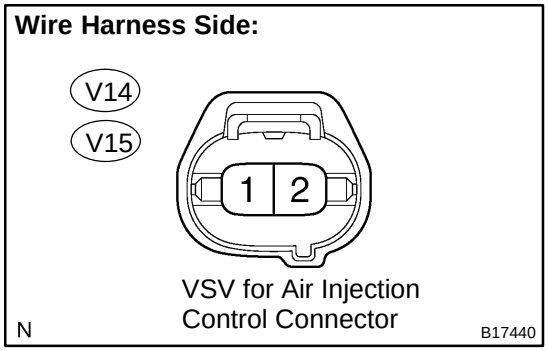
INSPECTION PROCEDURE

1	Check VSV for air injection control power source.



PREPARATION:

(a) Disconnect the VSV for air injection control connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the terminal 1 of the VSV connector and body ground.

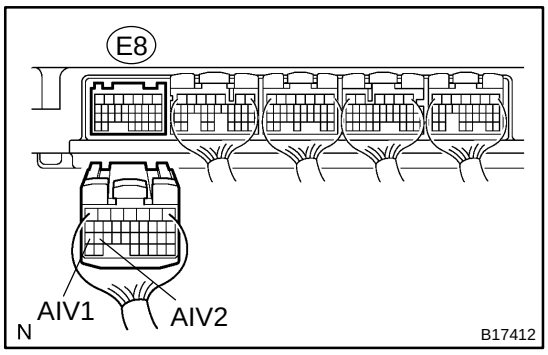
OK:

Standard: 9 V or more

NG	Check and replace harness and connector.

OK

2	Check for open and short circuit in harness and connector between ECM and VSV for air injection control



PREPARATION:

(a) Disconnect the E8 ECM connector.

(b) Disconnect the VSV for air injection control connector.

CHECK:

Measure the resistance between the VSV connector and ECM.

OK:

Standard:

Tester connection	Specified condition
E8–27 (AIV1) – V14–2	Below 1 Ω
E8–26 (AIV2) – V15–2	Below 1 Ω

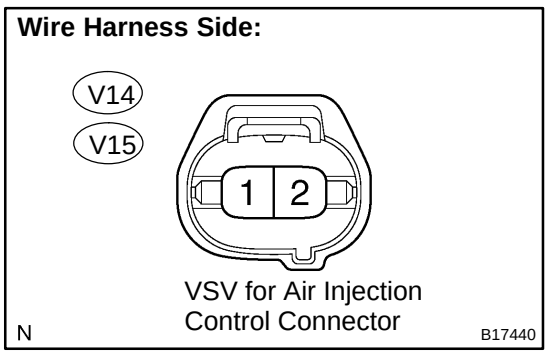
CHECK:

Measure the resistance between the VSV connector and body ground.

OK:

Standard:

Tester connection	Specified condition
E8–27 (AIV1) or V14–2 and Body ground	10 KΩ or higher
E8–26 (AIV1) or V15–2 and Body ground	10 KΩ or higher



NG	Repair or replace harness or connector.

OK

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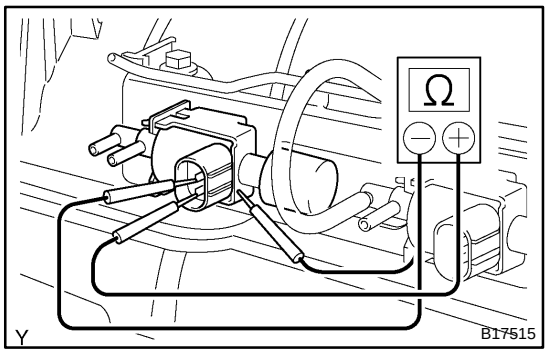
3	Check resistance of VSV for air injection control.



PREPARATION:

(a) Disconnect the connector from the VSV.

(b) Disconnect the 2 vacuum hoses from the VSV.

CHECK:

Measure the resistance between the VSV terminals.

OK:

Standard:

Tester Connection	Specified Condition
1 – 2	33 to 39 Ω at 20°C (68°F)
1 – Body ground	10 kΩ or higher
2 – Body ground	10 kΩ or higher

NG → **Replace VSV for air injection control.**

OK →

Replace ECM. (See page SF–80)

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DTC	P1441	Secondary Air Injection System Switching Valve No.2 Stuck Open Bank 1

DTC	P1444	Secondary Air Injection System Switching Valve No.2 Stuck Open Bank 2

DTC	P2440	Secondary Air Injection System Switching Valve Stuck Open Bank 1

CIRCUIT DESCRIPTION

Refer to DTC P0412 on page DI–234.

DTC No.	DTC Detection Condition	Trouble Area
P1441	**Air switching valve No.2 (bank 1) stuck open:** The pressure sensor detects exhaust pulsation, when both of air switching valve No.2 are OFF (and air switching valve ON). (2 trip detection logic)	▶VSV for air injection control circuit (Bank 1) ▶Air switching valve No.2 (Bank 1) ▶VSV for air injection system (Bank 1) ▶ECM
P1444	**Air switching valve No.2 (bank 2) stuck open:** The pressure sensor detects exhaust pulsation, when both of air switching valve No.2 are OFF (and air switching valve ON). (2 trip detection logic)	▶VSV for air injection control circuit (Bank 2) ▶Air switching valve No.2 (Bank 2) ▶VSV for air injection system (Bank 2) ▶ECM
P2440	**Air switching valve stuck open:** The pressure sensor detects exhaust pulsation when the system does not operate (both of air switching valve No.2 OFF, and air switching valve OFF and air pump OFF). This DTC means open stuck of air switching valve and ”air switching valve No.2 (bank 1 or bank 2)” (1 trip detection logic)	▶Air switching valve ▶Air switching valve No.2 (Bank 1 and/or 2) ▶VSV for air injection system (Bank 1 and/or 2) ▶Air injection driver ▶Air injection driver circuit ▶ECM

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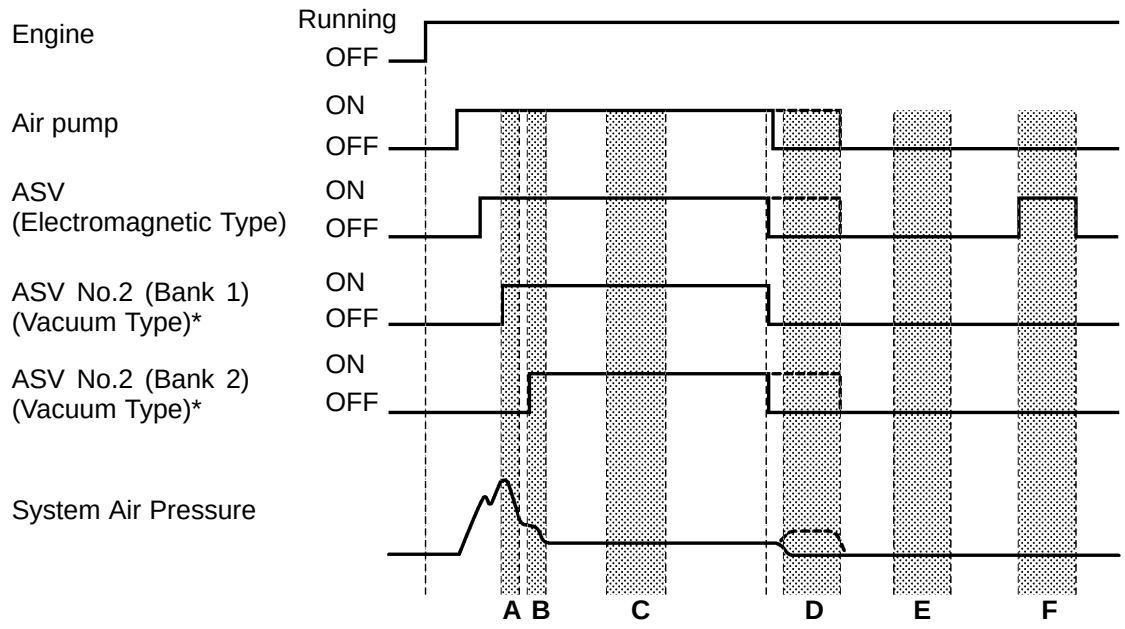
MONITOR DESCRIPTION

The ECM detects pressure change with the pressure sensor to determine malfunctioning parts in the system, and stores the DTCs. The ECM measures pressure and/or exhaust pulsation of the system at 6 points, A to F, when the air injection system is in operation or when not in operation. When the pressure is high, the ECM determines the that pump operates. When exhaust pulsation is detected, the ECM determines that the ASV is open. The ECM determines malfunction parts based on the measured value, and stores the DTCs.
Points A and B:
ECM detects pressure changes (decrease), and determines that the ASV No.2 is open.
Points C and F:
ECM detects pressure and exhaust pulsation, and determines the pressure pattern of the system.
Point D:
ECM operates the system, as indicated by the dashed lines, to determine which of the ASV No.2 is malfunctioning only when pressure changes cannot be detected at point A or B.
Point E:
ECM detects exhaust pulsation to determine the condition of the system.

Monitor Operation Outline



*: ASV No.2 opens alternately per a trip.

B17424

Pressure condition in Secondary Air Injection System (Point C and F)
Pattern 1:

Air Pump	ON
Air Switching Valve and Air Switching Valve No.2	Open
Pressure	1 kPa or more
Pulsation detection	Exhaust gas pulsation detected

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Pattern 2:

Air Pump	OFF
Air Switching Valve and Air Switching Valve No.2	Open
Pressure	Less than 5 kPa
Pulsation detection	Exhaust gas pulsation detected

Pattern 3:

Air Pump	ON
Air Switching Valve and Air Switching Valve No.2	Close
Pressure	1 kPa or more
Pulsation detection	Slight pulsation detected

Pattern 4:

Air Pump	OFF
Air Switching Valve and Air Switching Valve No.2	Close
Pressure	Less than 5 kPa
Pulsation detection	Not detected

Judgement and decision of failure mode:

Monitor						Judgement
C	F	A	B	D	E	DTCs where set
Pattern 1	Pattern 1	Pressure changed	Pressure changed	–	No pulsation detected	P2444, P1441 and P1444
Pattern 1	Pattern 1	No pressure changed	Pressure changed	–	No pulsation detected	P2444 and ”P1441 or P1444”
Pattern 1	Pattern 1	Pressure changed	No pressure changed	Pulsation detected	No pulsation detected	P2444, P1441 and P1444
Pattern 1	Pattern 1	No pressure changed	No pressure changed	Pulsation detected	No pulsation detected	P2444, P1441 and P1444
Pattern 1	Pattern 2	Pressure changed	Pressure changed	–	No pulsation detected	P1441 and P1444
Pattern 1	Pattern 2	No pressure changed	Pressure changed	–	No pulsation detected	P1441 or P1444
Pattern 1	Pattern 2	Pressure changed	No pressure changed	Pulsation detected	No pulsation detected	P1441 and P1444
Pattern 1	Pattern 2	No pressure changed	No pressure changed	Pulsation detected	No pulsation detected	P1441 and P1444
Pattern 1	Pattern 3	Pressure changed	Pressure changed	–	No pulsation detected	P2444
Pattern 1	Pattern 3	No pressure changed	Pressure changed	–	No pulsation detected	P2444 and ”P1442 or P1445”
Pattern 1	Pattern 3	Pressure changed	No pressure changed	No pulsation detected	No pulsation detected	P2444 and ”P1442 or P1445”
Pattern 1	Pattern 3	No pressure changed	No pressure changed	No pulsation detected	No pulsation detected	P2444, P1442 and P1444
Pattern 1	Pattern 4	Pressure changed	Pressure changed	–	No pulsation detected	Normal
Pattern 1	Pattern 4	Pressure changed	No pressure changed	Pulsation detected	No pulsation detected	Normal
Pattern 1	Pattern 4	Pressure changed	No pressure changed	No pulsation detected	No pulsation detected	P1442 or P1445
Pattern 1	Pattern 4	No pressure changed	Pressure changed	–	No pulsation detected	P1442 or P1445
Pattern 1	Pattern 4	No pressure changed	No pressure changed	Pulsation detected	No pulsation detected	P1442 or P1445
Pattern 1	Pattern 4	No pressure changed	No pressure changed	No pulsation detected	No pulsation detected	P1442 and P1445
Pattern 2	–	No pressure changed	No pressure changed	–	_	P2445
Pattern 3	Pattern 3	No pressure changed	No pressure changed	No pulsation detected	No pulsation detected	P2441, P2444, P1442 and P1445
Pattern 3	Pattern 4	No pressure changed	No pressure changed	No pulsation detected	No pulsation detected	P2441, P1442 and P1445
Pattern 4	–	No pressure changed	No pressure changed	–	_	P2445
–	–	–	–	–	Pulsation detected	P2440 and ”P1441 or P1444”

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MONITOR STRATEGY

Related DTCs	P1441	Air switching valve No. 2 (Bank 1) is stuck open
	P1444	Air switching valve No. 2 (Bank 2) is stuck open
	P2440	Air switching valve and air switching valve No. 2 are stuck open
Required sensors/components	Pressure sensor, Air switching valve No. 2 (Bank 1, 2), Electromagnetic air switching valve	
Frequency of operation	Continuous	
Duration	P1441 (Air switching valve No. 2 (Bank 1) is stuck open): 20 sec. P1444 (Air switching valve No. 2 (Bank 2) is stuck open): 20 sec. P2440 (Air switching valve and air switching valve No. 2 are stuck open): 18 sec.	
MIL operation	P1441 (Air switching valve No. 2 (Bank 1) is stuck open): 2 driving cycles P1444 (Air switching valve No. 2 (Bank 2) is stuck open): 2 driving cycles P2440 (Air switching valve and air switching valve No. 2 are stuck open): 1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P1441, P1444: Air switching valve No. 2 bank 1 and/or bank 2 are stuck open

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
CASE 1		
Atmospheric pressure	76 kPa (570 mmHg)	–
Battery voltage	11.5 V	–
Time after secondary air injection out of operation	10 sec.	–
AIR pump	OFF	
Time after engine start	10 sec.	–
Air switching valve No. 2 (Bank 1)	OFF	
Air switching valve No. 2 (Bank 2)	OFF	
Air injection pressure sensor fail	Not detected	
Air switching valve	ON	
Engine RPM	–	3,750 rpm
CASE 2		
Atmospheric pressure	76 kPa (570 mmHg)	–
Battery voltage	11.5 V	–
AIR pump	OFF	
Time after engine start	10 sec.	–
Air switching valve No. 2 (Bank 1)	OFF	
Air switching valve No. 2 (Bank 2)	OFF	
Air injection pressure sensor fail	Not detected	
Engine load	0%	–
Intake air amount	40 g/sec	–
IAT at engine start	–15˚C (5˚F)	–
ECT at engine start	–	5˚C (41˚F)

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Air switching valve	ON	
Engine RPM	–	3,750 rpm

P2440: Electromagnetic air switching valve and air switching valve No. 2 are stuck open

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Atmospheric pressure	76 kPa (570 mmHg)	–
Battery voltage	11.5 V	–
Time after secondary air injection out of operation	10 sec.	–
Cumulative intake air amount	172 g	–
AIR pump	OFF	
Air switching valve	OFF	
Air switching valve No. 2 (Bank 1)	OFF	
Air switching valve No. 2 (Bank 2)	OFF	
Engine RPM	–	3,750 rpm
Air injection pressure sensor fail	Not detected	

TYPICAL MALFUNCTION THRESHOLDS

P1441, P1444: Air switching valve No. 2 bank 1 and/or bank 2 are stuck open

Detection Criteria	Threshold
CASE 1:	
Both of the following conditions are met	Condition (a) and (b)
(a) Cumulative pressure pulsation (When AI OFF)	20 kPa (150 mmHg) or more
(b) Air pressure change (When ASV No.2 open) (P1441 (Bank 1), P1444 (Bank 2))	Less than 1 kPa (7.5 mmHg) or more
CASE 2:	
Detected times of identifying condition 1 is met	4 times or more
1. Cumulative pressure pulsation	100 kPa (750 mmHg) or more

P2440: Electromagnetic air switching valve and air switching valve No. 2 are stuck open

Detection Criteria	Threshold
Detected times of identifying condition 1 is met	4 times or more
1. Cumulative pressure pulsation	100 kPa (750 mmHg) or more

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MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.
- ▶ Scaling is used to calculate the test value indicated on generic tools.

Secondary air injection (AIR) system

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$71	$E1	Multiply by 0.01 (g/s)	Test value of AIR amount insufficient	Minimum test limit	Maximum test limit
$71	$E2	Multiply by 0.01 (kPa)	Test value of AIR pump stuck ON	Minimum test limit	Maximum test limit
$71	$E3	Multiply by 0.01 (kPa)	Test value of AIR pump stuck OFF	Minimum test limit	Maximum test limit
$71	$E4	Multiply by 0.01 (kPa)	Test value of AIR control valve ON	Minimum test limit	Maximum test limit
$71	$E5	Multiply by 0.01 (kPa)	Test value of AIR control valve OFF	Minimum test limit	Maximum test limit
$71	$E6	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR valve	Minimum test limit	Maximum test limit
$71	$E7	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR VSV bank 1	Minimum test limit	Maximum test limit
$71	$E8	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR VSV bank 2	Minimum test limit	Maximum test limit
$71	$E9	Multiply by 0.01 (kPa)	Test value of AIR pressure pulsation for AIR VSV when AIR pressure is low	Minimum test limit	Maximum test limit

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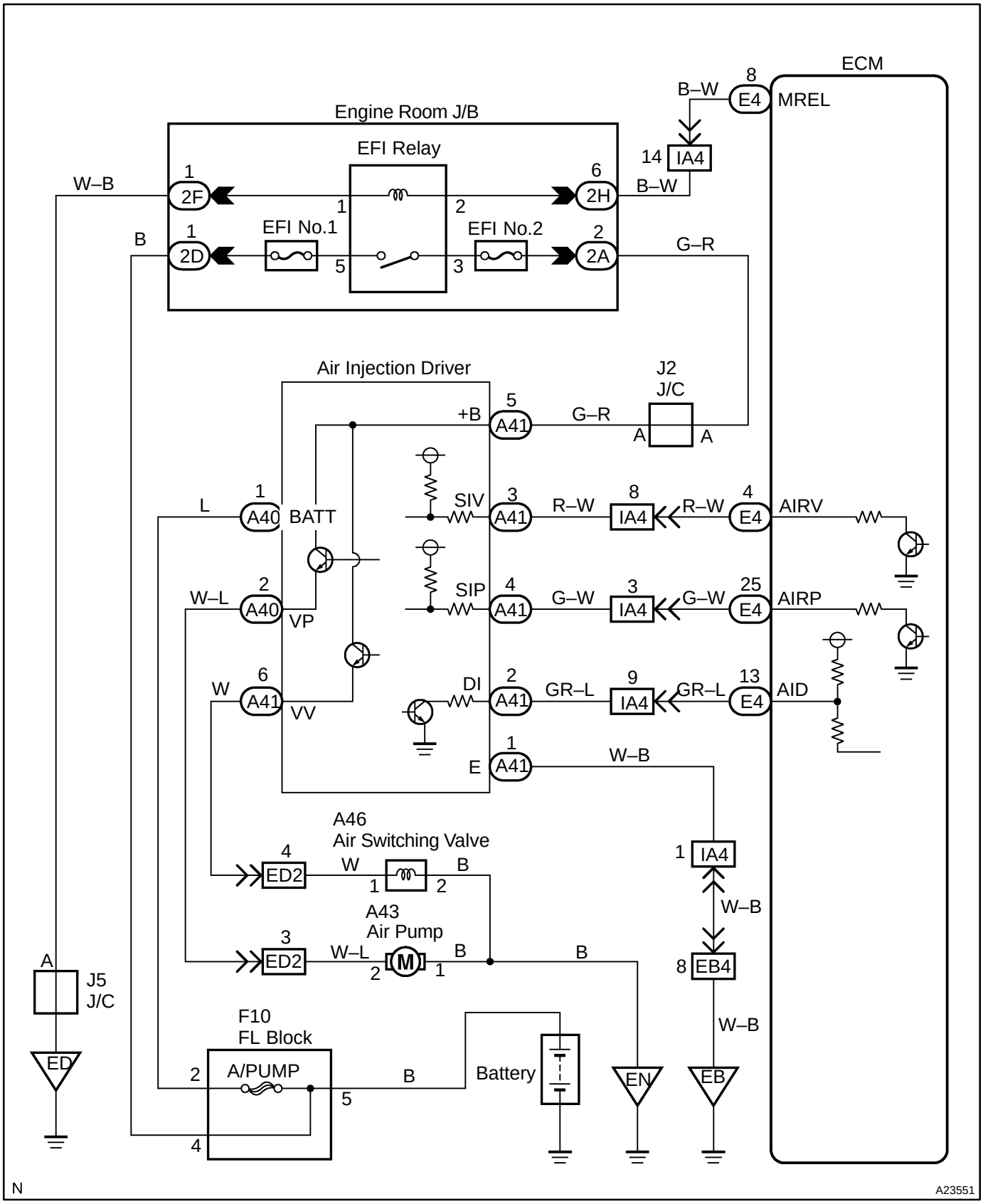
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check any other DTCs output (In addition to secondary air injection system DTCs).**

PREPARATION:

(a) Connect hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

(a) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
”P1441 and/or P1444” and P2440	A
P1441 and/or P1444	B
”P1441 and/or P1444 and/or P2440” and other DTCs	C

HINT:

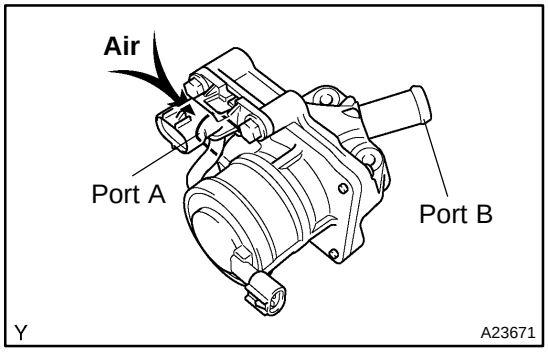
If any DTCs other than P1441, P1444 or P2440 are output, troubleshoot those DTCs first.

B → **Go to step 7.**

C → **Go to DTC chart (See page DI–58).**

A

2	**Check air switching valve operation.**



PREPARATION:

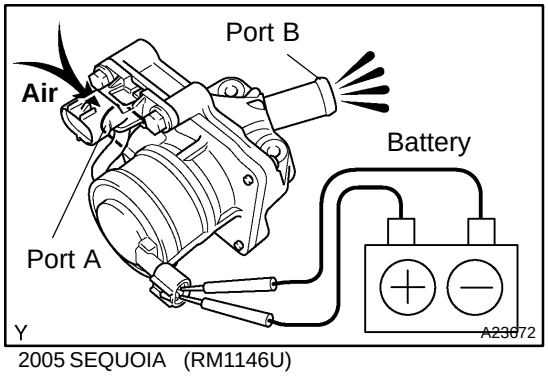
(a) Remove the intake manifold (see page EM–36).
(b) Remove the air switching valve.

CHECK:

Blow air into port A and check that air is not discharged from port B.

OK:

Not discharged



CHECK:

(a) Apply battery positive across the terminals.
(b) Blow air into port A and check that air is discharged from port B.

OK:

Discharged

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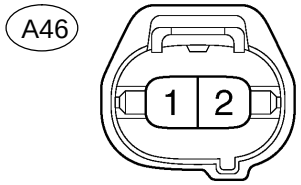
NG → **Replace air switching valve and go to step 7.**

OK

3	**Check voltage between terminal 1 of air switching valve and body ground.**

Wire Harness Side:



Air Switching Valve Connector

N B17440

PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A46 air switching valve connector.
(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal 1 of the air switching valve connector and body ground.

OK:

Standard:

Tester Connection	Specified Condition
A46–1 – Body ground	Below 1.0 V

NG → **Go to step 4.**

OK

Check for intermittent problems (See page DI–11) and go to step 7.

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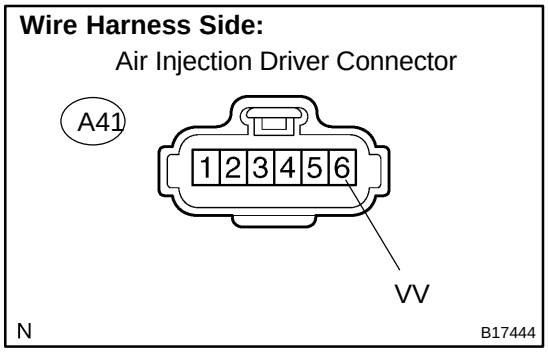
4	Check for open and short in harness and connector between air injection driver and air switching valve.



PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A41 air injection driver connector.
(c) Disconnect the A46 air switching valve connector.
(d) Disconnect the battery positive terminal cable.

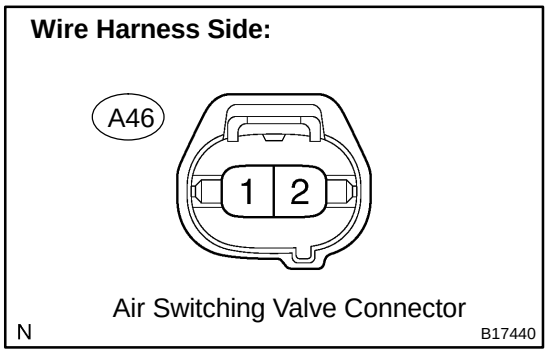
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

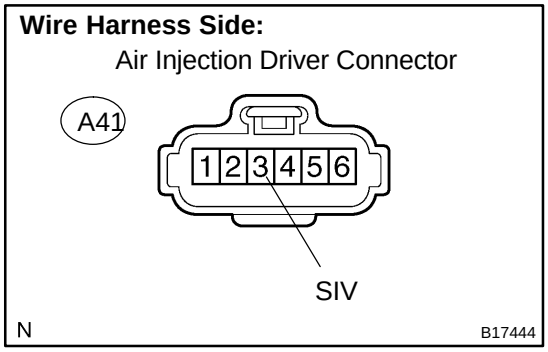
Tester Connection	Specified Condition
VV (A41–6) – A46–1	Below 1 Ω
VV (A41–6) or A46–1 – Battery positive terminal cable	10 kΩ or higher



NG → **Repair or replace harness or connector.**

OK

5	Check voltage between SIV terminal of air injection driver and body ground.



PREPARATION:

(a) Disconnect the A41 air injection driver connector.
(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal 3 (SIV) of the air injection driver connector and body ground.

OK:

Standard:

Tester Connection	Specified Condition
3 (SIV) – Body ground	10 V or more

NG → **Go to step 6.**

OK

Replace air injection driver.

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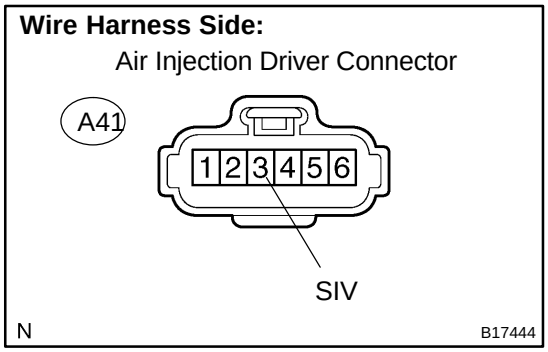
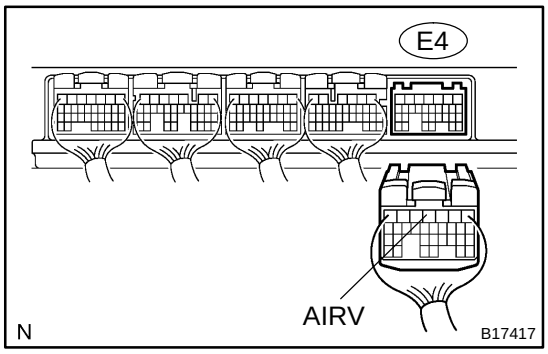
6	Check for open and short in harness and connector between air injection driver and ECM.





PREPARATION:

(a) Disconnect the air injection driver connector.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
SIV (A41–3) – AIRV (E4–4)	Below 1 Ω
SIV (A41–3) or AIRV (E4–4) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF–80).

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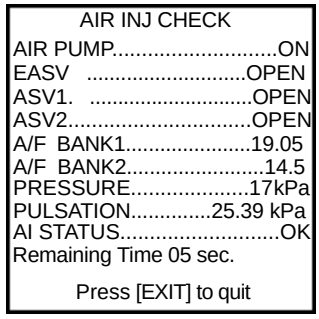
7	Check air switching valve No.2 operation.



PREPARATION:

(a) Start the engine and warm it up.
(b) Turn the ignition switch to OFF.
(c) Connect the hand–held tester to the DLC3.
(d) Start the engine and push the hand–held tester main switch ON.

CHECK:

(a) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/ AIR INJ CHECK/ MANUAL OPERATION/OPERATION 5 and 6

HINT:

OPERATION 5: AP:ON, EASV:OPEN, ASV1:OPEN, ASV2:CLOSE

OPERATION 6: AP:ON, EASV:OPEN, ASV1:CLOSE, ASV2:OPEN

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

(b) Read value of the A/F BANK1 and BANK2 on the hand–held tester.

RESULT:

Air switching valve No.2 operation	Air–fuel ratio
Open	18 or more
Close	Approximately 14.5

HINT:

- When the ASV No.2 operates normally, the A/F value is 18 or more when the valve is open, and approximately 14.5 when the valve is closed.
- Perform the following procedures only on the bank of which the valve is not close.

NEXT

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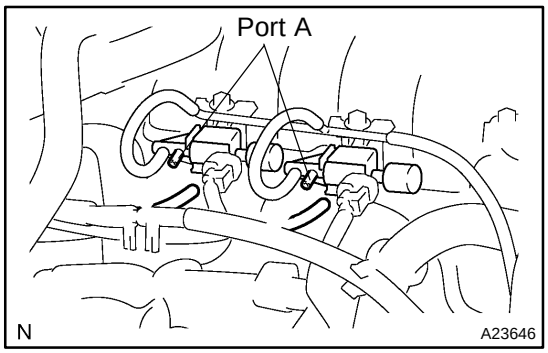
8	Check VSV for air injection control operation.



PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the vacuum hose from the VSV for air injection control.
(c) Connect the hand–held tester to the DLC3.
(d) Start the engine and turn the tester ON.

CHECK:

(a) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/ AIR INJ CHECK/ MANUAL OPERATION/OPERATION 1
(b) At this time, check that no negative pressure generates at port A of the VSV.

HINT:

OPERATION 1: AP: OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

No negative pressure is generated.

NG → **Go to step 10.**

OK

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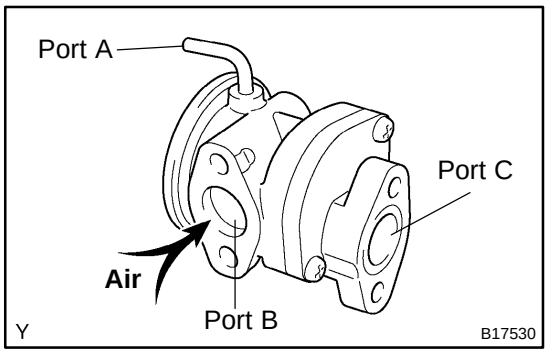
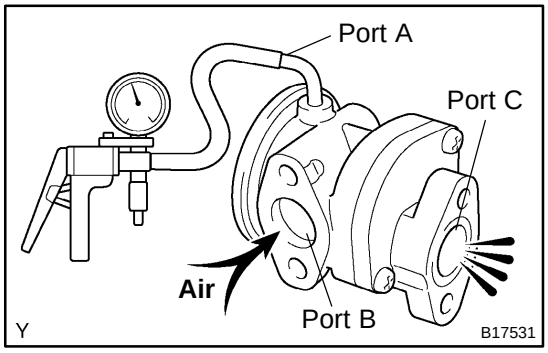
9	Check air switching valve No.2 operation.



PREPARATION:
Remove the air switching valve No.2.
CHECK:
Blow air into port B and check that air is not discharged from port C.
OK:
Not discharged from port C



CHECK:
Apply vacuum 30 kPa (225 mmHg) to port A, blow air into port B and check that air is discharged from port C.
OK:
Discharged from port C

NG → **Replace air switching valve No.2.**

OK

Check for intermittent problems (See page DI–11).

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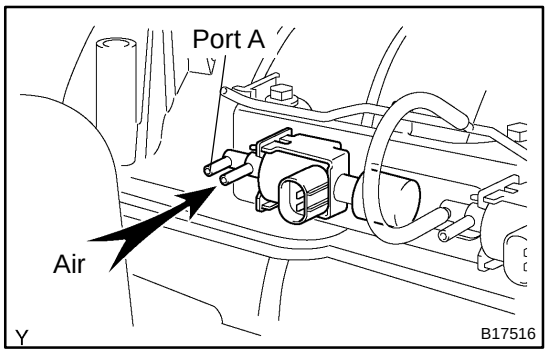
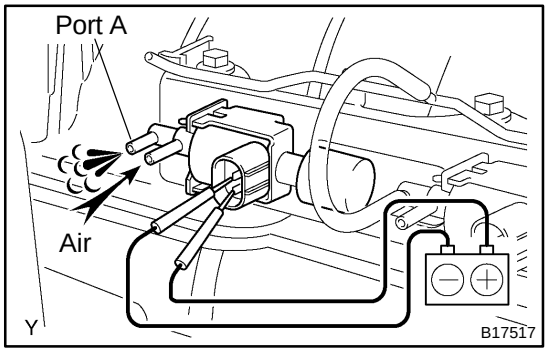
10	Check VSV for air injection control.



PREPARATION:
Disconnect the connector from the VSV for air injection control.
CHECK:
Check that air does not flow from the port as shown in the illustration.
OK:

Does not flow from port A



CHECK:
Apply battery positive across the terminals, check that air flows from the ports.
OK:

Flows from port A

NG → **Replace VSV for air injection control.**

OK

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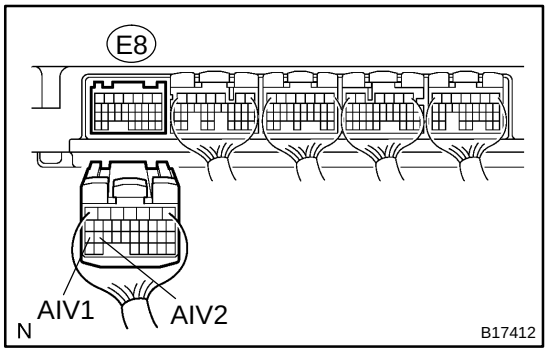
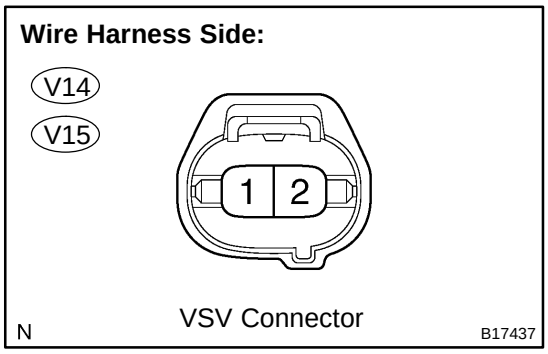
11	Check for open and short circuit in harness and connector between ECM and VSV for air injection system control





PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the E8 ECM connector.
(c) Disconnect the VSV for air injection system control connector.

CHECK:

Measure the resistance between the VSV connector and ECM.

OK:

Standard:

Tester connection	Specified condition
E8–27 (AIV1) – V14–2	Below 1 Ω
E8–26 (AIV1) – V15–2	Below 1 Ω

CHECK:

Measure the resistance between the VSV connector and body ground.

OK:

Standard:

Tester connection	Specified condition
E8–27 (AIV1) or V14–2 and Body ground	10 KΩ or higher
E8–26 (AIV1) or V15–2 and Body ground	10 KΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Replace ECM (See page SF–80).

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DTC	P1442	Secondary Air Injection System Switching Valve No.2 Stuck Close Bank 1

DTC	P1445	Secondary Air Injection System Switching Valve No.2 Stuck Close Bank 2

DTC	P2441	Secondary Air Injection System Switching Valve Stuck Close Bank 1

CIRCUIT DESCRIPTION

Refer to DTC P0412 on page DI–234.

DTC No.	DTC Detection Condition	Trouble Area
P1442	**Air switching valve No.2 (bank 1) stuck close:** No pressure change (decrease) after the ECM sends an open air switching valve No.2 (bank 1) signal. (2 trip detection logic)	▶VSV for air injection control circuit (Bank 1) ▶Vacuum hose (VSV for air injection control – air switching valve No.2) ▶Air injector pipe (Air switching valve No.2 – exhaust manifold) ▶Air switching valve No.2 (Bank 1) ▶VSV for air injection control (Bank 1) ▶ECM
P1445	**Air switching valve No.2 (bank 2) stuck close:** No pressure change (decrease) after the ECM sends an open air switching valve No.2 (bank 2) signal. (2 trip detection logic)	▶VSV for air injection control circuit (Bank 2) ▶Vacuum hose (VSV for air injection control – air switching valve No.2) ▶Air injector pipe (Air switching valve No.2 – exhaust manifold) ▶Air switching valve No.2 (Bank 2) ▶VSV for air injection control (Bank 2) ▶ECM
P2441	**Air switching valve stuck close:** The pressure sensor does not detect exhaust pulsation when system operates. (All of air switching valve ON) This DTC means either of following conditions. (a) Electromagnetic air switching valve stuck closed. (b) Both of ”air switching valve No.2 bank 1” and ”air switching valve No.2 bank 2” stuck closed. (2 trip detection logic)	▶Vacuum hoses (Throttle body – VSVs for air injection control) ▶Air switching valve ▶Air injector pipe (Air switching valve No.2 – exhaust manifold) ▶Air injection hose ▶Air switching valve No.2 (Bank 1 and/or 2) ▶VSV for air injection control (Bank 1 and/or 2) ▶Air injection driver ▶Air injection driver circuit ▶ECM

MONITOR DESCRIPTION

Refer to DTC P1441, P1444 and P2440 on page DI–314.

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MONITOR STRATEGY

Related DTCs	P1442	Air switching valve No. 2 (Bank 1) is stuck closed
	P1445	Air switching valve No. 2 (Bank 2) is stuck closed
	P2441	Air switching valve and air switching valve No.2 are stuck closed
Required sensors/components	Pressure sensor, Air switching valve No. 2 (Bank 1, 2), Electromagnetic air switching valve	
Frequency of operation	Continuous	
Duration	P1442 (Air switching valve No. 2 (Bank 1) is stuck closed): 20 sec. P1445 (Air switching valve No. 2 (Bank 2) is stuck closed): 20 sec. P2441 (Air switching valve is stuck closed): 8 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P1442, P1445: Air switching valve No. 2 bank 1 and/or bank 2 are stuck closed

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Atmospheric pressure	76 kPa (570 mmHg)	–
Battery voltage	11.5 V	–
Idle	ON	
Engine RPM	–	3,750 rpm
Time after secondary air injection out of operation	10 sec.	–
Air injection pressure sensor fail	Not detected	

P2441: Electromagnetic air switching valve is stuck closed or air switching valve No. 2 (Bank 1 and Bank 2) are stuck closed

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Atmospheric pressure	76 kPa (570 mmHg)	–
Battery voltage	11.5 V	–
Time after secondary air injection in operation	6 sec.	–
AIR pump	ON	
Air switching valve	ON	
Air switching valve No. 2 (Bank 1)	ON	
Air switching valve No. 2 (Bank 2)	ON	
Engine RPM	–	3,750 rpm
Delay time after engine started	6 sec.	–
Air injection pressure sensor fail	Not detected	

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TYPICAL MALFUNCTION THRESHOLDS

P1442: Air switching valve No. 2 bank 1 is stuck closed

Detection Criteria	Threshold
Both of following conditions are met	Condition 1 and 2
1. Cumulative pressure pulsation	15 kPa (113 mmHg) or more (when AI ON (Air pump ON, all of air switching valves are ON)
2. Air pressure change	Less than 1 kPa (7.5 mmHg) (when opening air switching valve No. 2 (Bank 1))

P1445: Air switching valve No. 2 bank 2 is stuck closed

Detection Criteria	Threshold
Both of following conditions are met	Condition 1 and 2
1. Cumulative pressure pulsation	15 kPa (113 mmHg) or more (when AI ON (Air pump ON, all of air switching valves are ON)
2. Air pressure change	Less than 1 kPa (7.5 mmHg) (when opening air switching valve No. 2 (Bank 2))

P2441: Electromagnetic air switching valve is stuck closed or air switching valve No. 2 (Bank 1 and Bank 2) are stuck closed

Cumulative pressure pulsation	Less than 15 kPa (113 mmHg) (when AI ON (Air pump ON, all of air switching valves are ON)

MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.
- ▶ Scaling is used to calculate the test value indicated on generic OBD ll scan tools.

Secondary air injection (AIR) system

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$71	$E1	Multiply by 0.01 (g/s)	Test value of AIR amount insufficient	Minimum test limit	Maximum test limit
$71	$E2	Multiply by 0.01 (kPa)	Test value of AIR pump stuck ON	Minimum test limit	Maximum test limit
$71	$E3	Multiply by 0.01 (kPa)	Test value of AIR pump stuck OFF	Minimum test limit	Maximum test limit
$71	$E4	Multiply by 0.01 (kPa)	Test value of AIR control valve ON	Minimum test limit	Maximum test limit
$71	$E5	Multiply by 0.01 (kPa)	Test value of AIR control valve OFF	Minimum test limit	Maximum test limit
$71	$E6	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR valve	Minimum test limit	Maximum test limit
$71	$E7	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR VSV bank 1	Minimum test limit	Maximum test limit
$71	$E8	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR VSV bank 2	Minimum test limit	Maximum test limit
$71	$E9	Multiply by 0.01 (kPa)	Test value of AIR pressure pulsation for AIR VSV when AIR pressure is low	Minimum test limit	Maximum test limit

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WIRING DIAGRAM

Refer to DTC P1441, P1444 and P2440 on page DI–314.

INSPECTION PROCEDURE

1	**Check any other DTCs output (In addition to secondary air injection system DTCs).**

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

(a) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
”P1442 and/or P1445” and P2441	A
P1442 and/or P1445	B
”P1442 and/or P1445 and/or P2441” and other DTCs	C

HINT:

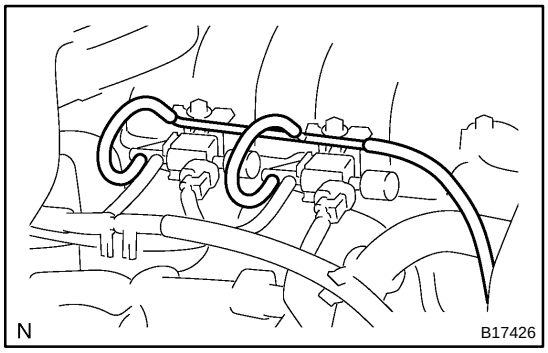
If any DTCs other than P1441 and/or P1444 and P2440 are output, troubleshoot those DTCs first.

B → **Go to step 6.**

C → **Go to DTC chart (See page DI–58).**

A

2	**Check vacuum hose between throttle body and VSV for air injection control.**



CHECK:

(a) Check that the vacuum hoses between the throttle body and VSV for air injection control are securely connected.

OK:

The vacuum hoses are securely connected.

CHECK:

(a) Check the vacuum hoses for blockage or damage.

OK:

The vacuum hoses are no blockages and damage.

NG → **Repair or replace vacuum hoses.**

OK

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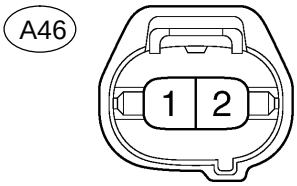
3	Check voltage between terminal 1 of air switching valve and body ground.

Wire Harness Side:



Air Switching Valve Connector

N B17440

PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A46 air switching valve connector.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.

CHECK:

(a) When the air switching valve is operated using the hand–held tester, measure voltage between terminal A46–1 of the air switching valve connector and body ground.
(b) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/AIR INJ CHECK/MANUAL OPERATION/OPERATION 1 and 4

HINT:

OPERATION 1: AP:OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

OPERATION 4: AP:OFF, EASV:OPEN, ASV1:CLOSE, ASV2:CLOSE

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Standard:

Tester operation	Tester Connection	Specified Condition
Operation 4	A46–1 – Body ground	10 V or more
Operation 1	A46–1 – Body ground	Below 1.0 V

NG	Go to step 12.

OK

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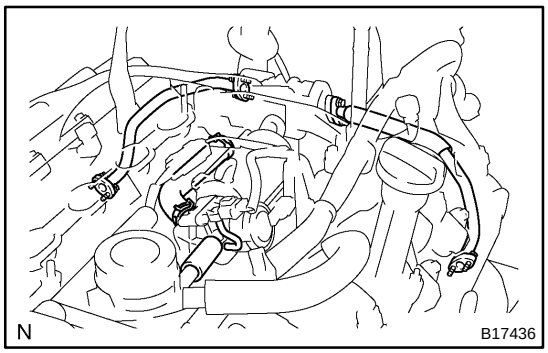
4	Check all air injection pipes and hoses of air injection system.



CHECK:

(a) Remove the intake manifold (see page EM–36).

(b) Check all pipes and hoses of the air injection system.

OK:

All the air injection pipes and hoses are securely connected.

CHECK:

(a) Check all pipes and hoses of the air injection system for blockage or damage.

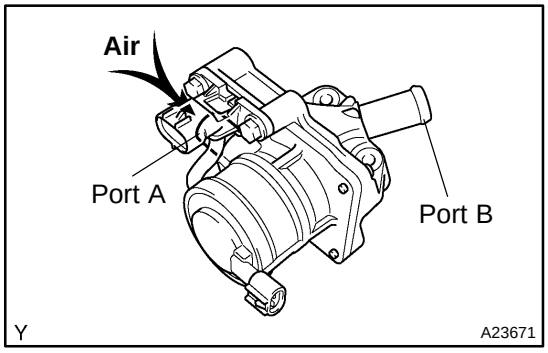
OK:

The air injection system pipes and hoses have no blockage or damage.

NG	Repair or replace pipe or hose.

OK

5	Check air switching valve operation.



PREPARATION:

(a) Remove the intake manifold (see page EM–36).

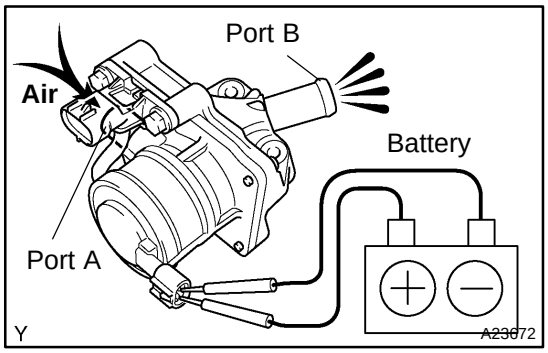
(b) Remove the air switching valve.

CHECK:

Blow air into port A and check that air is not discharged from port B.

OK:

Not discharged



CHECK:

(a) Apply battery positive across the terminals.

(b) Blow air into port A and check that air is discharged from port B.

OK:

Discharged

NG	Replace air switching valve and go to step 6.

OK

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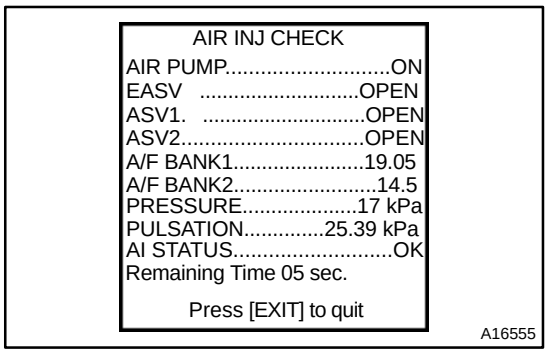
6	Check air switching valve No.2 operation.



PREPARATION:

(a) Start the engine and warm it up.
(b) Turn the ignition switch to OFF.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to ON and push the hand–held tester main switch ON.

CHECK:

(a) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/ AIR INJ CHECK/ MANUAL OPERATION/OPERATION 5 and 6

HINT:

OPERATION 5: AP:ON, EASV:OPEN, ASV1:OPEN, ASV2:CLOSE

OPERATION 6: AP:ON, EASV:OPEN, ASV1:CLOSE, ASV2:OPEN

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

(b) Read value of the A/F BANK1 and BANK2 on the hand–held tester.

RESULT:

Air switching valve No.2 operation	Air–fuel ratio
Open	18 or more
Close	Approximately 14.5

HINT:

- ▶ When the ASV No.2 operates normally, the A/F value is 18 or more when the valve is open, and approximately 14.5 when the valve is closed.
- ▶ Perform the following procedures only on the bank of which the valve is not open.

NEXT

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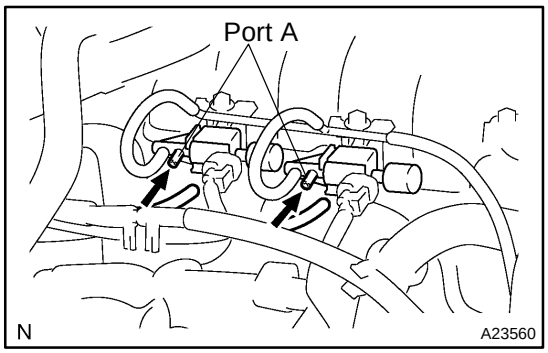
7	Check VSV for air injection control operation.



PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the vacuum hose from the VSV for air injection control.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to ON and turn the tester ON.

CHECK:

(a) When the air switching valve is operated using the hand–held tester, check that negative pressure from the port A.
(b) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/ AIR INJ CHECK/ MANUAL OPERATION/OPERATION 2

HINT:

OPERATION 2: AP: ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Negative pressure from port A

NG	**Go to step 10.**

OK

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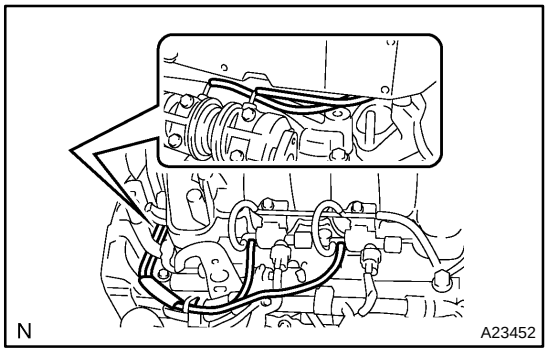
8	Check vacuum hose between air switching valve(s) No.2 and VSV for air injection control.



CHECK:

(a) Check that the vacuum hoses between the air switching valve(s) No.2 and VSV for air injection control are securely connected.

OK:

The vacuum hose(s) are securely connected.

CHECK:

(a) Check the vacuum hoses for blockages and damage.

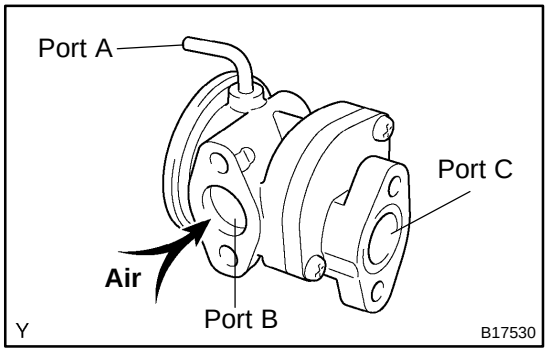
OK:

The vacuum hoses no blockages and damages.

NG → **Repair or replace vacuum hose.**

OK

9	Check air switching valve No.2 operation.



PREPARATION:

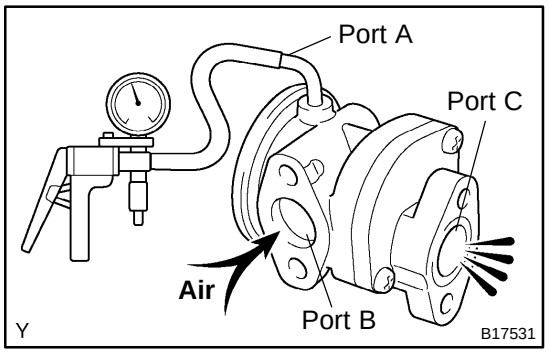
Remove the air switching valve No.2.

CHECK:

Blow air into port B and check that air is not discharged from the port C.

OK:

Not discharged from port C



CHECK:

Apply vacuum 30 kPa (225 mmHg) to port A, blow air into port B and check that air is discharged from the port C.

OK:

Discharged from port C

NG → **Replace air switching valve No.2.**

OK

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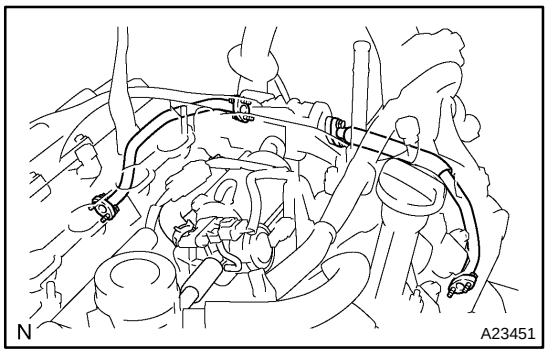
10	Check air injection pipe between air switching valve No.2 and exhaust manifold.



CHECK:

(a) Check that the air injection pipe between the air switching valve(s) No.2 and exhaust manifold is securely connected.

OK:

The air injection pipe is securely connected.

CHECK:

(a) Check the air injection pipe for blockages and damage.

OK:

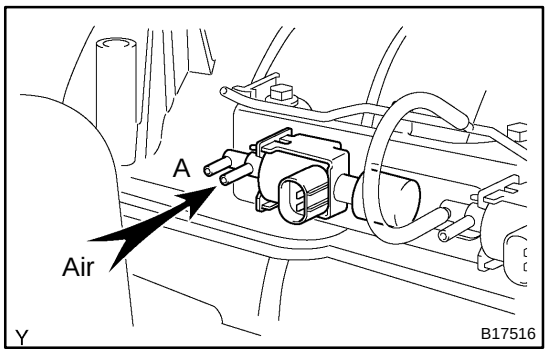
The air injection pipe have no blockages and damage.

NG → **Repair or replace air injection pipe.**

OK

Check for intermittent problems (See page DI–11).

11	Check VSV for air injection control.



PREPARATION:

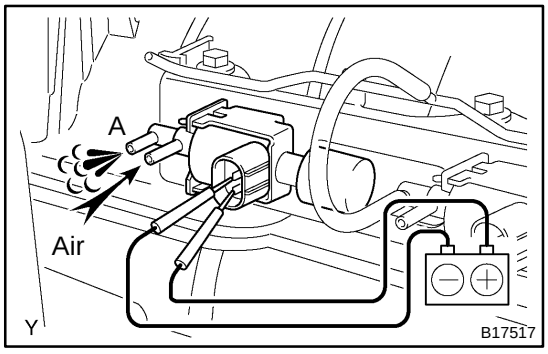
Disconnect the 2 vacuum hoses.

CHECK:

Check that air does not flow from the port A as shown in the illustration.

OK:

Not flow from port A



CHECK:

Apply battery positive across the terminals, check that air flows from the port A.

OK:

Flow from port A

NG → **Replace VSV for air injection control.**

OK

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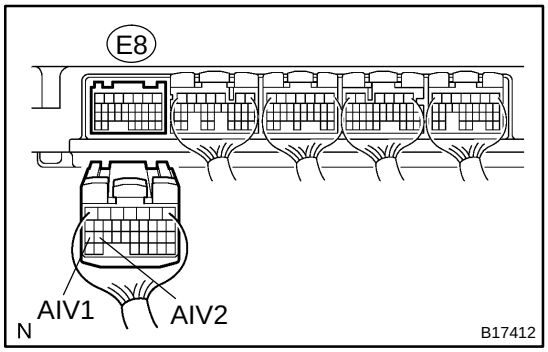
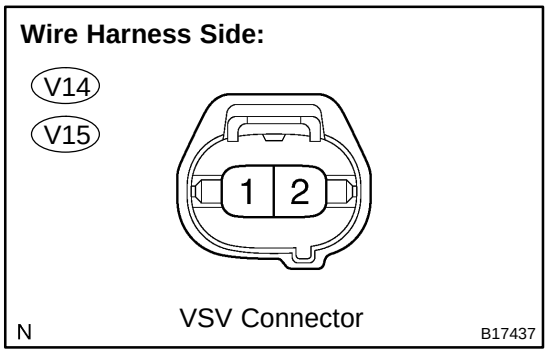
12	Check for open and short circuit in harness and connector between ECM and VSV for air injection system control





PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the E8 ECM connector.
(c) Disconnect the VSV for air injection system control connector.

CHECK:

Measure the resistance between the VSV connector and ECM.

OK:

Standard:

Tester connection	Specified condition
E8–27 (AIV1) – V14–2	Below 1 Ω
E8–26 (AIV1) – V15–2	Below 1 Ω

CHECK:

Measure the resistance between the VSV connector and body ground.

OK:

Standard:

Tester connection	Specified condition
E8–27 (AIV1) or V14–2 and Body ground	10 KΩ or higher
E8–26 (AIV1) or V15–2 and Body ground	10 KΩ or higher

NG → **Repair or replace harness or connector.**

OK

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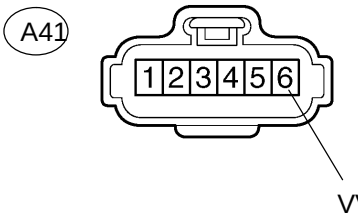
13	Check for open and short in harness and connector between air injection driver and air switching valve.

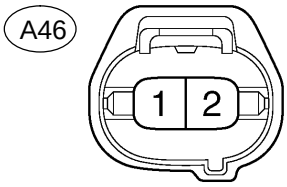
Wire Harness Side:

Air Injection Driver Connector



N B17444

Wire Harness Side:



Air Switching Valve Connector

N B17440

PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A41 air injection driver connector.
(c) Disconnect the A46 air switching valve connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

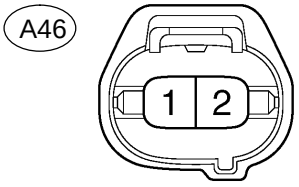
Tester Connection	Specified Condition
VV (A41–6) – A46–1	Below 1 Ω
VV (A41–6) or A46–1 – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector and go to step 6.**

OK

14	Check for open in harness and connector between air switching valve and body ground.

Wire Harness Side:



Air Switching Valve Connector

N B17440

PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A46 air switching valve connector.

CHECK:

Measure the resistance between the wire harness side connectors and body ground.

OK:

Standard:

Tester Connection	Specified Condition
A46–2 – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector and go to step 6.**

OK

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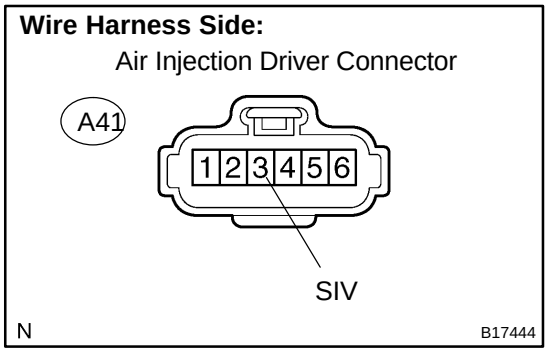
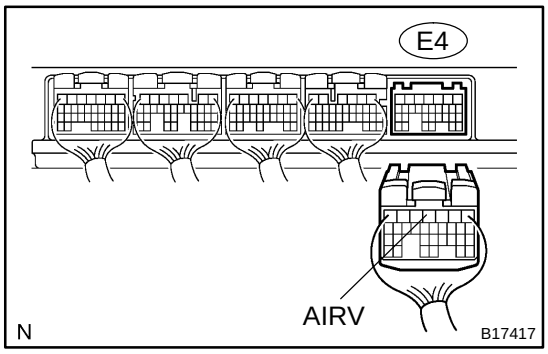
15	Check for open and short in harness and connector between air injection driver and ECM.





PREPARATION:

(a) Disconnect the air injection driver connector.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
SIV (A41–3) – AIRV (E4–4)	Below 1 Ω
SIV (A41–3) or AIRV (E4–4) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector and go to step 6.**

OK →

Replace ECM (See page SF–80).

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DIDMX–01

DTC	P1613	Air Injection System Air Injection Driver

CIRCUIT DESCRIPTION

Refer to DTC P0412 on page DI–234.

DTC No.	DTC Detection Condition	Trouble Area
P1613	Either of the following condition (a) or (b) is met: (a) All of the following conditions are met (1 trip detection logic): ▶Either the air pump or air switching valve does not operate. ▶Air injection driver outputs a normal signal (80% duty signal) (b) All of the following conditions are met (1 trip detection logic): ▶Air injection driver outputs an abnormal duty signal (duty signal excluding 0, 20, 40, 60, 80, 100%)	▶Air injection driver (AID) ▶Open in air injection driver ground circuit
P1613	All of the following conditions are met (1 trip detection logic): (a) Air injection system operates (Air pump ON and all ASV ON) (b) Air injection driver outputs an air pump malfunction signal (0% duty signal)	▶Short in diagnostic information signal circuit (AID – ECM) ▶Open or short in air pump and air switching valve command signal circuit (AID – ECM) ▶Air injection driver (AID) ▶Open in air injection driver ground circuit ▶ECM
P1613	Air injection driver outputs an abnormal duty signal (100% duty signal) (1 trip detection logic)	▶Open or short in AID power source circuit ▶Open in diagnostic information signal circuit (AID – ECM) ▶Air injection driver (AID) ▶ECM

MONITOR DESCRIPTION

When the air injection system operation is required while the engine is warming up, the ECM transmits command signals to the Air Injection Driver (AID) to drive the air pump and air switching valve.

AID detects an open or short in the air pump and air switching valve circuit according to the terminal voltage and sends a signal as diagnostic information to the ECM.

If the air injection system drive circuit or the AID itself has a malfunction, the AID sends a malfunction signal (duty signal) as a diagnostic information signal to the ECM (when the system is normal, a system normal signal is sent).

The ECM sets the DTC based on the diagnostic information from the AID.

Example:

(1) The duty ratio of the diagnostic information signal output from the AID is 0 or 100% (remains at 0 V or battery voltage).

(2) The duty ratio output from the AID is the ratio to output the impossible (excluding 0, 20, 40, 60, 80, 100%).

(3) The AID outputs the normal signal (normal duty signal: 80%) while the system is not operating.

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MONITOR STRATEGY

Related DTCs	P1613	Secondary air injection system control module range check
Required sensors/components	Air injection driver	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Case 1:		
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	
Case 2:		
Either of following conditions is met	Condition 1 or 2	
1. Air pump	Not operating	
2. Air switching valve	Not operating	
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	
Case 3:		
Air pump	Operating	
Air switching valve	Operating	
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	
Case 4:		
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1:	
One of the following conditions is met	Condition 1, 2, 3 or 4
1. Diagnostic signal duty ratio from air injection driver	1 to 10 %
2. Diagnostic signal duty ratio from air injection driver	30 %
3. Diagnostic signal duty ratio from air injection driver	49 %
4. Diagnostic signal duty ratio from air injection driver	91 to 99 %
Case 2:	
Diagnostic signal duty ratio from air injection driver	70 to 90 %

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Case 3:	
Diagnostic signal duty ratio from air injection driver	0 %
Case 4:	
Diagnostic signal duty ratio from air injection driver	100 %

COMPONENT OPERATING RANGE

Parameter	Standard Value
Diagnostic signal duty ratio from air injection driver	70 to 90% when secondary air injection system operating and 0% when secondary air injection system not operating

WIRING DIAGRAM

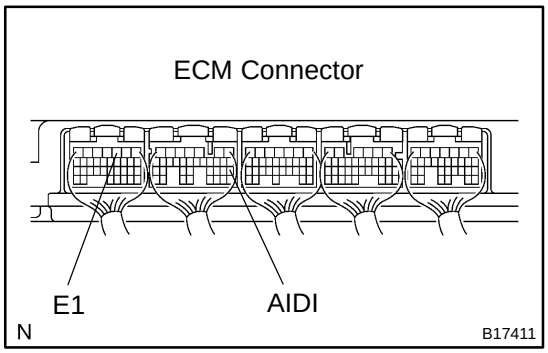
Refer to DTC P0412 on page DI–234.

INSPECTION PROCEDURE

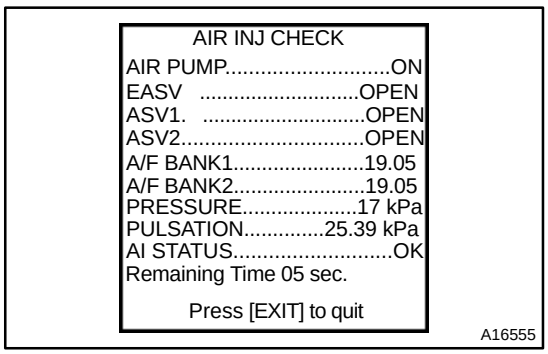
HINT:

The diagnostic information output from the AID can be confirmed by connecting an oscilloscope to the diagnostic information terminal of the AID. It narrows a trouble area search to read the waveform on the oscilloscope when performing the AI system intrusive operation function provided in the SYSTEM CHECK.

(a) Start the engine and warm it up.
(b) Turn the ignition switch to OFF.
(c) Connect a hand–held tester to the DLC3.



(d) Connect an oscilloscope probe to the AIDI terminal of the ECM.
(e) Start the engine and turn the tester ON.
(f) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ SYSTEM.



(g) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / AIR INJ CHECK / MANUAL OPERATION / OPERATION 1 and 2.

HINT:

OPERATION 1: AP: OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:OFF

OPERATION 2: AP: ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN

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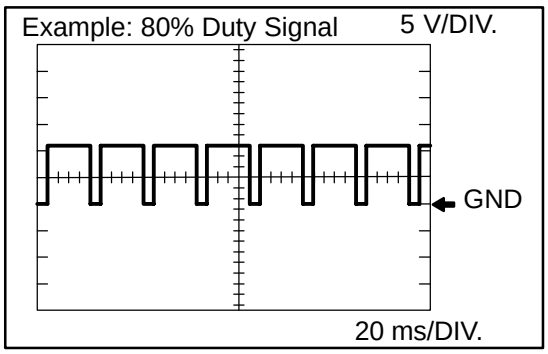

(1) Monitor the voltage output of the AID (duty ratio signal).

Oscilloscope range:

Items	Contents
Terminals	CH1: AIDI – E1
Equipment Settings	5 V/Division, 20 to 40 ms/Division
Conditions	Idling

NOTICE:

- **This AIR INJECTION CHECK only allows technicians to operate the AI system for 5 seconds. Furthermore, the check can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between checks.**
  While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again.
- **Performing the AIR INJ CHECK over and over again may cause the damage in the secondary air injection system. If necessary, put an interval of several minutes between tests to prevent overheating the system.**

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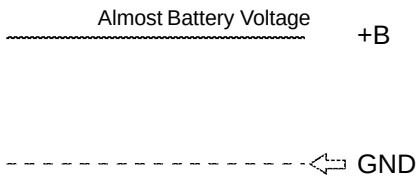
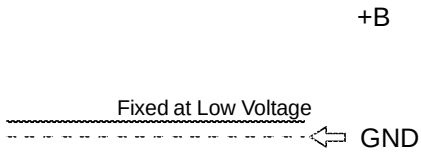
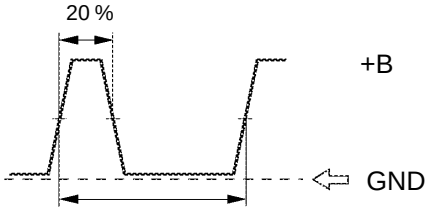
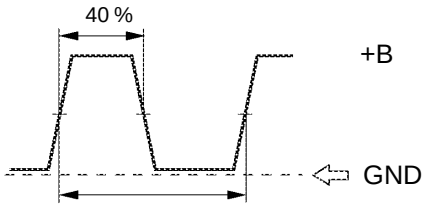
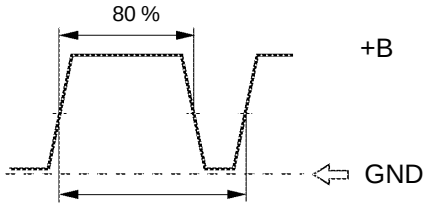
AID Diagnostic Signal Waveforms	ECM Commands	DTCs (ECM Output)	Suspected Trouble Areas
100 % Duty ratio 	Any Air Injection (AI) System operation	**P1613**	• Open in diagnostic signal circuit • Air Injection Control Driver (AID) • Open in AID+B circuit (AID power source) • Short between +B circuit and diagnostic signal circuit
0 % Duty ratio 	AI System: ON (Air pump ON, ASV ON)	**P1613**	• Open or short in air pump or Air Switching Valve (ASV) command signal circuit (ECM–AID) • Open in AID ground circuit • Short between diagnostic signal circuit and body ground • AID • ECM
	AI System: OFF (Air pump OFF, ASV OFF)	–	Normal
20 % Duty ratio 	Air Pump: ON	**P0418**	Short between air pump drive circuit and body ground • Harness & connector (AID–Pump) • Air Pump • AID • ECM
	Air Pump: OFF	**P0418**	Open in air pump drive circuit (AID–Pump) , or short between air pump drive circuit and +B • Harness & connector (AID–Pump) • Air Pump • AID • ECM
40 % Duty ratio 	ASV: ON	**P0412**	Short between ASV drive circuit and body ground • Harness & connector (AID–ASV) • ASV • AID • ECM
	ASV: OFF	**P0412**	Open in ASV drive circuit (AID–ASV), or short between ASV drive circuit and +B • Harness & connector (AID–ASV) • AID • ASV • ECM
80 % Duty ratio 	AI System: OFF (Air pump OFF, ASV OFF)	**P1613**	• AID • ECM
	AI System: ON (Air pump ON, ASV ON)	—	Normal
Excluding above (excluding 0, 20, 40, 80, 100 % duty)	—	**P1613**	• AID • Open in AID ground circuit

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HINT:

- ▶ Using the AIR INJ CHECK operation of the SYSTEM CHECK provided in the hand–held tester function, conditions for air–fuel ratio and pressure in the secondary air injection system passage can be checked while the secondary air injection system operating. It helps technicians to troubleshoot the system when it malfunctioning.
- ▶ Read freeze frame data using a hand–held tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**Check any other DTCs output (In addition to air injection system DTCs).**

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

(a) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P1613	A
P1613 and other DTCs	B

HINT:

If any DTCs other than P1613 are output, troubleshoot those DTCs first.

B → **Go to DTC chart (See page DI–58).**

A

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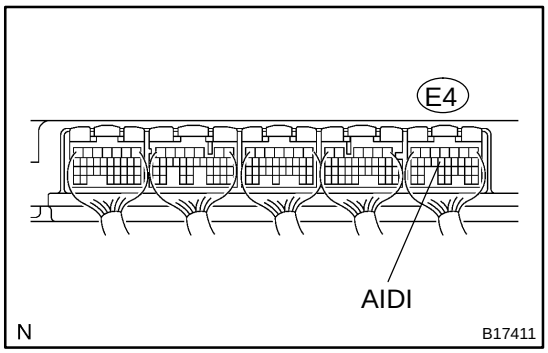
2	Check voltage between AIDI terminal of ECM and body ground.



PREPARATION:

(a) Start the engine and warm it up.
(b) Turn the ignition switch to OFF.
(c) Connect a hand–held tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.
(e) Start the engine.
(f) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/AIR INJ CHECK/AUTOMATIC OPERATION

CHECK:

Measure the voltage between terminal E4–13 (AIDI) of the ECM connector and body ground when the air injection system is both ON and OFF.

RESULT:

Results	Suspected Trouble Areas	Proceed To
Fixed at Low (1.6 V or less) even when AI system ON (Air pump ON, ASV ON)	▶Short between air pump or air switching valve command signal circuit and body ground ▶Open in air pump command signal circuit (between ECM and AID) ▶Open in ASV command signal circuit (between ECM and AID) ▶Open in AID ground circuit (between AID and body ground) ▶Diagnostic signal circuit ground short ▶AID ▶ECM	A
Fixed at High (12 V or more) even when AI system OFF (Air pump OFF, ASV OFF)	▶Open in diagnostic signal circuit (ECM – AID) ▶Short between +B circuit and diagnostic signal circuit (ECM – AID) ▶Open in AID power source circuit ▶AID ▶ECM	B
Other than above: ▶Fluctuating (duty signal excluding 20, 40, 80%)	▶AID ▶Open in AID ground circuit (between AID and body ground)	C

B	Go to step 5.
C	Go to step 8.

A

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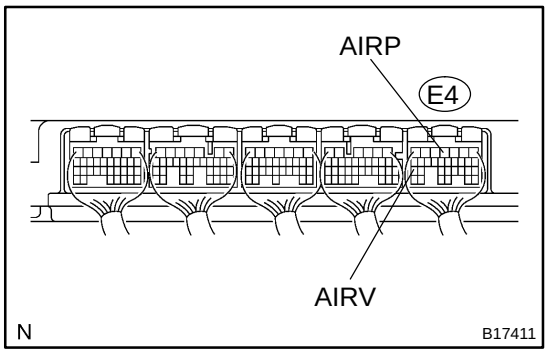
3	Check voltage between AIRP, AIRV terminals of ECM and body ground.



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals E4–25 (AIRP), E4–4 (AIRV) of the ECM connector, and body ground.

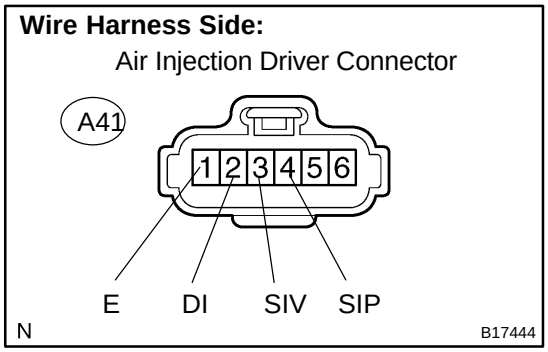
OK:

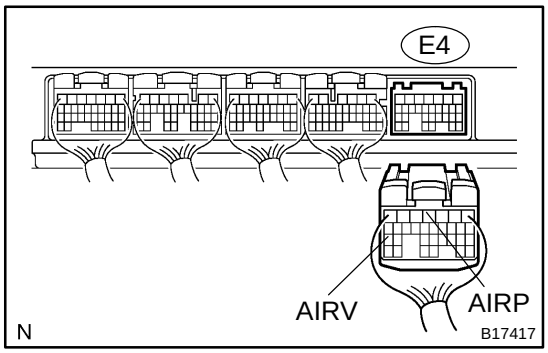
Tester Connection	Specified Condition
E4–25 (AIRP) – Body ground	10 V or more
E4–4 (AIRV) – Body ground	10 V or more

NG → **Replace ECM (See page SF–80).**

OK

4	Check for short in harness and connector between SIP terminal of air injection driver and SIRP of ECM.





PREPARATION:

(a) Disconnect the A41 air injection driver connector.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
SIP (A41–4) or AIRP (E4–25) – Body ground	10 kΩ or higher
SIV (A41–3) or AIRV (E4–4) – Body ground	10 kΩ or higher
E (A41–1) – Body ground	Below 1 Ω

CHECK:

Measure the voltage between terminals DI (A41–2) and E (A41–1) of the air injection driver wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
DI (A41–2) – E (A41–1)	9 V or more

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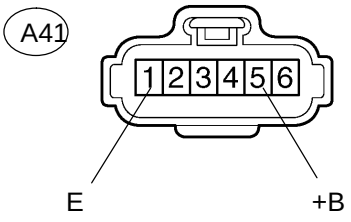
NG → **Repair or replace harness or connector.**

OK

Replace air injection driver.

5	**Inspect air injection driver power source circuit.**

Wire Harness Side:
Air Injection Driver Connector



PREPARATION:
(a) Disconnect the A41 air injection driver connector.
(b) Turn the ignition switch to ON.

CHECK:
Measure the voltage between terminals +B (A41–5) and E (A41–1) of the air injection driver connector.

OK:

Standard:

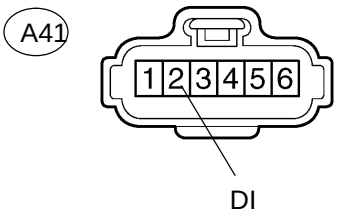
Tester Connection	Specified Condition
A41–5 (+B) – E (A41–1)	10 V or more

NG → **Repair or replace harness or connector.**

OK

6	**Check voltage between DI terminals of air injection driver and body ground.**

Wire Harness Side:
Air Injection Driver Connector



PREPARATION:
(a) Disconnect the A41 air injection driver connector.
(b) Turn the ignition switch to ON.

CHECK:
Measure the voltage between terminal A41–2 (DI) of the air injection driver connector and body ground.

OK:

Standard:

Tester Connection	Specified Condition
A41–2 (DI) – Body ground	10 V or more

NG → **Go to step 7.**

OK

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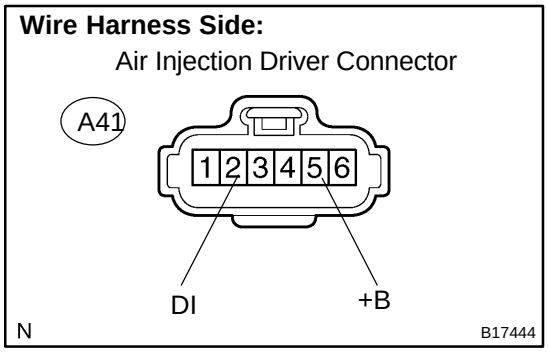
7	Check for short in harness and connector between DI terminal of air injection driver and AIDI terminal of ECM.



PREPARATION:

(a) Disconnect the A41 air injection driver connector.

(b) Disconnect the E4 ECM connector.

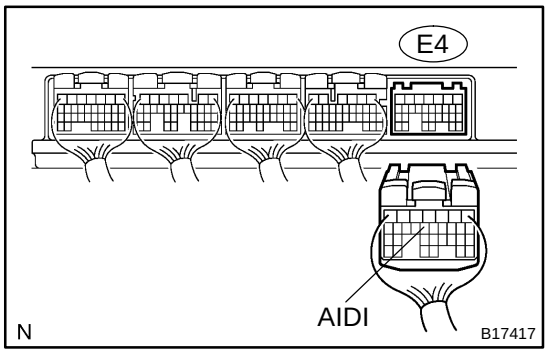
CHECK:

Check the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
DI (A41–2) – AIDI (E4–13)	Below 1 Ω
DI (A41–2) or AIDI (E4–13) – +B (A41–5)	10 kΩ or higher

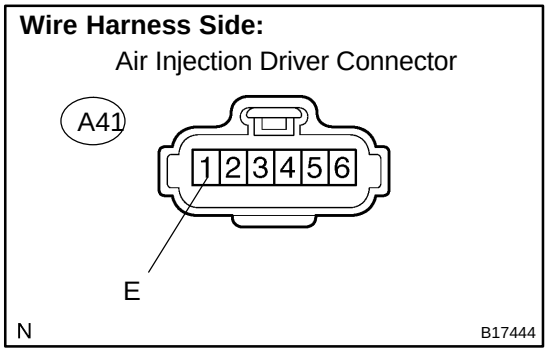


NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF–80).

8	Inspect air injection driver ground circuit.



PREPARATION:

Disconnect the A41 air injection driver connector.

CHECK:

Measure the resistance between terminal E (A41–1) of the air injection driver connector and body ground.

OK:

Standard:

Tester Connection	Specified Condition
E (A41–1) – Body ground	10 V or more

NG → **Repair or replace harness or connector.**

OK

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9	**Replace air injection driver.**

NEXT

10	**Check whether DTC output recurs.**

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Clear the DTCs (see page DI–43).
(d) Start the engine.

CHECK:

(a) Perform SYSTEM CHECK to operate the air injection system.
Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/AIR INJ CHECK/AUTOMATIC OPERATION
(b) After operating the secondary air injection system, confirm the pending codes of the secondary air injection system by selecting the following menu items: DIAGNOSIS/ENHANCED OBD II/DTC INFO/PENDING CODES.

OK:

DTC P1613 for the secondary air injection system is not output.

NG → **Go to DTC chart (See page DI–58).**

OK

END

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DICF9–02

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM. It opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM. This feedback allows the ECM to control the throttle motor and monitor the throttle opening angle as the ECM responds to driver inputs.
HINT:
This Electrical Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds: (1 trip detection logic) (a) Throttle control motor output duty 80 % or more (b) Throttle control motor current less than 0.5 A or less	▶Open in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶ECM
P2103	Either of the following condition is met. (1 trip detection logic) (a) Throttle control motor current 10 A or more (0.1 sec) (b) Throttle control motor current 7 A or more (0.6 sec.)	▶Short in throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Throttle valve ▶Throttle body ▶ECM

MONITOR DESCRIPTION

The ECM monitors the current through the electronic throttle motor and detects malfunctions or open circuit in the throttle motor based on the voltage of the current. When the current deviates from the standard, the ECM concludes that there is a fault in the throttle motor.
Or, if the throttle valve is not functioning properly (for example, stuck ON), the ECM concludes that there is a fault, turns on the MIL and sets a DTC is set.
Example:
When the current is more than 10 A. Or the current is less than 0.5 A when the motor driving duty ratio is exceeding 80%. The ECM concludes that the current is out of range, turns on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel–cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail–safe operation will stop and the system will return to normal condition.

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MONITOR STRATEGY

Related DTCs	P2102	Throttle actuator control motor current (Low current)
	P2103	Throttle actuator control motor current (High current)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P2102:		
Throttle motor	ON	
Duty–cycle ratio to open throttle actuator	80%	–
Throttle actuator power supply	8 V	–
Current motor current – Motor current at 0.016 sec. before	–	0.2 A
P2103:		
Throttle motor	ON	
Either of the following conditions is met:	Condition 1 or 2	
1. Throttle actuator power supply	8 V	–
2. Throttle actuator power	ON	
Battery voltage	8 V	–
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2102:	
Throttle motor current	Less than 0.5 A (when motor drive duty 80% or more)
P2103:	
Throttle motor current	More than 10 A (0.1 sec.) More than 7 A (0.6 sec.)

WIRING DIAGRAM

Refer to DTC P0120 on page DI–127.

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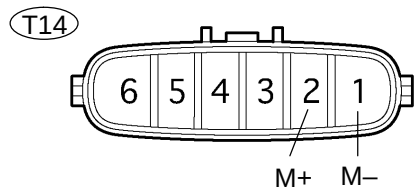
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check throttle control motor.**

Component Side:
Throttle Control Motor and Sensor



PREPARATION:

Disconnect the throttle control motor and sensor connector.

CHECK:

Measure the resistance between terminals of the throttle control motor.

OK:

Standard:

Tester Connection	Specified Condition
M+ (T14–2) – M– (T14–1)	0.3 to100 Ω (20°C (68°F))

NG → **Replace throttle body (See page SF–39).**

OK

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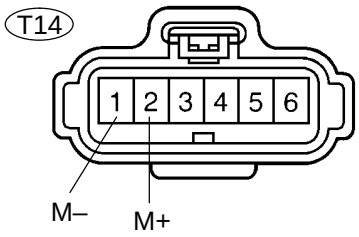
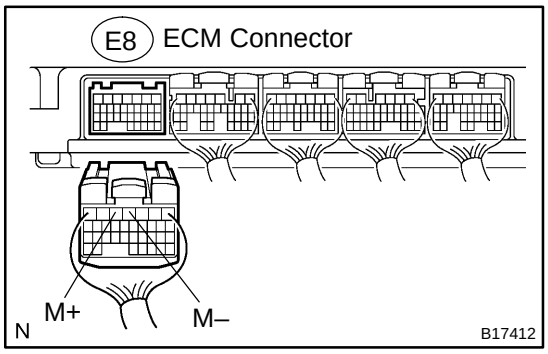
2	Check for open and short in harness and connector between throttle control motor and ECM.

Wire Harness Side:
Throttle Control Motor and Sensor





PREPARATION:

(a) Disconnect the T14 throttle control motor and sensor connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
M+ (T14–2) – M+ (E8–3)	Below 1 Ω
M– (T14–1) – M– (E8–2)	Below 1 Ω
M+ (T14–2) or M+ (E8–3) – Body ground	10 kΩ or higher
M– (T14–1) or M– (E8–2) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

3	Visually check throttle valve.

CHECK:

Check the area between the throttle valve and the housing for foreign objects.
Also, check if the valve can open and close smoothly.

OK:

The throttle valve is not contaminated by foreign objects and can move smoothly.

NG → **Remove foreign object and clean throttle body.**

OK

Replace ECM (See page SF–80).

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DICFA–02

DTC	P2111	Throttle Actuator Control System –Stuck Open

DTC	P2112	Throttle Actuator Control System –Stuck Closed

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM. It opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the throttle position sensor, which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM to control the throttle motor and set the throttle valve angle in response to driver input.

HINT:

This Electrical Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2111	Throttle motor locked during ECM order to close. (1 trip detection logic)	▶Throttle control motor and sensor circuit ▶Throttle control motor and sensor ▶Throttle body ▶Throttle valve
P2112	Throttle motor locked during ECM order to open. (1 trip detection logic)	

MONITOR DESCRIPTION

The ECM concludes that there is a malfunction of the ETCS (Electronic Throttle Control System) when the throttle valve remains at a fixed angle despite high drive current from the ECM. The ECM will turn on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel–cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.

If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail–safe operation will stop and the system will return to normal condition.

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MONITOR STRATEGY

Related DTCs	P2111	Throttle motor actuator lock (Open)
	P2112	Throttle motor actuator lock (Closed)
Required sensors/components	Main sensors/components	Throttle actuator motor
	Related sensors/components	Throttle position sensor
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P2111:		
Throttle motor current	2 A	–
Throttle motor duty to close side	80%	–
P2112:		
Throttle motor current	2 A	–
Throttle motor duty to open side	80%	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
|Current throttle position sensor voltage at this time – throttle position sensor voltage 0.016 sec. earlier|	Less than 0.1 V when throttle motor open (or close) duty 80% or more

WIRING DIAGRAM

Refer to DTC P0120 on page DI–127.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

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1	**Check any other DTC output (in addition to DTC P2111 or P2112).**

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

(a) Read DTCs.

Result:

Display (DTC Output)	Proceed To
P2111 and/or P2112	A
P2111 and/or P2112 and other DTCs	B

HINT:
If any DTCs other than P2111 and/or P2112 are output, troubleshoot those DTCs first.

B → **Go to DTC chart (See page DI–58).**

A

2	**Visually check throttle valve.**

PREPARATION:

Remove the intake air connector.

CHECK:

Check whether or not a foreign body is caught between the throttle valve and housing. Also, check if the valve can open and close smoothly.

OK: The throttle valve is not contaminated by foreign objects and can move smoothly.

NG → **Remove foreign body and clean throttle body.**

OK

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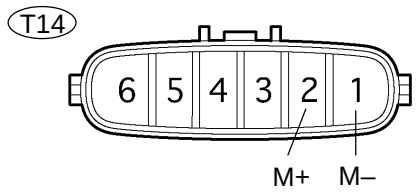
3	Check throttle control motor.

Component Side:
Throttle Control Motor and Sensor



PREPARATION:
Disconnect the throttle control motor and sensor connector.

CHECK:
Measure the resistance between terminals of the throttle control motor.

OK:

Standard:

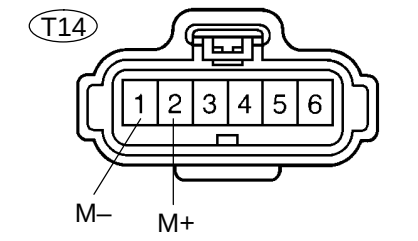
Tester Connection	Specified Condition
M+ (T14–2) – M– (T14–1)	0.3 to100 Ω (20˚C (68˚F))

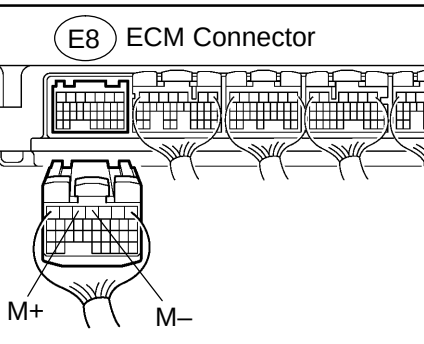
NG → **Replace throttle body (See page SF–39).**

OK

4	Check for open and short in harness and connector between ECM and throttle control motor.

Wire Harness Side:
Throttle Control Motor and Sensor





PREPARATION:
(a) Disconnect the T14 throttle control motor and sensor connector.
(b) Disconnect the E8 ECM connector.

CHECK:
Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
M+ (T14–2) – M+ (E8–3)	Below 1 Ω
M– (T14–1) – M– (E8–2)	Below 1 Ω
M+ (T14–2) or M+ (E8–3) – Body ground	10 kΩ or higher
M– (T14–1) or M– (E8–2) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI–11).

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DICFB–02

DTC	P2118	Throttle Actuator Control Motor Current Range/Performance

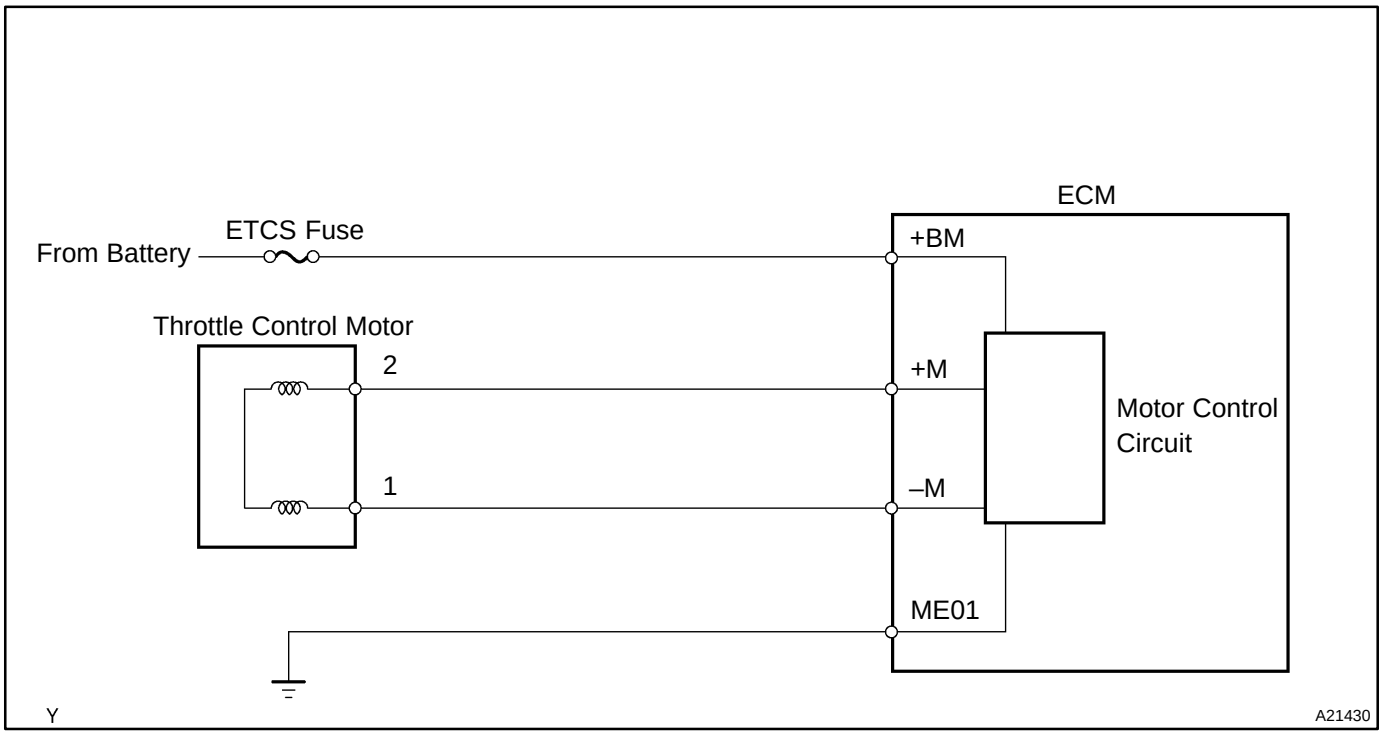
CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) has a dedicated power supply circuit. The voltage (+BM) is monitored and when the voltage is low (less than 4V), the ECM concludes that the ETCS has a fault and current to the throttle control motor is cut.

When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the motor is cut. If repairs are made and the system has returned to normal, turn the ignition switch OFF. The ECM then allows current to flow to the motor and the motor can be restarted.

HINT:

This Electrical Throttle Control System (ETCS) does not use a throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
P2118	Open in ETCS power source circuit (+BM)	▶Open in ETCS power source circuit ▶ETCS fuse ▶ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle motor +BM. When the power supply voltage drops below the threshold, the ECM concludes that the power supply has an open circuit. The MIL is turned on and a DTC is set.

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FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel–cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail–safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2118	Throttle actuator motor power supply line range check (Low voltage)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	0.8 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Actuator power	ON	
Battery voltage	8 V	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Throttle actuator motor power supply voltage	Less than 4 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle actuator motor power supply voltage	9 to 14 V

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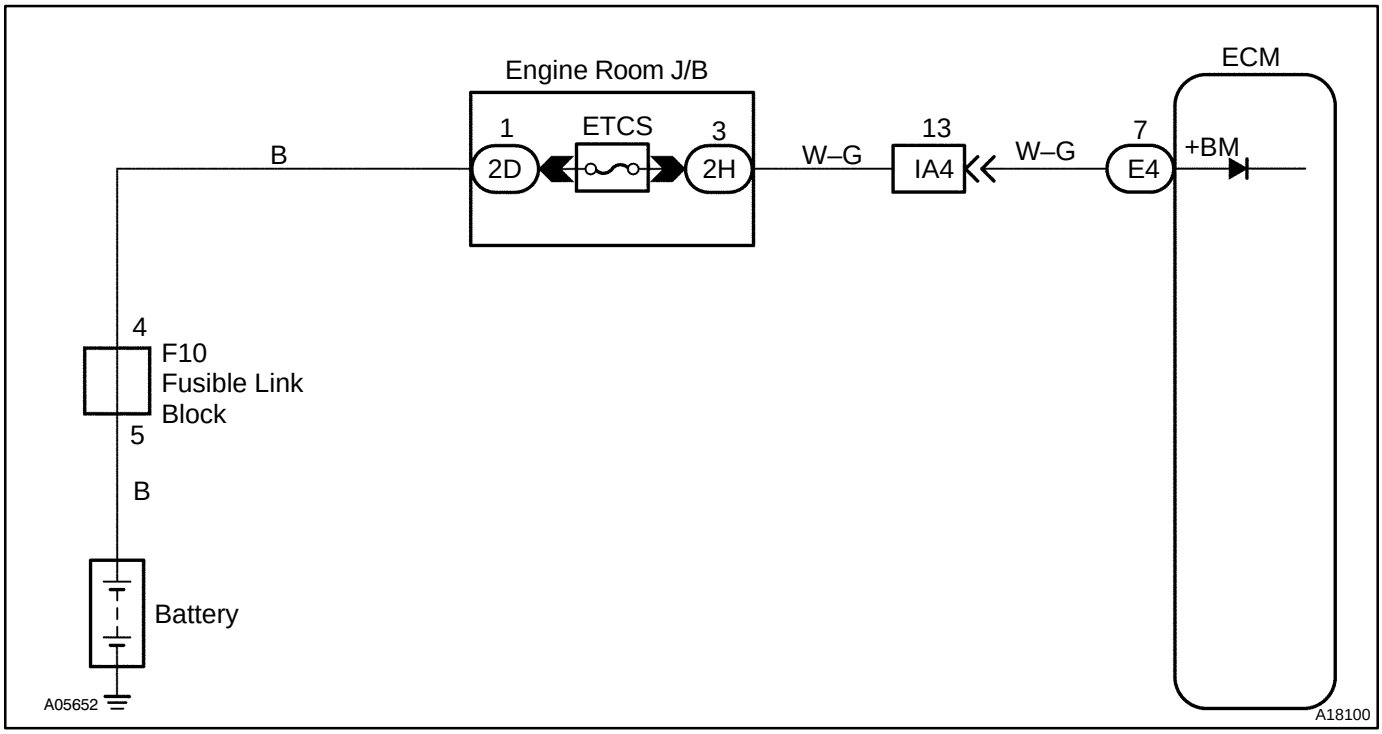
WIRING DIAGRAM



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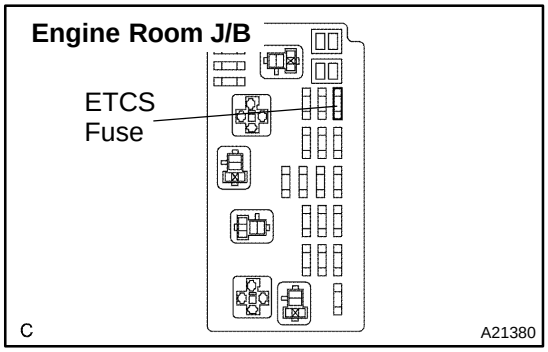
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Check ETCS fuse.**



PREPARATION:

Remove the ETCS fuse from the engine room J/B.

CHECK:

Check the resistance of the ETCS fuse.

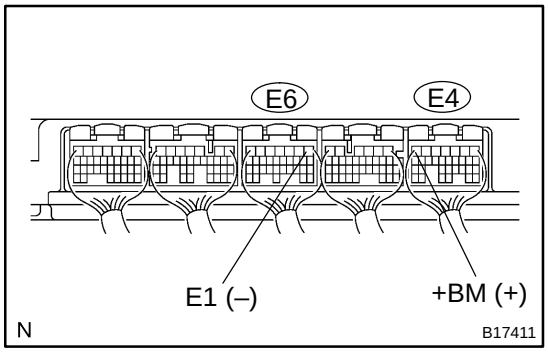
OK:

Below 1 Ω

NG → **Check for short in all harness and components connected to ETCS fuse.**

OK

2	**Check voltage between terminal +BM and E1 of ECM connector.**



CHECK:

Measure the voltage between the specified terminals of the E6 and E4 ECM connector.

OK:

Standard:

Tester Connection	Specified Condition
+BM (E4–7) – E6 (E6–1)	9 to 14 V

OK → **Check for intermittent problems (See page DI–11).**

NG

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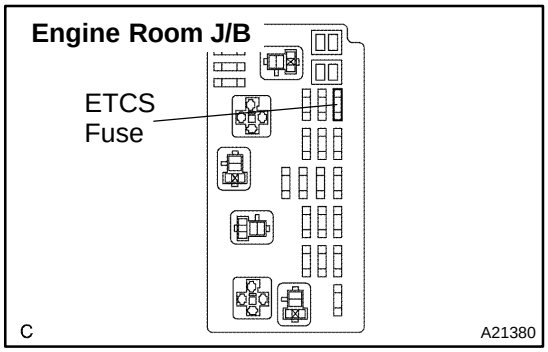
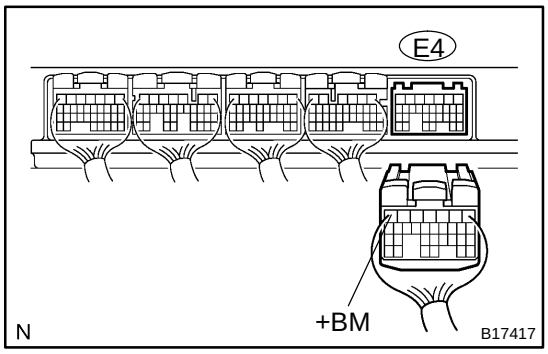
3	**Check for open or short in harness or connector between battery and ETCS fuse, ETCS fuse and ECM.**





PREPARATION:

(a) Remove the ETCS fuse from the engine room J/B.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance of the wire harness side connector between the ETCS fuse and ECM.

OK:

Standard:

Tester Connection	Specified Condition
Engine Room J/B (ETCS fuse terminal) – +BM (E4–7)	Below 1 Ω
Engine Room J/B (ETCS fuse terminal) or +BM (E4–7) – Body ground	10 kΩ or higher

PREPARATION:

(a) Remove the ETCS fuse from the engine room J/B.

(b) Disconnect the battery positive terminal.

CHECK:

Measure the resistance of the wire harness side connector between the ETCS fuse and battery.

OK:

Standard:

Tester Connection	Specified Condition
Engine Room J/B (ETCS fuse terminal) – Battery positive terminal	Below 1 Ω
Engine Room J/B (ETCS fuse terminal) or Battery positive terminal – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Check engine room J/B.

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DTC	P2119	Throttle Actuator Control Throttle Body Range/Performance

CIRCUIT DESCRIPTION

The Electric Throttle Control System (ETCS) is composed of a throttle motor that operates the throttle valve, a throttle position sensor that detects the opening angle of the throttle valve, an accelerator pedal position sensor that detects the accelerator pedal position, and the ECM that controls the ETCS system.
The ECM operates the throttle motor to position the throttle valve for proper response to driver inputs. The throttle position sensor, mounted on the throttle body, detects the opening angle of the throttle valve and provides this signal to the ECM so that the ECM can regulate the throttle motor.

DTC No.	DTC Detection Condition	Trouble Area
P2119	Throttle opening angle continues to vary greatly from target throttle opening angle (1 trip detection logic)	▶Electric throttle control system ▶Throttle body

MONITOR DESCRIPTION

The ECM determines the ”actual” throttle angle based on the throttle position sensor signal. The ”actual” throttle position is compared to the ”target” throttle position commanded by the ECM. If the difference of these two values exceeds a specified limit, the ECM interprets this as a fault in the ETCS (Electronic Throttle Control System). The ECM turns on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel–cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail–safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2119	Electronic throttle control system failure
Required sensors/components	Main sensors	Throttle actuator motor
	Related sensors	Throttle position sensor
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page DI–18
The typical enabling condition is not available	–

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TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Difference between ”target throttle position” and ”actual throttle position”	0.3 V or more

COMPONENT OPERATING RANGE

Standard Value
Commanded throttle position and current throttle position are nearly the same

WIRING DIAGRAM

Refer to DTC P2102 and P2103 on page DI–354.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P2119) being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) When using hand–held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand–held tester.

RESULT:

Display (DTC Output)	Proceed to
P2119	A
”P2119” and other DTC	B

HINT:

If any other codes besides P2119 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI–58).**

A

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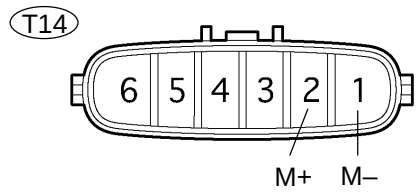
2	Check throttle control motor.

Component Side:
Throttle Control Motor and Sensor



PREPARATION:
Disconnect the throttle control motor and sensor connector.
CHECK:
Measure the resistance between terminals of the throttle control motor.
OK:

Standard:

Tester Connection	Specified Condition
M+ (T14–2) – M– (T14–1)	0.3 to100 Ω (20°C (68°F))

NG → **Replace throttle body (See page SF–42).**

OK

3	Replace ECM and check DTC (Check if DTC outputs reoccur).

PREPARATION:
(a) Replace ECM.
(b) Clear the DTC (See page DI–43).
(c) Start and warm up the engine.
(d) Run the engine at idle for 15 seconds or more.
CHECK:
Read the DTC using the hand–held tester (See page DI–43).
OK:

No DTC output.

OK → **System is normal.**

NG

Replace throttle body.

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DID8G–01

DTC	P2120	Throttle/Pedal Position Sensor/Switch ”D” Circuit

DTC	P2122	Throttle/Pedal Position Sensor/Switch ”D” Circuit Low Input

DTC	P2123	Throttle/Pedal Position Sensor/Switch ”D” Circuit High Input

DTC	P2125	Throttle/Pedal Position Sensor/Switch ”E” Circuit

DTC	P2127	Throttle/Pedal Position Sensor/Switch ”E” Circuit Low Input

DTC	P2128	Throttle/Pedal Position Sensor/Switch ”E” Circuit High Input

DTC	P2138	Throttle/Pedal Position Sensor/Switch ”D”/”E” Voltage Correlation

HINT:
This is the repair procedure for the ”accelerator pedal position sensor”.

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CIRCUIT DESCRIPTION

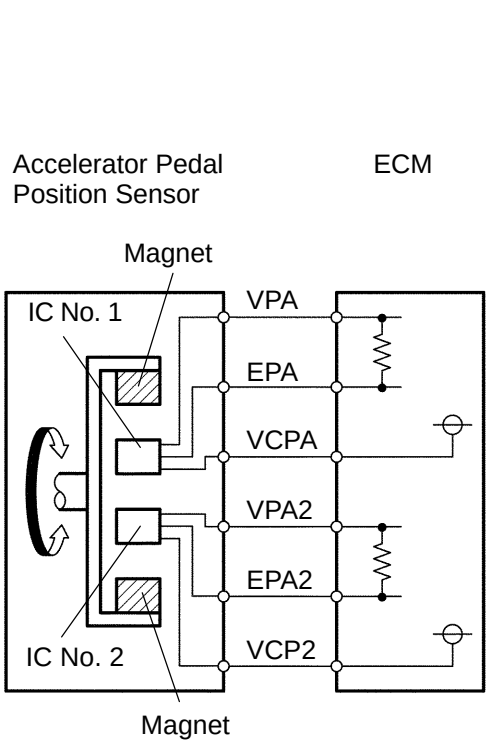
HINT:

- This electrical throttle control system does not use a throttle cable.
- This accelerator pedal position sensor is a non–contact type.

The accelerator pedal position sensor is mounted in the accelerator pedal to detect the angle of the accelerator pedal. This sensor is electronically controlled and uses Hall–effect elements.

In the accelerator pedal position sensor, the voltage applied to terminals VPA and VPA2 of the ECM changes between 0 V and 5 V in proportion to the angle of the accelerator pedal. The VPA is a signal to indicate the actual accelerator pedal angle and is used for the engine control. VPA2 is used to detect malfunctions of the sensor itself.

The ECM judges the current angle of the accelerator pedal from these signals input from terminals VPA and VPA2, and the ECM controls the throttle motor based on these signals.



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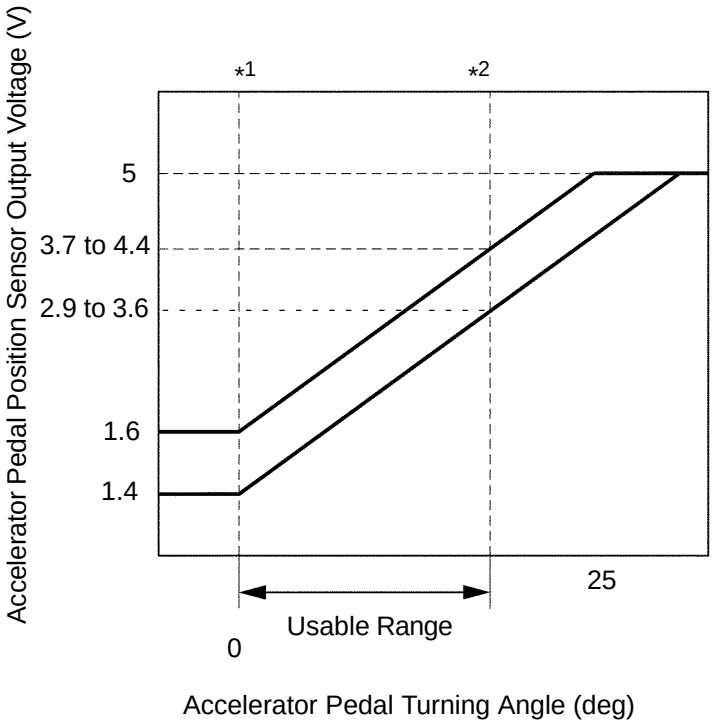

*1 : Accelerator Pedal Fully Released

*2 : Accelerator Pedal Fully Depressed

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DTC No.	DTC Detection Condition (Open or short in accelerator pedal position sensor circuit)	Main trouble Area
P2120	Condition (a) continues for 0.5 seconds or more: (a) VPA ≧ 0.2 V or VPA ⊖ 4.8 V	▶Accelerator pedal position sensor ▶ECM
P2122	Condition (a) and (b) continues for 0.5 seconds or more: (a) VPA ≧ 0.2 V (b) VPA2 ⊖ 0.97 deg	▶Accelerator pedal position sensor ▶VCPA circuit open ▶VPA circuit open or ground short ▶ECM
P2123	Condition (a) continues for 2.0 seconds or more: (a) VPA ⊖ 4.8 V	▶Accelerator pedal position sensor ▶EPA circuit open ▶ECM
P2125	Condition (a) continues for 0.5 seconds or more: (a) VPA2 ≧ 0.5 V or VPA2 ⊖ 4.8 V and 0.2 V ≧ VPA ≧ 3.45 V	▶Accelerator pedal position sensor ▶ECM
P2127	Condition (a) and (b) continues for 0.5 seconds or more: (a) VPA2 ≧ 0.5 V (b) VPA ⊖ 0.97 deg	▶Accelerator pedal position sensor ▶VCP2 circuit open ▶VPA2 circuit open or ground short ▶ECM
P2128	Condition (a) and (b) continues for 2.0 seconds or more: (a) VPA2 ⊖ 4.8 V (a) 0.2 V ≧ VPA ≧ 3.45 V	▶Accelerator pedal position sensor ▶EPA circuit open ▶ECM
P2138	Condition (a) or (b) continues for 2.0 seconds or more: (a) |VPA – VPA2| ≧ 0.02 V (b) VPA ≧ 0.2 V and VPA2 ≧ 0.5 V	▶VPA and VPA2 circuit are short circuited ▶Accelerator pedal position sensor ▶ECM

HINT:
After confirming DTC P2120, P2122, P2123, P2125, P2127, P2128 and P2138 use the OBD II scan tool or the hand–held tester to confirm the accelerator pedal opening percentage.

Trouble area	Accelerator pedal position expressed as voltage			
	Accelerator pedal completely released		Accelerator pedal fully depressed	
	ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2
VC circuit open	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V
VPA circuit open or ground short	0 to 0.2 V	1.2 to 2.0 V	0 to 0.2 V	3.4 to 5.3 V
VPA2 circuit open or ground short	0.5 to 1.1 V	0 to 0.2 V	2.6 to 4.5 V	0 to 0.2 V
E2 circuit open	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V

MONITOR DESCRIPTION

When VPA or VPA2 deviates from the standard, or the difference between the voltage outputs of the two sensors is less than threshold, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.
Example:
When the voltage output of the VPA is below 0.2 V or exceeds 4.8 V.

FAIL SAFE

The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving.
If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail–safe operation will stop and the system will return to normal condition.

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MONITOR STRATEGY

Related DTCs	P2120	Accelerator position sensor 1 (VPA) range check (Fluttering)
	P2122	Accelerator position sensor 1 (VPA) range check (Low voltage)
	P2123	Accelerator position sensor 1 (VPA) range check (High voltage)
	P2125	Accelerator position sensor 2 (VPA2) range check (Fluttering)
	P2127	Accelerator position sensor 2 (VPA2) range check (Low voltage)
	P2128	Accelerator position sensor 2 (VPA2) range check (High voltage)
	P2138	Accelerator position sensor correlation range check
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Ignition switch	ON	
Throttle control motor power	ON	

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TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2120:	
Either of the following conditions is met	Condition 1 or 2
1. VPA1 voltage when VPA2 is 0.97˚ or more	0.2 V or less
2. VPA1 voltage	4.8 V or more
P2122:	
VPA1 voltage when VPA2 is 0.97˚ or more	0.2 V or less
P2123:	
VPA1 voltage	4.8 V or more
P2125:	
Either of the following conditions is met	Condition 1 or 2
1. VPA2 voltage when VPA1 is 0.97˚ or more	0.5 V or less
2. VPA2 voltage when VPA1 is 0.2 to 3.45 V	4.8 V or more
P2127:	
VPA2 voltage when VPA1 is 0.97˚ or more	0.5 V or less
P2128:	
VPA2 voltage when VPA1 is 0.2 to 3.45 V	4.8 V or more
P2138:	
Either of the following condition is met:	Condition 1 or 2
1. Difference between VPA1 and VPA2 voltage	0.02 V or less
2. Both of the following conditions are met:	(a) and (b)
(a) VPA1 voltage	0.2 V or less
(b) VPA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

Parameter	Standard Value
VPA voltage	More than 0.2 V and less than 4.8 V
VPA2 voltage	More than 0.5 V and Less than 4.8 V
Difference between VPA and VPA2 voltages	More than 0.02 V

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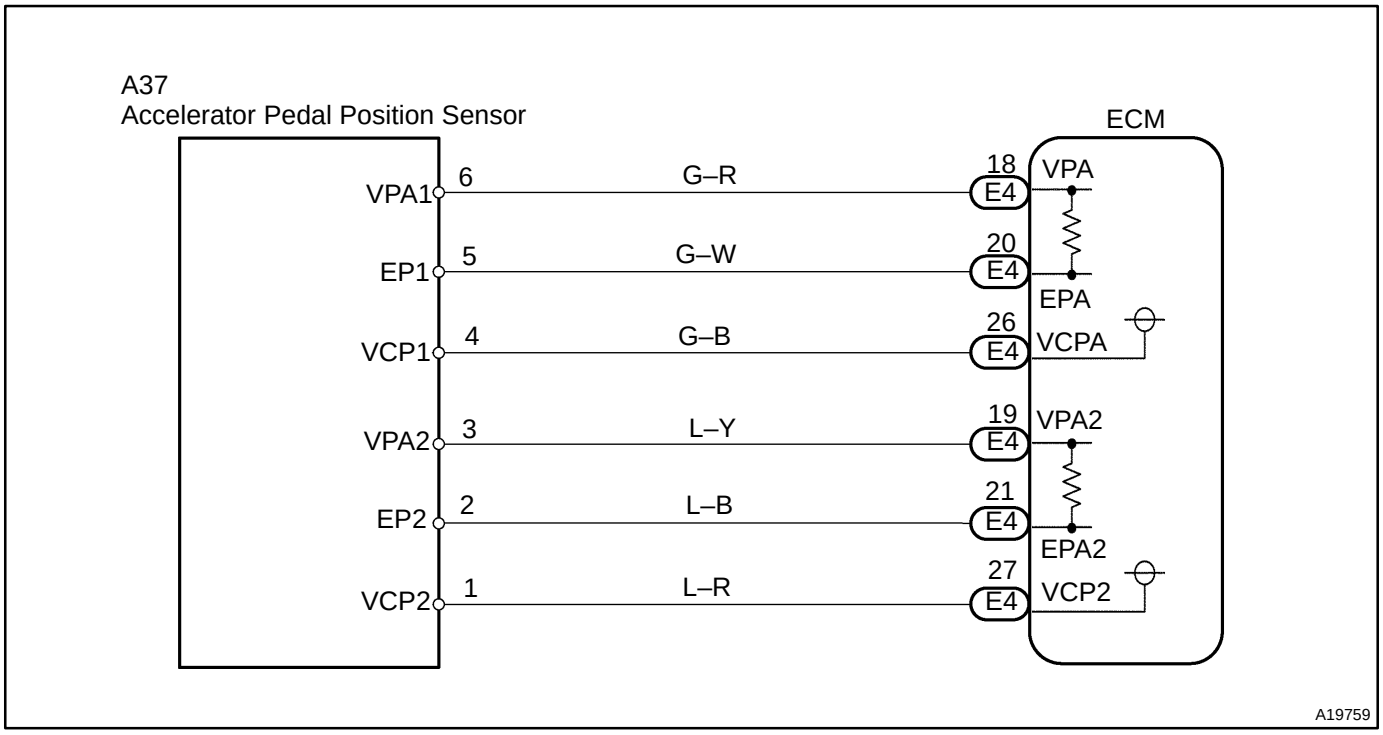
WIRING DIAGRAM



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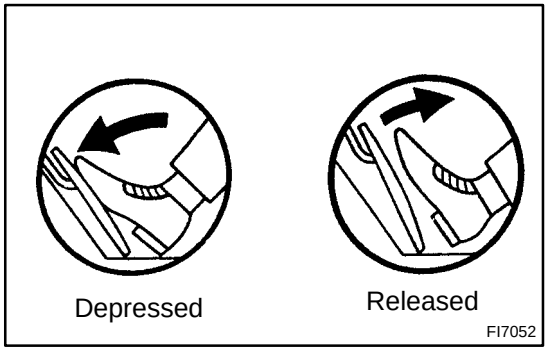
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Connect hand–held tester, and read the voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand–held tester main switch ON.

(c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

OK:

Standard:

Accelerator pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK	**Go to step 5.**

NG

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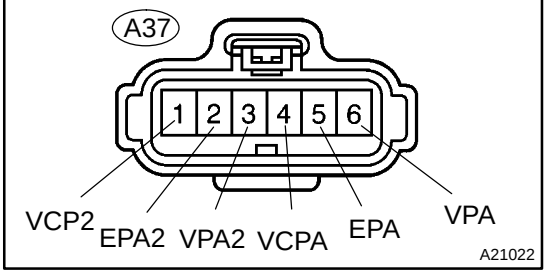
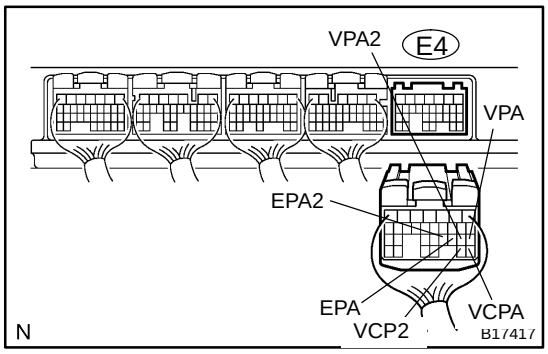
2	**Check for open and short in harness and connector in VCPA, VCP2, VPA, VPA2 EPA and EPA2 circuit between ECM and accelerator pedal position sensor.**

Wire Harness Side:
Accelerator Pedal Position Sensor





PREPARATION:

(a) Disconnect the A37 accelerator pedal position sensor connector.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VPA (A37–6) – VPA (E4–18)	Below 1 Ω
EPA (A37–5) – EPA (E4–20)	Below 1 Ω
VCPA (A37–4) – VCPA (E4–26)	Below 1 Ω
VPA2 (A37–3) – VPA2 (E4–19)	Below 1 Ω
EPA2 (A37–2) – EPA2 (E4–21)	Below 1 Ω
VCP2 (A37–1) – VCP2 (E4–27)	Below 1 Ω
VPA (A37–6) or VPA (E4–18) – Body ground	10 kΩ or higher
EPA (A37–5) or EPA (E4–20) – Body ground	10 kΩ or higher
VCPA (A37–4) or VCPA (E4–26) – Body ground	10 kΩ or higher
VPA2 (A37–3) or VPA2 (E4–19) – Body ground	10 kΩ or higher
EPA2 (A37–2) or EPA2 (E4–21) – Body ground	10 kΩ or higher
VCP2 (A37–1) or VCP2 (E4–27) – Body ground	10 kΩ or higher

NG → **Repair or replace harness and connector.**

OK

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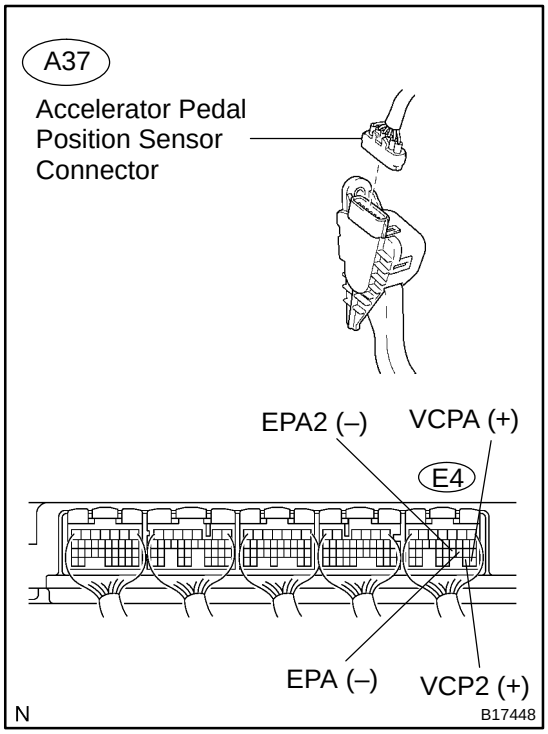
3	Check voltage between terminals VCPA and EPA, and VCP2 and EPA2 of ECM terminals.



PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the A37 accelerator pedal position sensor connector.

CHECK:

Measure the voltage between the specified terminals of the E4 ECM connector.

OK:

Standard:

Tester Connection	Specified Condition
VCPA (E4–26) – EPA (E4–20)	4.5 to 5.5 V
VCP2 (E4–27) – EPA2 (E4–21)	4.5 to 5.5 V

NG → **Replace ECM (See page SF–80).**

OK

4	Replace accelerator pedal assembly (See page SF–78).

Go

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5	**Check whether DTC output recurs (DTC P2120, P2122, P2123, P2125, P2127, P2128 or P2138)**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Disconnect the battery terminals or remove the EFI No. 1 fuse and ETCS fuse (Clear DTCs).
(c) Start the engine.
(d) Drive the engine at idle for 15 seconds or more.
(e) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

CHECK:

Read the DTC output.

RESULT:

Display (DTC Output)	Proceed To
P2120, P2122, P2123,P2125, P2127, P2128 or P2138	A
No output	B

B → **System is OK.**

A

Replace ECM (See page SF–80).

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DID8H–01

DTC	P2121	Throttle/Pedal Position Sensor/Switch ”D” Circuit Range/Performance

HINT:
This is repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P2120 on page DI–370.

DTC No.	DTC Detecting Condition	Trouble Area
P2121	Conditions (a) and (b) continue for 0.5 seconds: (a) Difference between VPA and VPA2 exceeds the threshold (b) IDL is OFF	▶Accelerator pedal position sensor circuit ▶Accelerator pedal position sensor ▶ECM

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket. The accelerator pedal position sensor has 2 sensor elements/signal outputs: VPA1 and VPA2. VPA1 is used to detect the actual accelerator pedal angle (used for engine control) and VPA2 is used to detect malfunctions in VPA1. When the difference between the voltage outputs of VPA1 and VPA2 deviates from the standard, the ECM concludes the accelerator pedal position sensor has a malfunction. The ECM turns on the MIL and a DTC is set.

FAIL SAFE

The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving.
If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail–safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2121	Accelerator position sensor (rationality)
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Either of the following conditions is met	Condition 1 or 2	
1. Ignition switch	ON	
2. Throttle control motor power	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Difference between VPA1 voltage (learned value) and VPA2 voltage (learned value)	Less than 0.4 V, or more than 1.2 V

WIRING DIAGRAM

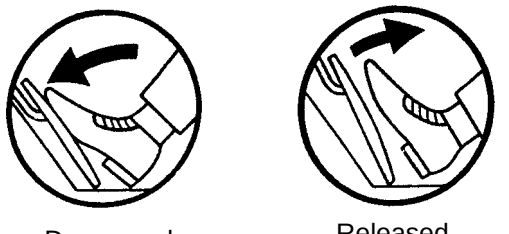
Refer to DTC P2120 on page DI–370.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, as well as other data from the time when a malfunction occurred.

1	**Connect hand–held tester, and read the voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand–held tester main switch ON.

(c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

OK:

Standard:

Accelerator pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → **Replace ECM (See page SF–80).**

NG

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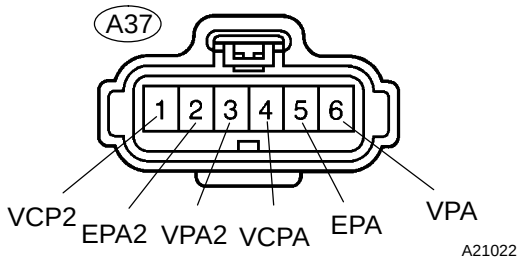
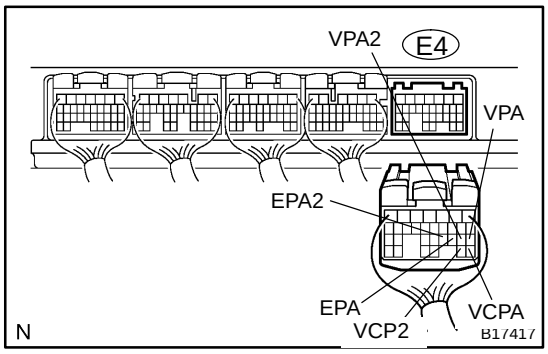
2	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM.**

Wire Harness Side:
Accelerator Pedal Position Sensor





PREPARATION:

(a) Disconnect the A37 accelerator pedal position sensor connector.

(b) Disconnect the E4 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard (Check for open):

Tester Connection	Specified Condition
VPA (A37–6) – VPA (E4–18)	Below 1 Ω
EPA (A37–5) – EPA (E4–20)	Below 1 Ω
VCPA (A37–4) – VCPA (E4–26)	Below 1 Ω
VPA2 (A37–3) – VPA2 (E4–19)	Below 1 Ω
EPA2 (A37–2) – EPA2 (E4–21)	Below 1 Ω
VCP2 (A37–1) – VCP2 (E4–27)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VPA (A37–6) or VPA (E4–18) – Body ground	10 kΩ or higher
EPA (A37–5) or EPA (E4–20) – Body ground	10 kΩ or higher
VCPA (A37–4) or VCPA (E4–26) – Body ground	10 kΩ or higher
VPA2 (A37–3) or VPA2 (E4–19) – Body ground	10 kΩ or higher
EPA2 (A37–2) or EPA2 (E4–21) – Body ground	10 kΩ or higher
VCP2 (A37–1) or VCP2 (E4–27) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace accelerator pedal pedal assembly.

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DTC	P2195	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)

DTC	P2196	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)

DTC	P2197	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 2 Sensor 1)

DTC	P2198	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 2 Sensor 1)

HINT:

- Although the DTC titles say oxygen sensor, these DTCs relate to the Air–Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three–Way Catalytic Converter (TWC) and located near the engine assembly.

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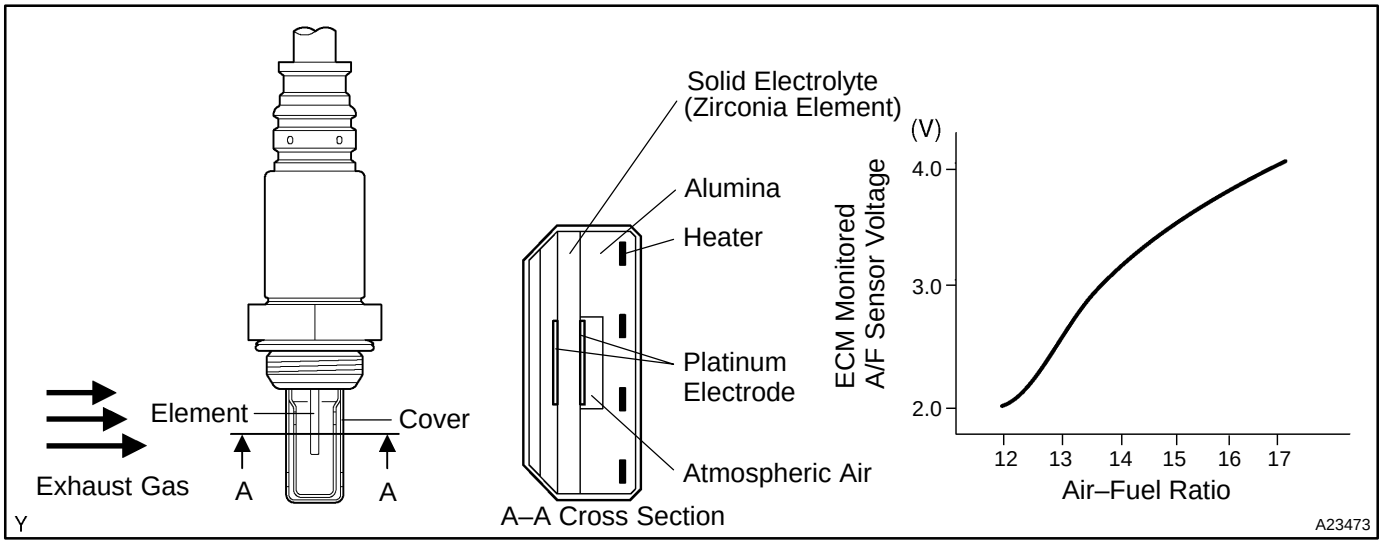
CIRCUIT DESCRIPTION

The A/F sensor generates a voltage* that corresponds to the actual air–fuel ratio. This sensor voltage is used to provide the ECM with feedback so that it can control the air–fuel ratio. The ECM determines the deviation from the stoichiometric air–fuel ratio level, and regulates the fuel injection time. If the A/F sensor malfunctions, the ECM is unable to control the air–fuel ratio accurately.

The A/F sensor is the planar type and is integrated with the heater, which heats the solid electrolyte (zirconia element). This heater is controlled by the ECM. When the intake air volume is low (the exhaust gas temperature is low), a current flows into the heater to heat the sensor, in order to facilitate accurate air–fuel ratio detection. In addition, the sensor and heater portions are narrower than the conventional type. The heat generated by the heater is conducted to the solid electrolyte though the alumina, therefore the sensor activation is accelerated.

In order to obtain a high purification rate of the carbon monoxide (CO), hydrocarbon (HC) and nitrogen oxide (NOx) components in the exhaust gas, a TWC is used. For the most efficient use of the TWC, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric level.

*: Value changes inside the ECM. Since the A/F sensor is the current output element, a current is converted to a voltage inside the ECM. Any measurements taken at the A/F sensor or ECM connectors will show a constant voltage.



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DTC No.	DTC Detection Conditions	Trouble Areas
P2195 P2197	While fuel–cut operation performing (during vehicle deceleration), air–fuel ratio sensor current is 3.6 mA or more for 3 seconds.	▶A/F sensor (sensor 1) ▶ECM
P2195	Conditions (a) and (b) continue for 2 seconds or more (2 trip detection logic): (a) Air–Fuel Ratio (A/F) sensor voltage more than 3.8 V (b) Heated Oxygen (HO2) sensor voltage 0.15 V or more	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor (sensor 1) heater ▶EFI relay ▶A/F sensor heater and relay circuits ▶Air induction system ▶Fuel pressure ▶Injector ▶ECM
P2196 P2198	While fuel–cut operation performing (during vehicle deceleration), air–fuel ratio sensor current is less than 1.4 mA for 3 seconds.	▶A/F sensor (sensor 1) ▶ECM
P2196	Conditions (a) and (b) continue for 2 seconds or more (2 trip detection logic): (a) A/F sensor voltage less than 2.8 V (b) HO2 sensor voltage less than 0.85 V	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor (sensor 1) heater ▶EFI relay ▶A/F sensor heater and relay circuits ▶Air induction system ▶Fuel pressure ▶Injector ▶ECM

HINT:

- ▶ When any of these DTCs are set, check the A/F sensor voltage output by selecting the following menu items on a hand−held tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / AFS B1S1.
- ▶ Short−term fuel trim values can also be read using a hand−held tester.
- ▶ The ECM regulates the voltage at the A1A+ and A1A– terminals of the ECM at a constant level. Therefore, the A/F sensor voltage output cannot be confirmed without using a hand–held tester.
- ▶ If the A/F sensor functional malfunction is detected, the ECM sets this DTC.

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MONITOR DESCRIPTION

▶ Sensor voltage detection monitor:

Under the air–fuel ratio feedback control, if the A/F sensor voltage output indicates rich or lean for a certain period of time, the ECM determines that there is a malfunction in the A/F sensor. The ECM illuminates the MIL and sets a DTC.

Example:

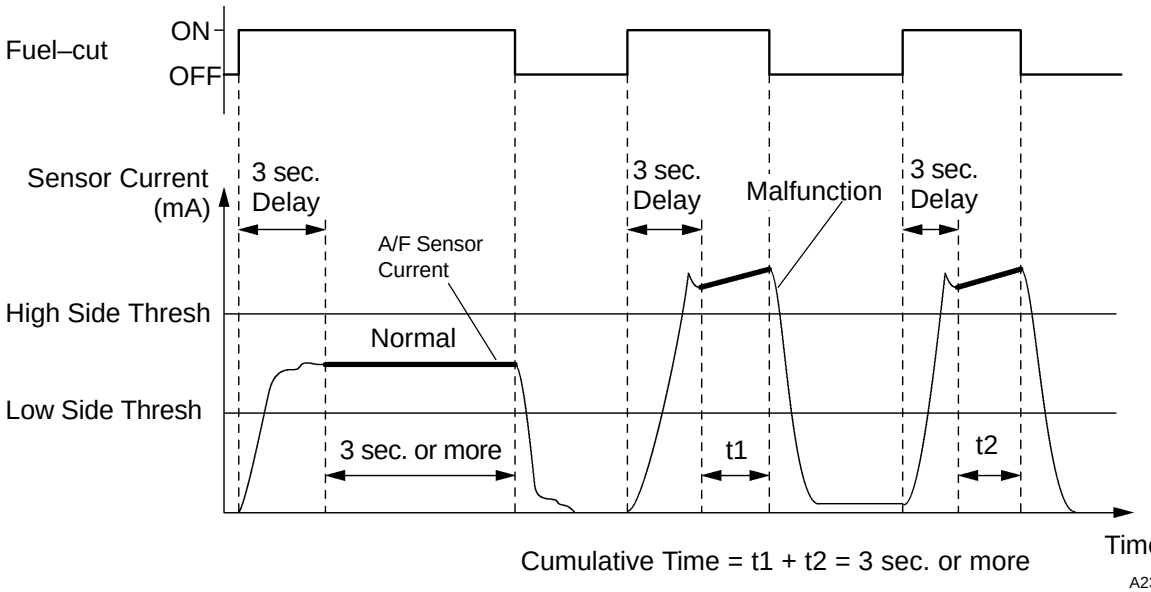
If the A/F sensor voltage output is less than 2.8 V (very rich condition) for 10 seconds, despite the HO2 sensor voltage output being less than 0.85 V, the ECM sets DTC P2196. Alternatively, if the A/F sensor voltage output is more than 3.8 V (very lean condition) for 10 seconds, despite the HO2 sensor voltage output being 0.15 V or more, DTC P2195 or P2197 is set.

▶ Sensor current detection monitor:

A rich air–fuel mixture causes a low air–fuel ratio sensor current, and a lean air fuel mixture causes a high air fuel ratio sensor current. Therefore, the sensor output becomes high during acceleration, and the sensor becomes low during deceleration.

The ECM monitors the air–fuel ratio sensor current during fuel–cut and detects an unusual current value. If the cumulative time the sensor output is out of range exceeds more than 3 seconds, the ECM interprets a malfunction in the air–fuel ratio sensor and sets a DTC.

Air–fuel Ratio Sensor Current Monitor:



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MONITOR STRATEGY

Related DTCs	P2195	A/F sensor (Bank 1) signal stuck lean
		A/F sensor (Bank 1) current (high side)
	P2196	A/F sensor (Bank 1) signal stuck rich
		A/F sensor (Bank 1) current (low side)
	P2197	A/F sensor (Bank 2) signal stuck lean
		A/F sensor (Bank 2) current (high side)
	P2198	A/F sensor (Bank 2) signal stuck rich
		A/F sensor (Bank 2) current (low side)
Required sensors/components	A/F sensor	
Frequency of operation	Once per driving cycle	
Duration	15 sec.: A/F sensor signal stuck lean/rich 3 sec.: A/F sensor current (high/low side)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P2195, P2197 (A/F sensor signal stuck lean):		
Duration while all of following conditions met	2 sec.	–
Rear HO2S voltage	0.15 V	–
Time after engine start	30 sec.	–
A/F sensor status	Activated	
Fuel system status	Closed–loop	
Engine	Running	
P2196, P2198 (A/F sensor signal stuck rich):		
Duration while all of following conditions met	2 sec.	–
Rear HO2S voltage	–	0.6 V
Time after engine start	30 sec.	–
A/F sensor status	Activated	
Fuel system status	Closed–loop	
Engine	Running	
P2195, P2197 (A/F sensor current (High side)):		
Battery voltage	11 V	–
ECT	75°C (167°F)	–
Atmospheric pressure/760 mmHg	0.75	–
A/F sensor status	Activated	
Continuous time of fuel–cut	3 to 10 sec.	
P2196, P2198 (A/F sensor current (Low side)):		
Battery voltage	11 V	–
ECT	75°C (167°F)	–

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Atmospheric pressure/760 mmHg	0.75	–
A/F sensor status	Activated	
Continuous time of fuel–cut	3 to 10 sec.	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2195, P2197 (A/F sensor signal stuck lean):	
A/F sensor voltage	More than 3.8 V for 15 sec.
P2196, P2198 (A/F sensor signal stuck rich):	
A/F sensor voltage	Less than 2.8 V for 15 sec.
P2195, P2197 (A/F sensor current (High side)):	
Duration of the following condition	3 sec. or more
A/F sensor current	3.6 mA or more
P2196, P2198 (A/F sensor current (Low side)):	
Duration of the following condition	3 sec. or more
A/F sensor current	Less than 1.4 mA

MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.

A/F sensor bank 1 sensor 1

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$01	$91	Multiply by 0.003906 (mA)	A/F current	Minimum test limit	Maximum test limit

A/F sensor bank 2 sensor 1

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$05	$91	Multiply by 0.003906 (mA)	A/F current	Minimum test limit	Maximum test limit

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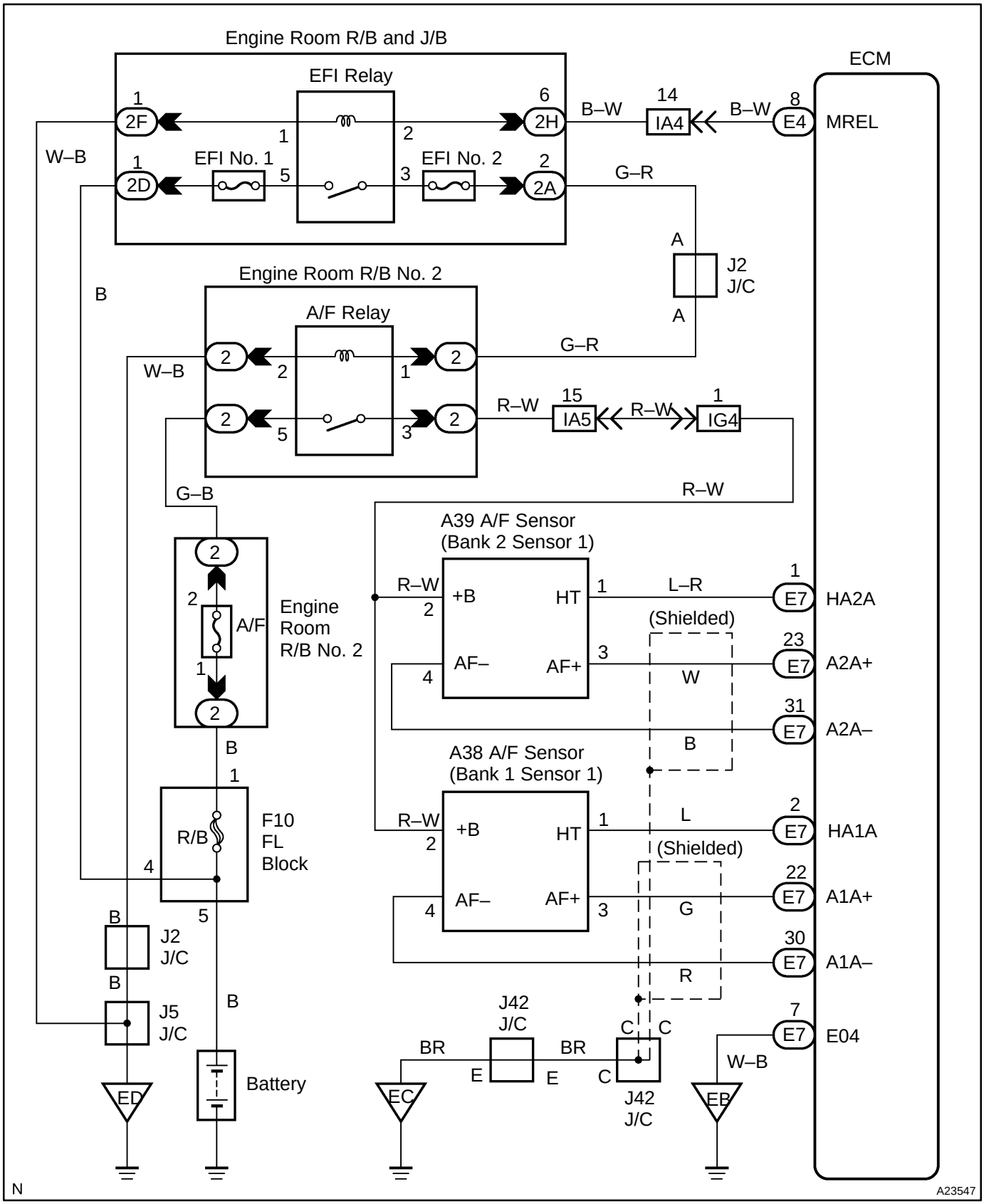
WIRING DIAGRAM



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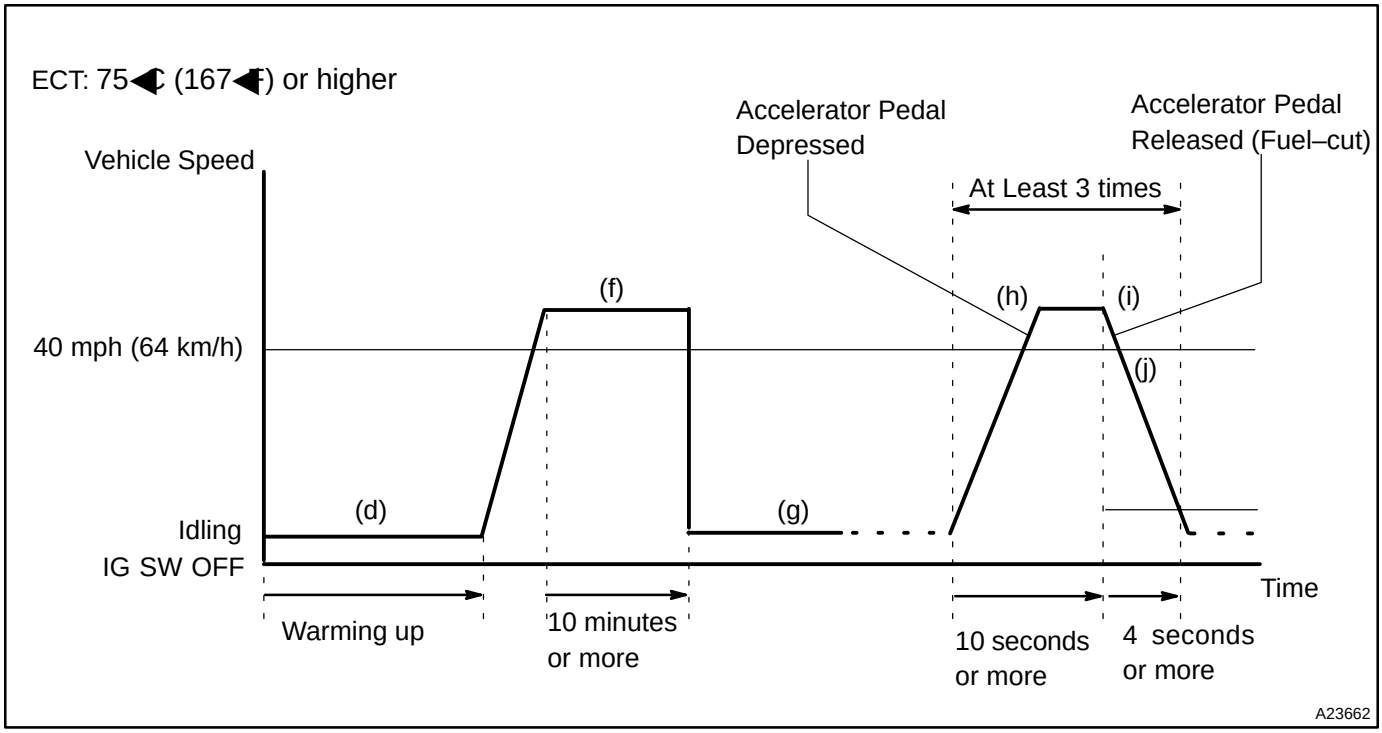
CONFIRMATION DRIVING PATTERN

HINT:

This confirmation driving pattern is used in steps 2, 4, 7, 17 and 21 of the following diagnostic troubleshooting procedure when using a hand–held tester.



(a) Connect the hand–held tester to DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Clear DTCs (see page DI–43).
(d) Start the engine, and warm it up until the ECT reaches 75◀C (167◀F) or higher.
(e) On the hand–held tester, select the following menu items: DIAGNOSIS/ENHANCED OBD II/DATA LIST/FC IDL.
(f) Drive the vehicle at 40 mph (64 km/h) or more for at least 10 minutes.
(g) Change the transmission to 2nd gear.
(h) Drive the vehicle at proper vehicle speed to perform fuel–cut operation.

HINT:

Fuel–cut is performed under following conditions met:

- ▶ Accelerator pedal fully released.
- ▶ Engine speed 2,500 rpm or more (fuel injection returns at 1,000 rpm).

(i) Accelerate the vehicle to 30 mph (48 km/h) or more by depressing the accelerator pedal for at least 10 seconds.
(j) Soon after performing step (8) above, release the accelerator pedal for at least 4 seconds without depressing the brake pedal, in order to execute fuel–cut control.
(k) Stop the vehicle and allow the engine to idle for 10 seconds or more.
(l) Allow the vehicle to decelerate until the vehicle speed declines to less than 6 mph (10 km/h).
(m) Repeat steps from (8) through (10) above at least 3 times in one driving cycle.

HINT:

Completing all A/F sensor monitors are required to change the value in TEST RESULT.

CAUTION:

Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive pattern.

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INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air–Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using a hand–held tester.

(1) Connect a hand–held tester to the DLC3.
(2) Start the engine and turn the tester ON.
(3) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(4) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(6) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 (AFS B2S1) and OS2 B1S2 (O2S B2S2)) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (AFS B2S1) (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (AFS B2S1) (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (O2S B2S2) (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (O2S B2S2) (HO2)	–12.5 %	Lean	Less than 0.4

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NOTICE:
The Air–Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage	HO2 Sensor (Sensor 2) Output Voltage	Main Suspected Trouble Areas
1	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
2	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	• A/F sensor • A/F sensor heater • A/F sensor circuit
3	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
4	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• Injector • Fuel pressure • Gas leakage from exhaust system (Air–fuel ratio extremely lean or rich)

▶ Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.

▶ To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press the YES button and then the ENTER button followed by the F4 button.

HINT:

▶ Read freeze frame data using a hand–held tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

▶ A low A/F sensor voltage could be caused by a rich air–fuel mixture. Check for conditions that would cause the engine to run rich.

▶ A high A/F sensor voltage could be caused by a lean air–fuel mixture. Check for conditions that would cause the engine to run lean.

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1	**Check any other DTCs output (in addition to DTC P2195, P2196, P2197 or P2198).**

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

(a) Read DTCs.

Result:

Display (DTC Output)	Proceed To
P2195, P2196, P2197 or P2198	A
P2195, P2196, P2197 or P2198 and other DTCs	B

HINT:
If any DTCs other than P2195, P2196, P2197 or P2198 are output, troubleshoot those DTCs first.

B → **Go to DTC chart (See page DI–58).**

A

2	**Check A/F sensor output current.**

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Clear DTCs (see page DI–43).
(d) On the hand–held tester, select the following menu items: DIAGNOSIS/ENHANCED OBD II/MONITOR INFO/MONITOR STATUS.
(e) Check that the status of O2S MON is COMPL.
(f) On the hand–held tester, select the following menu items: DIAGNOSIS/ENHANCED OBD II/MONITOR INFO/TEST RESULT/RANGE BISI and B2S1.
(g) Check the test value of the air–fuel ratio sensor output current during fuel–cut.

RESULT:

Test Value	Proceed to
Out of normal range (1.4 mA or more, and less than 3.6 mA)	A
Within normal range (Less than 1.4 mA, or 3.6 mA or more)	B

B → **Go to step 20.**

A

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3	Read value output voltage of A/F sensor.

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and turn the scan tool ON.
(c) Warm up the Air–Fuel Ratio (A/F) sensor at an engine speed of 2,500 rpm for 90 seconds.

CHECK:

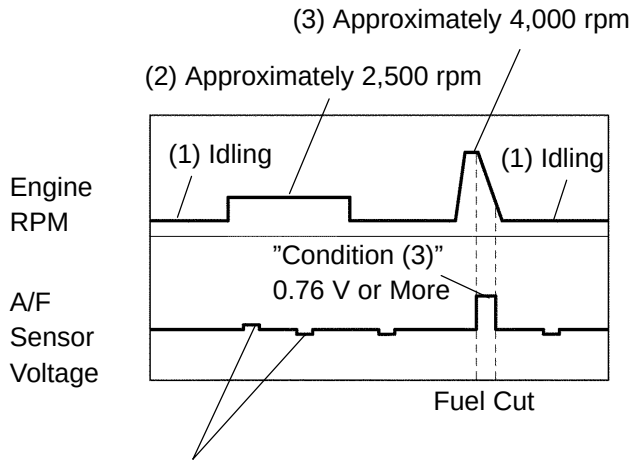
(a) Using the scan tool, check the A/F sensor voltage 3 times, once when the engine is in each of the following conditions:
  (1) While idling (check for at least 30 seconds)
  (2) At an engine speed of approximately 2,500 rpm (without any sudden changes in engine speed)
  (3) Raise the engine speed to 4,000 rpm and then quickly release the accelerator pedal so that the throttle valve is fully closed.

  Standard:

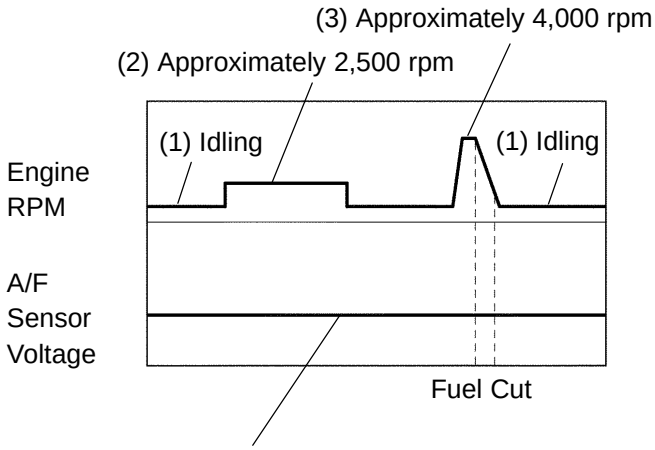
Conditions	A/F Sensor Voltage Variations	Reference
(1) and (2)	Changes at approx 0.66 V	Between 0.62 V and 0.7 V
(3)	Increases to 0.76 V or more	This occurs during engine deceleration (when fuel–cut performed)

For more information, see the diagrams below.

Normal Condition:



Malfunction Condition:



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HINT:

- If the output voltage of the A/F sensor remains at approximately 0.66 V (see Malfunction Condition diagram) under any conditions, including those above, the A/F sensor may have an open circuit. (This will also happen if the A/F sensor heater has an open circuit.)
- If the output voltage of the A/F sensor remains at either approximately 0.76 V or more, or 0.56 V or less (see Malfunction Condition diagram) under any conditions, including those above, the A/F sensor may have a short circuit.
- The ECM stops fuel injection (fuel cut) during engine deceleration. This causes a lean condition and results in a momentary increase in the A/F sensor output voltage.

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- The ECM must establish a closed throttle valve position learning value to perform fuel cut. If the battery terminal has been reconnected, the vehicle must be driven over 10 mph (16 km/h) to allow the ECM to learn the closed throttle valve position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 0.56 V during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element; therefore, the current is converted into a voltage inside the ECM. Measuring the voltage at the connectors of the A/F sensor or ECM will show a constant voltage result.

NG	**Go to step 9.**

OK

4	**Perform confirmation driving pattern.**

NEXT

5	**Check whether DTC output recurs (DTC P2195, P2196, P2197 or P2198)**

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P2195, P2196, P2197 or P2198	A
No output	B

B	**Go to step 5.**

A

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6	**Replace air fuel ratio sensor.**

NEXT

7	**Perform confirmation driving pattern.**

NEXT

8	**Check whether DTC output recurs (DTC P2195, P2196, P2197 or P2198)**

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P2195, P2196, P2197 or P2198	A
No output	B

B → **Go to step 5.**

A

9	**Confirm whether vehicle has run out of fuel in past.**

NO → **Check for intermittent problems (See page DI–11).**

YES

DTC caused by running out of fuel.

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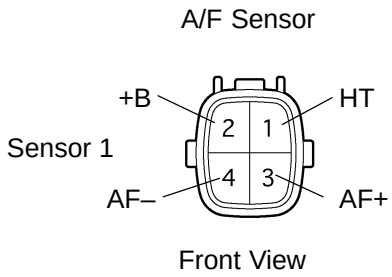
10	Check resistance of air–fuel ratio (A/F) sensor heater.

Component Side:



PREPARATION:

Disconnect the air–fuel ratio (A/F) sensor connector.

CHECK:

Measure resistance between the terminals of the A/F sensor connector.

OK:

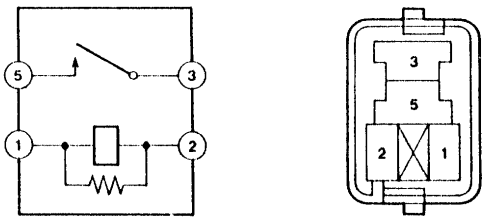
Tester Connection	Specified Condition
HT (1) – +B (2)	Between 1.8 Ω and 3.4 Ω at 20°C (68°F)
HT (1) – AF– (4)	10 kΩ or higher

NG → **Replace air–fuel ratio (A/F) sensor.**

OK

11	Check A/F relay.

A/F Relay



PREPARATION:

Remove the A/F relay from the engine room J/B.

CHECK:

Inspect the A/F relay.

OK:

Standard:

Terminal No.	Condition	Specified Condition
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace EFI relay.**

OK

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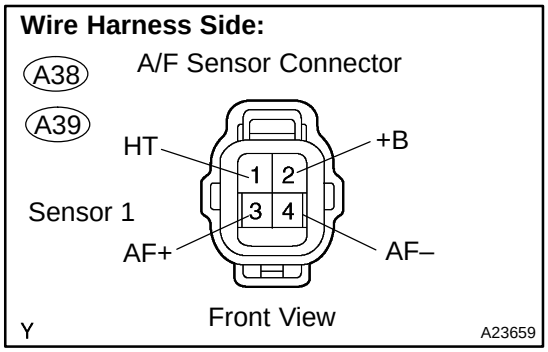
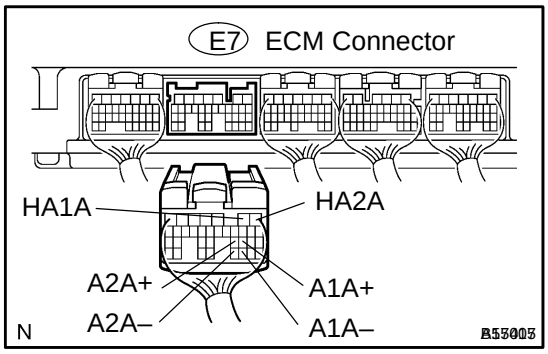
12	Check for open and short in harness and connector between ECM and A/F sensor.





PREPARATION:

(a) Disconnect the A38 or A39 A/F sensor connector.

(b) Turn the ignition switch to ON.

CHECK:

(a) Measure the voltage between the +B terminal of the A/F sensor connector and body ground.

Standard:

Tester Connections	Specified Conditions
+B (2) – Body ground	Between 9 V and 14 V

PREPARATION:

(a) Turn the ignition switch to OFF.

(b) Disconnect the E7 ECM connector.

CHECK:

(a) Check the resistance.

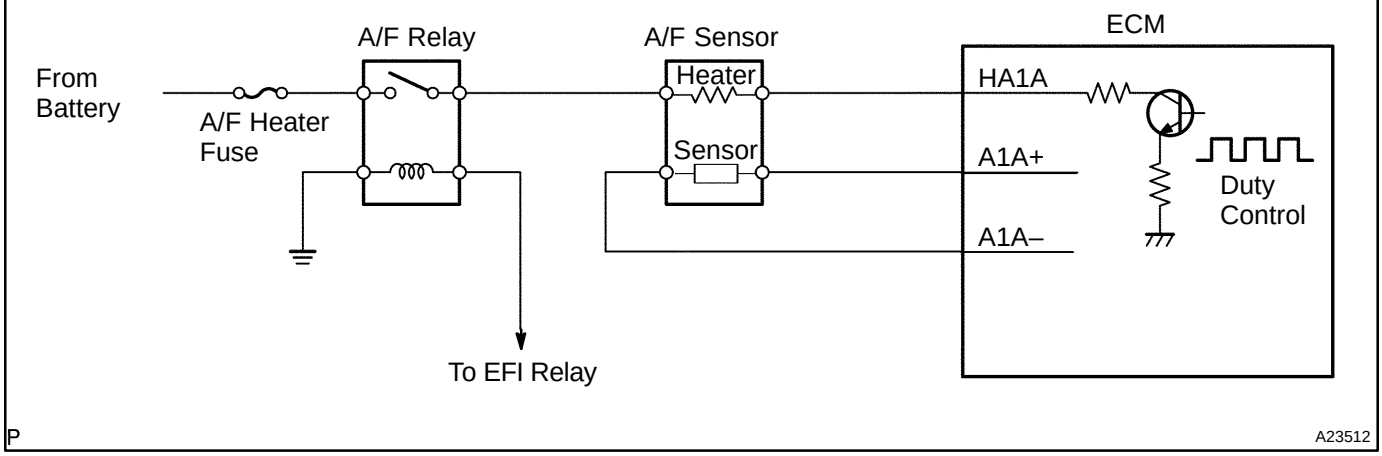
Standard (Check for open):

Tester Connections	Specified Conditions
HT (A38–1) – HA1A (E7–2) HT (A39–1) – HA2A (E7–1)	Below 1 Ω
AF+ (A38–3) – A1A+ (E7–22) AF+ (A39–3) – A2A+ (E7–23)	Below 1 Ω
AF– (A38–4) – A1A– (E7–30) AF– (A39–4) – A2A– (E7–31)	Below 1 Ω

Standard (Check for short):

Tester Connections	Specified Conditions
HT (A38–1) or HA1A (E7–2) – Body ground HT (A39–1) or HA2A (E7–1) – Body ground	10 kΩ or higher
AF+ (A38–3) or A1A+ (E7–22) – Body ground AF+ (A39–3) or A2A+ (E7–23) – Body ground	10 kΩ or higher
AF– (A38–4) or A1A– (E7–30) – Body ground AF– (A39–4) or A2A– (E7–31) – Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing):



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NG → Replace or replace harness or connector.

OK

13	Check air induction system (See page SF–1).

CHECK:
Check the air induction system for vacuum leaks.

NG → Repair or replace air induction system.

OK

14	Check fuel pressure (See page SF–7).

CHECK:
Check the fuel pressure (high or low pressure).

NG → Check and replace fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).

OK

15	Check injector injection (See page SF–29).

NG → Replace injector.

OK

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16	**Replace air fuel ratio sensor.**

NEXT

17	**Perform confirmation driving pattern.**

NEXT

18	**Check whether DTC output recurs (DTC P2195, P2196, P2197 or P2198)**

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P2195, P2196, P2197 or P2198	A
No output	B

B → **Replace ECM (See page SF–80) and perform confirmation driving pattern.**

A

19	**Confirm whether vehicle has run out of fuel in past.**

NO → **Check for intermittent problems (See page DI–11).**

YES

DTC caused by running out of fuel.

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20	**Replace air fuel ratio sensor.**

NEXT

21	**Perform confirmation driving pattern.**

NEXT

22	**Check whether DTC output recurs (DTC P2195, P2196, P2197 or P2198)**

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P2195, P2196, P2197 or P2198 (A/F sensor pending DTCs)	A
No output	B

B → **Replace ECM (See page SF–80).**

A

END

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DIDFU–01

DTC	P2238	Oxygen Sensor Pumping Current Circuit Low (For A/F Sensor)(Bank 1 Sensor1)

DTC	P2239	Oxygen Sensor Pumping Current Circuit High (For A/F Sensor)(Bank 1 Sensor1)

DTC	P2241	Oxygen Sensor Pumping Current Circuit Low (For A/F Sensor)(Bank 2 Sensor1)

DTC	P2242	Oxygen Sensor Pumping Current Circuit High (For A/F Sensor)(Bank 2 Sensor1)

DTC	P2252	Oxygen Sensor Reference Ground Circuit Low (For A/F Sensor)(Bank 1 Sensor1)

DTC	P2253	Oxygen Sensor Reference Ground Circuit High (For A/F Sensor)(Bank 1 Sensor1)

DTC	P2255	Oxygen Sensor Reference Ground Circuit Low (For A/F Sensor)(Bank 2 Sensor1)

DTC	P2256	Oxygen Sensor Reference Ground Circuit High (For A/F Sensor)(Bank 2 Sensor1)

HINT:

- Although the DTC titles say oxygen sensor, these DTCs relate to the Air–Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three–Way Catalytic Converter (TWC) and located near the engine assembly.

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CIRCUIT DESCRIPTION

Refer to DTC P2195 on page DI–383.

DTC No.	DTC Detection Conditions	Trouble Areas
P2238 P2241	▶Case 1: Condition (a) or (b) continues for 5.0 seconds or more (1 trip detection logic): (a) AF+ voltage 0.5 V or less (b) (AF+) – (AF–) = 0.1 V or less ▶Case 2: A/F sensor admittance: Less than 0.022 1/Ω (1 trip detection logic)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater ▶EFI relay ▶A/F sensor heater and relay circuits ▶ECM
P2239 P2242	AF+ voltage more than 4.5 V for 5.0 seconds or more (1 trip detection logic)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater ▶EFI relay ▶A/F sensor heater and relay circuits ▶ECM
P2252 P2255	AF– voltage 0.5 V or less for 5.0 seconds or more (1 trip detection logic)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater ▶EFI relay ▶A/F sensor heater and relay circuits ▶ECM
P2253 P2256	AF– voltage more than 4.5 V for 5.0 seconds or more (1 trip detection logic)	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶A/F sensor heater ▶EFI relay ▶A/F sensor heater and relay circuits ▶ECM

MONITOR DESCRIPTION

The Air–Fuel Ratio (A/F) sensor varies its output voltage in proportion to the air–fuel ratio. If the A/F sensor impedance (alternating current resistance) or voltage output deviates greatly from the standard range, the ECM determines that there is an open or short malfunction in the A/F sensor circuit.

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MONITOR STRATEGY

Related DTCs	P2238	A/F sensor (Bank 1) open circuit between AF+ and AF–
		A/F sensor (Bank 1) short circuit between AF+ and AF–
		A/F sensor (Bank 1) short circuit between AF+ and GND
	P2239	A/F sensor (Bank 1) short circuit between AF+ and +B
	P2241	A/F sensor (Bank 2) open circuit between AF+ and AF–
		A/F sensor (Bank 2) short circuit between AF+ and AF–
		A/F sensor (Bank 2) short circuit between AF+ and GND
	P2242	A/F sensor (Bank 2) short circuit between AF+ and +B
	P2252	A/F sensor (Bank 1) short circuit between AF– and GND
	P2253	A/F sensor (Bank 1) short circuit between AF– and +B
	P2255	A/F sensor (Bank 2) short circuit between AF– and GND
	P2256	A/F sensor (Bank 2) short circuit between AF– and +B
Required sensors/components	A/F sensor	
Frequency of operation	Once per driving cycle	
Duration	10 sec.: A/F sensor open circuit between AF+ and AF– 5 sec.: Others	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
P2238, P2241 (A/F sensor open circuit between AF+ and AF–):		
Duration while all of following conditions met	20 sec.	–
AF+ terminal voltage	0.5 to 4.5 V	
AF– terminal voltage	0.5 to 4.5 V	
Difference between AF+ terminal and AF– terminal voltage	0.1 to 0.8 V	
ECT	20°C (68°F)	–
Engine	Running	
Time after engine start	20 sec.	–
Fuel–cut	OFF	
A/F sensor heater duty cycle	0%	–

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Time after A/F sensor heating	20 sec.	–
Battery voltage	10.5 V	–
Ignition switch	ON	
Others:		
Battery voltage	10.5 V	–
Ignition switch	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2238, P2241 (A/F sensor open circuit between AF+ and AF–):	
A/F sensor admittance	Bellow 0.022 1/ohm
P2238, P2241 (A/F sensor short circuit between AF+ and GND):	
A/F+ terminal voltage	0.5 V or less
P2238, P2241 (A/F sensor short circuit between AF+ and AF–):	
Difference between A/F+ terminal and AF– terminal voltage	0.1 V or less
P2239, P2242 (A/F sensor short circuit between AF+ and +B):	
A/F+ terminal voltage	More than 4.5 V
P2252, P2255 (A/F sensor short circuit between AF– and GND):	
A/F– terminal voltage	0.5 V or less
P2253, P225+ (A/F sensor short circuit between AF– and +B):	
A/F– terminal voltage	More than 4.5 V

WIRING DIAGRAM

Refer to DTC P2195 on page DI–383.

INSPECTION PROCEDURE

HINT:

Hand–held tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air–Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using a hand–held tester.

(1) Connect a hand–held tester to the DLC3.
(2) Start the engine and turn the tester ON.
(3) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(4) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(6) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 (AFS B2S1) and OS2 B1S2 (O2S B2S2)) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

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Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (AFS B2S1) (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (AFS B2S1) (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (O2S B2S2) (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (O2S B2S2) (HO2)	–12.5 %	Lean	Less than 0.4

NOTICE:

The Air–Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

- ▶ Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
- ▶ To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press the YES button and then the ENTER button followed by the F4 button.

Case	A/F Sensor (Sensor 1) Output Voltage	HO2 Sensor (Sensor 2) Output Voltage	Main Suspected Trouble Areas
1	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
2	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	• A/F sensor • A/F sensor heater • A/F sensor circuit
3	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
4	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• Injector • Fuel pressure • Gas leakage from exhaust system (Air–fuel ratio extremely lean or rich)

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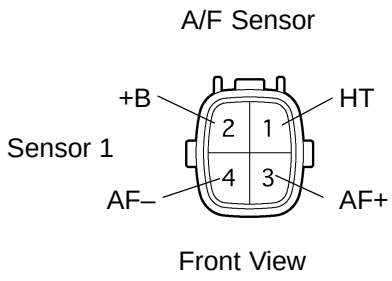
HINT:
Read freeze frame data using a hand–held tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**Check resistance of air–fuel ratio (A/F) sensor heater.**

Component Side:



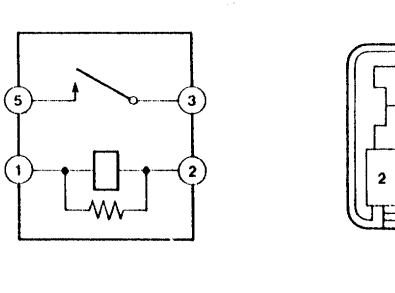
PREPARATION:
Disconnect the air–fuel ratio (A/F) sensor connector.
CHECK:
Measure resistance between the terminals of the A/F sensor connector.
OK:

Tester Connection	Specified Condition
HT (1) – +B (2)	Between 1.8 Ω and 3.4 Ω at 20°C (68°F)
HT (1) – AF– (4)	10 kΩ or higher

NG → **Replace air–fuel ratio (A/F) sensor.**

OK

2	**Check A/F relay.**



PREPARATION:
Remove the A/F relay from the engine room J/B.
CHECK:
Inspect the A/F relay.
OK:

Terminal No.	Condition	Specified Condition
1 – 2	Constant	Continuity
3 – 5	Usually	No Continuity
	Apply B+ between terminals 1 and 2	Continuity

NG → **Replace EFI relay.**

OK

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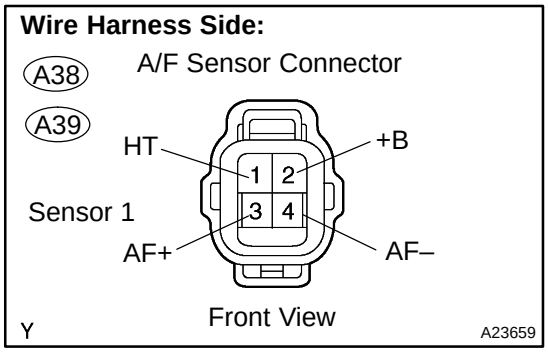
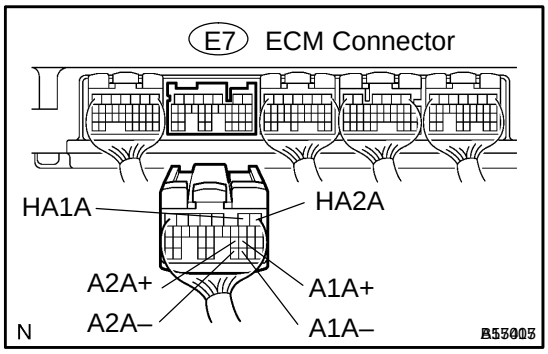
3	**Check for open and short in harness and connector between ECM and A/F sensor.**





PREPARATION:

(a) Disconnect the A38 or A39 A/F sensor connector.

(b) Turn the ignition switch to ON.

CHECK:

(a) Measure the voltage between the +B terminal of the A/F sensor connector and body ground.

OK:

Standard:

Tester Connections	Specified Conditions
+B (2) – Body ground	Between 9 V and 14 V

PREPARATION:

(a) Turn the ignition switch to OFF.

(b) Disconnect the E7 ECM connector.

CHECK:

(a) Check the resistance.

OK:

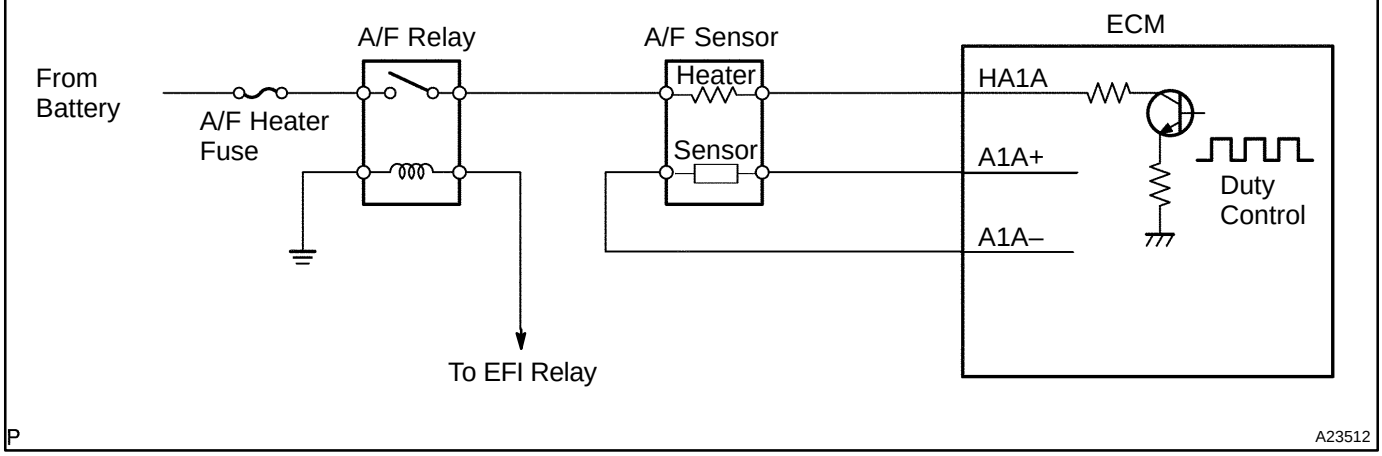
Standard (Check for open):

Tester Connections	Specified Conditions
HT (A38–1) – HA1A (E7–2) HT (A39–1) – HA2A (E7–1)	Below 1 Ω
AF+ (A38–3) – A1A+ (E7–22) AF+ (A39–3) – A2A+ (E7–23)	Below 1 Ω
AF– (A38–4) – A1A– (E7–30) AF– (A39–4) – A2A– (E7–31)	Below 1 Ω

Standard (Check for short):

Tester Connections	Specified Conditions
HT (A38–1) or HA1A (E7–2) – Body ground HT (A39–1) or HA2A (E7–1) – Body ground	10 kΩ or higher
AF+ (A38–3) or A1A+ (E7–22) – Body ground AF+ (A39–3) or A2A+ (E7–23) – Body ground	10 kΩ or higher
AF– (A38–4) or A1A– (E7–30) – Body ground AF– (A39–4) or A2A– (E7–31) – Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing):



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NG → Replace or replace harness or connector.

OK

Replace ECM (See page SF–80).

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DIDFV–01

DTC	P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low

DTC	P2402	Evaporative Emission System Leak Detection Pump Control Circuit High

DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2401	Vacuum pump stuck OFF	Vacuum pump creates negative pressure through 0.02 inch orifice, and EVAP system pressure measured to determine leak pressure standard. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If system pressure higher than –1.06 kPa (–7.93 mmHg)*, or lower than –4.85 kPa (–36.38 mmHg)*, ECM determines that vacuum pump stuck OFF.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	While ignition switch OFF	2 trip
P2402	Vacuum pump stuck ON	Vacuum pump creates negative pressure through 0.02 inch orifice, and EVAP system pressure measured to determine leak pressure standard. If system pressure higher than –1.06 kPa (–7.93 mmHg)*, or lower than –4.85 kPa (–36.38 mmHg)*, ECM determines that vacuum pump stuck ON.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	While ignition switch OFF	2 trip

*: The threshold values vary according to the atmospheric pressure measured in operation A. The values described in the table above are based on an atmospheric pressure of 100 kPa (750.1 mmHg).

HINT:

The vacuum pump is built into the pump module.

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page DI–460).

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MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

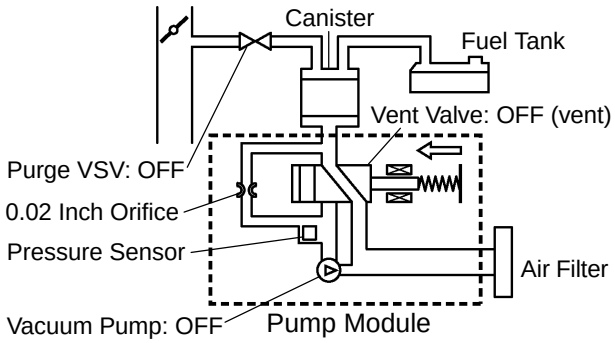
HINT:

*: If the engine coolant temperature is not below 35◀C (95◀F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◀C (95◀F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

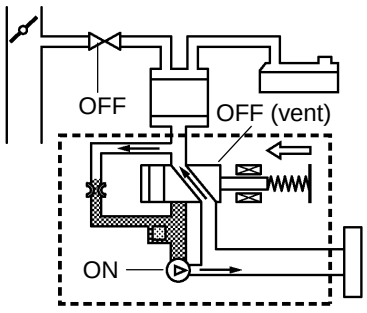
Sequence	Operations	Descriptions	Duration
–	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	–
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and them ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	–

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

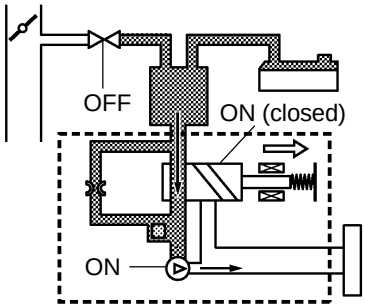
Operation A: Atmospheric Pressure Measurement

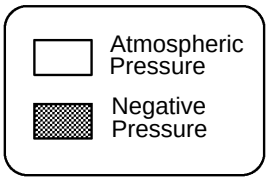


Operation B: 0.02 Inch Leak Pressure Measurement

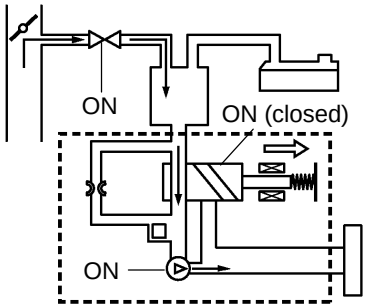


Operation C: EVAP Leak Check





Operation D: Purge VSV monitor



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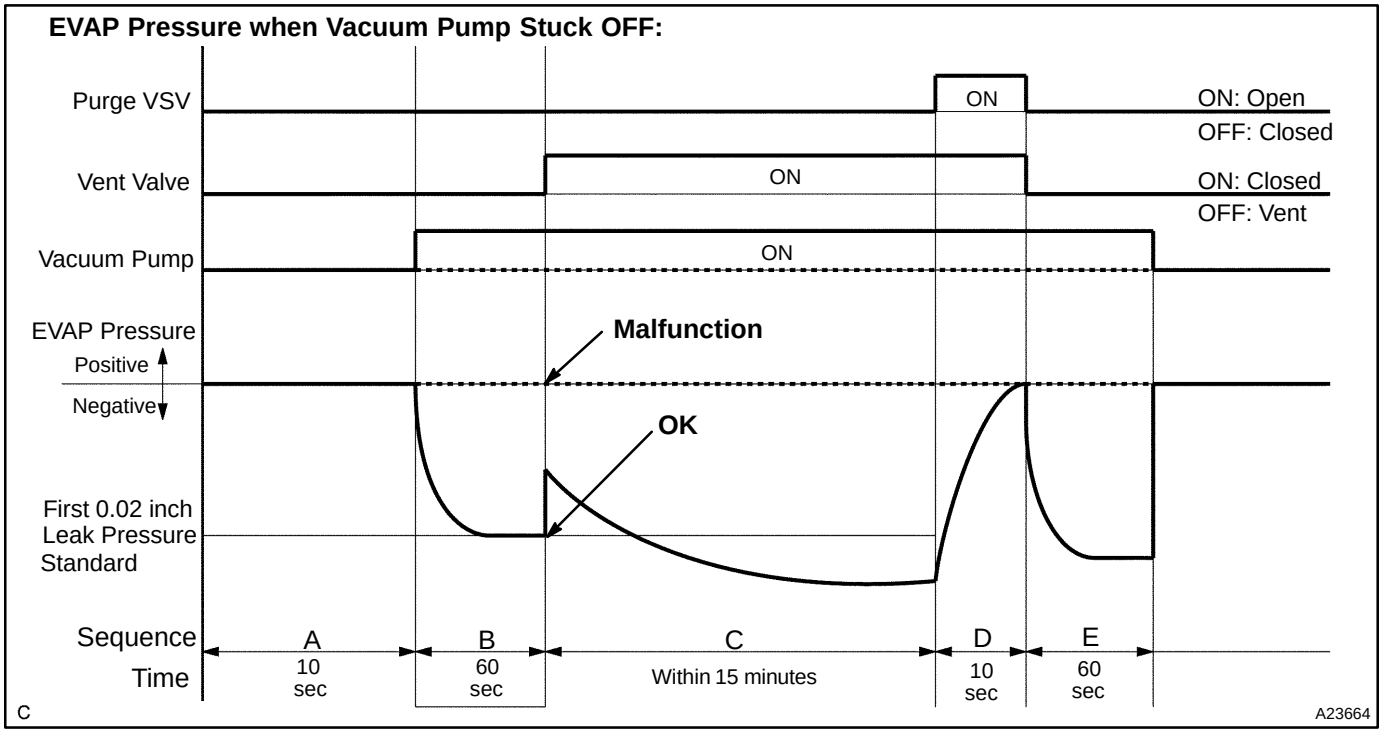
(a) P2401: Vacuum pump stuck OFF

In operation B, the vacuum pump creates negative pressure (a vacuum) through the 0.02 inch orifice. The EVAP (Evaporative Emission) system pressure is then measured by the ECM, using the pressure sensor, to determine the 0.02 inch leak pressure standard. If the pressure is higher than –1.06 kPa (–7.95 mmHg)*, or lower than –4.85 kPa (–36.38 mmHg)*, the ECM interprets this as the vacuum pump being stuck OFF (not operating). The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

*: The thresholds vary according to the atmospheric pressure measured in operation A. The values described above are based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



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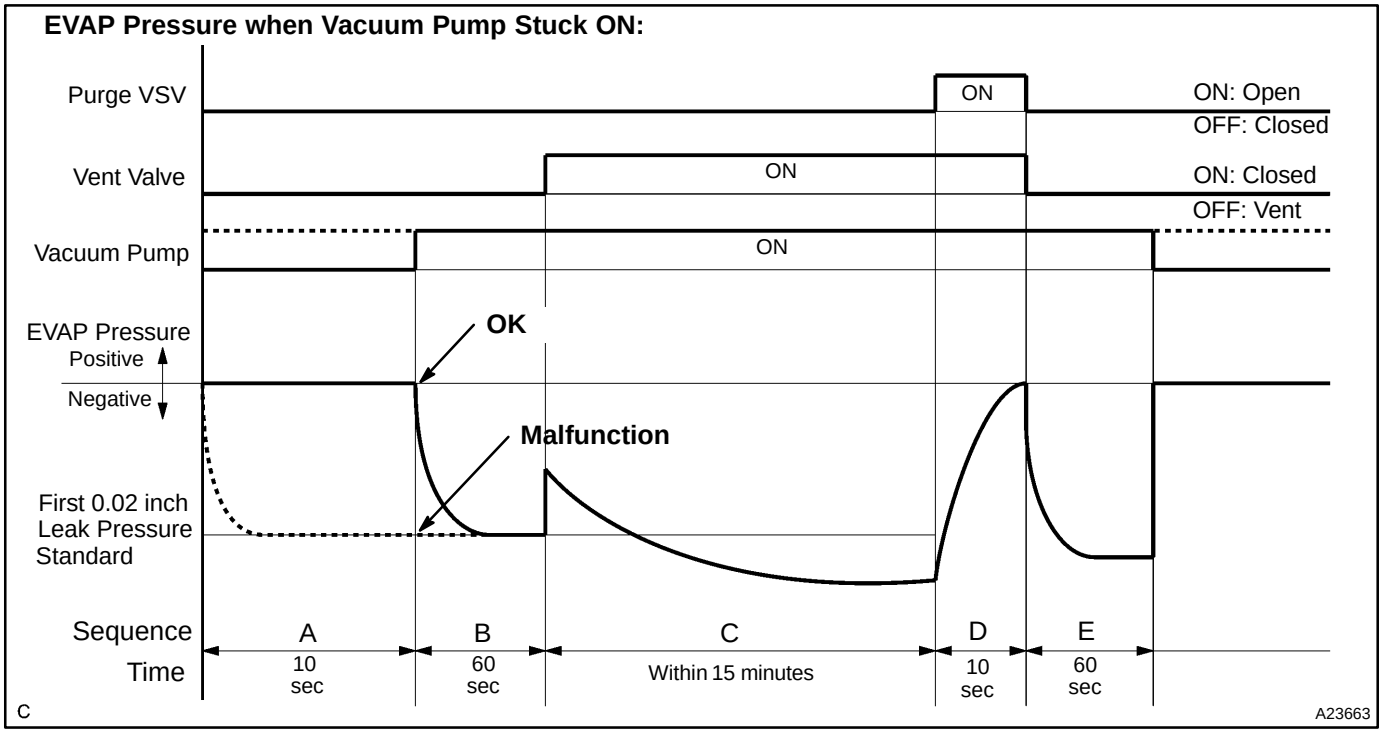
(b) P2402: Vacuum pump stuck ON

In operation B, the vacuum pump creates negative pressure (a vacuum) through the 0.02 inch orifice. The EVAP (Evaporative Emission) system pressure is then measured by the ECM, using the pressure sensor, to determine the 0.02 inch leak pressure standard. If the pressure is higher than –1.06 kPa (–7.95 mmHg)*, or lower than –4.85 kPa (–36.38 mmHg)*, the ECM interprets this as the vacuum pump being stuck ON (remaining ON all the time). The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

*: The thresholds vary according to the atmospheric pressure measured in operation A. The values described above are based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



HINT:

The detection logic of DTCs P2401 and P2402 is the same because in both cases the 0.02 inch leak pressure standard measured in operation B is compared to the atmospheric pressure registered in operation A. The ECM calculates the difference between these pressures by deducting [the 0.02 inch leak pressure standard] from [the stored atmospheric pressure], and uses this to monitor the EVAP system pressure change.

MONITOR STRATEGY

Related DTCs	P2401	Vacuum pump stuck OFF
	P2402	Vacuum pump stuck ON
Required sensors/components	Pump module	
Frequency of operation	Once per driving cycles	
Duration	Within 2 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Following values are when atmospheric is 760 mmHg (100 kPa)	–	
EVAP key–off monitor runs when all of the following conditions met:	–	
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)	
Battery voltage	10.5 V	–
Vehicle speed	–	4 km/h (2.5 mph)
Ignition switch	OFF	
Engine condition	Not running	
Time after engine stopped	5 hours	
FTP sensor malfunction (P0450, P0452, P0453)	Not detected	
Purge VSV	Not operated by scan tool	
Vent valve	Not operated by scan tool	
Leak detection pump	Not operated by scan tool	
Both of the following conditions are met before IG switch OFF	Condition 1 and 2	
1. Duration that vehicle is driven	5 min.	–
2. Purge flow	Executed	
ECT	4.4 to 35˚C (40 to 95˚F)	
IAT	4.4 to 35˚C (40 to 95˚F)	
Example of re–start time	–	
First time	7 hours	
Second time	9 hours and 30 min.	
Key–off monitor sequence	1 to 8	
1. Atmospheric pressure	–	
Next sequence is run if following condition set	–	
Atmospheric pressure change for 10 sec.	–	2.25 mmHg (0.3 kPa) for 1 sec.
2. First reference pressure	–	
Next sequence is run if all of following conditions set	Condition 1, 2 and 3	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1.057 kPa)	
3. Reference pressure	Saturated	
3. Vent valve stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa)	–

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4. Vacuum introduction and leak	–	
Next sequence is run if both of following conditions set	Condition 1 and 2	
1. Vacuum introduction time	–	15 min.
2. FTP	FTP was saturated	
5. Purge VSV stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa)	–
6. Second reference pressure measurement	–	
Next sequence is run if all of following conditions set	Condition 1, 2, 3 and 4	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1.057 kPa)	
3. Reference pressure	Saturated	
4. Reference pressure difference between first and second	–	5.25 mmHg (0.7 kPa)
7. Leak check	–	
Next sequence is run if following condition set	–	
FTP when vacuum introduction was complete	–	Second reference pressure
8. Atmospheric pressure	–	
Monitor is complete if following	–	
Atmospheric pressure difference between sequence 1 and 8	–	2.25 mmHg (0.3 kPa)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Following values are when atmospheric pressure is 760 mmHg (100 kPa)	–
One of the following conditions set	Condition 1, 2, 3, 4 or 5
1. FTP when 4 sec. after reference pressure measurement began	–7.5 mmHg (–1 kPa) or more
2. Reference pressure	–36.38 mmHg (–4.85 kPa) or less
3. Reference pressure	–7.93 mmHg (–1.057 kPa) or more
4. Reference pressure	Not saturated
5. Reference pressure difference between first and second	More than 5.25 mmHg (0.7 kPa)

MONITOR RESULT (MODE 06 DATA)

Refer to page DI–26 for detailed information on Monitor Result.

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page DI–460).

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DIDFW–01

DTC	P2419	Evaporate Emission System Switching Valve Control Circuit Low

DTC	P2420	Evaporate Emission System Switching Valve Control Circuit High

DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2419	Vent valve stuck closed	Vacuum pump creates negative pressure through 0.02 inch orifice and EVAP system pressure measured to determine leak pressure standard. If system pressure higher than –1.06 kPa (–7.95 mmHg)* 4 seconds after vacuum pump turned ON, ECM determines that vent valve stuck closed.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	While ignition switch OFF	2 trip
P2420	Vent valve stuck open (vent)	Vacuum pump creates negative pressure through 0.02 inch orifice and EVAP system pressure measured to determine leak pressure standard. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If system pressure does not increase by more than 0.3 kPa (2.25 mmHg) within 10 seconds when vent valve turned ON, ECM determines that vent valve stuck close.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM	While ignition switch OFF	2 trip

*: The threshold value varies according to the atmospheric pressure measured in operation A. The value described above is based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.

HINT:

The vent valve is built into the pump module.

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page DI–460).

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MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

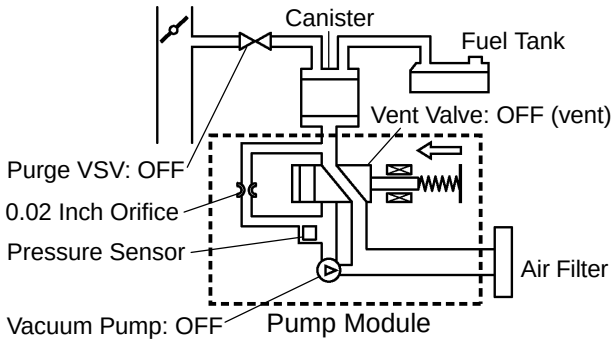
HINT:

*: If the engine coolant temperature is not below 35◀C (95◀F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◀C (95◀F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

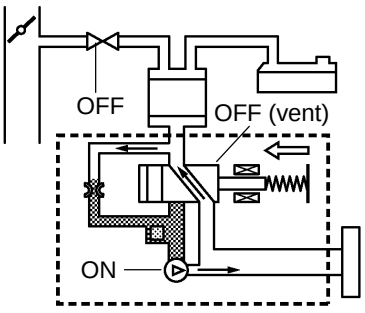
Sequence	Operations	Descriptions	Duration
–	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	–
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and them ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	–

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

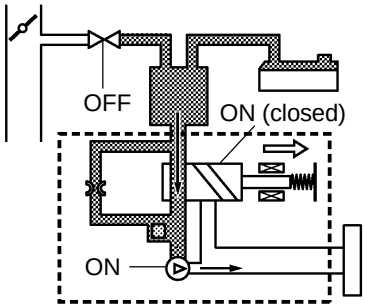
Operation A: Atmospheric Pressure Measurement

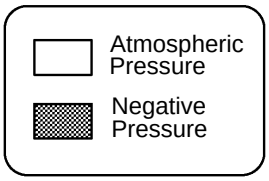


Operation B: 0.02 Inch Leak Pressure Measurement

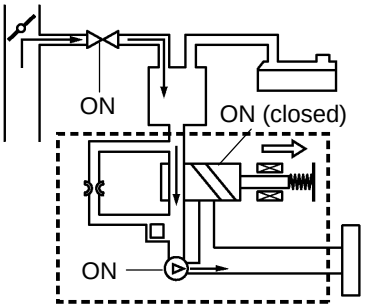


Operation C: EVAP Leak Check





Operation D: Purge VSV monitor



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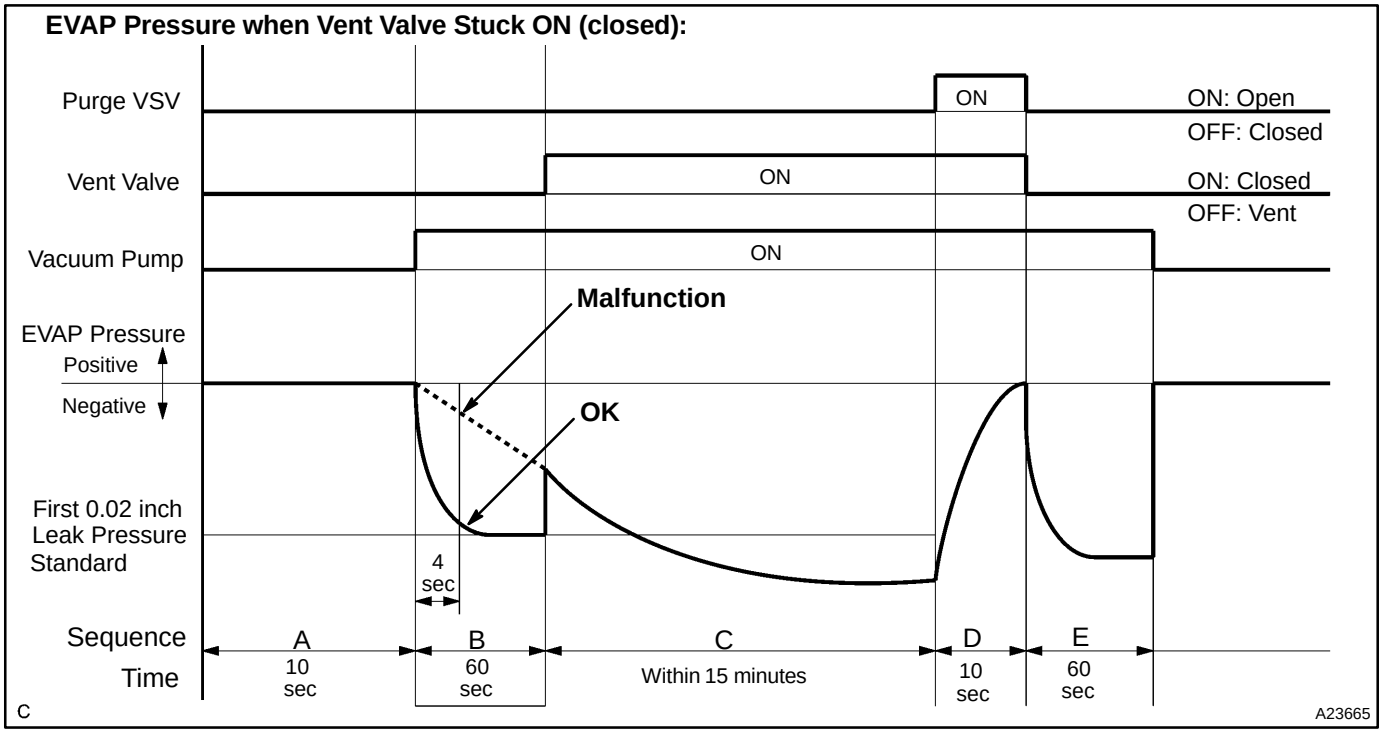
(a) P2419: Vent valve stuck closed

In operation B, the vacuum pump creates negative pressure (a vacuum) through the 0.02 inch orifice. The EVAP (Evaporative Emission) system pressure is then measured by the ECM, using the pressure sensor, to determine the 0.02 inch leak pressure standard. If the pressure exceeds –1.06 kPa (–7.95 mmHg)* 4 seconds after the vacuum pump is turned ON, the ECM interprets this as the vent valve being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

*: The threshold varies according to the atmospheric pressure measured in operation A. The value described above is based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



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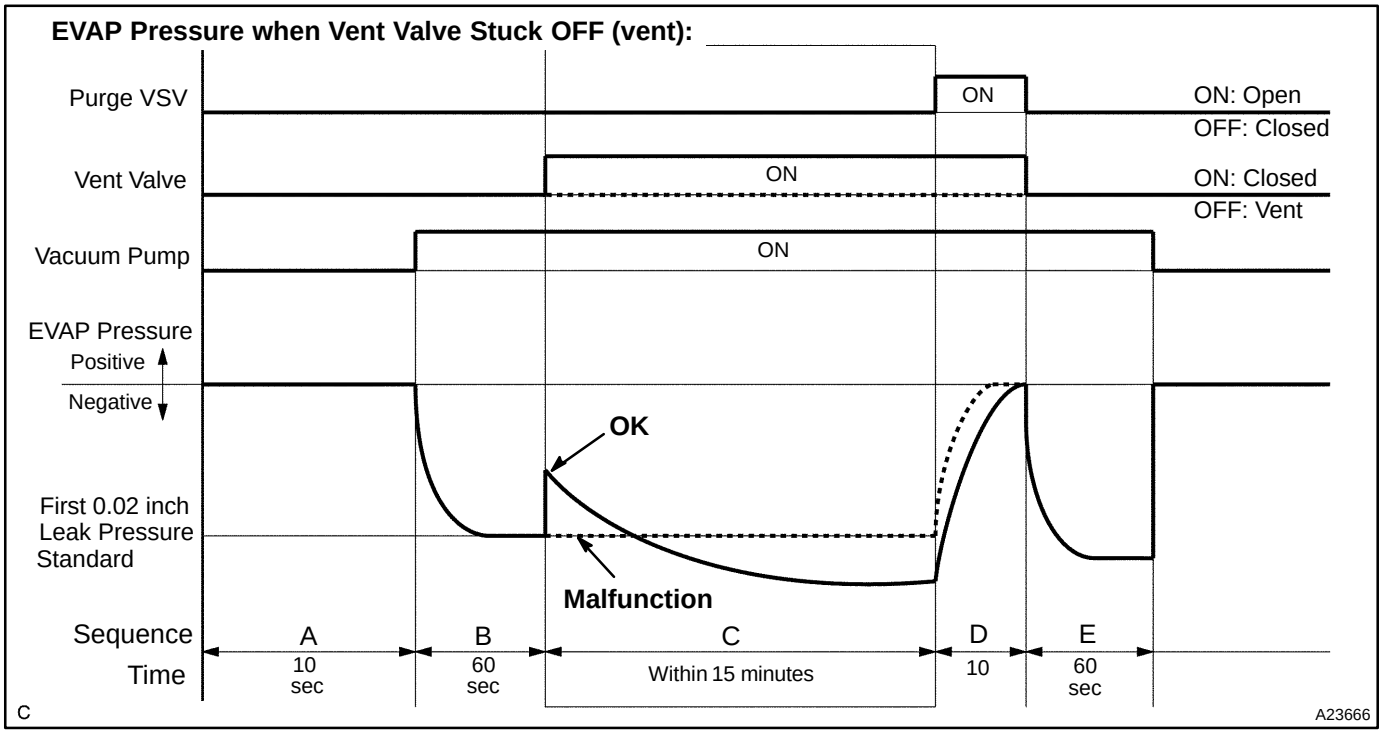
(b) P2420: Vent valve stuck open (vent)

In operation C, the vent valve turns ON (closes) and the EVAP (Evaporative Emission) system pressure is then measured by the ECM, using the pressure sensor, to conduct an EVAP leak check. If the pressure does not increase when the vent valve is open, the ECM interprets this as the vent valve being stuck open. The ECM illuminates the MIL and sets the DTC.



MONITOR STRATEGY

Related DTCs	P2419	Vent valve stuck open
	P2420	Vent valve stuck closed
Required sensors/components	Vent valve	
Frequency of operation	Once per driving cycle	
Duration	8 sec. (P2419), 10 sec. (P2420)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Following values are when atmospheric is 760 mmHg (100 kPa)	–	
EVAP key–off monitor runs when all of the following conditions met:	–	
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)	
Battery voltage	10.5 V	–
Vehicle speed	–	4 km/h (2.5 mph)
Ignition switch	OFF	
Engine condition	Not running	
Time after engine stopped	5 hours	

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FTP sensor malfunction (P0450, P0452, P0453)	Not detected	
Purge VSV	Not operated by scan tool	
Vent valve	Not operated by scan tool	
Leak detection pump	Not operated by scan tool	
Both of the following conditions are met before IG switch OFF	Condition 1 and 2	
1. Duration that vehicle is driven	5 min.	–
2. Purge flow	Executed	
ECT	4.4 to 35˚C (40 to 95˚F)	
IAT	4.4 to 35˚C (40 to 95˚F)	
Example of re–start time	–	
First time	7 hours	
Second time	9 hours and 30 min.	
Key–off monitor sequence	1 to 8	
1. Atmospheric pressure	–	
Next sequence is run if following condition set	–	
Atmospheric pressure change for 10 sec.	–	2.25 mmHg (0.3 kPa) for 1 sec.
2. First reference pressure	–	
Next sequence is run if all of following conditions set	Condition 1, 2 and 3	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1.057 kPa)	
3. Reference pressure	Saturated	
3. Vent valve stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa)	–
4. Vacuum introduction and leak	–	
Next sequence is run if both of following conditions set	Condition 1 and 2	
1. Vacuum introduction time	–	15 min.
2. FTP	FTP was saturated	
5. Purge VSV stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa)	–
6. Second reference pressure measurement	–	
Next sequence is run if all of following conditions set	Condition 1, 2, 3 and 4	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1.057 kPa)	

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3. Reference pressure	Saturated	
4. Reference pressure difference between first and second	–	5.25 mmHg (0.7 kPa)
7. Leak check	–	
Next sequence is run if following condition set	–	
FTP when vacuum introduction was complete	–	Second reference pressure
8. Atmospheric pressure	–	
Monitor is complete if following	–	
Atmospheric pressure difference between sequence 1 and 8	–	2.25 mmHg (0.3 kPa)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Vent valve stuck open:	
Following valuers are when atmospheric pressure is 760 mmHg (100 kPa)	–
One of the following conditions set	Condition 1, 2, 3, 4 or 5
1. FTP when 4 sec. after reference pressure measurement began	–7.5 mmHg (–1 kPa) or more
2. Reference pressure	–36.38 mmHg (–4.85 kPa) or less
3. Reference pressure	–7.93 mmHg (–1.057 kPa) or more
4. Reference pressure	Not saturated
5. Reference pressure difference between first and second	More than 5.25 mmHg (0.7 kPa)
Vent valve stuck closed:	
FTP change for 10 sec. after vent valve opened	Less than 2.25 mmHg (0.3 kPa)

MONITOR RESULT (MODE 06 DATA)

Refer to page DI–26 for detailed information on Monitor Result.

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page DI–460).

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DTC	P2430	Secondary Air Injection System Air Flow/ Pressure Sensor Circuit Bank 1

DTC	P2431	Secondary Air Injection System Air Flow/Pressure Sensor Circuit Range/Performance Bank 1

DTC	P2432	Secondary Air Injection System Air Flow/ Pressure Sensor Circuit Low Bank 1

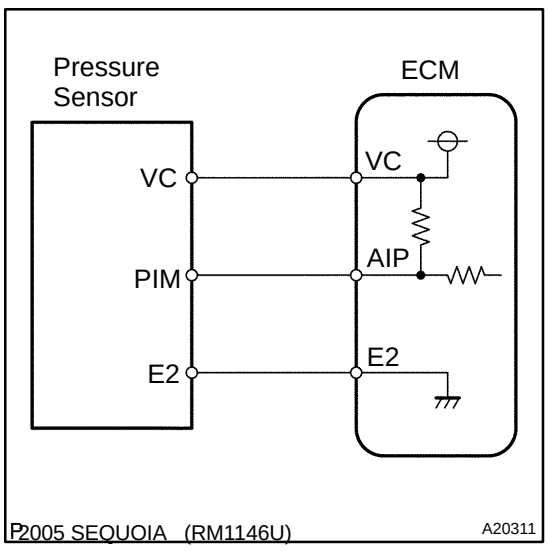
DTC	P2433	Secondary Air Injection System Air Flow/ Pressure Sensor Circuit High Bank 1

CIRCUIT DESCRIPTION

Refer to DTC P412 on page DI–234.

DTC No.	DTC Detecting Condition	Trouble Area
P2430	While the engine is running, voltage output of the pressure sensor indicates 0.1V or less, or indicates 4.8V or more. (1 trip detection logic)	▶Pressure sensor ▶Open or short in pressure sensor circuit ▶ECM
P2431	The pressure sensor indicates less than 45 kPa (338 mHg), or more than 135 kPa (1013 mHg). (1 trip detection logic)	
P2432	While the engine is running, voltage output of pressure sensor remains below 0.1 V. (1 trip detection logic)	
P2433	While the engine is running, voltage output of the pressure sensor remains above 4.8 V. (1 trip detection logic)	

MONITOR DESCRIPTION



The ECM observes the pressure in the secondary air passage using the pressure sensor located on the air switching valve in the secondary air injection system.
If there is a defect in the sensor or the sensor circuit, the voltage level will deviate from the normal operating range, the ECM interprets this deviation as a defect in the pressure sensor circuit and sets a DTC.

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MONITOR STRATEGY

Related DTCs	P2430	Air flow/pressure sensor circuit range check (Fluctuating)
	P2431	Air flow/pressure sensor circuit rationality
	P2432	Air flow/Pressure sensor circuit range check (Low voltage)
	P2433	Air flow/pressure sensor circuit range check (High voltage)
Required sensors/components	Pressure sensor	
Frequency of operation	Continuous	
Duration	P2430, P2432, P2433: 0.5 sec. P2431: 5 sec.	
MIL operation	P2430, P2432, P2433: Immediate P2431: 2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Starter	OFF	
Time after starter turned from ON to OFF	2 sec.	–
Battery voltage	8 V	–
Ignition switch	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2430:	
Air pressure sensor voltage	Less than 0.1 V, or more than 4.8 V
P2432:	
Air pressure sensor voltage	Less than 0.1 V
P2433:	
Air pressure sensor voltage	More than 4.8 V
P2431:	
Air pressure	Less than 338 mmHg (45 kPa), or more than 1013 mmHg (135 kPa)

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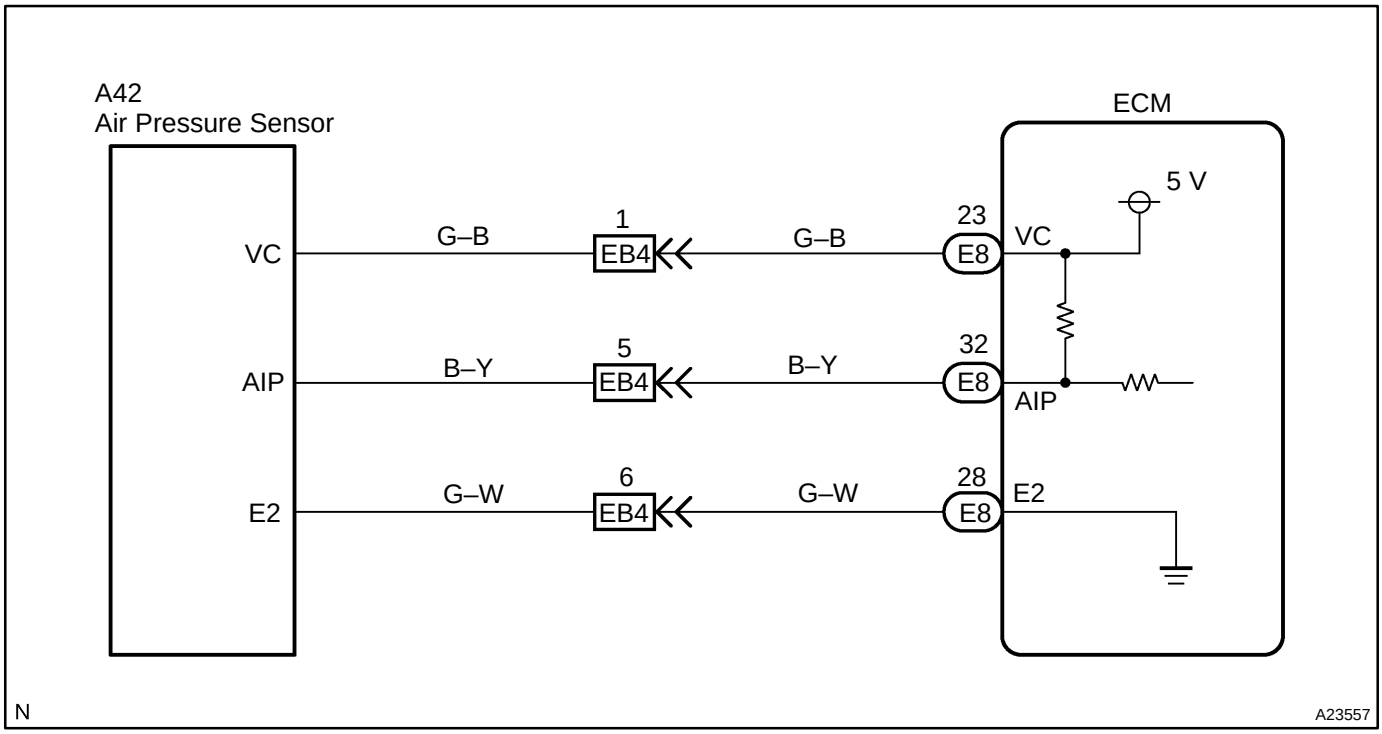
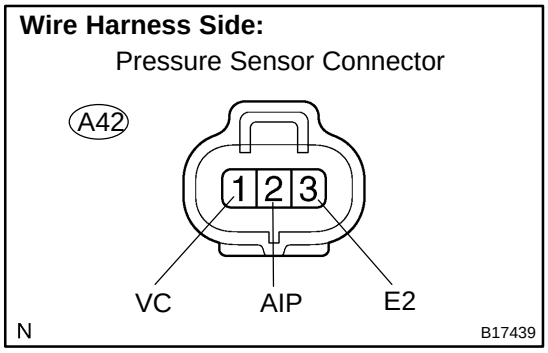
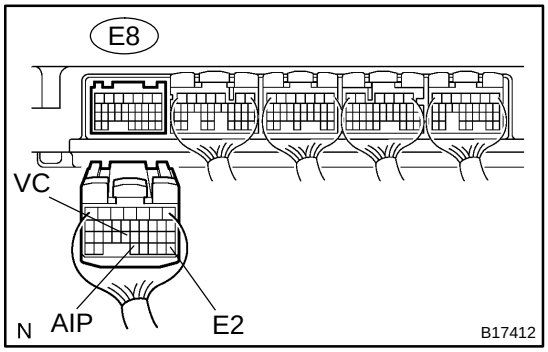
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check for open and short in harness and connector between pressure sensor and ECM (See page IN–35).**





PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A42 pressure sensor connector.
(c) Disconnect the E8 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VC (A42–1) – VC (E8–23) AIP (A42–2) – AIP (E8–32) E2 (A42–3) – AIP (E8–28)	Below 1 Ω
VC (A42–1) or VC (E8–23) – Body ground AIP (A42–2) or AIP (E8–32) – Body ground	10 kΩ or higher

NG → **Repair or replace harness and connector.**

OK

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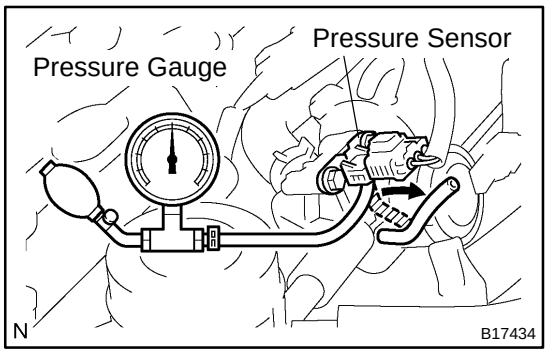
2	Inspect pressure sensor.



PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Connect the pressure gauge to the pressure sensor as shown in the illustration.
(c) Connect the hand–held tester to the DLC3 on the vehicle.
(d) Turn the ignition switch ON and push the hand–held tester main switch ON (Do not start engine).
(e) Select the following items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / 2ND AIR PRESS.

CHECK:

Check that the pressure displayed on the hand–held tester fluctuates when applying the pressure to the pressure sensor with the pressure gauge.

OK:

Pressure fluctuates in response to the pressure applied with pressure gauge.

NG → **Replace pressure sensor (See page EC–22).**

OK

Replace ECM (See page SF–80).

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DTC	P2444	Secondary Air Injection System Pump Stuck ON Bank 1

DTC	P2445	Secondary Air Injection System Pump Stuck OFF Bank 1

CIRCUIT DESCRIPTION

Refer to DTC P0412 on page DI–234.

DTC No.	DTC Detection Condition	Trouble Area
P2444	**Air pump stuck ON.** The secondary air pressure is more than 5 kPa (38 mmHg) despite the ECM ordering the air pump to turn off. (2 trip detection logic)	▶Short in air pump circuit ▶Air injection driver ▶Pressure sensor ▶Open or short in pressure sensor circuit ▶ECM
P2445	**Air pump stuck OFF or air injection volume is insufficient.** The amount of air flow is below the criteria. (The secondary air pressure is less than specified value despite the ECM ordering the air pump turn ON.) (2 trip detection logic)	▶Air pump fuse ▶Vacuum hose ▶Air pump assembly ▶Air injection driver ▶Open in air pump circuit ▶Air injection system piping ▶Pressure sensor ▶Open or short in pressure sensor circuit ▶ECM

MONITOR DESCRIPTION

P2444:

The ECM observes the pressure in the secondary air passage using the pressure sensor located on the air switching valve in the secondary air injection system. The sensor measures the pressure in the secondary air passage and sends a signal to the ECM.

If the pressure level from the sensor exceed a certain level despite the ECM turning off the air pump, the ECM interprets this as a fault in the secondary air injection system and sets a DTC.

P2445:

The ECM calculates the amount of air flow in the secondary air system based on the output values of the pressure sensor and mas air flow meter.

The ECM determines whether the amount of air flow is normal or not according to the calculated value. When the amount of air flow is below the criteria, the ECM stores the DTC and illuminates the MIL.

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MONITOR STRATEGY

Related DTCs	P2444	Air pump is stuck ON
	P2445	Air pump is stuck OFF
		Air flow volume is insufficient
		Air pressure sensor is stuck
Required sensors/components	AIR pump, AIR pressure sensor	
Frequency of operation	Continuous	
Duration	P2444 (Air pump is stuck ON): 20 sec. P2445 (Air pump is stuck OFF): 8 sec. P2445 (Air flow volume is insufficient): 8 sec. P2445 (Air pressure sensor is stuck:) 1.5 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P2444: Air pump is stuck ON

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Atmospheric pressure	570 mmHg (76 kPa)	–
Battery voltage	11.5 V	–
Time after secondary air injection out of operation	10 sec.	–
AIR pump	OFF	
Air switching valve No. 2 (Bank 1)	OFF	
Air switching valve No. 2 (Bank 2)	OFF	
Engine RPM	–	3,750 rpm
Air injection pressure sensor fail	Not detected	

P2445: Air pump is stuck OFF or air insufficient

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
Atmospheric pressure	570 mmHg (76 kPa)	–
Battery voltage	11.5 V	–
Time after secondary air injection out of operation	6 sec.	–
AIR pump	ON	
Air switching valve	ON	
Air switching valve No. 2 (Bank 1)	ON	
Air switching valve No. 2 (Bank 2)	ON	
Engine RPM	–	3,750 rpm
Delay time after engine started	6 sec.	–
Air injection pressure sensor fail	Not detected	

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P2445: Air pressure sensor is stuck

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI–18	
ECT at engine start	–	5˚C (41˚F)
IAT at engine start	–15˚C (5˚F)	–
Time that ECT is 80˚C (176˚F) or higher	10 to 60 min.	
Cumulative intake air amount	172 g	–
One of the following conditions is met	Condition 1, 2 or 3	
1. Vehicle speed	80 km/h (49.7 mile)	–
2. Engine RPM	0 rpm	–
3. Throttle position	0 deg	
Air switching valve	OFF	
Air switching valve No. 2 (Bank 1)	OFF	
Air switching valve No. 2 (Bank 2)	OFF	
Air injection pressure sensor fail	Not detected	

TYPICAL MALFUNCTION THRESHOLDS

P2444: Air pump is stuck ON

Detection Criteria	Threshold
Smoothed pressure	5 kPa (113 mmHg) or more (when AI OFF (Air pump OFF, all of air switching valves are OFF)

P2445: Air pump is stuck OFF or air insufficient

Detection Criteria	Threshold
Either of the following conditions is met	Condition 1 or 2
1. Air flow value	100 L/min. or less
2. Smoothed pressure	Less than 1 kPa (7.5 mmHg) (when AI ON (Air pump ON, all of air switching valves are ON)

P2445: Air pressure sensor is stuck

Detection Criteria	Threshold
Detected times of identifying condition 1 is met	4 times or more
Air pressure change	5 kPa (113 mmHg) or more

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MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.
- ▶ Scaling is used to calculate the test value indicated on generic OBD ll scan tools.

Secondary air injection (AIR) system

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$71	$E1	Multiply by 0.01 (g/s)	Test value of AIR amount insufficient	Minimum test limit	Maximum test limit
$71	$E2	Multiply by 0.01 (kPa)	Test value of AIR pump stuck ON	Minimum test limit	Maximum test limit
$71	$E3	Multiply by 0.01 (kPa)	Test value of AIR pump stuck OFF	Minimum test limit	Maximum test limit
$71	$E4	Multiply by 0.01 (kPa)	Test value of AIR control valve ON	Minimum test limit	Maximum test limit
$71	$E5	Multiply by 0.01 (kPa)	Test value of AIR control valve OFF	Minimum test limit	Maximum test limit
$71	$E6	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR valve	Minimum test limit	Maximum test limit
$71	$E7	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR VSV bank 1	Minimum test limit	Maximum test limit
$71	$E8	Multiply by 0.01 (kPa)	Test value of AIR pressure change for AIR VSV bank 2	Minimum test limit	Maximum test limit
$71	$E9	Multiply by 0.01 (kPa)	Test value of AIR pressure pulsation for AIR VSV when AIR pressure is low	Minimum test limit	Maximum test limit

WIRING DIAGRAM

Refer to DTC P0412 on page DI–234.

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INSPECTION PROCEDURE

HINT:

To check the pressure condition in the secondary air passage, the hand–held tester is available.

1	**Is the DTC P2444 and/or P2445 being output?**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the following items: DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES.

CHECK:

Read the DTCs.

RESULT:

Display (DTC output)	Proceed to
P2445	A
P2444	B
P2444 and P2445	B
”P2444 and P2445” and other DTCs	C

HINT:

If any other codes besides P2444 or P2445 is output, perform troubleshooting for those DTCs first.

B	**Go to step 7.**
C	**Go to DTC chart (See page DI–58).**

A

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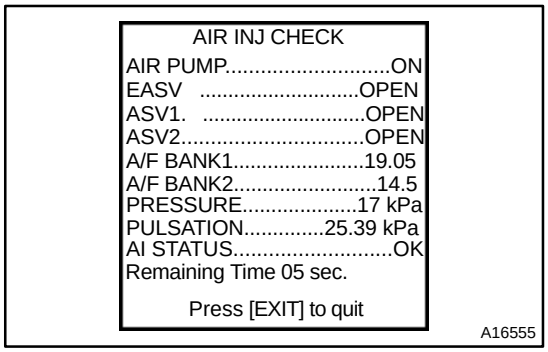
2	Check air injection system pressure.



PREPARATION:

(a) Start the engine and warm it up.
(b) Turn the ignition switch to OFF.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to ON and push the hand–held tester main switch ON.
(e) Start the engine.

CHECK:

(a) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/ AIR INJ CHECK/ MANUAL OPERATION/OPERATION 1 and 2

HINT:

OPERATION 1: AP:OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

OPERATION 2: AP:ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN

(b) Check that the PRESSURE on the hand–held tester.

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Tester operation	PRESSURE
Operation 1	Less then 2.5 kPa
Operation 2	5 to 8 kPa or more

NG → **Go to step 4.**

OK

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3	Check whether DTC output recurs.

PREPARATION:

(a) Start the engine and warm it up.
(b) Turn the ignition switch OFF.
(c) Connect a hand–held tester to the DLC3.
(d) Turn the ignition switch to ON and turn the tester ON.
(e) Clear the DTCs (see page DI–43).
(f) Start the engine.

CHECK:

(a) Perform SYSTEM CHECK to operate the air injection system.
Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/AIR INJ CHECK/AUTOMATIC OPERATION
(b) After operating the secondary air injection system, confirm the pending codes for the secondary air injection system by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(c) Read DTCs and check that no DTC is set.

OK:

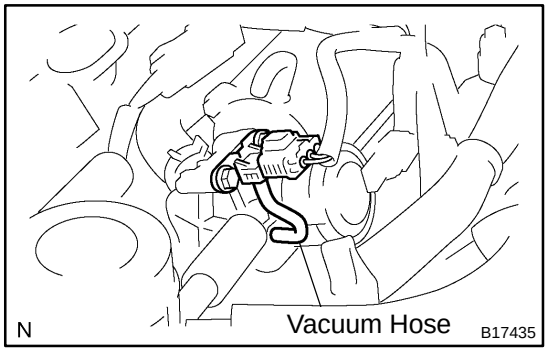
DTC P2444 or P2445 for the secondary air injection system is not output.

NG → **Go to step 4.**

OK

Check for intermittent problems (See page DI–11).

4	Check vacuum hose.



CHECK:

(a) Remove the intake manifold (see page EM–36).
(b) Check the vacuum hose connection between the pressure sensor and air switching valve.

OK:

The vacuum hose is securely connected.

CHECK:

(a) Check the vacuum hose for blockage or damage.

OK:

The vacuum hose has no blockage or damage.

NG → **Repair or replace vacuum hose.**

OK

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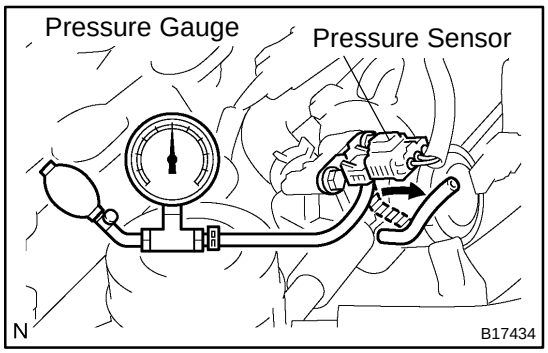
5	Inspect ECM (air voltage).



PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Connect the pressure gauge to the pressure sensor as shown in the illustration.
(c) Connect the hand–held tester to the DLC3 on the vehicle.
(d) Turn the ignition switch ON and push the hand–held tester main switch ON (Do not start engine).
(e) Select the following items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / AIR PUMP PRS.

CHECK:

Check that the pressure displayed on the hand–held tester fluctuates when applying the pressure to the pressure sensor with the pressure gauge.

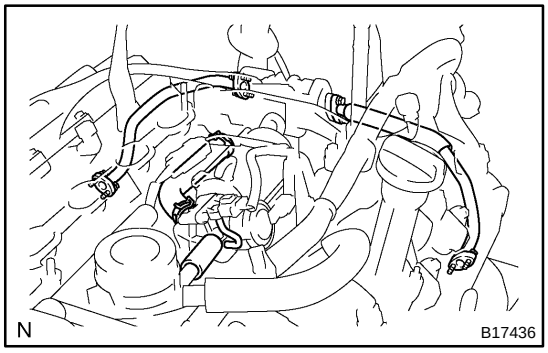
OK:

Pressure fluctuates in response to the pressure applied with the pressure gauge.

NG	Replace pressure sensor.

OK

6	Check connection of all air injection system piping and hoses.



CHECK:

(a) Remove the intake manifold (see page EM–36).
(b) Check that all the pipes and hoses between the air pump and air switching valve are securely connected.

OK:

All the air injection pipes and hoses are securely connected.

CHECK:

(a) Check the pipe and hoses for blockage or damage.

OK:

The air injection system pipes and hoses have no blockage and damage.

NG	Repair or replace air injection system piping.

OK

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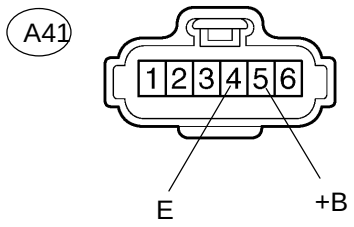
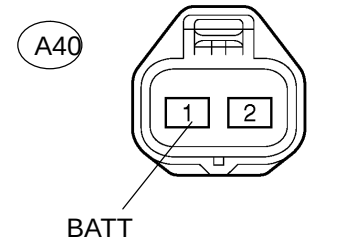
7	Inspect air injection driver power source circuit.

Wire Harness Side:
Air Injection Driver Connector



Wire Harness Side:
Air Injection Driver Connector



PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A40 and A41 air injection driver connectors.
(c) Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminals A41–5 (+B) and A40–1 (BATT) of the air injection driver and body ground.

OK:

Standard:

Tester Connection	Specified Condition
A41–5 (+B) – Body ground	10 V or more
A40–1 (BATT) – Body ground	10 V or more

CHECK:

Measure the resistance between terminal A41–1 (E) of the air injection driver and body ground.

OK:

Standard:

Tester Connection	Specified Condition
A41–1 (E) – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

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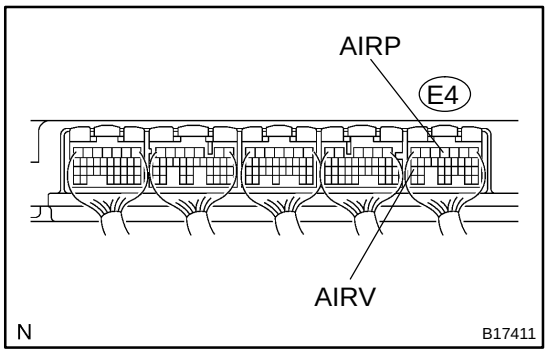
8	Check voltage between AIRP and AIRV terminal of ECM and body ground.



PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and turn the tester ON.

CHECK:

(a) When the air pump and air switching valve are operated using the hand–held tester, measure the voltage between terminals E4–25 (AIRP) and E4–4 (AIRV) of the air injection driver connector and body ground.

(b) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/AIR INJ CHECK/MANUAL OPERATION/OPERATION 1 and 2

HINT:

OPERATION 1: AP:OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

OPERATION 2: AP: ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Standard:

Air pump operation	Tester Connection	Specified Condition
ON	E4–25 (AIRP) – Body ground	10 V or more
OFF	E4–25 (AIRP) – Body ground	3.5 to 7.7 V*
ASV operation (EASV)	Tester Connection	Specified Condition
OPEN	E4–4 (AIRV) – Body ground	10 V or more
CLOSE	E4–4 (AIRV) – Body ground	3.5 to 7.7 V*

*: 35 to 55 % of the +B voltage.

NG → **Replace ECM (See page SF–80).**

OK

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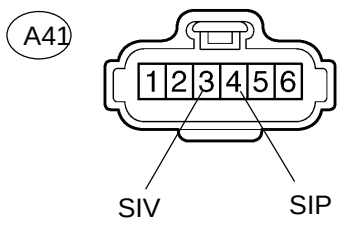
9	**Check voltage between SIV and SIP terminals of air injection driver and body ground.**

Wire Harness Side:
Air Injection Driver Connector



PREPARATION:

(a) Disconnect the A41 air injection driver connector.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch ON and turn the tester ON.

CHECK:

(a) When the air pump and air switching valve are operated using the hand–held tester, measure the voltage between terminals A41–3 (SIV) and A41–4 (SIP) of the air injection driver connector and body ground.
(b) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/AIR INJ CHECK/MANUAL OPERATION/OPERATION 1 and 2

HINT:
OPERATION 1: AP:OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE
OPERATION 2: AP:ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN

NOTICE:
This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.
While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Standard:

Air pump operation	Tester Connection	Specified Condition
ON	A41–3 (SIP) – Body ground	10 V or more
OFF	A41–3 (SIP) – Body ground	3.5 to 7.7 V*
ASV operation (EASV)	Tester Connection	Specified Condition
OPEN	A41–4 (SIV) – Body ground	10 V or more
CLOSE	A41–4 (SIV) – Body ground	3.5 to 7.7 V*

*: 35 to 55 % of the +B voltage.

NG → **Repair or replace harness or connector between air injection driver and ECM.**

OK

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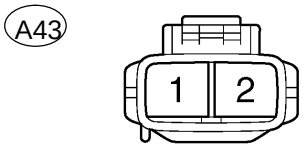
10	Check voltage between terminal 2 of air pump and body ground.

Wire Harness Side:



Air Pump Connector

N B17438

PREPARATION:

(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A43 air pump connector.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch ON and turn the tester ON.

CHECK:

(a) When the air pump is operated using the hand–held tester, measure the voltage between terminal A43–2 of the air injection driver connector and body ground.
(b) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/ AIR INJ CHECK/ MANUAL OPERATION/OPERATION 1 and 2

HINT:

OPERATION 1: AP:OFF, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

OPERATION 2: AP:ON, EASV:OPEN, ASV1:OPEN, ASV2:OPEN

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Standard:

Air pump operation	Tester Connection	Specified Condition
ON	A43–2 – Body ground	10 V or more
OFF	A43–2 – Body ground	Below 1.0 V

NG	Go to step 14.

OK

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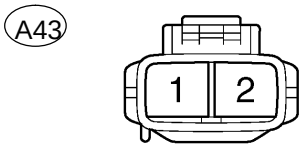
11	Check for open in harness and connector between air pump and body ground.

Wire Harness Side:



Air Pump Connector

N B17438

PREPARATION:

(a) Remove the intake manifold (see page EM–36).

(b) Disconnect the A43 air pump connector.

CHECK:

Check the resistance between the wire harness side connectors and body ground.

OK:

Standard:

Tester Connection	Specified Condition
A43–1 – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK →

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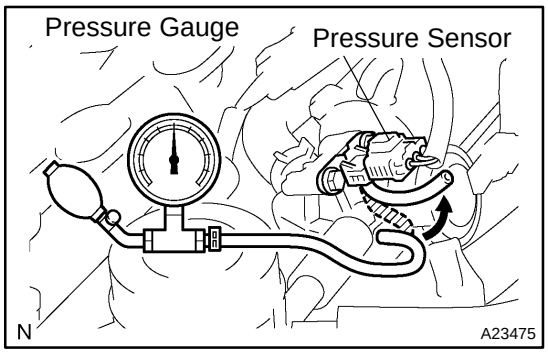
12	Check air pump operation.



PREPARATION:

(a) Connect the pressure gauge to the air switching valve as shown in the illustration.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch ON and turn the tester ON.

CHECK:

(a) When the air pump is operated using the hand–held tester, measure the secondary air injection system pressure.
(b) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/AIR INJ CHECK/MANUAL OPERATION/OPERATION 3

HINT:

OPERATION 2: AP:ON, EASV:CLOSE, ASV1:CLOSE, ASV2:CLOSE

NOTICE:

This test only allows technicians to operate the AI system for 5 seconds. Furthermore, the test can be performed 4 times a trip. If the test is repeated, intervals of at least 30 seconds are required between tests.

While the AI system operation using the hand–held tester is prohibited, the tester displays the prohibition (WAIT or ERROR). If the ERROR (AI STATUS NG) is displayed on the tester, stop the engine for 10 minutes and then try again..

OK:

Standard:

25 to 30 kPa or more

NG → **Replace air pump.**

OK

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13	**Check whether DTC output recurs.**

PREPARATION:

(a) Start the engine and warm it up.
(b) Turn the ignition switch OFF.
(c) Connect a hand–held tester to the DLC3.
(d) Turn the ignition switch to ON and turn the tester ON.
(e) Clear the DTCs (see page DI–43).
(f) Start the engine.

CHECK:

(a) Perform SYSTEM CHECK to operate the air injection system.
Select the following menu items: DIAGNOSIS/ENHANCED OBD II/SYSTEM CHECK/AIR INJ CHECK/AUTOMATIC OPERATION
(b) After operating secondary air injection system, confirm the pending codes of the secondary air injection system by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(c) Read DTC and check no DTC.

OK:

DTC P2444 or P2445 for the secondary air injection system is not output.

NG → **Check for intermittent problems (See page DI–11).**

OK

END

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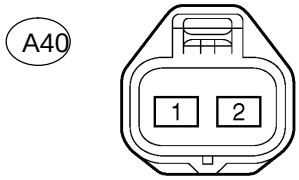
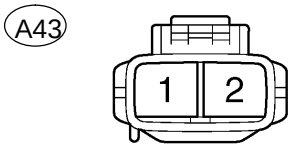
14	**Check for open and short in harness and connector between air injection driver and air pump.**

Wire Harness Side:
Air Injection Driver Connector



N B17443

Wire Harness Side:



Air Pump Connector

N B17438

PREPARATION:
(a) Remove the intake manifold (see page EM–36).
(b) Disconnect the A40 air injection driver connector.
(c) Disconnect the A43 air pump connector.

CHECK:
Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VP (A40–2) – A43–2	Below 1 Ω
VP (A40–2) or A43–2 – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace air injection driver.

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DTC	P2610	ECM/PCM Internal Engine OFF Timer Performance

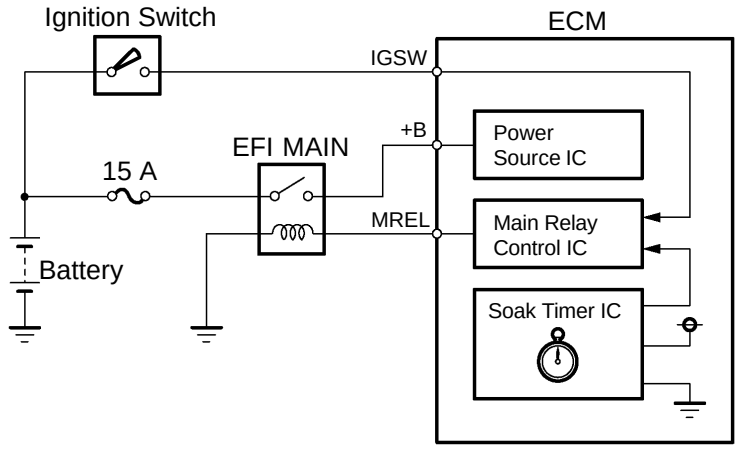
DTC SUMMARY

DTC	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P2610	Soak timer (built into ECM)	ECM internal malfunction	ECM	Engine running	2 trip

CIRCUIT DESCRIPTION

To ensure the accuracy of the EVAP (Evaporative Emission) monitor values, the soak timer, which is built into the ECM, measures 5 hours (≧15 minutes) from when the ignition switch is turned OFF, before the monitor is run. This allows the fuel to cool down, which stabilizes the Fuel Tank Pressure (FTP). When 5 hours have elapsed, the ECM turns on.

Soak Timer Circuit



A23667

MONITOR DESCRIPTION

5 hours after the ignition switch is turned OFF, the soak timer activates the ECM to begin the EVAP system monitor. While the engine is running, the ECM monitors the synchronization of the soak timer and the CPU clock. If these two are not synchronized, the ECM interprets this as a malfunction, illuminates the MIL and sets the DTC (2 trip detection logic).

MONITOR STRATEGY

Related DTCs	P2610	Soak timer (built into ECM)
Required sensors/components	ECM	
Frequency of operation	Once per driving cycle	
Duration	10 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Soak time measurement when ECM CPU clock counts 10 min.	Less than 7 min., or more than 13 min.

INSPECTION PROCEDURE

HINT:

- ▶ DTC P2610 is set if an internal ECM problem is detected. Diagnostic procedures are not required. ECM replacement is required.
- ▶ Read freeze frame data using a hand–held tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**Replace ECM (See page SF–80).**

NEXT

Check whether DTC output recurs.

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Clear DTCs (see page DI–43).
(d) Start the engine and wait for 10 minutes or more.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(f) If no pending DTC is displayed, the repair has been successfully completed.

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DID8J–01

DTC	U0001	High Speed Can Communication Circuit

CIRCUIT DESCRIPTION

The engine control unit and the transmission control unit are located inside the ECM. The engine control unit intercommunicates with the transmission control ECU with the Controller Area Network (CAN).
If there is a problem in this intercommunication, the ECM sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
U0001	The following conditions are met for 2 seconds (1 trip detection logic): (a) Ignition switch ON (b) Battery voltage is 10 V or more (c) No intercommunication between engine control ECU and transmission control ECU	ECM

INSPECTION PROCEDURE

Replace ECM (See page SF–80)

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DID8I–01

DTC	P043E	Evaporate Emission System Reference Orifice Clog Up

DTC	P043F	Evaporate Emission System Reference Orifice High Flow

DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P043E	0.02 inch orifice clogged	Vacuum pump creates negative pressure through 0.02 inch orifice, and EVAP system pressure is measured to determine leak pressure standard. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If system pressure lower than –4.85 kPa (–36.38 mmHg)*, ECM determines that 0.02 inch orifice has clogging malfunction.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM ▶Leakage from EVAP system	While ignition switch is OFF	2 trip
P043F	0.02 inch orifice high–flow	Vacuum pump creates negative pressure through 0.02 inch orifice, and EVAP system pressure is measured to determine leak pressure standard. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If system pressure higher than –1.06 kPa (–7.95 mmHg)*, ECM determines that 0.02 inch orifice has high–flow malfunction.	▶Pump module ▶Connector/Wire harness (Pump module – ECM) ▶ECM ▶Leakage from EVAP system	While ignition switch is OFF	2 trip

*: The threshold values vary according to the atmospheric pressure measured at EVAP monitor beginning. The values described in the table above are based on an atmospheric pressure of 100 kPa (750.1 mmHg) (absolute pressure).

HINT:

The 0.02 inch orifice is located inside the pump module.

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page DI–460).

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MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

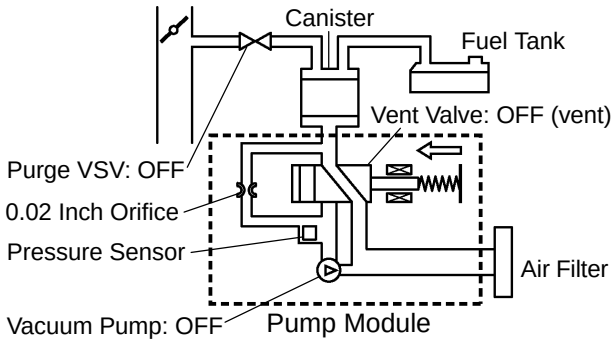
HINT:

*: If the engine coolant temperature is not below 35◀C (95◀F) after 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◀C (95◀F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

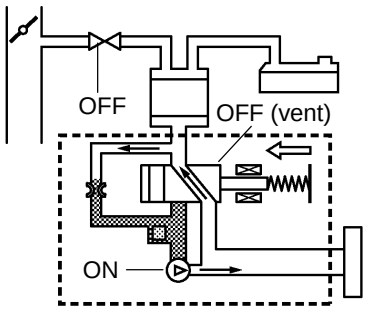
Sequence	Operations	Descriptions	Duration
–	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	–
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	–

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

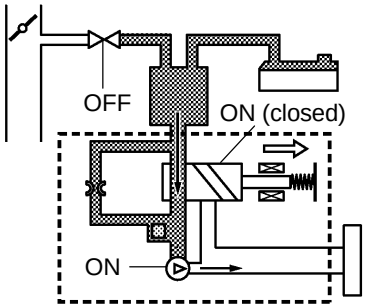
Operation A: Atmospheric Pressure Measurement

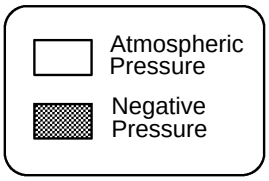


Operation B: 0.02 Inch Leak Pressure Measurement

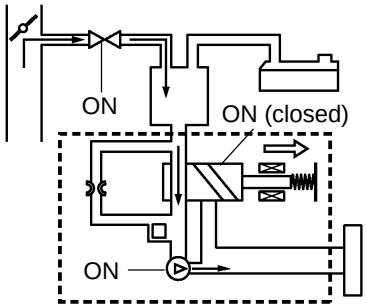


Operation C: EVAP Leak Check





Operation D: Purge VSV monitor



A23480

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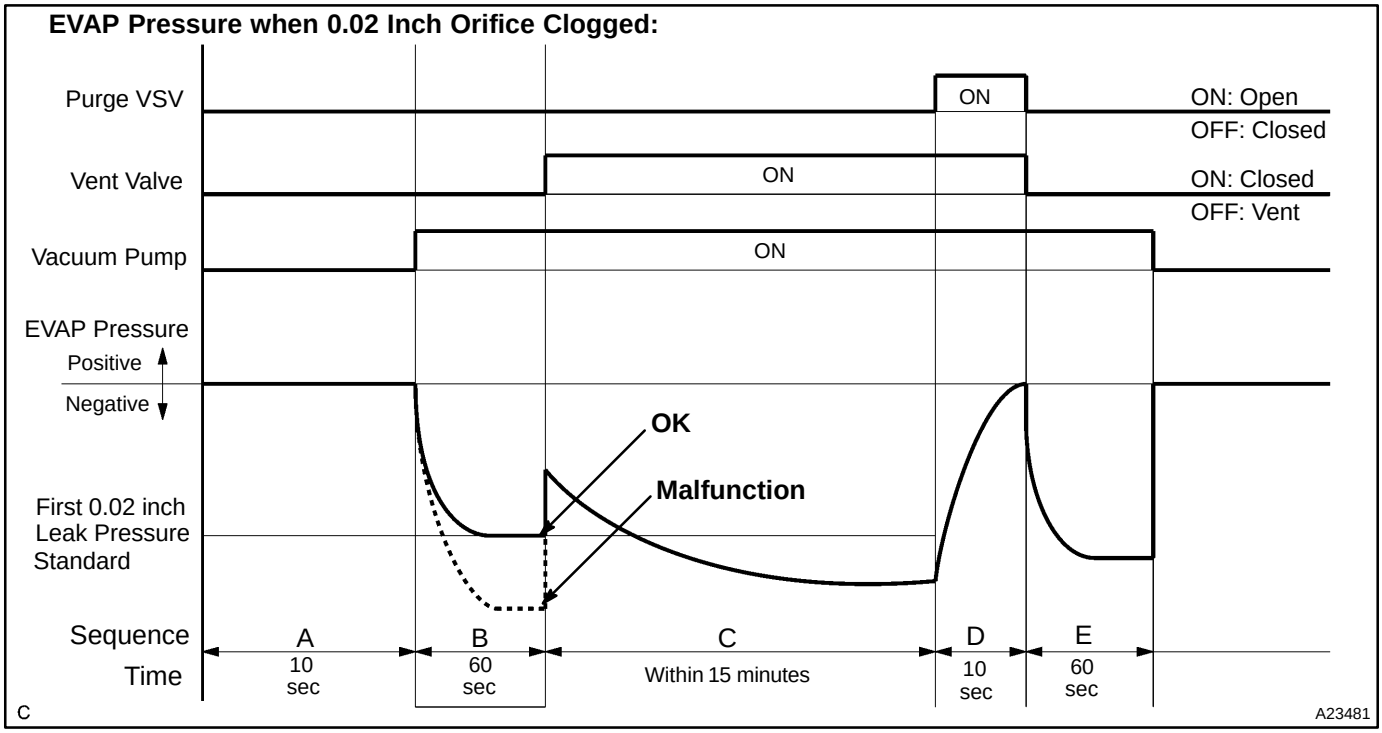
(a) P043E: 0.02 inch orifice clogged

In operation B, the vacuum pump creates negative pressure (vacuum) through the 0.02 inch orifice. The EVAP system pressure is then measured by the ECM, using the pressure sensor, to determine the 0.02 inch leak pressure standard. If the pressure is lower than –4.85 kPa (–36.38 mmHg)*, the ECM interprets this as a clog malfunction in the 0.02 inch orifice, and stops the EVAP (Evaporative Emission) system monitor. The ECM then illuminates the MIL and sets the DTC (2 trip detection logic).

*: The threshold varies according to the atmospheric pressure measured in operation A. The value described above is based on an atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



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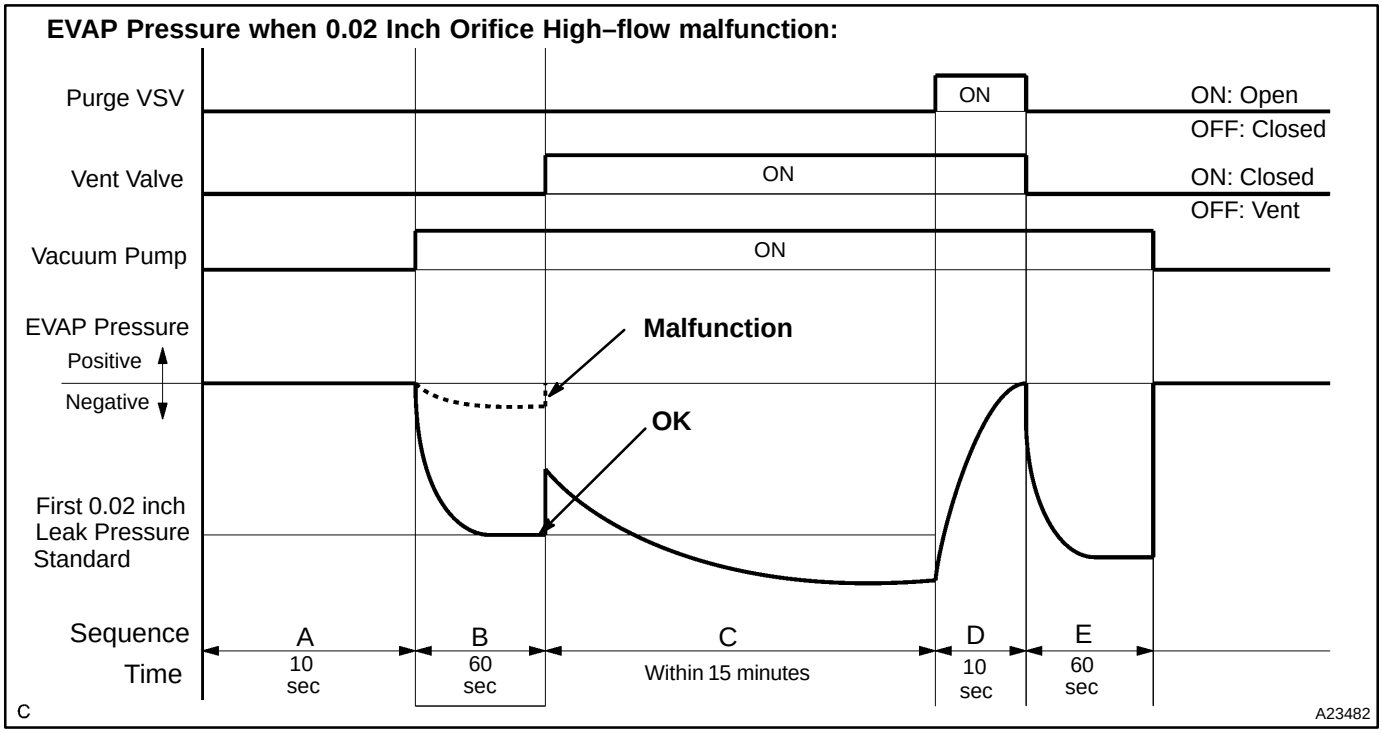
(b) P043F: 0.02 inch orifice high–flow

In operation B, the vacuum pump creates negative pressure (vacuum) through the 0.02 inch orifice. The EVAP system pressure is then measured by the ECM using the pressure sensor to determine the 0.02 inch leak pressure standard. If the pressure is higher than –1.06 kPa (–7.95 mmHg)*, the ECM interprets this as a high–flow malfunction in the 0.02 inch orifice, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (2 trip detection logic).

*: The threshold varies according to the atmospheric pressure measured in operation A. The value described above is based on a atmospheric pressure of 100 kPa (750.1 mmHg): absolute pressure.



MONITOR STRATEGY

Related DTCs	P043E	0.02 inch orifice clog (built–in pump module)
	P043F	0.02 inch orifice high–flow (built–in pump module)
Required sensors/components	Pump module	
Frequency of operation	Once per driving cycle	
Duration	Within 2 min. (varies with amount of fuel in tank)	
MIL operation	2 driving cycle	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Following values are values when atmospheric is 760 mmHg (100 kPa)	–	
EVAP key–off monitor runs when all of the following conditions met:	–	
Atmospheric pressure	525 to 825 mmHg (70 to 110 kPa)	
Battery voltage	10.5 V	–
Vehicle speed	–	4 km/h (2.5 mph)
Ignition switch	OFF	
Engine condition	Not running	
Time after engine stopped	5 hours	
FTP sensor malfunction (P0450, P0452, P0453)	Not detected	
Purge VSV	Not operated by scan tool	
Vent valve	Not operated by scan tool	
Leak detection pump	Not operated by scan tool	
Both of the following conditions are met before IG switch OFF	Condition 1 and 2	
1. Duration that vehicle is driven	5 min.	–
2. Purge flow	Executed	
ECT	4.4 to 35˚C (40 to 95˚F)	
IAT	4.4 to 35˚C (40 to 95˚F)	
Example of re–start time	–	
First time	7 hours	
Second time	9 hours and 30 min.	
Key–off monitor sequence	1 to 8	
1. Atmospheric pressure	–	
Next sequence is run if following condition set	–	
Atmospheric pressure change for 10 sec.	–	2.25 mmHg (0.3 kPa) for 1 sec.
2. First reference pressure	–	
Next sequence is run if all of following conditions set	Condition 1, 2 and 3	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1.057 kPa)	
3. Reference pressure	Saturated	
3. Vent valve stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after vent valve ON (closed)	2.25 mmHg (0.3 kPa)	–
4. Vacuum introduction and leak	–	

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Next sequence is run if both of following conditions set	Condition 1 and 2	
1. Vacuum introduction time	–	15 min.
2. FTP	FTP was saturated	
5. Purge VSV stuck closed check	–	
Next sequence is run if following condition set	–	
FTP change for 10 sec. after purge VSV ON (open)	2.25 mmHg (0.3 kPa)	–
6. Second reference pressure measurement	–	
Next sequence is run if all of following conditions set	Condition 1, 2, 3 and 4	
1. FTP when 4 sec. after reference pressure measurement	–	–7.5 mmHg (–1 kPa)
2. Reference pressure	–36.38 to –7.93 mmHg (–4.85 to –1.057 kPa)	
3. Reference pressure	Saturated	
4. Reference pressure difference between first and second	–	5.25 mmHg (0.7 kPa)
7. Leak check	–	
Next sequence is run if following condition set	–	
FTP when vacuum introduction was complete	–	Second reference pressure
8. Atmospheric pressure	–	
Monitor is complete if following	–	
Atmospheric pressure difference between sequence 1 and 8	–	2.25 mmHg (0.3 kPa)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Following values are when atmospheric pressure is 760 mmHg (100 kPa)	–
One of the following conditions is met	–
FTP when 4 sec. after reference pressure measurement began	More than –7.5 mmHg (–1 kPa)
Reference pressure	Less than –36.38 mmHg (–4.85 kPa)
Reference pressure	–7.93 mmHg (–1.057 kPa) or more
Reference pressure	Not saturated
Reference pressure difference between first and second	5.3 mmHg (0.7 kPa) or more

MONITOR RESULT (MODE 06 DATA)

Refer to page DI–26 for detailed information on Monitor Result.

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page DI–460).

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DIDFY–01

DTC	P2A00	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)

DTC	P2A03	A/F Sensor Circuit Slow Response (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P2195 on page DI–383.

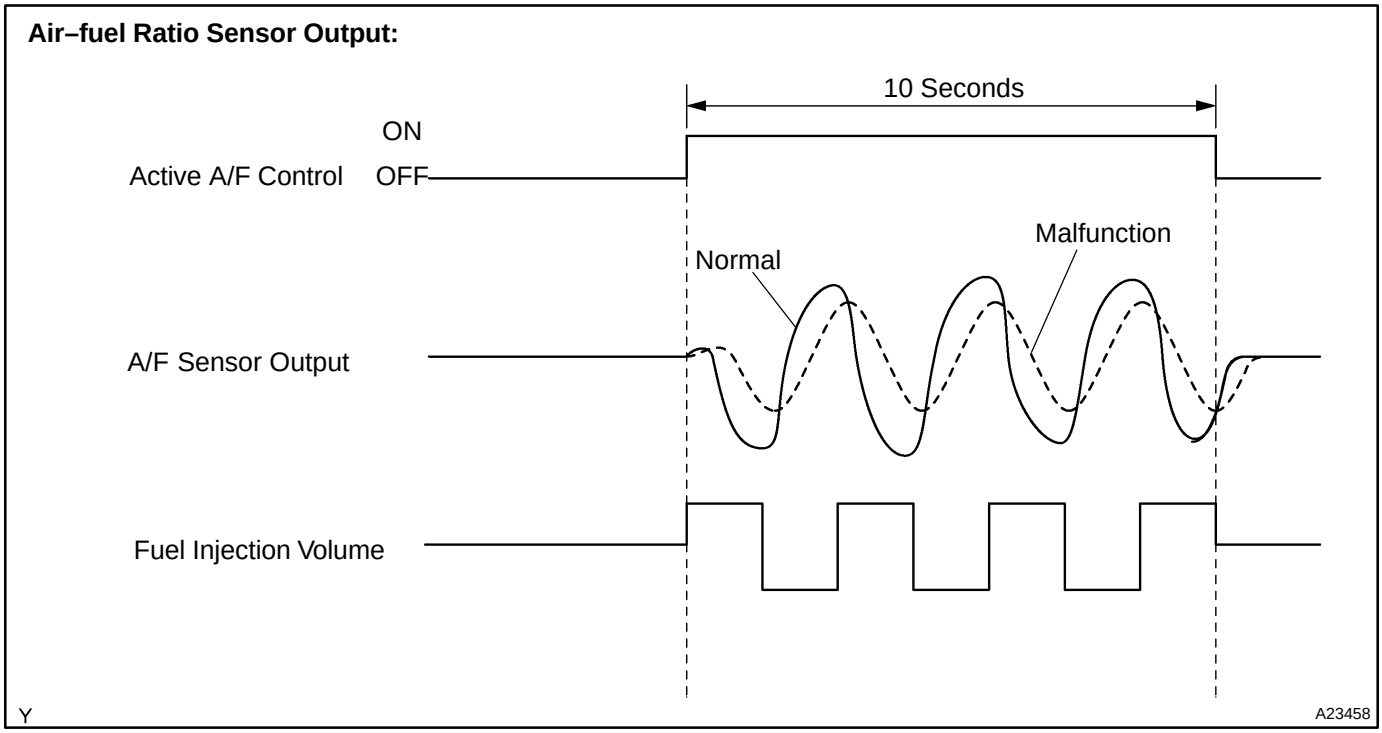
DTC No.	DTC Detection Conditions	Trouble Areas
P2A00 P2A03	Calculated test value for A/F sensor response rate deterioration level is less than threshold.	▶Open or short in A/F sensor (sensor 1) circuit ▶A/F sensor (sensor 1) ▶ECM

MONITOR DESCRIPTION

After engine is warmed up, the ECM performs air–fuel ratio feedback control to regulate the air–fuel ratio at stoichiometric ratio. In addition, this vehicle performs Active A/F Ratio Control for approximately 10 seconds after preconditions met in order to measure the A/F sensor response rate. During active air–fuel ratio control, the ECM forcibly increases and decreases the injection volume for certain amount based on learned stoichiomentric air –fuel ratio during usual air–fuel feedback control, and measures the A/F sensor response rate. The ECM calculates the signal from the A/F sensor while value for A/F sensor response rate deterioration level.

If the test value for A/F sensor response rate deterioration level is less than threshold, ECM interprets this as a malfunction, and sets the DTC.

Air–fuel Ratio Sensor Output:



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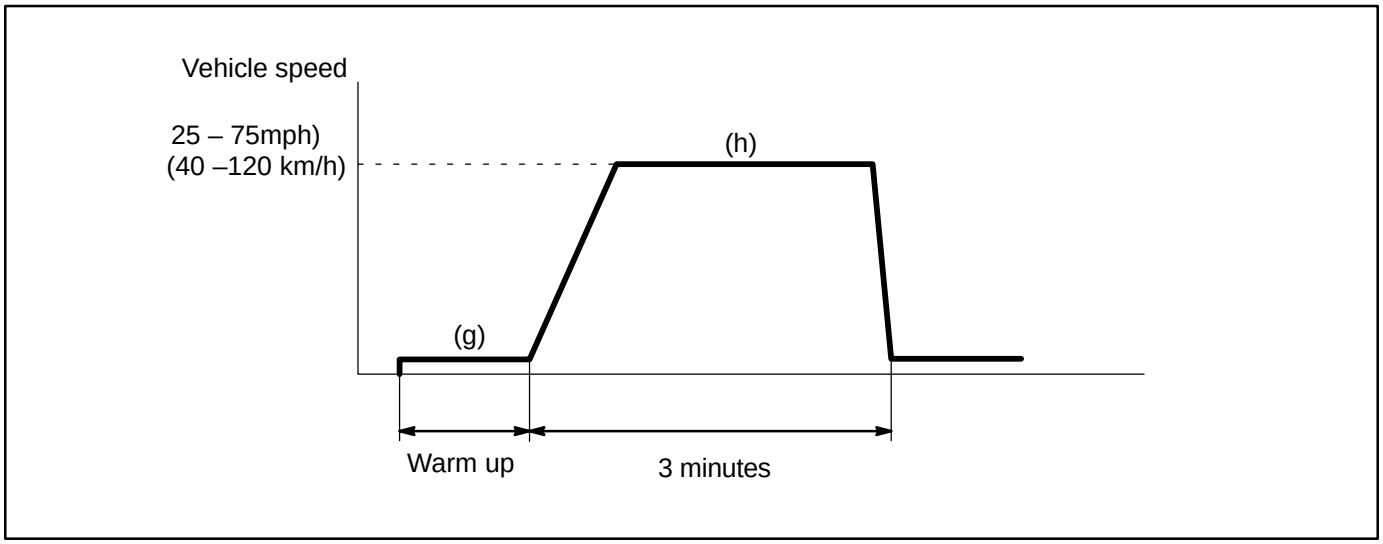
CONFIRMATION DRIVING PATTERN



(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON.
(c) Turn the hand–held tester ON.
(d) Clear DTCs.
(e) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/MONITOR INFO/MONITOR RESULT.
(f) Check that RES RATE B1 S1 is INCOMPL.
(g) Start the engine and warm it up.
(h) Drive the vehicle at between 25 mph and 75 mph (40 km/h and 120km/h) for 3 minutes. However, the vehicle should be driven at constant–speed.
(i) When detection is complete, Response rate of MONITOR RESULT changes.

If the value does not change, perform step (g) once more.

(j) Notes the value of the Monitor Result.
(k) Select the following menu items: DIAGNOSIS/ENHANCED OBD II/DTC INFO/ PENDING CODES.
(l) Check if any DTCs (any pending DTCs) are set.

MONITOR STRATEGY

Related DTCs	P2A00	A/F sensor (Bank 1) slow response
	P2A03	A/F sensor (Bank 2) slow response
Required sensors/components	A/F sensor	
Frequency of operation	Once per driving cycle	
Duration	10 to 15 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI–18	
Battery voltage	11 V	–
ECT	75°C (167°F)	–
Idle	OFF	
Engine RPM	–	4,000 rpm
A/F sensor status	Activated	
Fuel cut	OFF	
Engine load	10 to 70%	
Estimated catalyst temperature	500 to 800°C (932 to 1,472°F)	
Shift position	2nd	–
Catalyst monitor	Not executing	
Intake air amount	2.5 to 12 g/sec	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Response rate deterioration level	Less than 0.2 V
Number of average	5 or more

MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.
- ▶ Scaling is used to calculate the test value indicated on generic OBD ll scan tools.

A/F sensor bank 1 sensor 1

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$01	$8E	Multiply by 0.0003 (no dimension)	Response rate deterioration level for A/F sensor	Malfunction criterion	FF

A/F sensor bank 2 sensor 1

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$05	$8E	Multiply by 0.0003 (no dimension)	Response rate deterioration level for A/F sensor	Malfunction criterion	FF

WIRING DIAGRAM

Refer to DTC P2195 on page DI–383.

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INSPECTION PROCEDURE

HINT:

Hand–held tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air–Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using a hand–held tester.

(1) Connect a hand–held tester to the DLC3.
(2) Start the engine and turn the tester ON.
(3) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(4) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(5) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(6) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 (AFS B2S1) and OS2 B1S2 (O2S B2S2)) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard:

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 (AFS B2S1) (A/F)	+25 %	Rich	Less than 3.0
AFS B1S1 (AFS B2S1) (A/F)	–12.5 %	Lean	More than 3.35
O2S B1S2 (O2S B2S2) (HO2)	+25 %	Rich	More than 0.55
O2S B1S2 (O2S B2S2) (HO2)	–12.5 %	Lean	Less than 0.4

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NOTICE:
The Air–Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage	HO2 Sensor (Sensor 2) Output Voltage	Main Suspected Trouble Areas
1	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0 V **OK**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	—
2	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage More than 0.55 V Less than 0.4V **OK**	• A/F sensor • A/F sensor heater • A/F sensor circuit
3	Injection volume +25 % –12.5 % Output voltage More than 3.35 V Less than 3.0V **OK**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
4	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % –12.5 % Output voltage Almost no reaction **NG**	• Injector • Fuel pressure • Gas leakage from exhaust system (Air–fuel ratio extremely lean or rich)

▶ Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.

▶ To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press the YES button and then the ENTER button followed by the F4 button.

HINT:

▶ DTC P2A00 may be also set, when the air–fuel ratio is stuck rich or lean.

▶ A low A/F sensor voltage could be caused by a rich air–fuel mixture. Check for conditions that would cause the engine to run rich.

▶ A high A/F sensor voltage could be caused by a lean air–fuel mixture. Check for conditions that would cause the engine to run lean.

▶ Read freeze frame data using a hand–held tester or OBD II scan tool. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

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1	Check any other DTCs output (in addition to DTC P2A00 or P2A03).

PREPARATION:

(a) Connect a hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and turn the tester ON.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

(a) Read DTCs.

Result:

Display (DTC Output)	Proceed To
P2A00 and/or P2A03	A
P2A00 and/or P2A03 and other DTCs	B

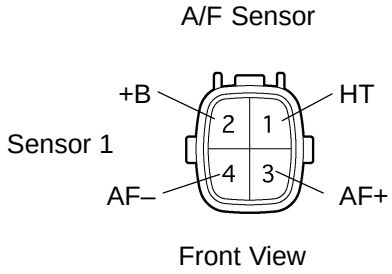
HINT:
If any DTCs other than P2A00 and/or P2A03 are output, troubleshoot those DTCs first.

B → **Go to DTC chart (See page DI–58).**

A

2	Check resistance of air–fuel ratio (A/F) sensor heater.

Component Side:



PREPARATION:

Disconnect the air–fuel ratio (A/F) sensor connector.

CHECK:

Measure resistance between the terminals of the A/F sensor connector.

OK:

Standard:

Tester Connection	Specified Condition
HT (1) – +B (2)	Between 1.8 Ω and 3.4 Ω at 20°C (68°F)
HT (1) – AF– (4)	10 kΩ or higher

NG → **Replace air–fuel ratio (A/F) sensor.**

OK

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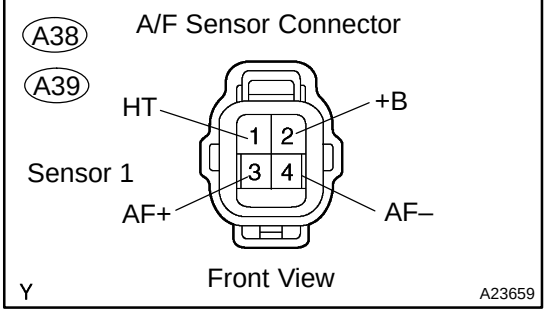
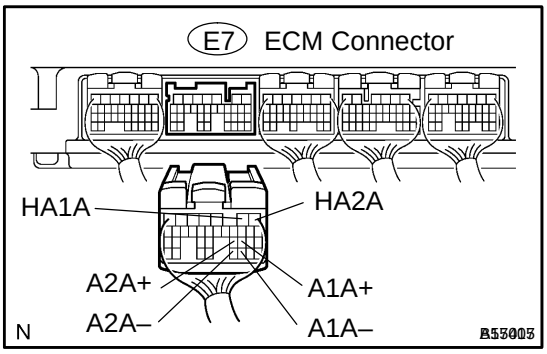
3	**Check for open and short in harness and connector between ECM and A/F sensor.**

Wire Harness Side:





PREPARATION:

(a) Disconnect the A38 or A39 A/F sensor connector.

(b) Turn the ignition switch to ON.

CHECK:

(a) Measure the voltage between the +B terminal of the A/F sensor connector and body ground.

OK:

Standard:

Tester Connections	Specified Conditions
+B (2) – Body ground	Between 9 V and 14 V

PREPARATION:

(a) Turn the ignition switch to OFF.

(b) Disconnect the E7 ECM connector.

CHECK:

(a) Check the resistance.

OK:

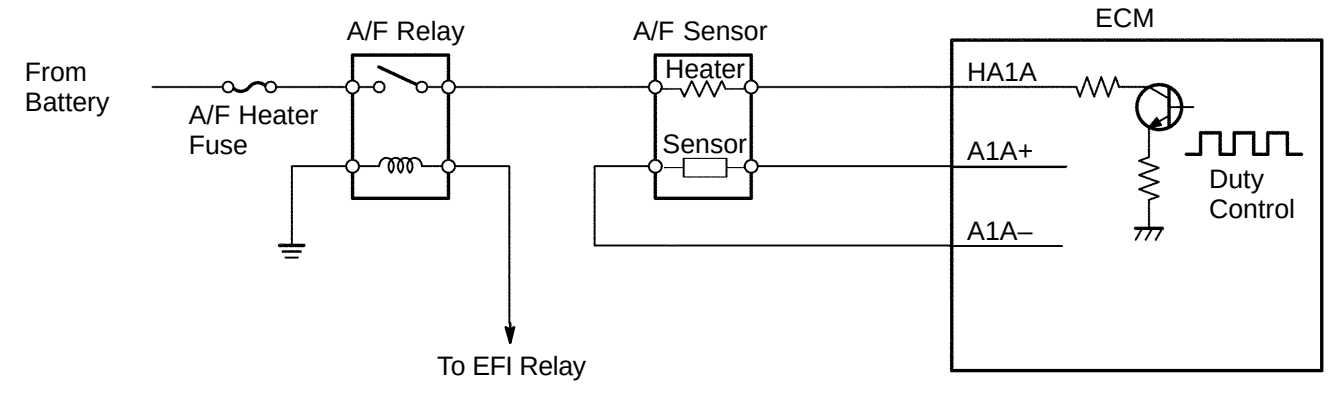
Standard (Check for open):

Tester Connections	Specified Conditions
HT (A38–1) – HA1A (E7–2) HT (A39–1) – HA2A (E7–1)	Below 1 Ω
AF+ (A38–3) – A1A+ (E7–22) AF+ (A39–3) – A2A+ (E7–23)	Below 1 Ω
AF– (A38–4) – A1A– (E7–30) AF– (A39–4) – A2A– (E7–31)	Below 1 Ω

Standard (Check for short):

Tester Connections	Specified Conditions
HT (A38–1) or HA1A (E7–2) – Body ground HT (A39–1) or HA2A (E7–1) – Body ground	10 kΩ or higher
AF+ (A38–3) or A1A+ (E7–22) – Body ground AF+ (A39–3) or A2A+ (E7–23) – Body ground	10 kΩ or higher
AF– (A38–4) or A1A– (E7–30) – Body ground AF– (A39–4) or A2A– (E7–31) – Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing):



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NG → Replace or replace harness or connector.

OK

4	Perform confirmation driving pattern.

NEXT

5	Check whether DTC output recurs (DTC P2A00 or P2A03)

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P2A00 or P2A03	A
No output	B

B → Check for intermittent problems (See page DI–11).

A

6	Replace air fuel ratio sensor.

NEXT

7	Perform confirmation driving pattern.

NEXT

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8	Check whether DTC output recurs (DTC P2A00 or P2A03)

CHECK:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

(b) Read DTCs.

RESULT:

Display (DTC Output)	Proceed To
P2A00 or P2A03	A
No output	B

A → **Check air–fuel ratio extremely lean or rich (See page DI–165).**

B →

END

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DIDFZ–01

EVAP (Evaporative Emission) Inspection Procedure

DTCS RELATING TO EVAP SYSTEM

DTCs	Monitoring Items	See Page
P043E	0.02 inch orifice clogged (built into pump module)	DI–445
P043F	0.02 inch orifice high–flow (built into pump module)	DI–445
P0441	▶Purge VSV (Vacuum Switching Valve) stuck closed ▶Purge VSV stuck open ▶Purge flow	DI–257
P0450	Pressure sensor (built into pump module) voltage abnormal fluctuation	DI–264
P0451	▶Pressure sensor (built into pump module) noising ▶Pressure sensor stuck (built into pump module)	DI–264
P0452	Pressure sensor (built into pump module) voltage low	DI–264
P0453	Pressure sensor (built into pump module) voltage high	DI–264
P0455	EVAP gross leak	DI–273
P0456	EVAP small leak	DI–273
P2401	Vacuum pump stuck OFF (built into pump module)	DI–410
P2402	Vacuum pump stuck ON (built into pump module)	DI–410
P2419	Vent valve stuck closed (built into pump module)	DI–416
P2420	Vent valve stuck open (vent) (built into pump module)	DI–416
P2610	Soak timer (built into ECM)	DI–442

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
0.02 inch orifice clogged	●								●	●	
0.02 inch orifice high–flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Pressure sensor stuck				●							
Pressure sensor noise				●							
Pressure sensor low output			●		●						
Pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Vacuum pump stuck OFF	●								●	●	
Vacuum pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

NOTICE:

If the 0.02 inch reference pressure difference between the first and second checks is greater than the specification, the DTCs corresponding to the reference pressure (P043E, P043F, P0441, P0455, P0456, P2401, P2420) will be all stored.

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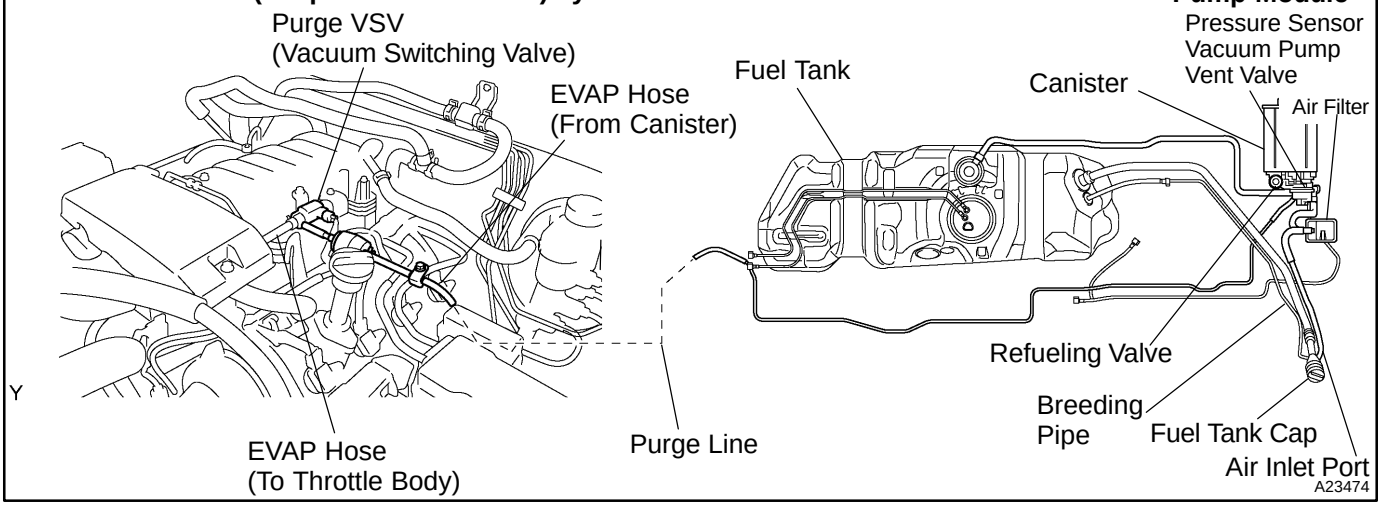
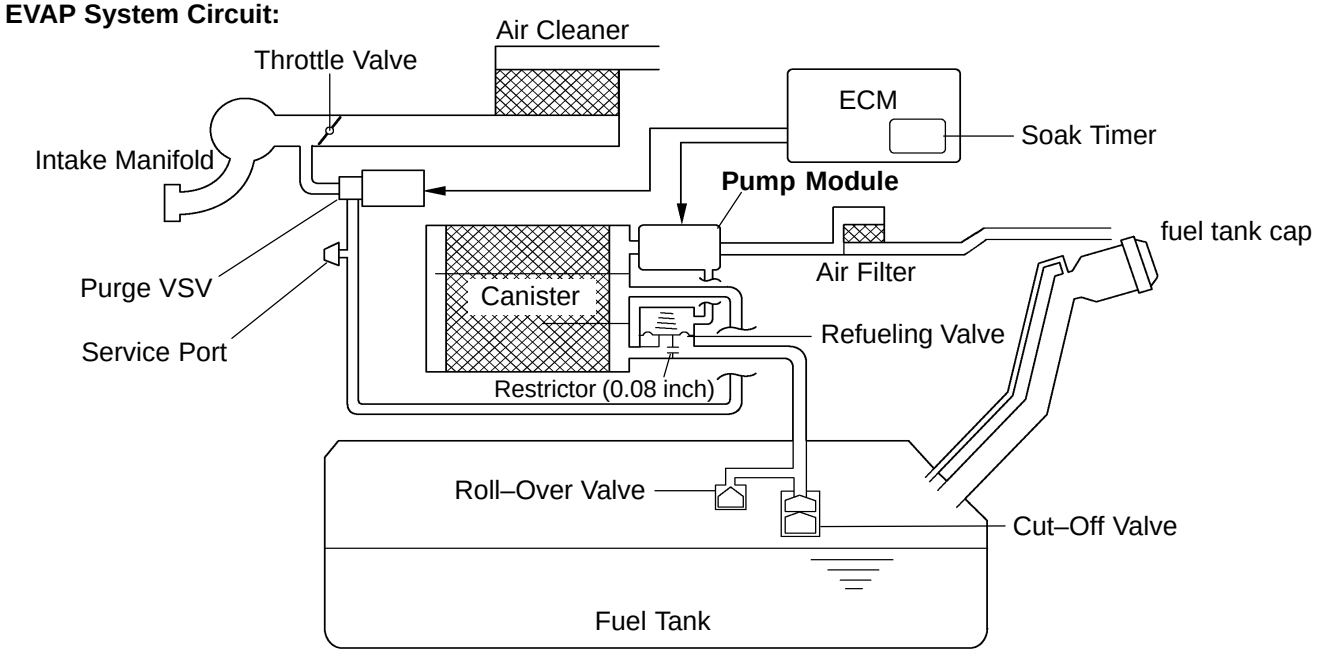
CIRCUIT DESCRIPTION

Location of EVAP (Evaporative Emission) system:



EVAP System Circuit:



While the engine is running, if a predetermined condition (closed–loop, etc.) is met, the purge VSV is opened by the ECM and stored fuel vapors in the canister are purged to the intake manifold. The ECM changes the duty cycle ratio of the purge VSV to control purge flow volume.

The purge flow volume is also determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve to ensure that the purge flow is maintained when the negative pressure (vacuum) is applied to the canister.

The following two monitors run to confirm appropriate EVAP system operation.

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Key–off monitor

This monitor checks for EVAP (Evaporative Emission) system leaks and pump module malfunctions. The monitor starts 5 hours* after the ignition switch is turned OFF. More than 5 hours are required to allow enough time for the fuel to cool down to stabilize the Fuel Tank Pressure (FTP), thus making the EVAP system monitor more accurate.

The electric vacuum pump creates negative pressure (vacuum) in the EVAP system and the pressure is measured. Finally, the ECM monitors for leaks from the EVAP system, and malfunctions in both the pump module and purge VSV, based on the EVAP pressure.

HINT:

*:If the engine coolant temperature is not below 35◀C 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◀C 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

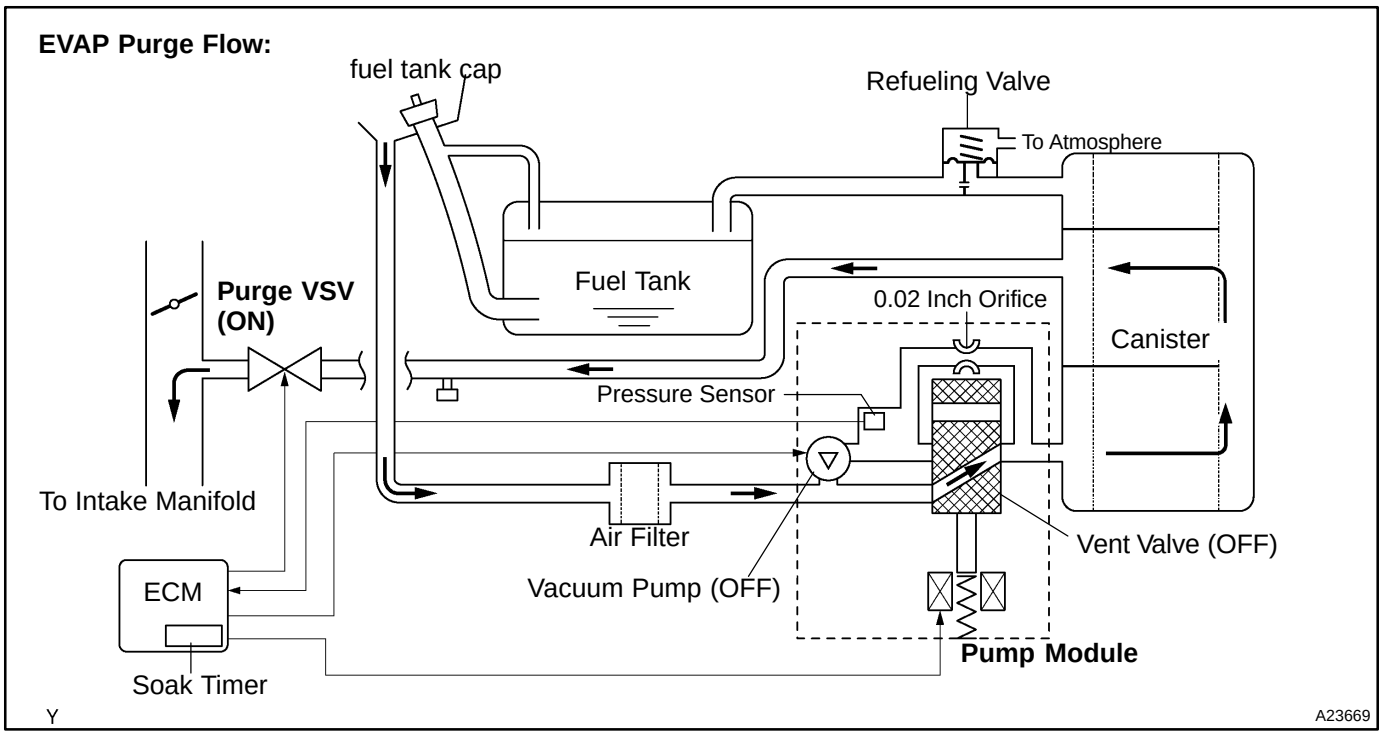
Purge flow monitor

The purge flow monitor consists of the two monitors. The 1st monitor is always conducted every time and the 2nd monitor is activated if necessary.

- ▶ The 1st monitor
  While the engine is running and the purge VSV (Vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- ▶ The 2nd monitor
  The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kpa (3.75 mmHg), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.



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Components	Operations
Canister	Contains activated charcoal to absorb EVAP (Evaporative Emissions) generated in fuel tank.
Cut–off valve	Located in fuel tank. Valve floats and closes when fuel tank is 100 % full.
Purge VSV (Vacuum Switching Valve)	Opens or closes line between canister and intake manifold. ECM uses purge VSV to control EVAP purge flow. In order to discharge EVAP absorbed by canister to intake manifold, ECM opens purge VSV. EVAP discharge volume to intake manifold controlled by purge VSV duty cycle ratio (current–carrying time). (Open: ON, Close: OFF)
Refueling valve	Controls EVAP pressure from fuel tank to canister. Valve consists of diaphragm, spring and restrictor (diameter: 0.08 inch). When fuel vapor and pressure inside fuel tank increase, valve opens. While EVAP purged, valve closes and restrictor prevents large amount of vacuum from affecting pressure in fuel tank. Valve opened while refueling. When valve open, adding fuel into fuel tank possible.
Roll–over valve	Located in fuel tank. Valve closes by its own weight when vehicle overturns to prevent fuel from spilling out.
Service port	Used for connecting vacuum gauge for inspecting EVAP system.
Soak timer	Built into ECM. To ensure accurate EVAP monitor, measures 5 hours* after ignition switch turned to OFF. This allows fuel to cool down, stabilizing Fuel Tank Pressure (FTP). When approx. 5 hours* elapsed, ECM activates.
Pump module	Consists of (a) to (d) below. Pump module cannot be disassembled.
(a) Vent valve	Vents and closes EVAP system. When ECM turns valve ON, EVAP system closed. When, ECM turns valve OFF, EVAP system vented. Negative pressure (vacuum) created in EVAP system to check for EVAP leaks by closing purge VSV, turning on vent valve (closed) and operating vacuum pump (refer to fig. 1).
(b) Pressure sensor	Indicates pressure as voltages. ECM supplies regulated 5 V to pressure sensor, and uses feedback from sensor to monitor EVAP system pressure (refer to fig 2).
(c) Vacuum pump	Creates negative pressure (vacuum) in EVAP system for leak check.
(d) 0.02 inch orifice	Has opening with 0.02 inch diameter. Vacuum produced through orifice by closing purge VSV, turning off vent valve and operating vacuum pump, to monitor 0.02 inch leak pressure. 0.02 inch leak pressure indicates small leak of EVAP.

HINT:

*:If the engine coolant temperature is not below 35◀C after 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35◀C 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

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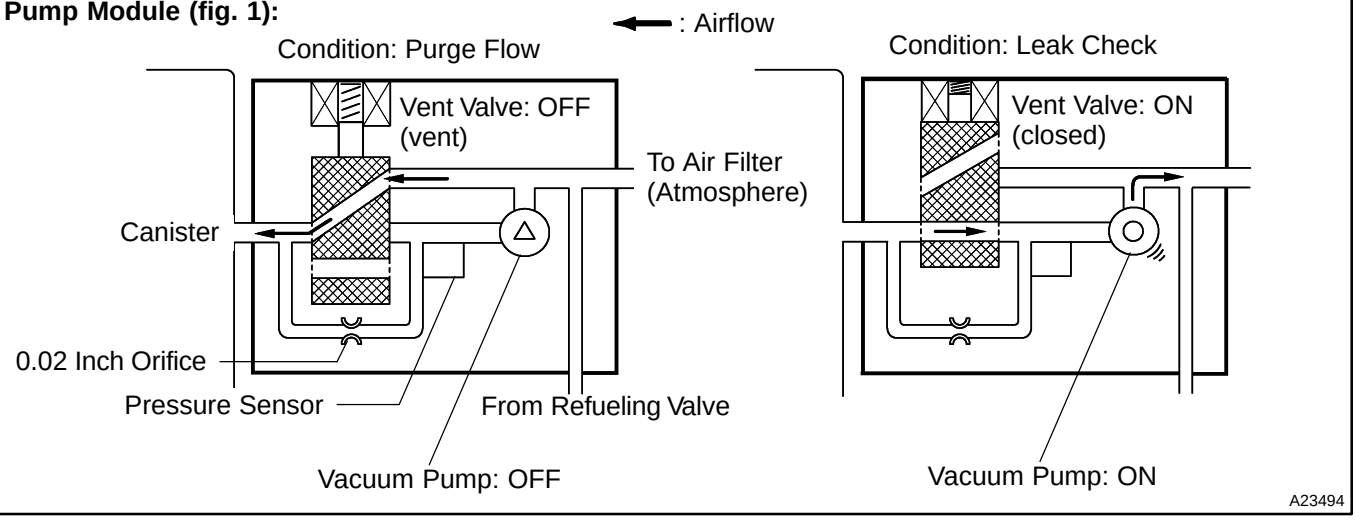
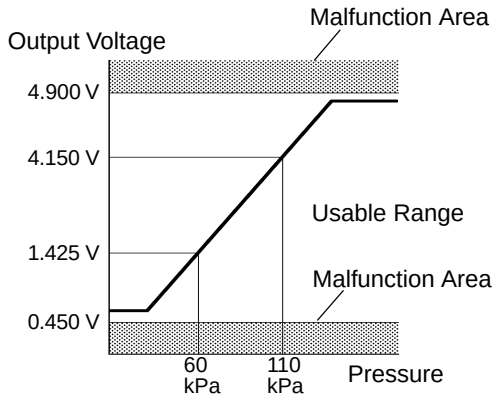
Pump Module (fig. 1):

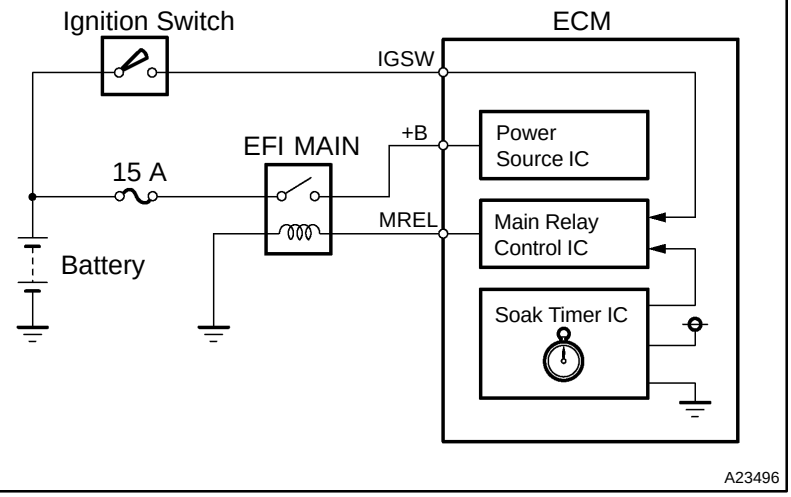


Pressure Sensor Specification (fig. 2)



HINT:
Standard atmospheric pressure is 101.3 kPa

Soak Timer Circuit (fig. 3)



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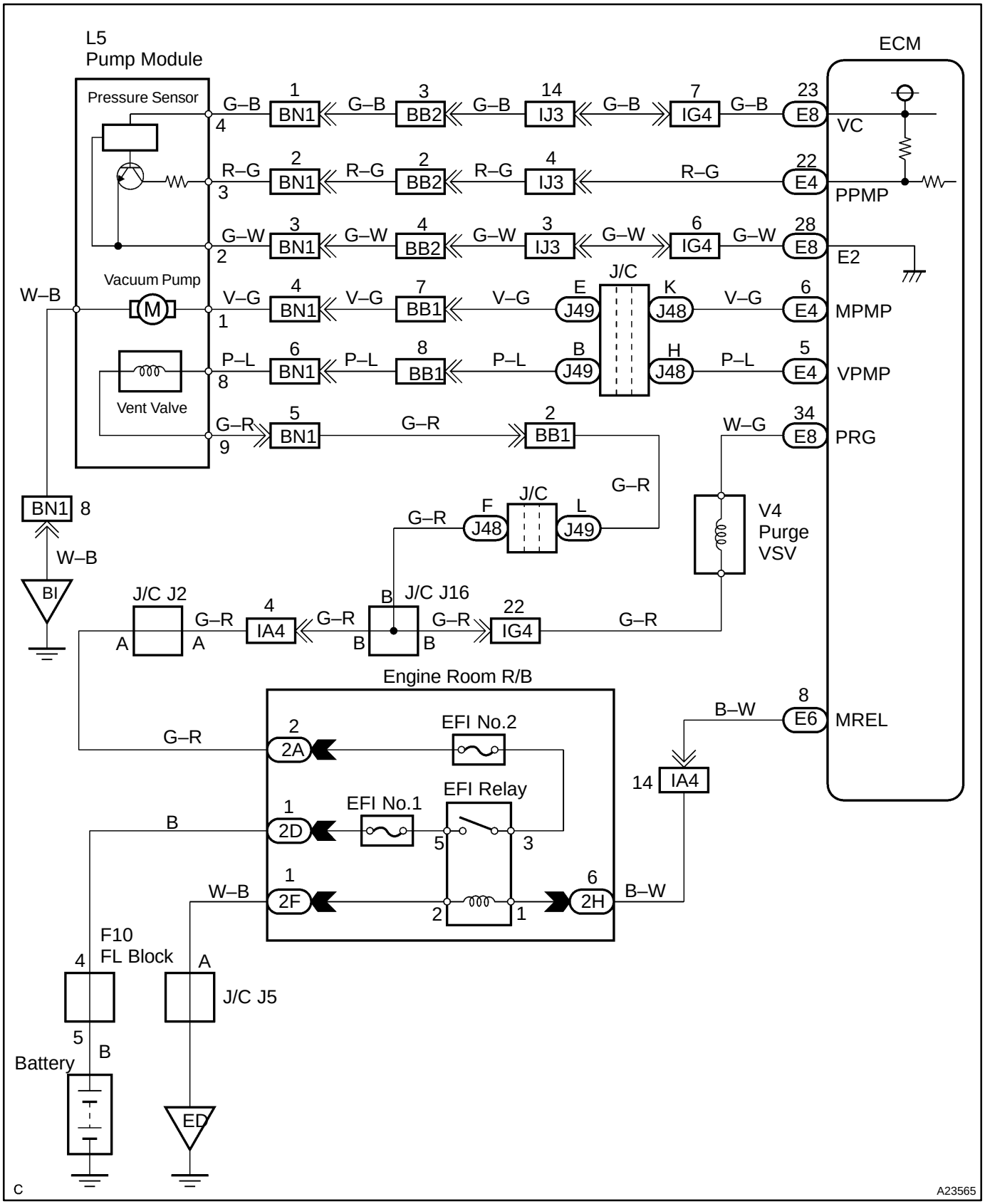
WIRING DIAGRAM



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INSPECTION PROCEDURE

NOTICE:

A hand–held tester is required to conduct the following diagnostic troubleshooting procedure.

HINT:

- ▶ Using hand–held tester monitor results enables the EVAP (Evaporative Emission) system to be confirmed.
- ▶ Read freeze frame data using a hand–held tester Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data, from the time the malfunction occurred.

1	**Confirm DTC.**

(a) Turn the ignition switch to OFF and wait for 10 seconds.
(b) Turn the ignition switch to ON.
(c) Turn the ignition switch to OFF and wait for 10 seconds.
(d) Connect a hand–held tester to the DLC3.
(e) Turn the ignition switch to ON and turn the tester ON.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Confirm DTCs and freeze frame data.

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
0.02 inch orifice clogged	●								●	●	
0.02 inch orifice high–flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Pressure sensor stuck				●							
Pressure sensor noising				●							
Pressure sensor voltage low			●		●						
Pressure sensor voltage high			●			●					
Gross leak		●					●				
Small leak								●			
Vacuum pump stuck OFF	●								●	●	
Vacuum pump stuck ON	●								●	●	
Vent valve stuck ON (closed)	●								●	●	
Vent valve stuck OFF (vent)											●

NOTICE:

If the 0.02 inch reference pressure difference between the first and second checks is greater than the specification, the DTCs corresponding to the reference pressure (P043E, P043F, P0441, P0455, P0456, P2401, P2420) will be all stored.

NEXT

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2	**Perform EVAP system check.**

NOTICE:

- **In the EVAP SYSTEM CHECK (AUTO OPERATION), the series of 5 EVAP SYSTEM CHECK steps is performed automatically. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut–off valve may be closed and making the leak check of the fuel tank unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear DTCs (see page DI–43).

(b) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.

(c) After the EVAP SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

HINT:

If no pending DTC is displayed, perform the Monitor Confirmation after this repair is completed. After this confirmation, check for pending DTCs. If no DTC is displayed, the EVAP system is normal.

NEXT

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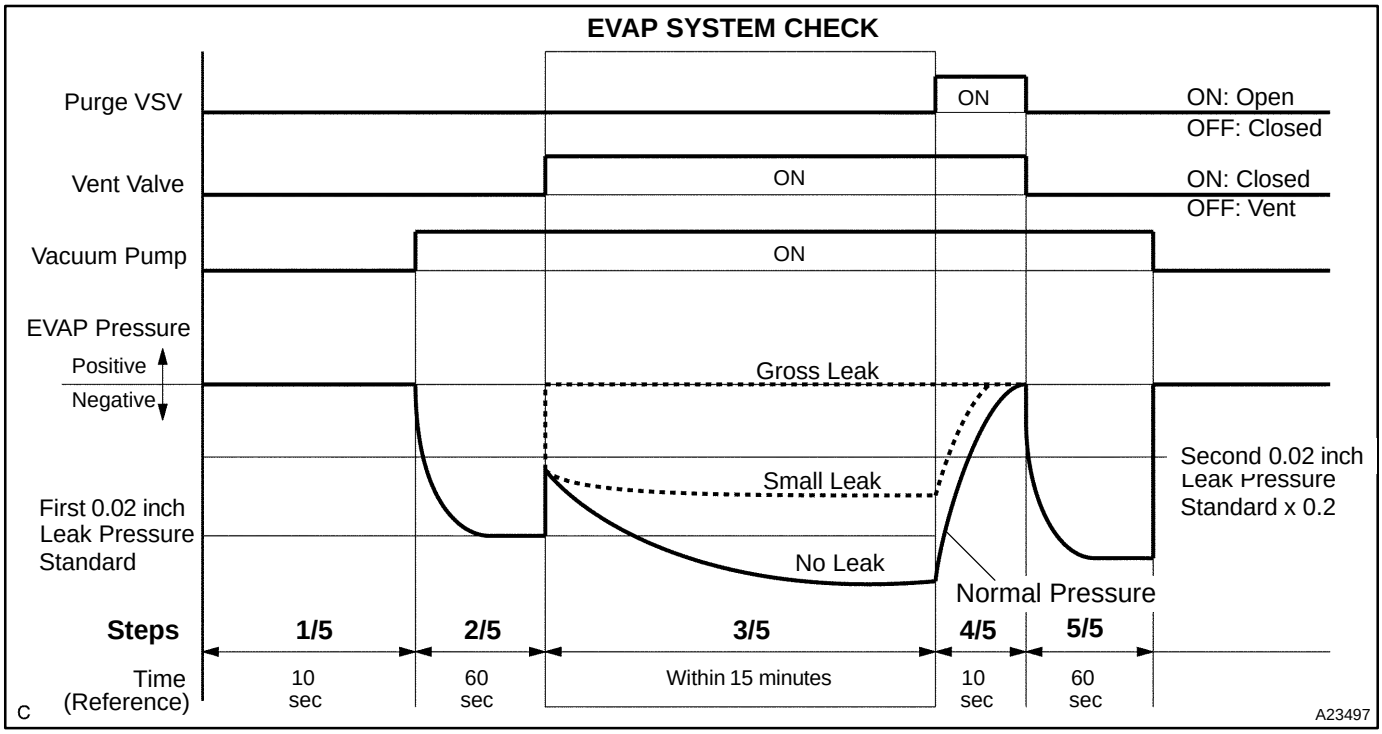
3	Perform EVAP system manual operation check.



NOTICE:

- **In the EVAP SYSTEM CHECK (MANUAL OPERATION), the series of 5 EVAP SYSTEM CHECK steps is performed manually.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut–off valve may be closed and making the leak check of the fuel tank unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear DTCs (see page DI–43).

(b) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / MANUAL OPERATION.

NEXT

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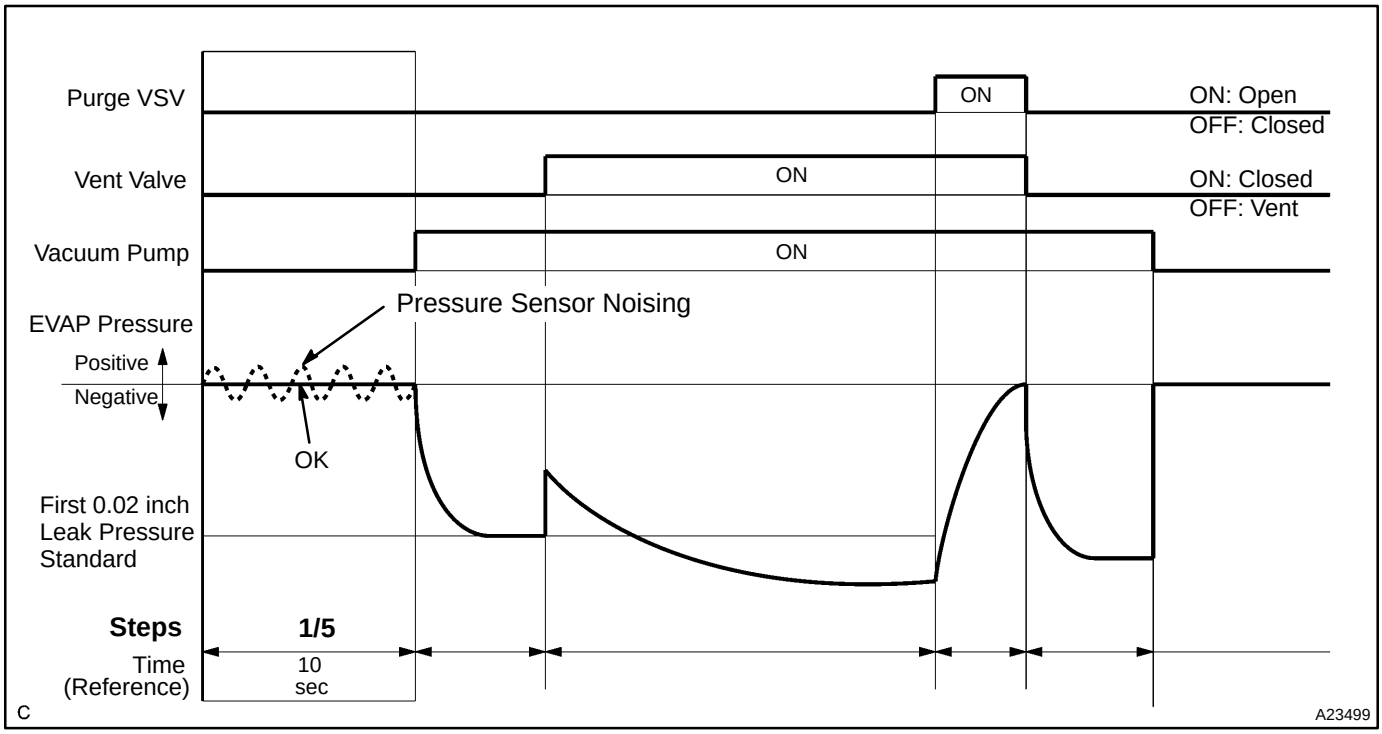
4	Perform EVAP system step 1/5 check.



(a) Check the EVAP pressure in step 1/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	Virtually no variation in EVAP pressure	Not yet determined	A
P0451	EVAP pressure fluctuates by ≧0.3 kPa (2.25 mmHg) or more	Pressure sensor noising	B

*: The DTCs relating to the EVAP system displayed on a hand–held tester when checking.

B → **Go to step 30**

A

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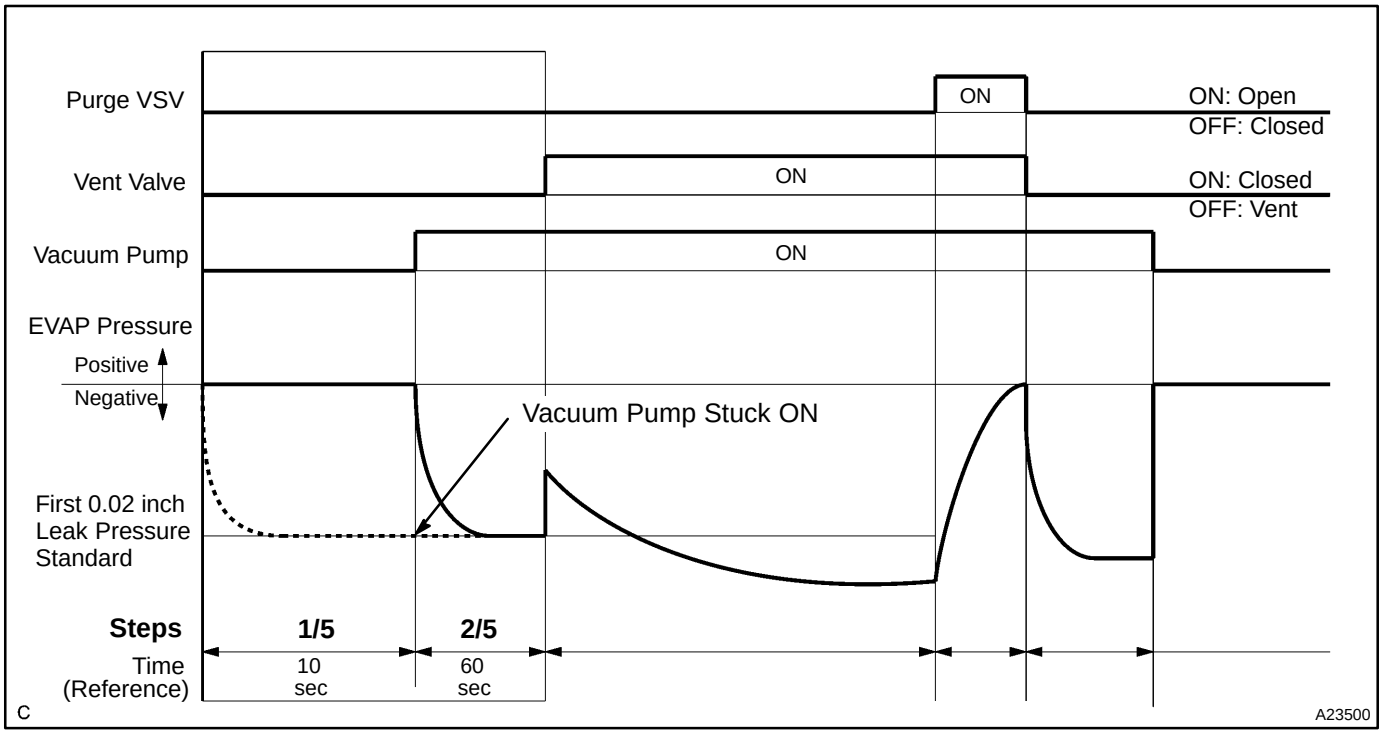
5	Perform EVAP system step 1/5 to 2/5 check.



(a) Check the EVAP pressure in step 1/5 and 2/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	Virtually no variation in EVAP pressure during step 1/5. Then decreases to 0.02 inch leak pressure standard*	Not yet determined	A
P2402	Small difference between EVAP pressures during steps 1/5 and 2/5	Vacuum pump stuck ON	B

*: The DTCs relating to the EVAP system displayed on a hand–held tester when checking.

HINT:

The 0.02 inch leak pressure standard is the value determined in step 2/5.

B → **Go to step 23.**

A

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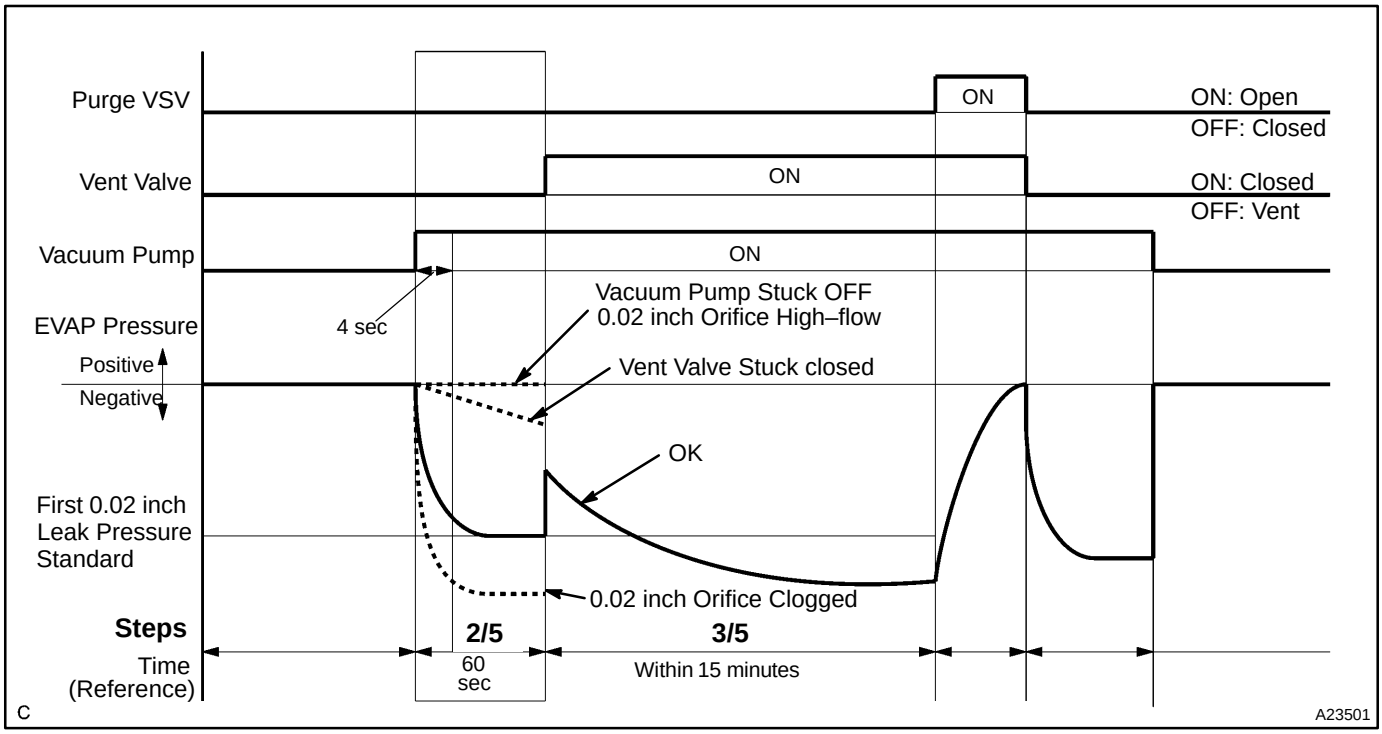
6	Perform EVAP system step 2/5 check.



HINT:

Make a note of the pressures checked in steps (a) and (b) below.

(a) Check the EVAP pressure 4 seconds after the vacuum pump is activated*.

(b) Check the EVAP pressure again when it has stabilized. This pressure is the 0.02 inch leak pressure standard.

*: The vacuum pump begins to operate as step 1/5 is proceeded to step 2/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure in step (b) between –4.85 kPa and –1.06 kPa (–36.38 mmHg and –7.95 mmHg)	Not yet determined	A
P043F and P2401	EVAP pressure in step (b) –1.06 kPa (–7.95 mmHg) or more	▶0.02 inch orifice high–flow ▶Vacuum pump stuck OFF	B
P043E	EVAP pressure in step (b) below –4.85 kPa (–36.38 mmHg)	0.02 inch orifice clogged	C
P2419	EVAP pressure in step (a) more than –1.06 kPa (–7.95 mmHg)	Vent valve stuck closed	D

*: The DTCs relating to the EVAP system displayed on a hand–held tester when checking.

B	**Go to step 11**
C	**Go to step 30**
D	**Go to step 19**

A

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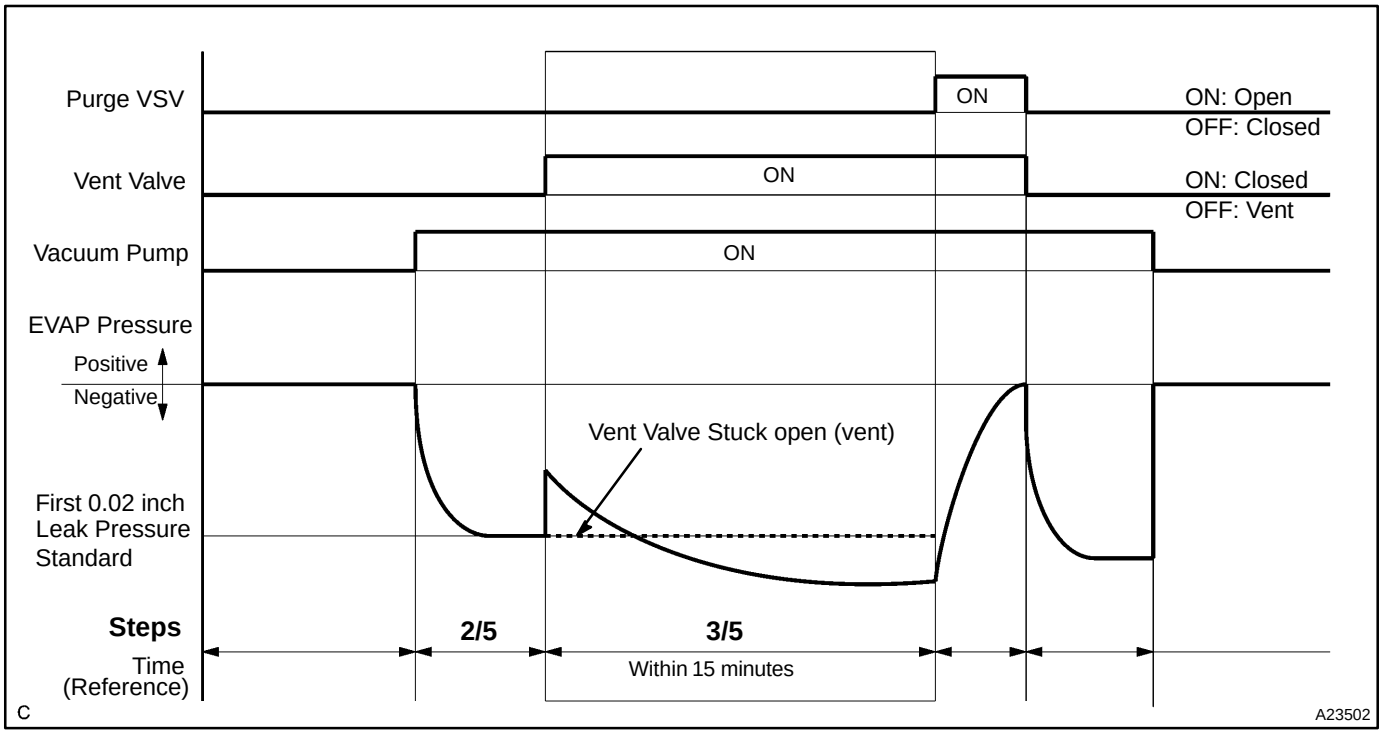
7	Perform EVAP system step 2/5 to 3/5 check.



(a) Check the EVAP pressure increase in step 3/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 2/5 to step 3/5	Not yet determined	A
P2420	No variation in EVAP pressure despite proceeding from step 2/5 to step 3/5	Vent valve stuck open (vent)	B
P0451	No variation in EVAP pressure during steps 1/5 through 3/5	Pressure sensor malfunction stuck	C

*: The DTCs relating to the EVAP system displayed on a hand–held tester when checking.

B	**Go to step 19.**
C	**Go to step 30.**

A

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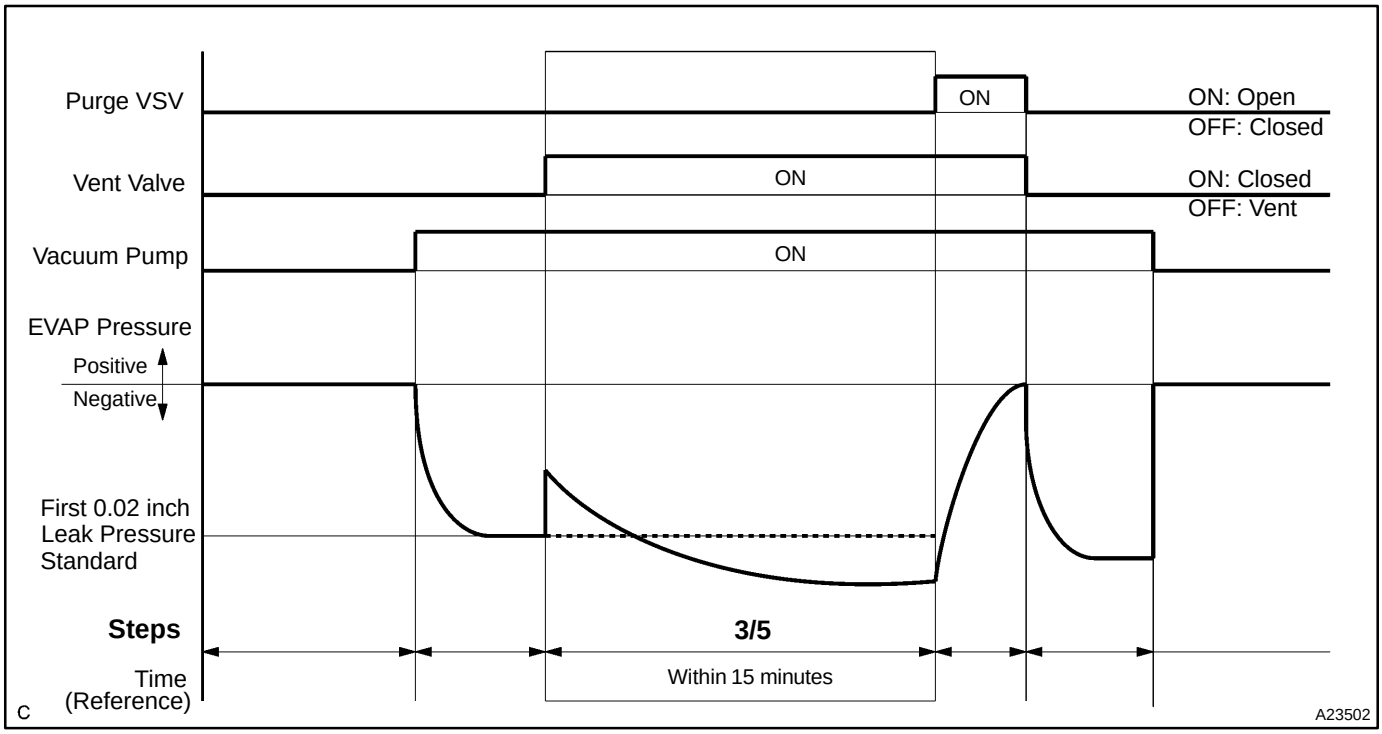
8	**Perform EVAP system step 3/5 check.**



(a) Wait until the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) for 30 seconds.

(b) Measure the EVAP pressure and record it.

HINT:

A few minutes are required for the EVAP pressure to become saturated. When there is little fuel in the fuel tank, it takes up to 12 minutes.

NEXT

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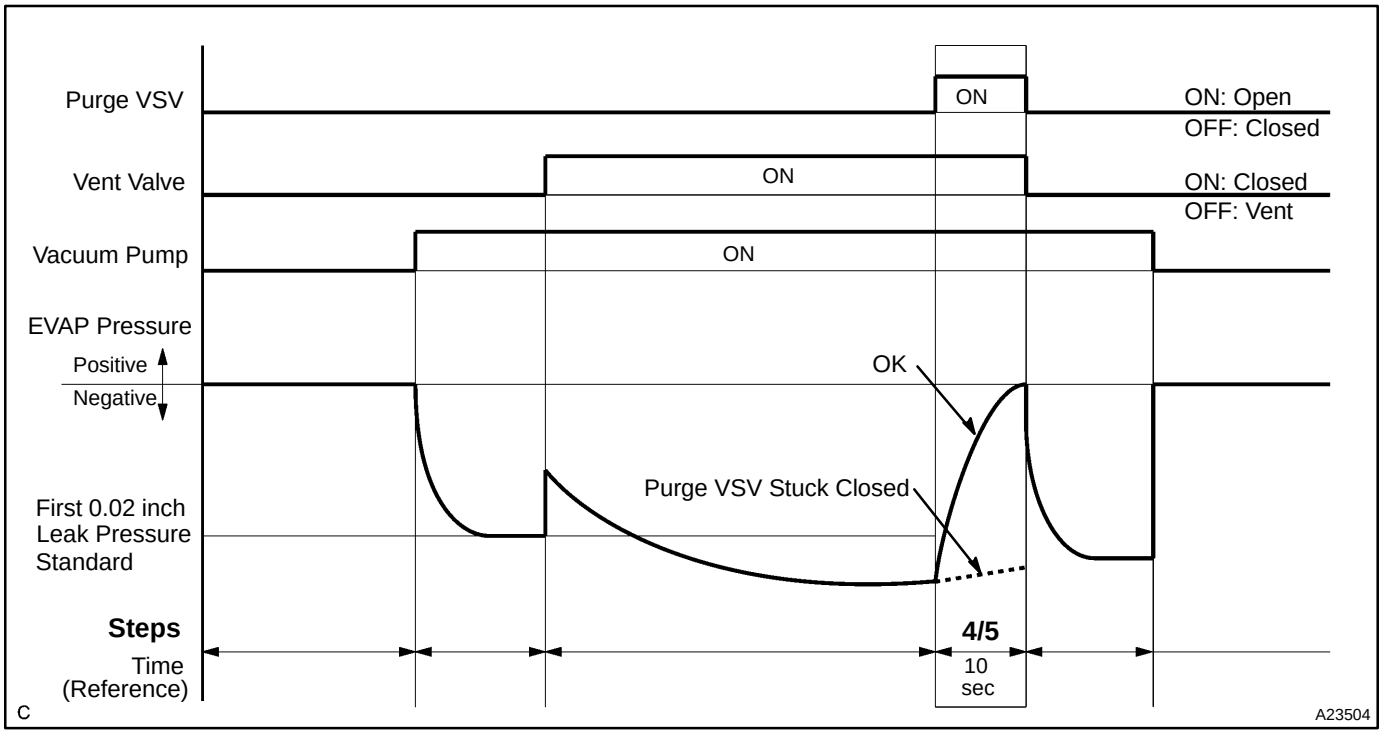
9	Perform EVAP system step 4/5 check.



(a) Check the EVAP pressure in step 4/5.

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Not yet determined	A
P0441	EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Problems in EVAP hose between pure VSV and throttle body	B
P0441	Variation in EVAP pressure is less than 0.3 kPa (2.25 mmHg) for 10 seconds, after proceeding from step 3/5 to step 4/5	Purge VSV stuck closed	C

*: The DTCs relating to the EVAP system displayed on a hand–held tester when checking.

B	**Go to step 15.**
C	**Go to step 12.**

A

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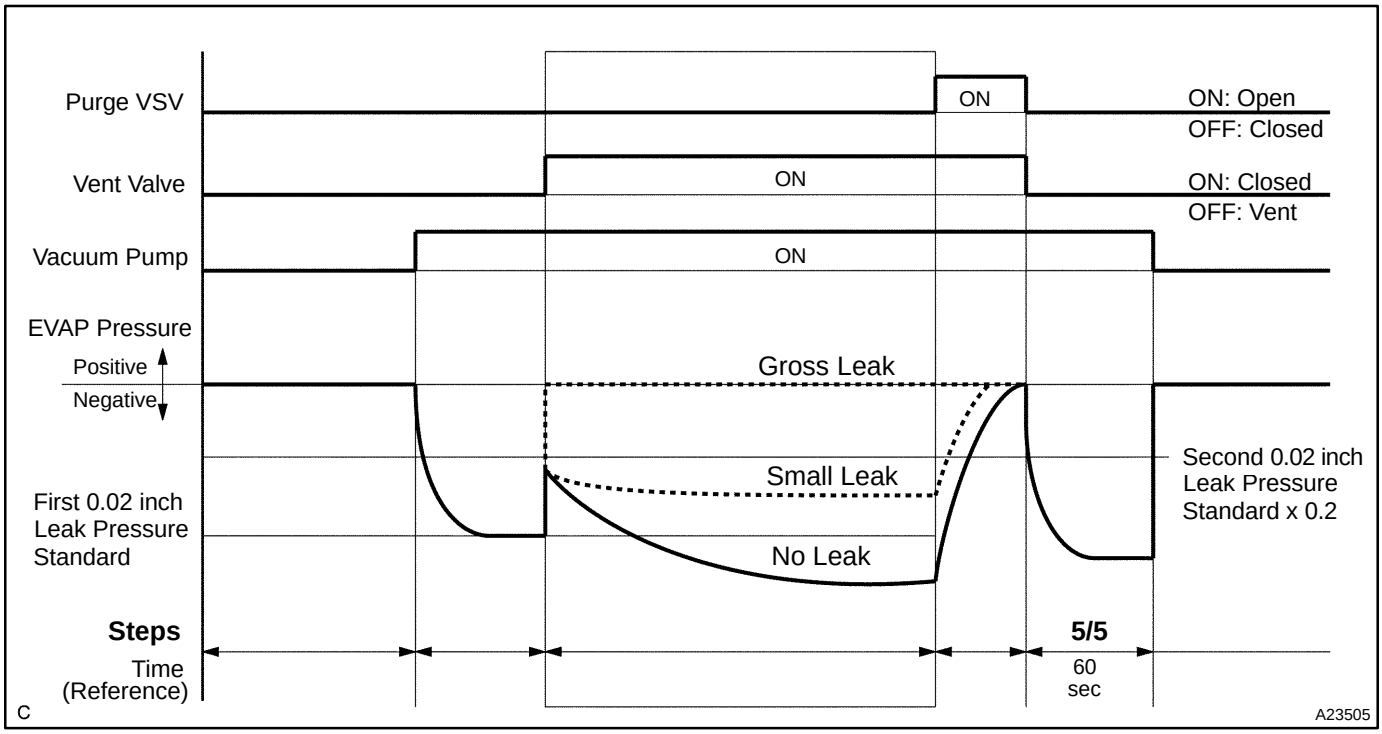
10	Perform EVAP system step 5/5 check.



(a) Check the EVAP pressure in step 5/5.

(b) Compare the EVAP pressure in step 3/5 and the second 0.02 inch leak pressure standard (step 5/5).

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure (step 3/5) lower than the second 0.02 inch leak pressure standard (step 5/5)	Not yet determined (no leakage from EVAP system)	A
P0441 and P0455	EVAP pressure (step 3/5) higher than [second 0.02 inch leak pressure standard (step 5/5) x 0.2]	▶Purge VSV stuck open ▶EVAP gross leak	B
P0456	EVAP pressure (step 3/5) higher than second 0.02 inch leak pressure standard (step 5/5)	EVAP small leak	B

*: The DTCs relating to the EVAP system displayed on a hand–held tester when checking.

A	**Go to step 36.**
B	**Go to step 12.**

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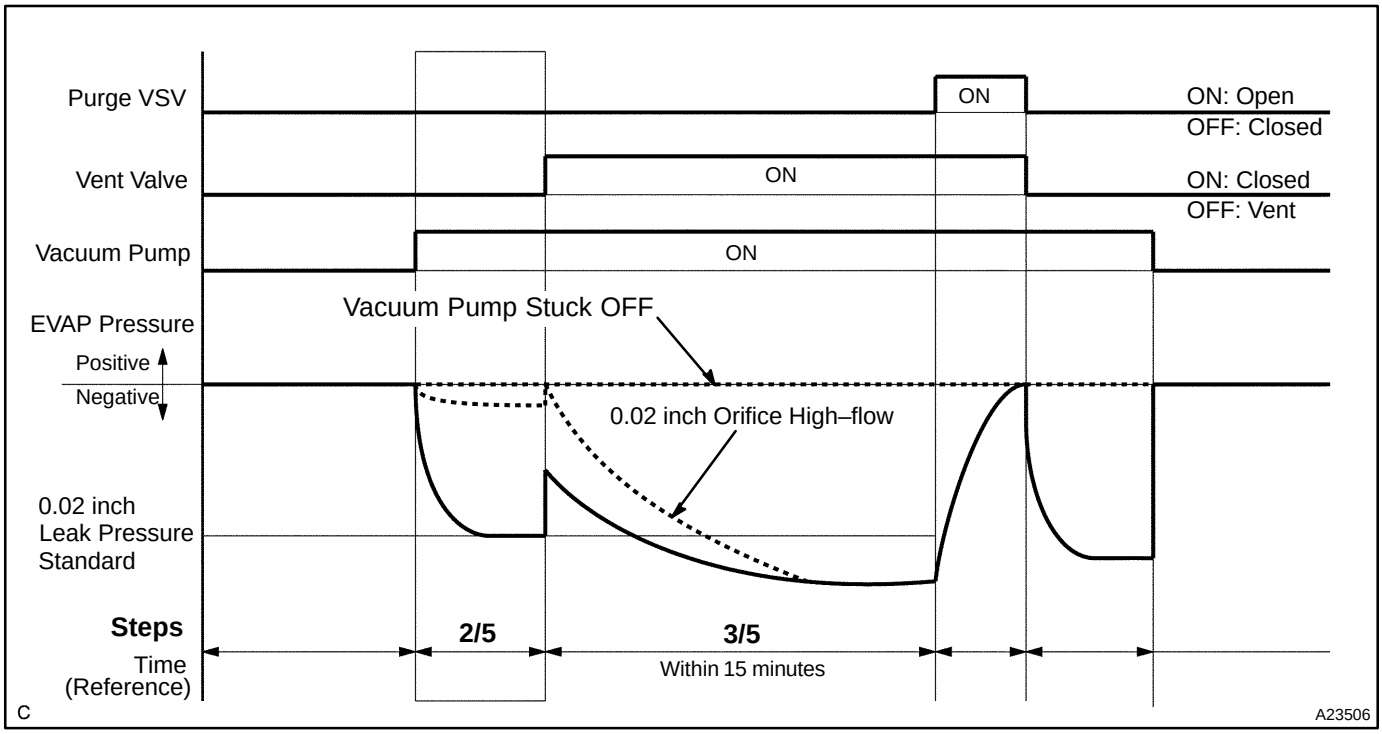
11	Perform EVAP system step 3/5 check.



(a) Check the EVAP pressure in step 3/5.

Result:

DTCs*	Test Results	Suspected Trouble Areas	Proceed To
—	EVAP pressure less than [0.02 inch leak pressure standard x 0.2]	0.02 inch orifice high–flow	A
—	EVAP pressure more than [0.02 inch leak pressure standard x 0.2]	Vacuum pump stuck OFF	B

*: The DTCs relating to the EVAP system displayed on a hand–held tester when checking.

HINT:

The 0.02 inch leak pressure standard is the value determined in step 2/5.

A	**Go to step 30.**
B	**Go to step 23.**

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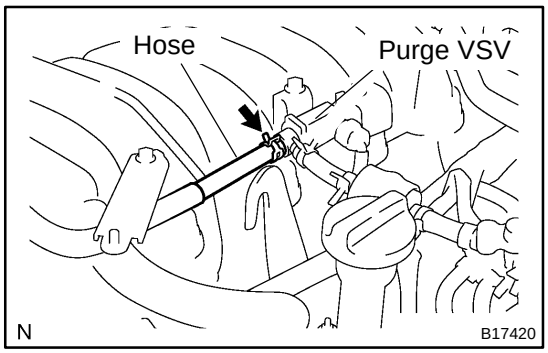
12	Perform active test of purge VSV.



PREPARATION:

(a) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II/ ACTIVE TEST / EVAP VSV.
(b) Disconnect the hose (connected to the canister) from the purge VSV.
(c) Start the engine.

CHECK:

(a) On the tester, turn off the purge VSV (EVAP VSV: OFF).
(b) Use your finger to confirm that the purge VSV has no suction.
(c) Using the tester, turn on the purge VSV (EVAP VSV: ON).
(d) Use your finger to confirm that the purge VSV has suction.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
No suction when purge VSV turned OFF, and suction applied when tuned ON	Purge VSV normal	A
Suction applied when purge VSV turned OFF	Purge VSV stuck open	B
No suction when purge VSV turned ON	▶Purge VSV stuck closed ▶Problems with EVAP hose between purge VSV and throttle body	C

B → **Go to step 14.**

C → **Go to step 15.**

A

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13	Check fuel tank cap.

CHECK:

(a) Check that the fuel tank cap is correctly installed.

(b) Confirm that the fuel tank cap is tightened until a few click sounds are heard.

HINT:

If an EVAP tester is available, check the fuel tank cap using the tester.

(1) Remove the fuel tank cap and install it onto a fuel tank cap adaptor.

(2) Connect an EVAP tester pump hose to the adaptor, and pressurize to 3.2 to 3.7 kPa (24 to 28 mmHg) using an EVAP tester pump.

(3) Seal the adaptor and wait for 2 minutes.

(4) Check the pressure. If the pressure is 2 kPa (15 mmHg) or more, the fuel tank cap is normal.

(5) Reinstall the fuel tank cap.

PREPARATION:

Test Results	Suspected Trouble Areas	Proceed To
Fuel tank cap correctly installed	—	A
Fuel tank cap loose	▶Fuel tank cap improperly installed ▶Defective fuel tank cap ▶Fuel tank cap does not meet OEM specifications	B
No fuel tank cap	—	C

A	**Go to step 29.**
B	**Go to step 27.**
C	**Go to step 28.**

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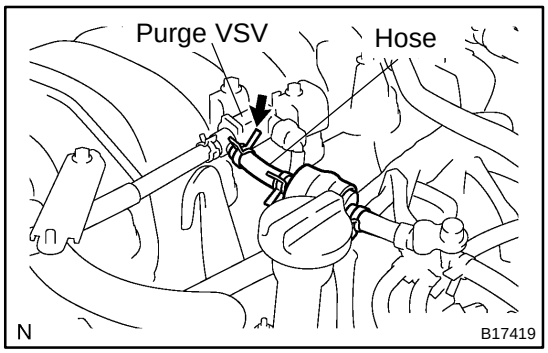
14	Inspect EVAP VSV.



PREPARATION:

(a) Turn the ignition switch to OFF.
(b) Disconnect the V4 purge VSV connector.
(c) Disconnect the hose (connected to the canister) from the purge VSV.
(d) Start the engine.

CHECK:

Use your finger to confirm that the purge VSV has no suction.

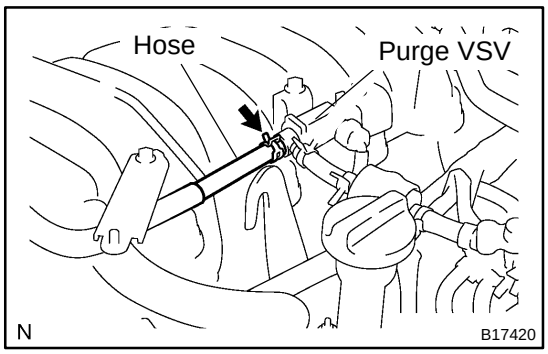
RESULT:

Test Results	Suspected Trouble Areas	Proceed To
No suction	ECM	A
Suction applied	Purge VSV	B

A	Go to step 34.

B	Go to step 30.

15	Check EVAP hose between purge VSV and throttle body.



PREPARATION:

(a) Disconnect the hose (connected to the throttle body) from the purge VSV.
(b) Start the engine.

CHECK:

(a) Use your finger to confirm that the hose has suction.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Suction applied	EVAP hose between purge VSV and throttle body normal	A
No suction	▶Throttle body ▶EVAP hose between purge VSV and throttle body	B

B	Go to step 26.

A

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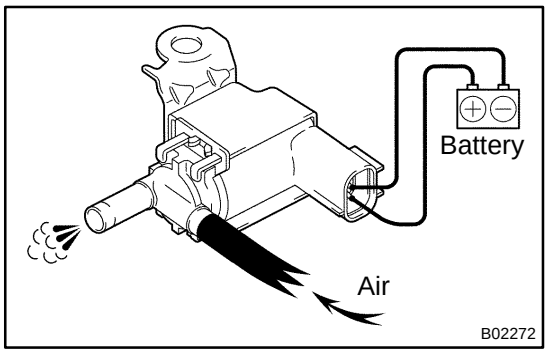
16	Inspect EVAP VSV.



PREPARATION:

(a) Remove the purge VSV.

(b) Apply battery voltage to the terminals of the purge VSV.

CHECK:

Using an air gun, confirm that air flows from port A to port B.

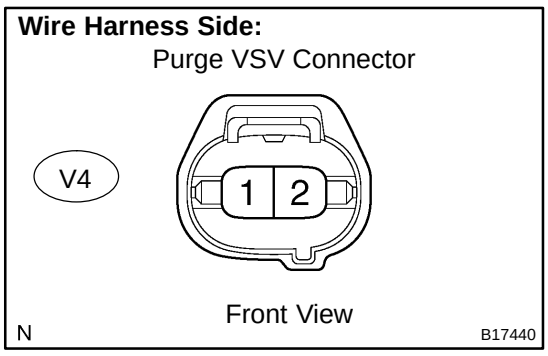
RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Suction applied	EVAP hose between purge VSV and throttle body normal	A
No suction	▶Throttle body ▶EVAP hose between purge VSV and throttle body	B

B → **Go to step 31.**

A

17	Measure purge VSV terminal voltage.



PREPARATION:

(a) Disconnect the V4 purge VSV connector.

(b) Turn the ignition switch to ON.

CHECK:

(a) Measure the voltage between terminal 1 of the purge VSV connector and the body ground.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Between 11 V and 14 V	Normal	A
Other than result above	Wire harness or connectors between purge VSV and ECM	B

B → **Go to step 32.**

A

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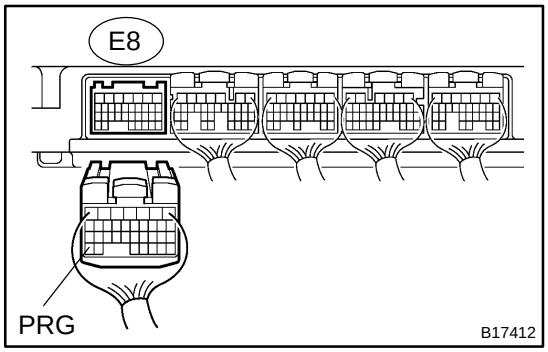
18	Check for open and short circuit in harness and connector between purge VSV and ECM.



PREPARATION:

Disconnect the E8 ECM connector and the V4 purge VSV connector.

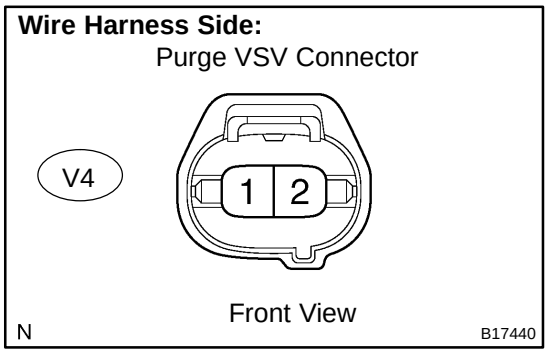
CHECK:

Check the resistance.

OK:

Standard:

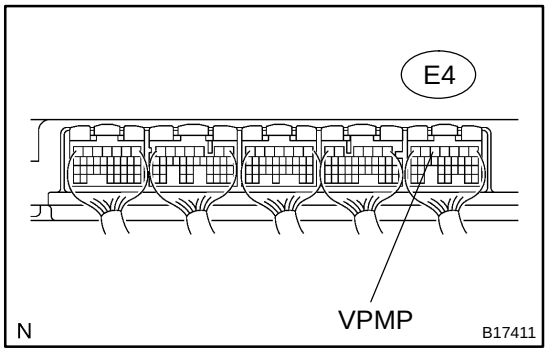
Tester Connections	Specified Conditions
E8–34 (PRG) – V4–1	Below 1 Ω
E8–34 (PRG) – Body ground	10 kΩ or higher
V4–1 – Body ground	10 kΩ or higher



OK	Go to step 35.

NG	Go to step 32.

19	Perform active test for vent valve.



PREPARATION:

(a) Turn the ignition switch to ON.

(b) On the hand–held tester, select the following menu items: DIAGNOSIS/ ENHANCED OBD II/ ACTIVE TEST/ VENT VALVE (ALONE).

CHECK:

Measure the voltage between terminal VPMP of the ECM connector and the body ground when the vent valve is turned ON (close) and OFF (vent) using the tester.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Between 9 V and 14 V when OFF Below 3 V when ON	Vent valve	A
Below 3 V when OFF and ON	ECM	B

A	Go to step 22.

B	Go to step 35.

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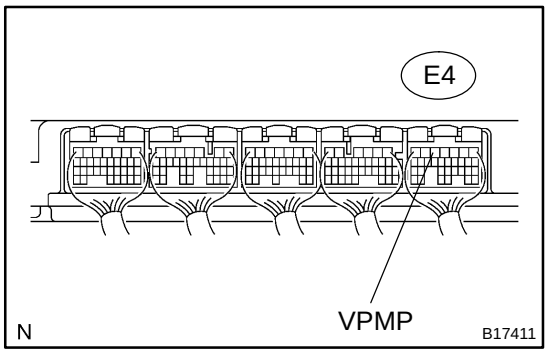
20	Perform active test for vent valve.



PREPARATION:

(a) Turn the ignition switch to ON.

(b) On the hand–held tester, select the following menu items: DIAGNOSIS/ ENHANCED OBD II/ ACTIVE TEST/ VENT VALVE (ALONE).

CHECK:

Measure the voltage between terminal VPMP of the ECM connector and the body ground when the vent valve is turned ON (close) and OFF (vent) using the tester.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Below 3 V when OFF and ON	Power source of vent valve	A
Between 9 V and 14 V when OFF Below 3 V when ON	Vent valve	B
Between 9 V and 14 V when OFF and ON	ECM	C

B → **Go to step 24.**

C → **Go to step 35.**

A

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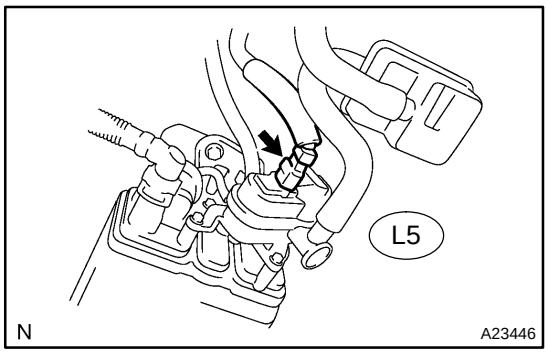
21	Inspect pump module power source circuit.

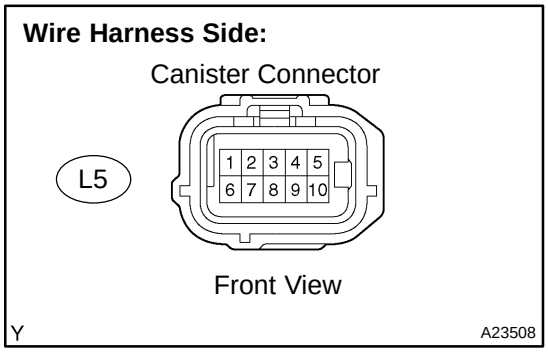


PREPARATION:

(a) Turn the ignition switch to OFF.
(b) Disconnect the L5 canister connector.
(c) Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminal 9 of the canister connector and the body ground.



RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Between 9 V and 14 V	Normal	A
Between 0 V and 3 V	Power source wire harness of vent valve	B

B → **Go to step 32.**

A

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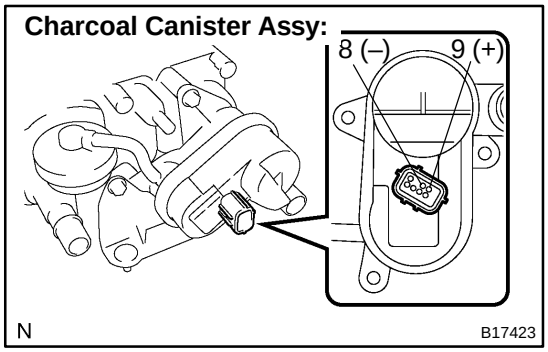
22	Inspect vent valve operation of pump module.



PREPARATION:

(a) Disconnect the L5 canister connector.
(b) Turn the ignition switch to OFF.
(c) Apply the battery voltage to terminals 9 and 8 of the pump module.

CHECK:

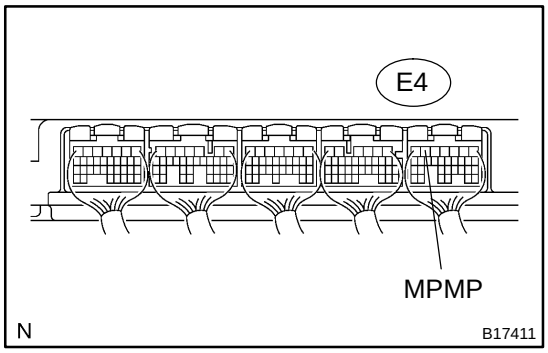
Touch the pump module to confirm the vent valve operation.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Operating	Wire harness between vent valve and ECM	A
Not operating	Vent valve	B

A	Go to step 32.
B	Go to step 30.

23	Perform active test for vacuum pump.



PREPARATION:

On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP (ALONE).

CHECK:

Measure the voltage between terminal MPMP of the ECM connector and the body ground when the vacuum pump is turned ON and OFF using the tester.

Result:

Tests Results	Suspected Trouble Areas	Proceed To
Between 0 V and 3 V when OFF Between 9 V and 14 V when ON	ECM normal	A
Between 9 V and 14 V when OFF Between 0 V and 3 V when ON	ECM	B

B	Go to step 35.

A

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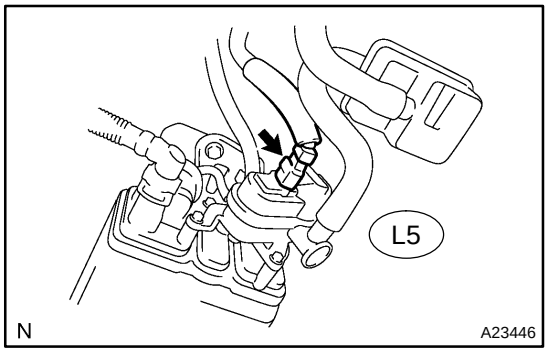
24	Check for open and short circuit in harness and connecter between pump module and ECM.

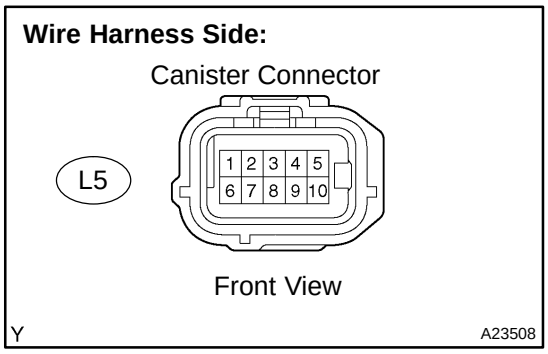


PREPARATION:

(a) Turn the ignition switch to OFF.
(b) Disconnect the L5 canister connector.
(c) Turn the ignition switch to ON.
(d) On the hand–held tester, select the following menu items:DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP (ALONE).
(e) Turn the vacuum pump ON.

CHECK:

Measure the voltage between terminal 1 of the canister connector and the body ground.



RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Between 9 V and 14 V	Normal	A
Between 0 V and 3 V	Wire harness between ECM and vacuum pump	B

B → **Go to step 32.**

A

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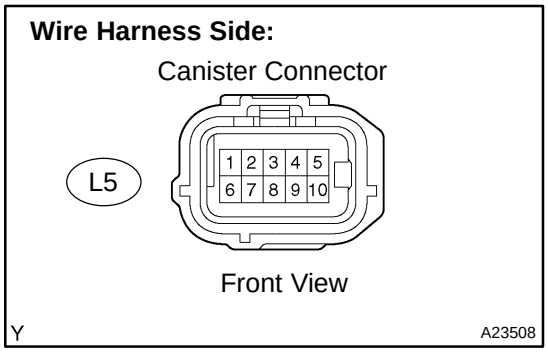
25	Check for open and short in harness and connector between pump module and ECM.



PREPARATION:

(a) Disconnect the L5 canister connector.

(b) Turn the ignition switch to OFF.

CHECK:

Check the resistance between terminal 6 of the canister connector and the body ground.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Below 1 Ω	Vacuum pump	A
10 kΩ or more	Wire harness between vacuum pump and body ground	B

A	Go to step 30.
B	Go to step 32.

26	Inspect throttle body.

PREPARATION:

(a) Stop the engine.

(b) Disconnect the EVAP hose from the throttle body.

(c) Start the engine.

CHECK:

(a) Use your finger to confirm that the port of the throttle body has suction.

RESULT:

Test Results	Suspected Trouble Areas	Proceed To
Suction applied	EVAP hose between throttle body and purge VSV	A
No suction	Throttle body	B

A	Go to step 33.
B	Go to step 34.

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27	**Correctly reinstall or replace fuel tank cap.**

HINT:

- When reinstalling the fuel tank cap, tighten it until a few click sounds are heard.
- When replacing the fuel tank cap, use a fuel tank cap that meets OEM specifications, and install it until a few click sounds are heard.

NEXT	**Go to step 37.**

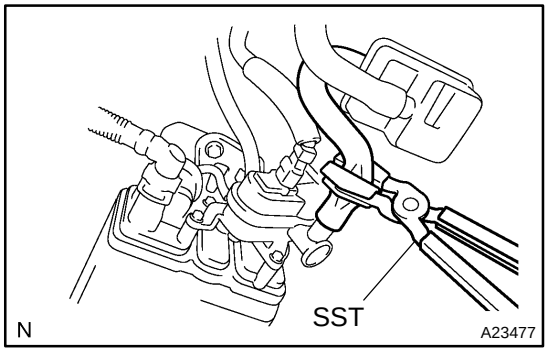
28	**Replace fuel tank cap.**

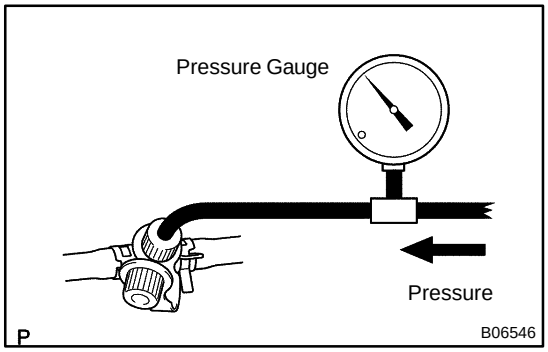
HINT:

When installing the fuel tank cap, tighten it until a few click sounds are heard.

NEXT	**Go to step 37.**

29	**Repair EVAP leak part.**





(a) Prepare a rubber hose with a 15 to 18.5 mm inside diameter.
(b) Reinstall the fuel tank cap.
(c) Disconnect the atmospheric side hose of the pump module.
(d) Connect the rubber tube to the pump module.
(e) Using SST, pinch the rubber tube to close the canister passage to air.
SST 00002–6872A
(f) Connect a pressure gauge (SST) to the service port (green cap near the air cleaner box).
(g) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).
(h) Apply soapy water to the piping and connecting parts of the EVAP system. Look for areas where bubbles appear. This indicates leaking points.
(i) Repair or replace leaking point.

HINT:

- If the system has leaks, a whistling sound will be heard.
- Disconnect the hose between the canister and the fuel tank from the canister. Close the canister hose connected to the fuel tank, and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

NEXT	**Go to step 36.**

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30	**Replace charcoal canister.**

NEXT → **Go to step 37.**

31	**Replace EVAP VSV (See page EC–8).**

(a) Disconnect the connector and the hoses from the purge VSV.
(b) Remove the purge VSV.
(c) Install a new purge VSV.
(d) Reconnect the connector and hoses.

NEXT → **Go to step 37.**

32	**Repair or replace wire harness or connector.**

NEXT → **Go to step 37.**

33	**Replace EVAP hose between EVAP VSV and throttle body.**

NEXT → **Go to step 37.**

34	**Inspect throttle body.**

(a) Remove the throttle body (see page SF–42).
(b) Check that the EVAP purge port of the throttle body is not clogged. If necessary, replace the throttle body.

NEXT → **Go to step 37.**

35	**Replace ECM (See page SF–80)**

NEXT → **Go to step 37.**

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36	**Repair or replace parts and components indicated by output DTCs.**

(a) Repair the malfunctioning areas indicated by the DTCs that had been confirmed when the vehicle was brought in.

NEXT → **Go to step 37.**

37	**Perform EVAP system auto operation check.**

NOTICE:

- **In the EVAP SYSTEM CHECK (AUTO OPERATION), the series of 4 EVAP SYSTEM CHECK steps is performed automatically. It takes a maximum of approximately 15 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90 % full because the cut–off valve may be closed and making the leak check of the fuel tank unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35◀C (95◀F) or more, a large amount of vapor forms and any check results become inaccurate. When performing an EVAP SYSTEM CHECK, keep the temperature below 35◀C (95◀F).**

(a) Clear DTCs (see page DI–43).

(b) On the hand–held tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.

(c) After the SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

HINT:

If no pending DTC is found, the repair has been successfully completed.

NEXT

Completed

Monitor Confirmation

HINT:

After a repair, check Monitor Status by performing the Key–Off Monitor Confirmation and Purge Flow Monitor Confirmation described below.

1. KEY–OFF MONITOR CONFIRMATION

(a) Preconditions

The monitor will not run unless:

- The vehicle has been driven for 10 minutes or more (in a city area or on a free way)
- The fuel tank is less than 90 % full
- The altitude is less than 8,000 ft (2,400 m)
- The Engine Coolant Temperature (ECT) is between 4.4◀C and 35◀C (40◀F and 95◀F)
- The Intake Air Temperature (IAT) is between 4.4◀C and 35◀C (40◀F and 95◀F)
- The vehicle remains stationary (the vehicle speed is 0 mph [0 km/h])

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(b) Monitor Conditions
(1) Allow the engine to idle for at least 5 minutes.
(2) Turn the ignition switch to OFF and wait for 6 hours (8 or 10.5 hours).

HINT:
Do not start the engine until checking MONITOR STATUS. If the engine is started, the steps described above must be repeated.

(c) Monitor Status
(1) Connect a hand–held tester to the DLC3.
(2) Turn the ignition switch to ON and turn the tester ON.
(3) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
(4) Check the Monitor Status displayed on the tester.

HINT:
If INCMP is displayed, the monitor is not completed. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

2. PURGE FLOW MONITOR CONFIRMATION (P0441)

HINT:
Perform this monitor confirmation after the Key–Off Monitor Confirmation shows COMPL (complete).

(a) Preconditions
The monitor will not run unless:
- The vehicle has been driven for 10 minutes or more (in a city area or on a free way)
- The ECT is between 4.4◀C and 35◀C (40◀F and 95◀F)
- The IAT is between 4.4◀C and 35◀C (40◀F and 95◀F)

(b) Monitor Conditions
(1) Release the pressure from the fuel tank by removing and reinstalling the fuel tank cap.
(2) Warm the engine up until the ECT reaches more than 75◀C (167◀F).
(3) Increase the engine speed to 3,000 rpm once.
(4) Allow the engine to idle and turn A/C ON for 1 minute.

(c) Monitor Status
(1) Turn the ignition switch to OFF (where ON or the engine is running).
(2) Connect a hand–held tester to the DLC3.
(3) Turn the ignition switch to ON and turn the tester ON.
(4) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
(5) Check the Monitor Status displayed on the tester.

HINT:
If INCMP is displayed, the monitor is not completed. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

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MONITOR RESULT

Refer to page DI–26 for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (refer to ”Confirmation Monitor”).

- ▶ MID (Monitor Identification Data) is assigned to each emissions–related component.
- ▶ TID (Test Identification Data) is assigned to each test value.
- ▶ Scaling is used to calculate the test value indicated on generic OBD ll scan tools.

EVAP–Key–off monitor

MID	TID	Scaling	Description of Test Value	Minimum Test Limit	Maximum Test Limit
$3D	$C9	Multiply by 0.01 (kPa)	Test value for small leak (P0456): Refer to pressure D*.	Minimum test limit for small leak	Maximum test limit for small leak
$3D	$CA	Multiply by 0.01 (kPa)	Test value for gross leak (P0455): Refer to pressure E*.	Minimum test limit for gross leak	Maximum test limit for gross leak
$3D	$CB	Multiply by 0.01 (kPa)	Test value for vacuum pump stuck OFF (P2401): Refer to pressure A*.	Minimum test limit for vacuum pump stuck OFF	Maximum test limit for vacuum pump stuck OFF
$3D	$CD	Multiply by 0.01 (kPa)	Test value for vacuum pump stuck ON (P2402): Refer to pressure A*.	Minimum test limit for vacuum pump stuck ON	Maximum test limit for vacuum pump stuck ON
$3D	$CE	Multiply by 0.01 (kPa)	Test value for vent valve stuck OFF (vent) (P2420): Refer to pressure C*.	Minimum test limit for vent valve stuck ON	Maximum test limit for vent valve stuck ON
$3D	$CF	Multiply by 0.01 (kPa)	Test value for vent valve stuck ON (closed) (P2419): Refer to pressure A*.	Minimum test limit for vent valve stuck OFF	Maximum test limit for vent valve stuck OFF
$3D	$D0	Multiply by 0.01 (kPa)	Test value for 0.02 inch orifice low flow (P043E): Refer to pressure B*.	Minimum test limit for 0.02 inch orifice low flow	Maximum test limit for 0.02 inch orifice low flow
$3D	$D1	Multiply by 0.01 (kPa)	Test value for 0.02 inch orifice high flow (P043F): Refer to pressure A*.	Minimum test limit for 0.02 inch orifice high flow	Maximum test limit for 0.02 inch orifice high flow
$3D	$D4	Multiply by 0.01 (kPa)	Test value for purge VSV stuck close (P0441): Refer to pressure F*.	Minimum test limit for purge VSV stuck close	Maximum test limit for purge VSV stuck close
$3D	$D5	Multiply by 0.01 (kPa)	Test value for purge VSV stuck open (P0441): Refer to pressure E*.	Minimum test limit for purge VSV stuck open	Maximum test limit for purge VSV stuck open
$3D	$D7	Multiply by 0.01 (kPa)	Test value for purge flow (P0441): Refer to pressure G*.	Minimum test limit for purge flow	Maximum test limit for purge flow

* Pressure A to G are indicated as shown in the diagram below.

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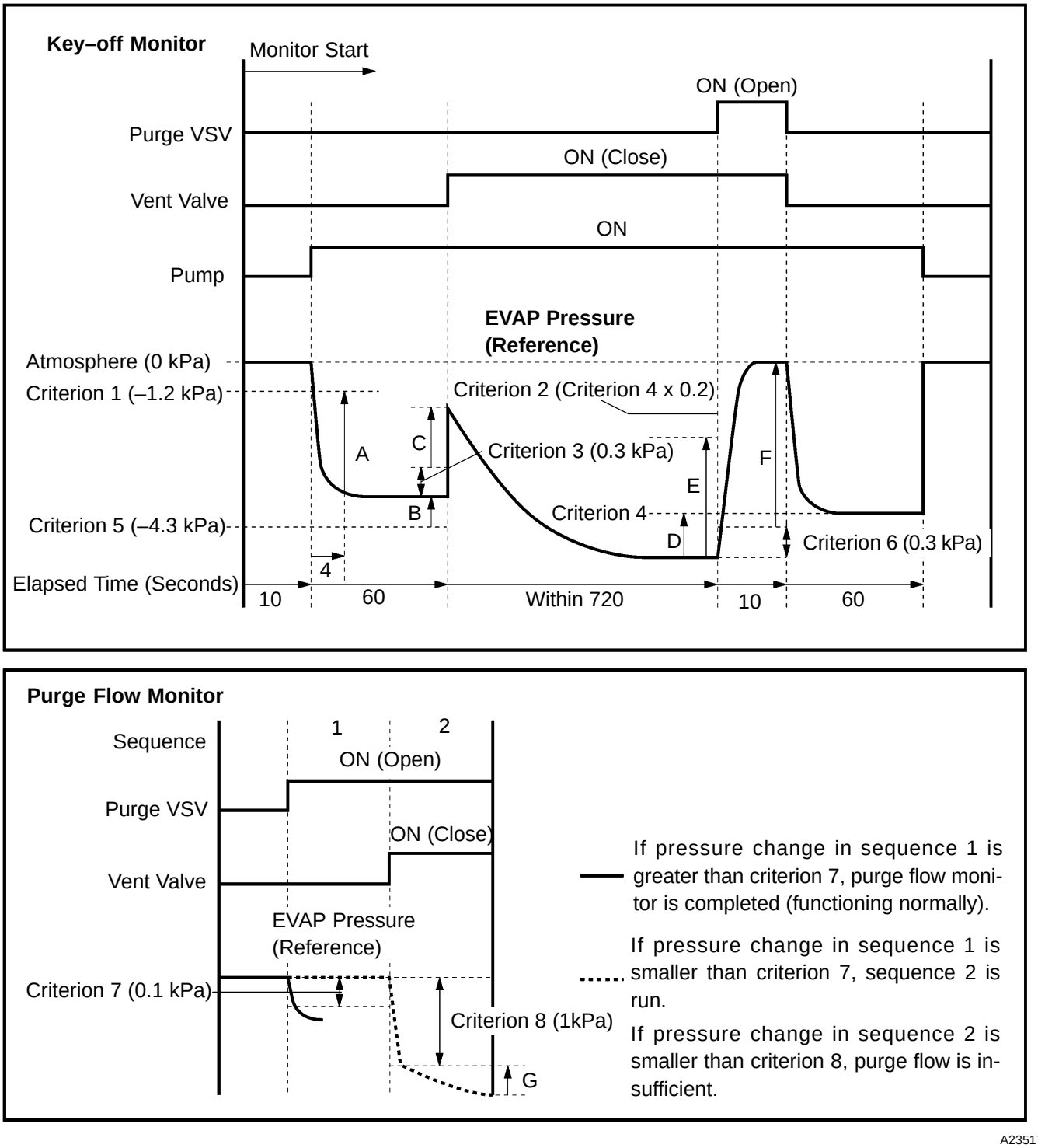
Key–off Monitor
Monitor Start
ON (Open)
Purge VSV
ON (Close)
Vent Valve
ON
Pump
EVAP Pressure
(Reference)
Atmosphere (0 kPa)
Criterion 1 (–1.2 kPa)
Criterion 2 (Criterion 4 x 0.2)
A
C
Criterion 3 (0.3 kPa)
F
E
B
Criterion 4
Criterion 5 (–4.3 kPa)
D
Criterion 6 (0.3 kPa)
4
Elapsed Time (Seconds)
10
60
Within 720
10
60
Purge Flow Monitor
Sequence
1
2
ON (Open)
Purge VSV
ON (Close)
Vent Valve
EVAP Pressure
(Reference)
Criterion 7 (0.1 kPa)
Criterion 8 (1kPa)
G
If pressure change in sequence 1 is greater than criterion 7, purge flow monitor is completed (functioning normally).
If pressure change in sequence 1 is smaller than criterion 7, sequence 2 is run.
If pressure change in sequence 2 is smaller than criterion 8, purge flow is insufficient.
C
A23517

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DID8K–01

ECM Power Source Circuit

CIRCUIT DESCRIPTION

When the ignition switch is turned ON, battery positive voltage is applied to terminal IGSW of the ECM and the EFI relay control circuit in the ECM sends a signal to terminal MREL of the ECM switching on the EFI relay.

This signal causes current to flow to the coil, closing the contacts of the EFI relay and supplying power to terminal +B of the ECM.

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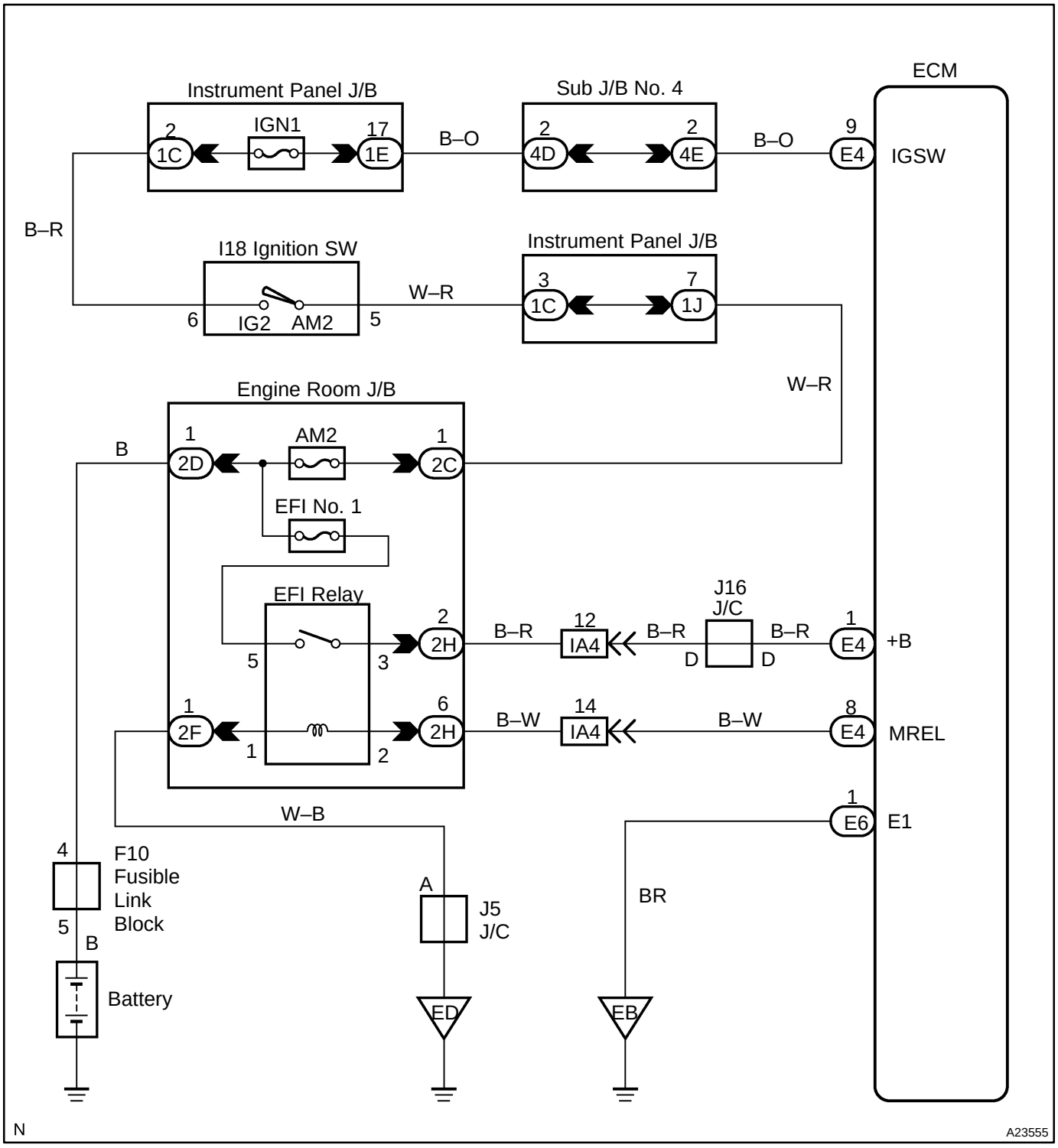
WIRING DIAGRAM



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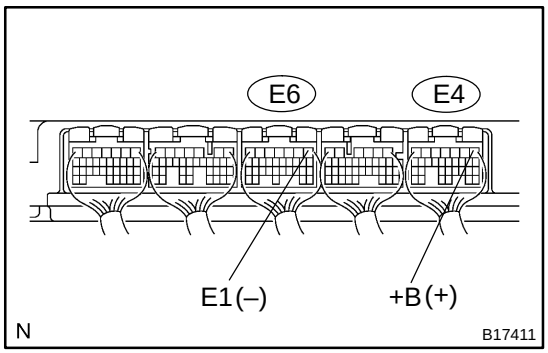
INSPECTION PROCEDURE

1	**Check voltage between terminals +B and E1 of ECM connector.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals +B and E1 of the ECM connectors.
OK:
Standard: 9 to 14 V

OK	**Proceed to next circuit inspection shown in the Problem symptoms table (See page BE–2).**

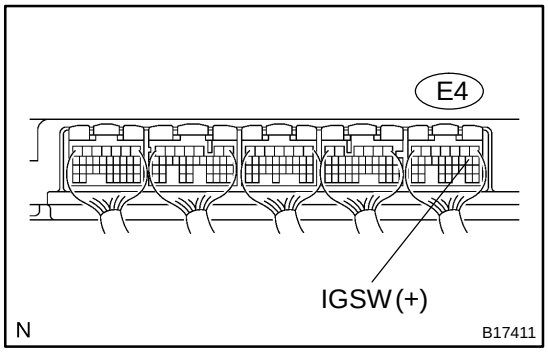
NG

2	**Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN–35).**

NG	**Repair or replace harness or connector.**

OK

3	**Check voltage between terminal IGSW of ECM connector and body ground.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal IGSW of the ECM connector and body ground.
OK:
Standard: 9 to 14 V

OK	**Go to step 6.**

NG

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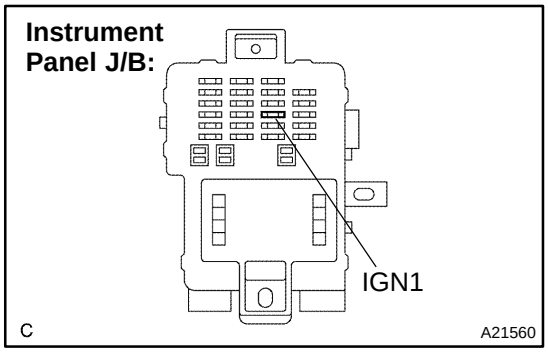
4	Check IGN1 fuse.

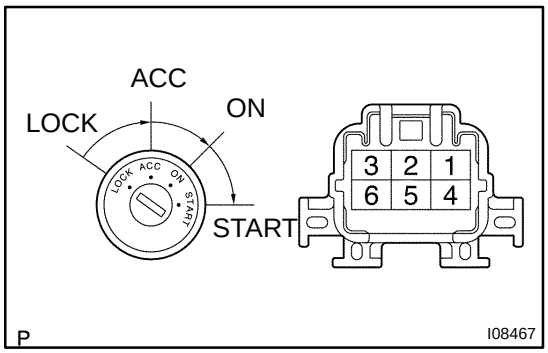


PREPARATION:
Remove the IGN1 fuse from the instrument panel J/B.
CHECK:
Check the resistance of the IGN1 fuse.
OK:
Below 1 Ω

NG → **Check for short in all harness and components connected to IGN1 fuse.**

OK

5	Check ignition switch (See page BE–24).



PREPARATION:
(a) Remove the lower finish panel.
(b) Disconnect the ignition switch connector.
CHECK:
Check resistance between terminals.
OK:
Standard:

Switch Position	Terminal Condition	Specified Condition
LOCK	Always	10 kΩ or more
ACC	1 – 3	Below 1 Ω
ON	1 – 2 – 3 5 – 6	Below 1 Ω
START	1 – 2 4 – 5 – 6	Below 1 Ω

NG → **Replace ignition switch.**

OK

Check and repair harness and connector between IGN fuse and ECM.

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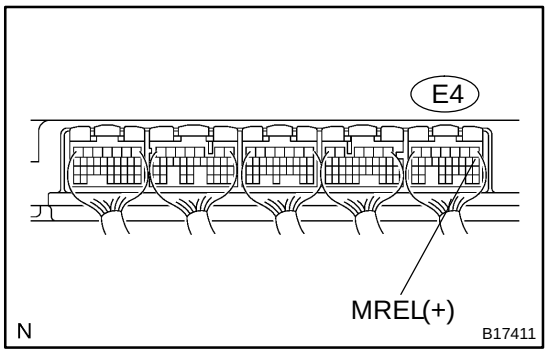
6	Check voltage between terminal MREL of ECM connector and body ground.

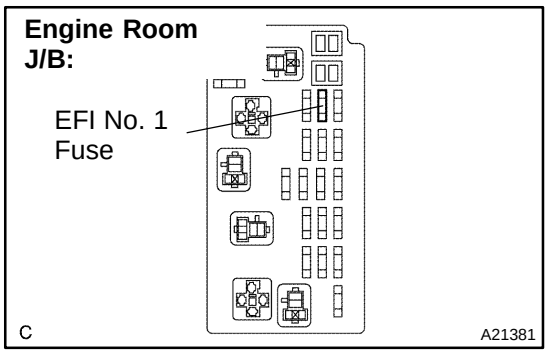


PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal MREL of the ECM connector and body ground.
OK:
Standard: 9 to 14 V

NG	Replace ECM (See page SF–80).

OK

7	Check EFI No. 1 fuse of engine room J/B.



PREPARATION:
Remove the EFI No. 1 fuse from the engine room J/B.
CHECK:
Check resistance of EFI No. 1 fuse.
OK:
Below 1 Ω

NG	Check for short in all harness and components connected to EFI No. 1 fuse.

OK

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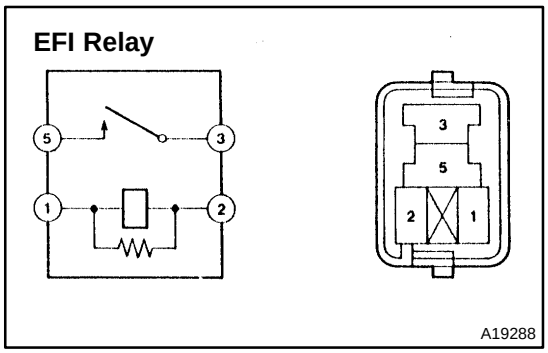
8	Check EFI relay.



PREPARATION:
Remove the EFI relay from the engine room J/B.
CHECK:
Inspect the EFI relay.
OK:

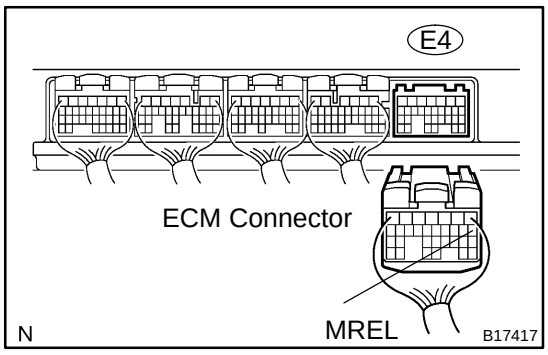
Standard:

Terminal No.	Condition	Specified Condition
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace EFI relay.**

OK

9	Check for open and short in harness and connector between terminal MREL of ECM and body ground.



PREPARATION:
Disconnect the E4 ECM connector.
CHECK:
Measure the resistance between the wire harness side connector and body ground.
OK:

Standard:

Tester Connection	Specified Condition
MREL (E4–8) – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI–11).

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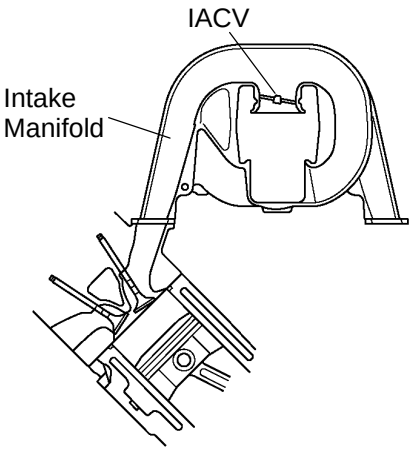
DIDG0–01

IACV Control Circuit

CIRCUIT DESCRIPTION

This circuit opens and closes the Intake Air Control Valve (IACV) in response to the engine load in order to increase the intake efficiency (ACIS: Acoustic Control Induction System).
When the engine speed is 4,700 rpm or more and the throttle valve opening angle is 60˚ or more, the VSV is OFF, so the is IACV open. All the other times, the ECM turns the VSV ON and closes the IACV.



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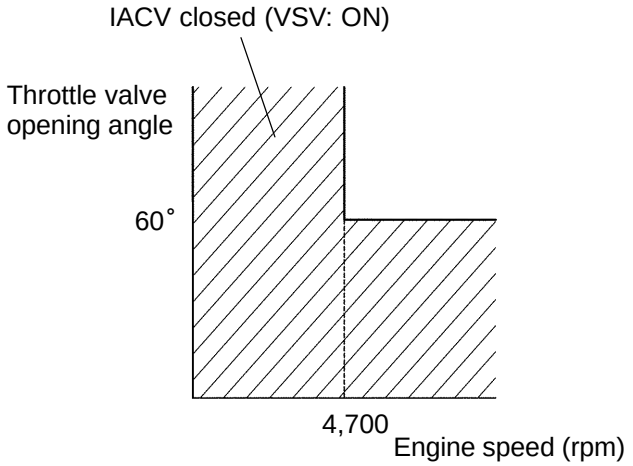

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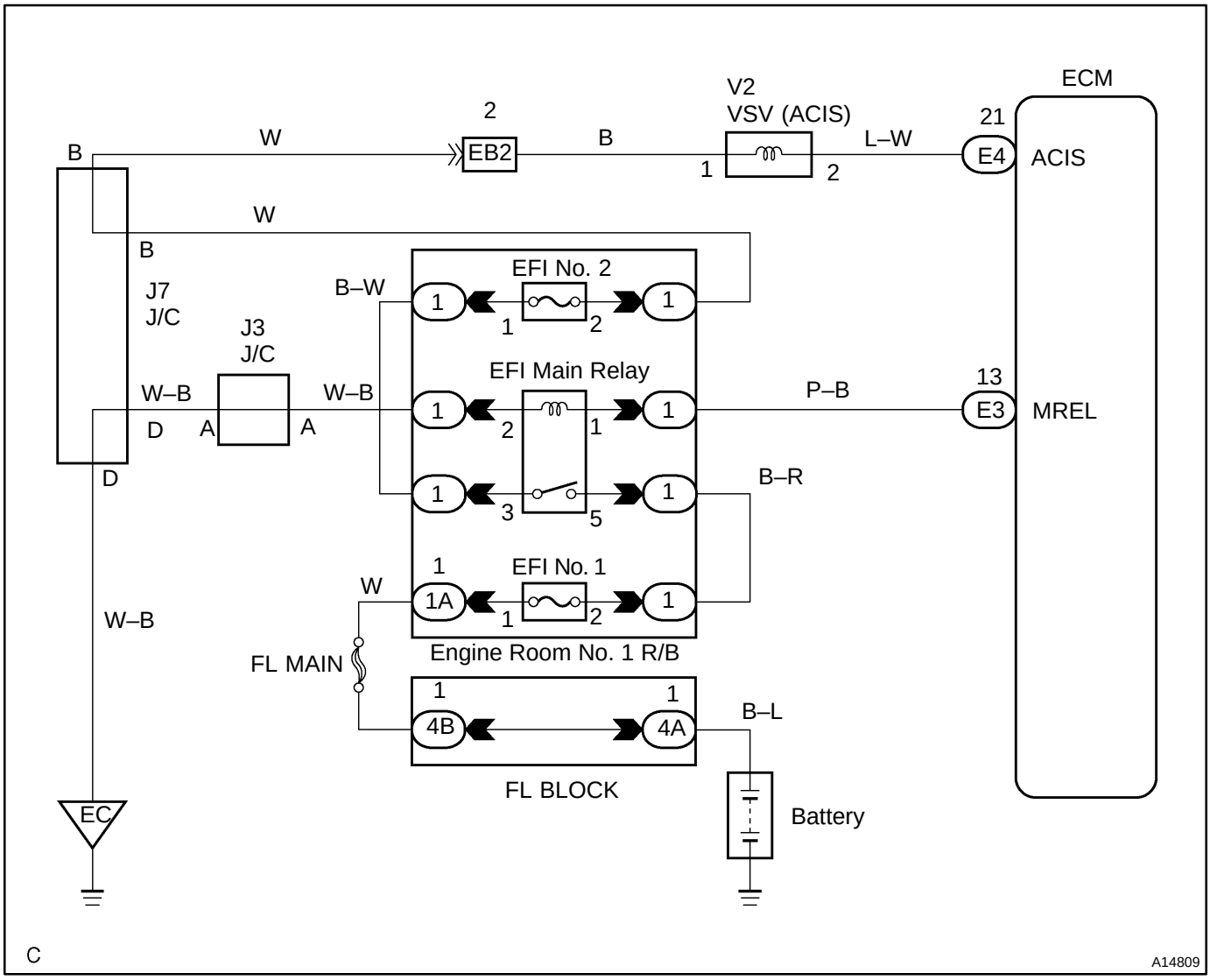
WIRING DIAGRAM



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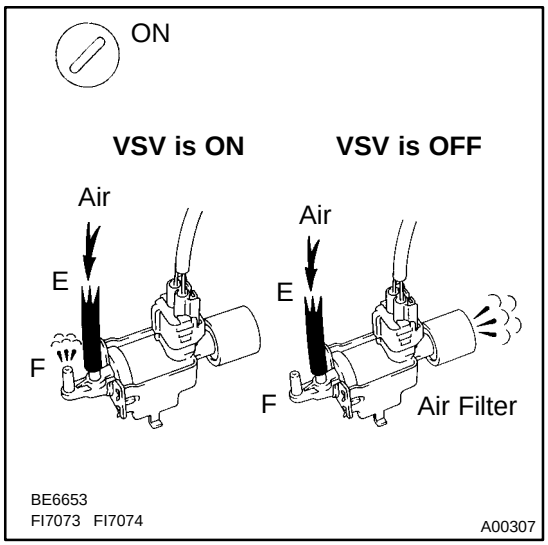
INSPECTION PROCEDURE

1	**Connect hand–held tester, and check operation of VSV for ACIS.**



PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:

Check the operation of the VSV when the VSV is operated by the hand–held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air from port E flows out through the air filter.

OK → **Check for vacuum tank (See page SF–54).**

NG

2	**Check VSV for ACIS (See page SF–54).**

NG → **Replace VSV for ACIS.**

OK

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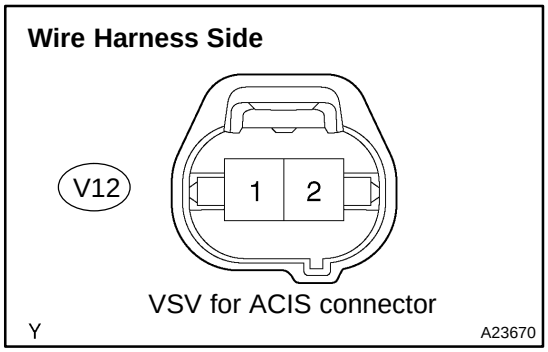
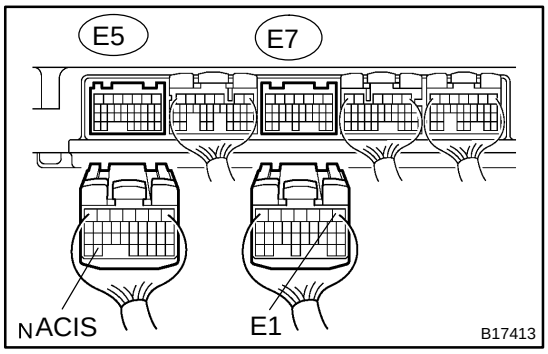
3	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN–35).**





(a) Check the wire harness between the VSV for ACIS and connector the ECM connector.
(1) Disconnect the VSV for ACIS connector.
(2) Disconnect the E5 and E7 ECM connector.
(3) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
VSV for ACIS (V12–2) – ACIS (E5–33)	Below 1 Ω

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
VSV for ACIS (V12–2) or ACIS (E5–33) – E1 (E7–1)	10 kΩ or higher

(b) Check the wire harness between the VSV for ACIS connector and the EFI relay.
(1) Disconnect the VSV for ACIS connector.
(2) Remove the EFI relay from the engine room R/B.
(3) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
VSV for ACIS (V12–1) – EFI relay terminal 3 of R/B	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–35).

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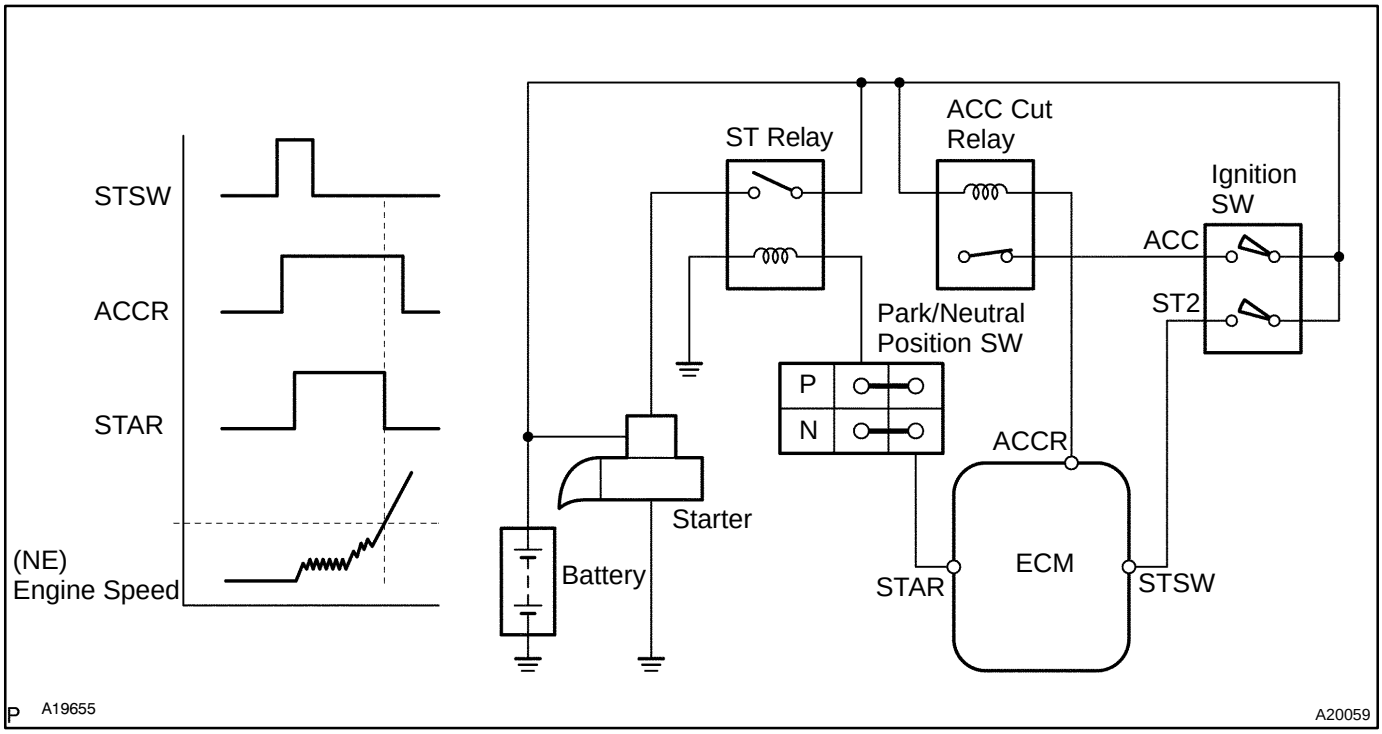
Cranking Hold Function Circuit

CIRCUIT DESCRIPTION

The starter is controlled by the ECM, when the ECM detects a start signal (STSW) from the ignition switch, this system monitors the engine speed (NE) and continues to operate the starter until it has determined that the engine has started (engine speed reaches approximately 500 rpm). If the engine is already running and the ignition switch is turned to START, the ECM will not operate the starter.



WIRING DIAGRAM

Refer to DTC P0617 on page DI–298.

INSPECTION PROCEDURE

Hand–held tester:

1	**Check operation of engine cranking.**

CHECK:

When turning the ignition switch to the START position, check whether the starter motor starts.

OK:

Starter motor starts.

OK → **Check for intermittent problems (See page DI–11).**

NG

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2	Connect hand–held tester, and check STA signal.

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.
(c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand–held tester while the starter operates.

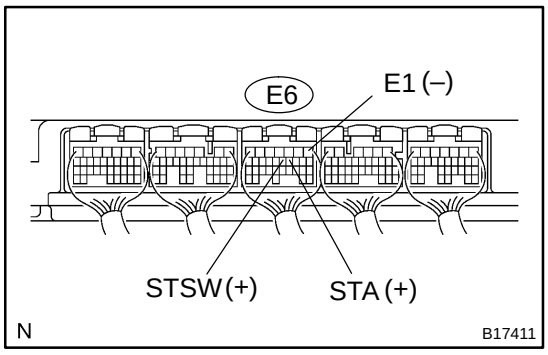
OK:

Ignition Switch Position	ON	START
STARTER SIG	OFF	ON

NG → **Go to step 5.**

OK

3	Check voltage between terminal STAR, STSW and E1 of ECM connector.



CHECK:

Measure the voltage between the terminals of the E6 ECM connectors, while cranking the engine (ignition switch START position).

OK:

Standard:

Tester Connection	Specified Condition
STA (E6–11) – E1 (E6–1)	9 to 14 V
STSW (E6–12) – E1 (E6–1)	9 to 14 V

RESULT:

Terminal STAR	Terminal STSW	Proceed to
9 to 14 V	9 to 14 V	A
0 V	9 to 14 V	B
0 V	0 V	C

B → **Replace ECM (See page SF–80).**

C → **Go to step 9.**

A

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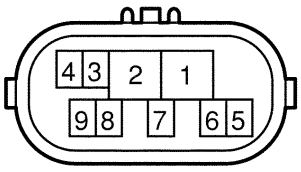
4	Check park/neutral position switch.

Component Side:



P D14154

PREPARATION:

Remove the P1 park/neutral position switch connector.

CHECK:

Check resistance between each terminal shown below when the shift lever is moved to each range.

Shift range	Terminal No. to continuity	
P	1 – 3	6 – 9
R	2 – 3	–
N	3 – 5	6 – 9
D	3 – 7	–
2	3 – 4	–
L	3 – 8	–

OK:

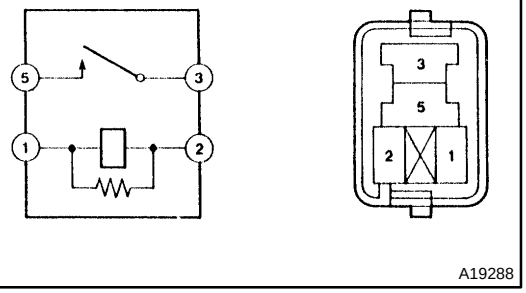
Below 1 Ω

NG → **Replace the park/neutral position switch.**

OK

Check and repair harness and connector between park/neutral position switch and ECM.

5	Check starter relay.



A19288

(a) Remove the starter relay from the engine room R/B.

(b) Inspect the starter relay.

Standard:

Tester Connection	Specified Condition
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

NG → **Replace starter relay.**

OK

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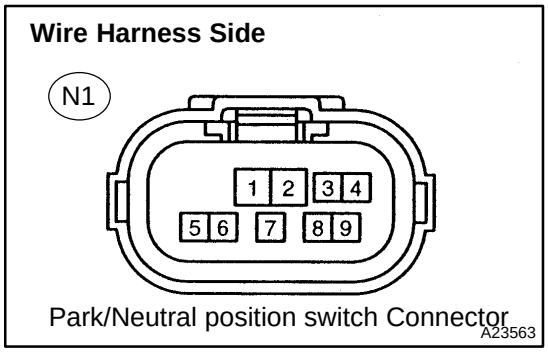
6	**Check for open and short in harness and connector between park/neutral position switch and starter relay.**



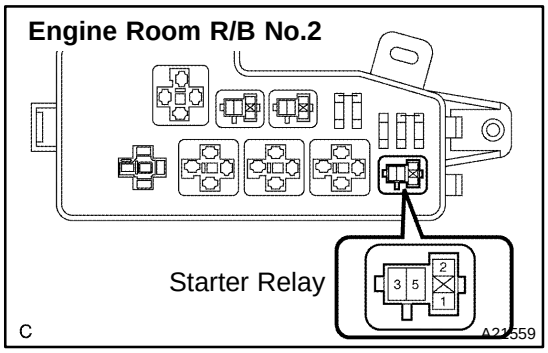
(a) Check the harness and the connector between the park/neutral position switch connector and the starter relay.
(1) Disconnect the park/neutral position switch connector.
(2) Remove the starter relay from the engine room R/B.
(3) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
Park/Neutral position switch (N1–6) – Starter relay (1)	Below 1 Ω

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
Park/Neutral position switch (N1–6) or Starter relay (1) – Body ground	10 kΩ or higher



(b) Check the harness and the connector between the starter relay and the body ground.
(1) Remove the starter relay from the engine room R/B.
(2) Check for resistance between the starter relay and the body ground.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
Starter relay (2) – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

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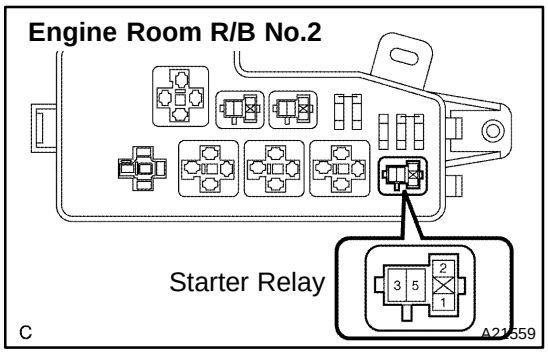
7	**Check engine room R/B No.2 (Starter relay voltage).**



PREPARATION:

Remove the starter relay from the engine room R/B No.2.

CHECK:

Measure the voltage between the terminal of the engine room R/B and body ground.

OK:

Standard:

Tester Connection	Specified Condition
Starter relay (5) – Body ground	9 to 14 V

NG → **Check and repair harness and connector between starter relay and battery.**

OK

8	**Check starter (See page ST–15).**

NG → **Repair or replace starter.**

OK

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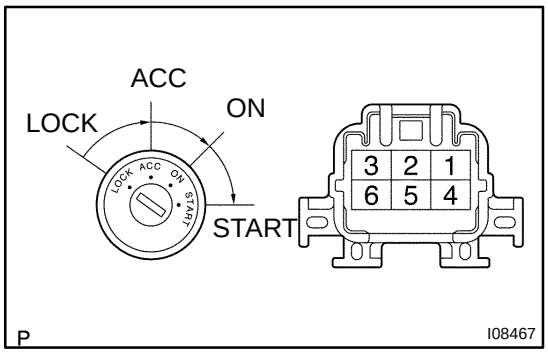
9	Check ignition switch.



PREPARATION:

(a) Remove the lower finish panel.

(b) Disconnect the ignition switch connector.

CHECK:

Check resistance between terminals.

OK:

Standard:

Switch Position	Terminal Condition	Specified Condition
LOCK	Always	10 kΩ or more
ACC	1 – 3	Below 1 Ω
ON	1 – 2 – 3 5 – 6	Below 1 Ω
START	1 – 2 4 – 5 – 6	Below 1 Ω

NG → **Replace ignition switch.**

OK

Check for open in harness and connector between ECM and ignition switch, ignition switch and battery (See page IN–35).

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DID8L–01

Fuel Pump Control Circuit

CIRCUIT DESCRIPTION

Refer to DTC P0230 on page DI–179.

WIRING DIAGRAM

Refer to DTC P0230 on page DI–179.

INSPECTION PROCEDURE

1	**Check fuel pump operation (See page SF–7).**

OK → **Go to step 8.**

NG

2	**Connect hand–held tester, and check operation of fuel pump relay.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP SPD.

CHECK:

Check the operation of the fuel pump relay when it is switched ON and OFF by the hand–held tester.

OK:

Operating noise can be heard from the relay.

OK → **Go to step 4.**

NG

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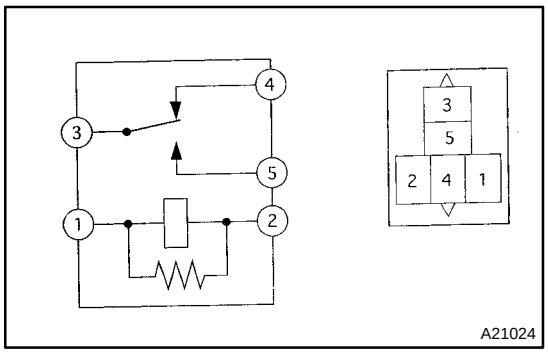
3	Check operation of fuel pump relay.



PREPARATION:
Remove the fuel pump relay from the engine room R/B.
CHECK:
Inspect the fuel pump relay.
OK:

Terminal No.	Condition	Specified Condition
3 – 4	Apply B+ between terminals 1 and 2	10 KΩ or higher
3 – 4	Always	Below 1 Ω
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace fuel pump relay.**

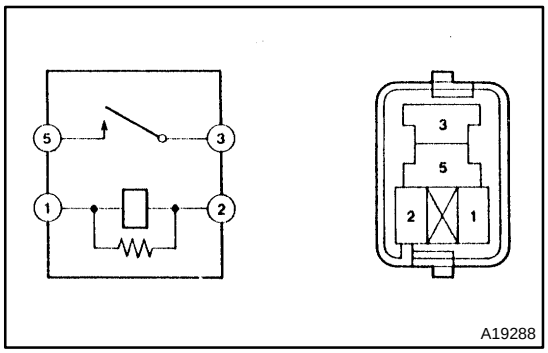
OK

4	Check fuel pump (See page SF–7).

NG → **Repair or replace fuel pump.**

OK

5	Check circuit opening relay (See page SF–58).



PREPARATION:
Remove the C/OPN relay from the engine room J/B.
CHECK:
Inspect the C/OPN relay.
OK:
Standard:

Terminal No.	Condition	Specified Condition
3 – 5	Always	10 KΩ or higher
3 – 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **Replace circuit opening relay.**

OK

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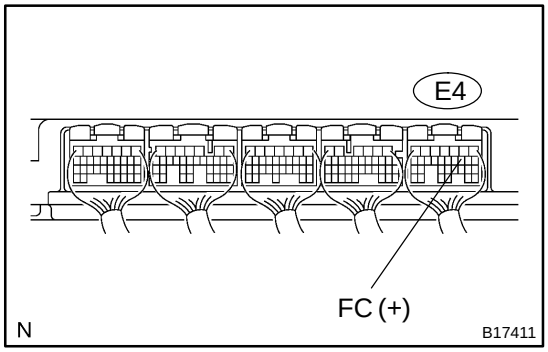
6	**Check for open in harness and connector between circuit opening relay and fuel pump, and fuel pump and body ground (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

7	**Check voltage between terminal FC and E1 of ECM connector.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal FC of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

NG → **Check for open in harness and connector between battery and FC terminal of ECM (See page IN–35).**

OK

Proceed to problem symptoms table (See page DI–33).

8	**Check fuel pump resistor (See page SF–61).**

NG → **Replace fuel pump resistor.**

OK

Check for open in harness and connector between circuit opening relay and fuel pump resistor, and fuel pump resistor and fuel pump (See page IN–35).

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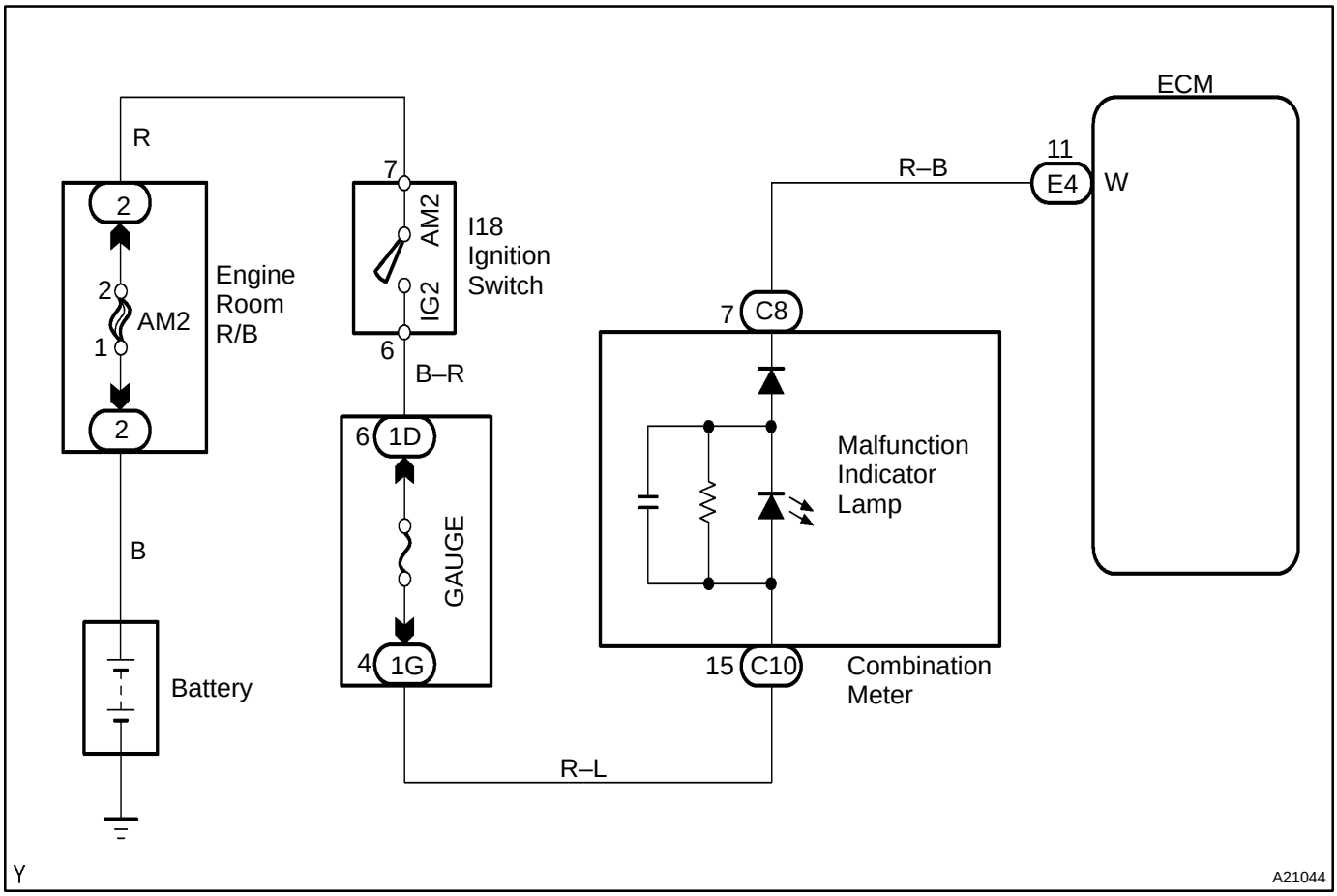
DICFG–02

MIL Circuit

CIRCUIT DESCRIPTION

If the ECM detects a trouble, the MIL lights up. At this time, the ECM records a DTC in the memory.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Troubleshoot each trouble symptom in accordance with the chart below.

MIL remains on	Start inspection from step 1
MIL does not light up	Start inspection from step 3

1	**Clear DTC.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Read the DTC (See page DI–43).
(d) Clear the DTC (See page DI–43).

CHECK:

(a) Check that MIL does not light up.

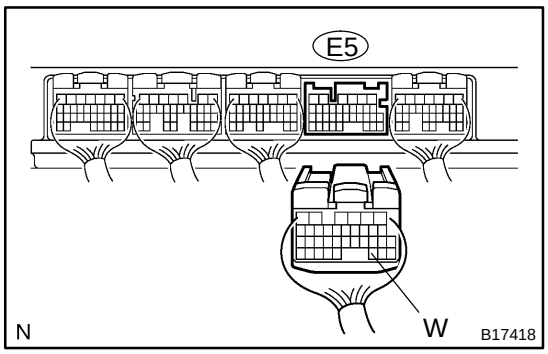
OK:

Standard: MIL does not light up

OK → **Repair circuit indicated by output code (See page DI–58).**

NG

2	**Check Harness and connector (Check for short in wire harness).**



PREPARATION:

(a) Disconnect the E4 ECM connector.
(b) Turn the ignition switch ON.

CHECK:

(a) Check that MIL does not light up.

OK:

Standard: MIL does not light up

OK → **Replace ECM (See page SF–80).**

NG

Check and repair harness and connector between combination meter and ECM.

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3	**Check that MIL lights up.**

CHECK:

Check that MIL lights up when turning the ignition switch ON.

OK:

Standard: MIL lights up

OK → **System OK.**

NG

4	**Inspect combination meter assy (MIL circuit).**

See the combination meter troubleshooting on page BE–55.

NG → **Repair or replace bulb or combination meter assembly.**

OK

Check and repair harness and connector between combination meter and ECM.

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AUTOMATIC TRANSMISSION

DIDIH–01

PRECAUTION

NOTICE:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assy, engine assy or ECM (See page DI–543).

HINT:

RESET MEMORY cannot be completed by only disconnecting the battery terminal.

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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DIDII–01

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. ”Once per driving cycle” means that the ECM detects malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects malfunction every time when enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the ”typical enabling conditions” are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. ”Immediately” means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.
Component operating range	Normal operation range of sensors and solenoids under normal driving conditions. Use these ranges as a reference. They cannot be used to judge if a sensor or solenoid is defective or not.

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DIDIJ–01

TOYOTA PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

Part and system name	Definition
Toyota HCAC system, Hydrocarbon adsorptive Catalyst (HCAC) system, HC adsorptive three–way catalyst	HC adsorptive three–way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor ”A”	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VAV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On–board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power–steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor

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Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti–theft system

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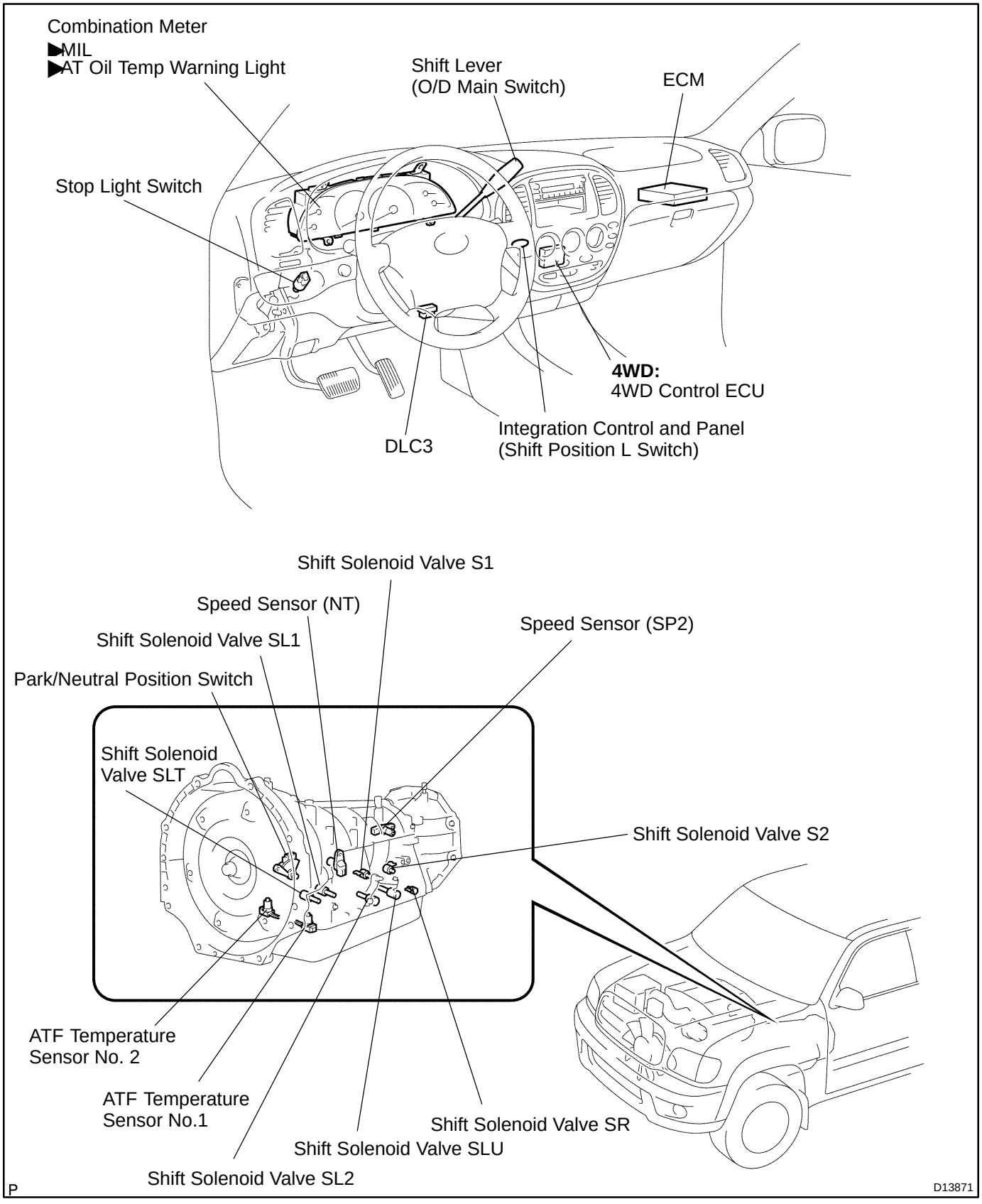
DIDIK–01

LOCATION



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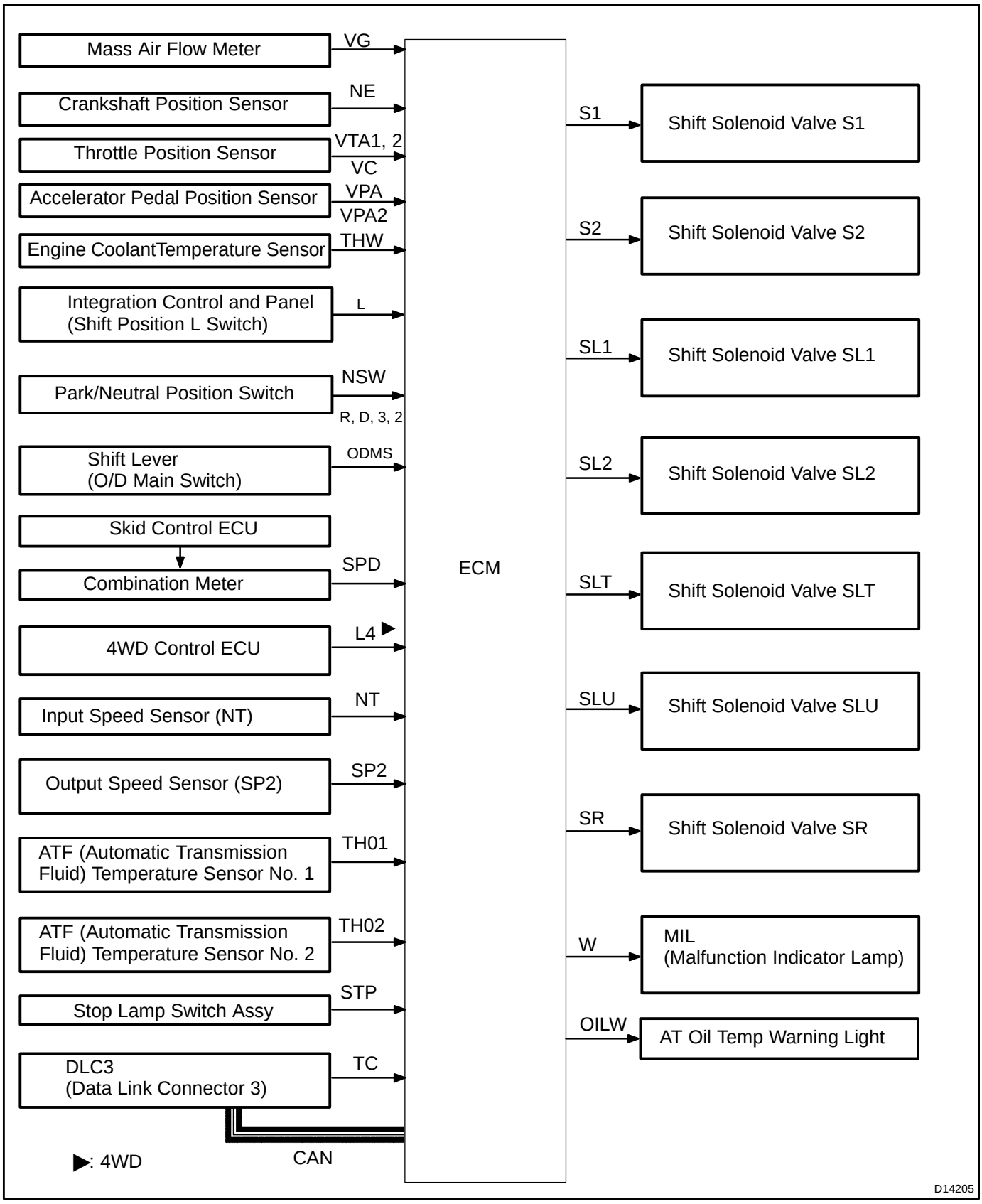
DIDIL–01

SYSTEM DIAGRAM

The configuration of the electronic control system in the A750E/A750F automatic transmission is as shown in the following chart.



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DIDIM–01

SYSTEM DESCRIPTION

SYSTEM DESCRIPTION

The ECT (Electronic controlled automatic transmission) is an automatic transmission that electronically controls shift timing using the ECM. The ECM detects electrical signals that indicate engine and driving conditions, and controls the shift point, based on driver habits and road conditions. As a result, fuel efficiency and power transmission performance are improved.

Shift shock has been reduced by controlling the engine and transmission simultaneously.

In addition, the ECT has features such as follows:

- Diagnostic function.
- Fail–safe function when a malfunction occurs.

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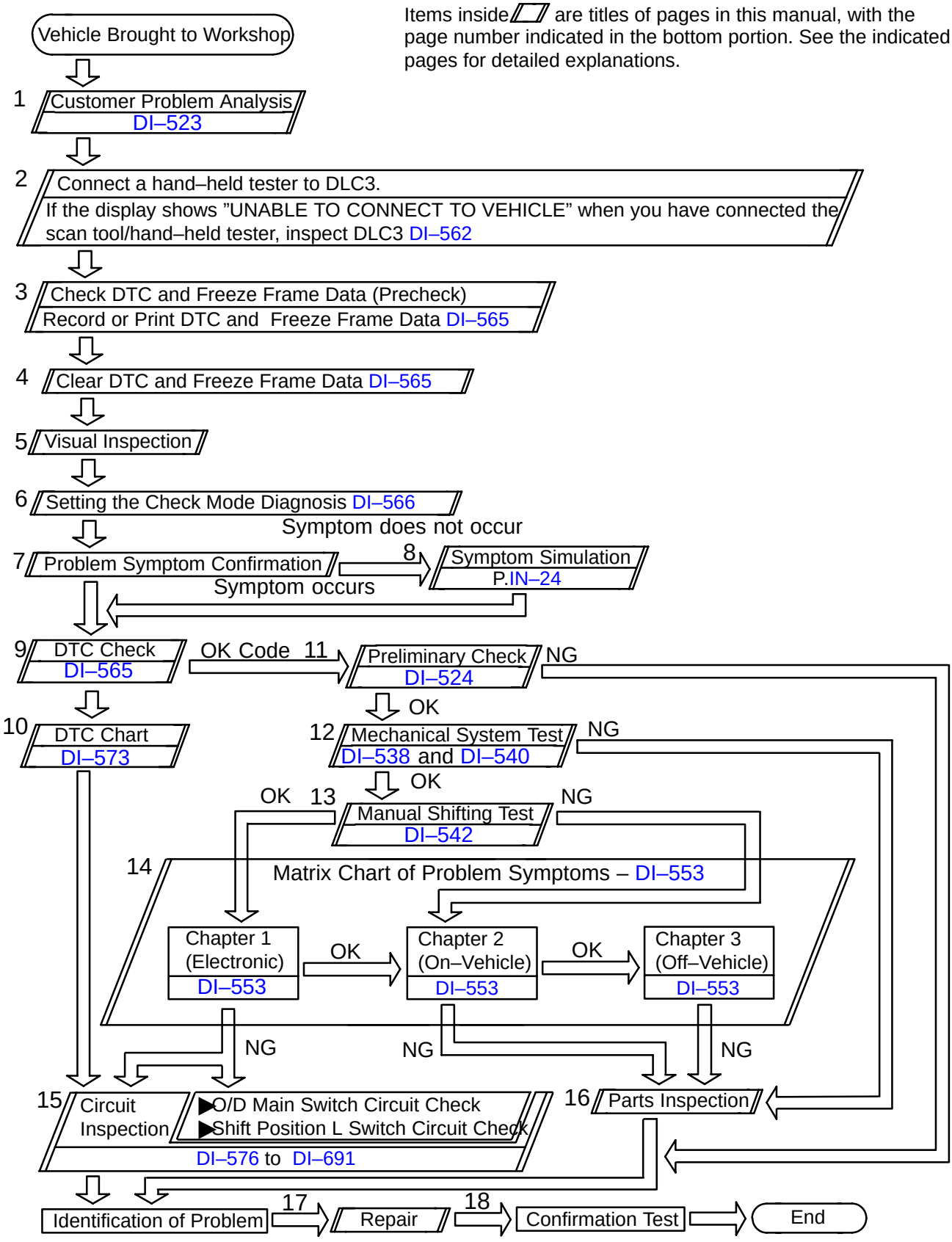
DIDIN–01

HOW TO PROCEED WITH TROUBLESHOOTING

Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



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DIDIO–01

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transmission System Check Sheet	Inspector's Name :

Customer's Name		VIN	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

Date Problem Occurred	/ /
How Often Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any position ☐ Particular position)
	☐ No up–shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → 4th ☐ 4th → 5th)
	☐ No down–shift (☐ 5th → 4th ☐ 4th → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock–up malfunction
	☐ Shift point too high or too low
	☐ Harsh engagement (☐ N → D ☐ Lock–up ☐ Any drive position)
	☐ Slip or shudder
	☐ No kick–down
	☐ Others ( )

Check Item	Malfunction Indicator Lamp	☐ Normal ☐ Remains ON

DTC Check	1st Time	☐ Normal system code ☐ Trouble code (DTC)
	2nd Time	☐ Normal system code ☐ Trouble code (DTC)

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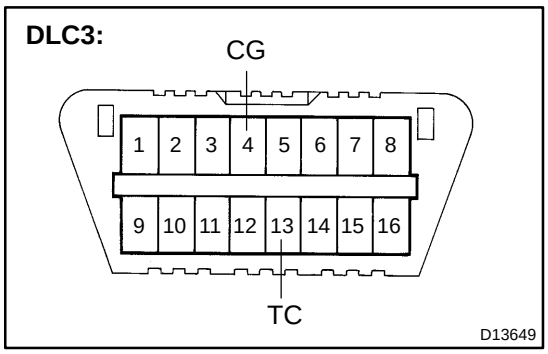
DIDIP–01

BASIC INSPECTION

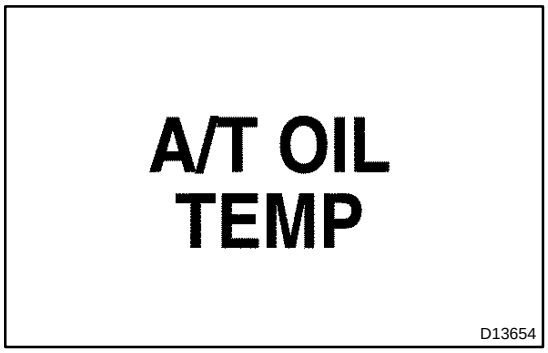


1. CHECK FLUID LEVEL

(a) Using SST, create a short–circuit between terminals TC and CG of the DLC3.
SST 09843–18040

(b) Start the engine and run at idle.
- ▶ The A/C switch must be turned off.
- ▶ On models with active height control suspension & adaptive variable suspension, turn the height control switch off.

(c) Slowly move the shift lever through all positions from P to L, and move it back to the P position.



(d) Switch to the fluid temperature detection mode.
Move the shift lever from the N to the D position, or from D to N, within 1.5 seconds. (Repeat this operation for 6 seconds or more.)
OK: The A/T OIL TEMP warning light comes on for 2 seconds and then goes off.

(e) Return the shift lever to the P position and disconnect terminals TC and CG.

(f) Idle the engine to raise oil temperature.

(g) Lift up the vehicle immediately after the meter indicator light (ATF temperature warning light) comes on.
- ▶ The A/T OIL TEMP warning light indicates the ATF temperature according to the following table.

ATF Temp.	Less than optimized temperature	Optimized temperature	More than optimized temperature
A/T OIL TEMP warning light	OFF	ON	Blinking

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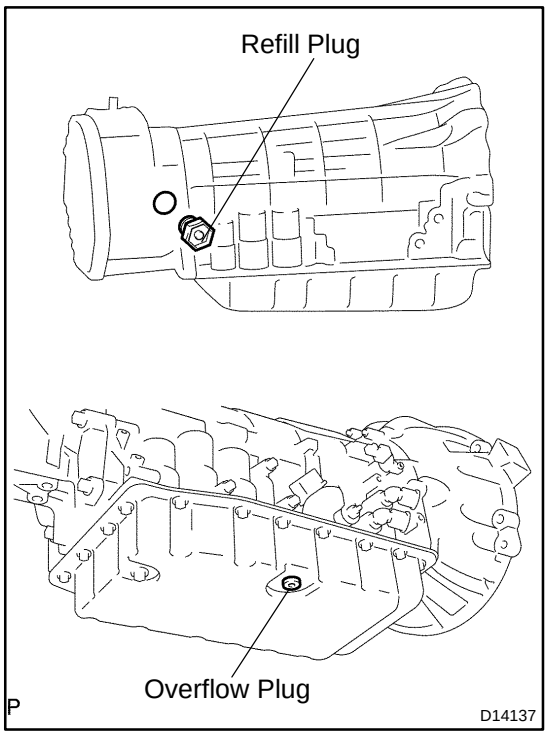


(h) Remove the overflow plug and check the fluid level.
Standard:

When ATF overflows	ATF level is higher than specification (Go to step (k))
When ATF does not overflow	ATF level is equal to or lower than specification (Go to step (i))

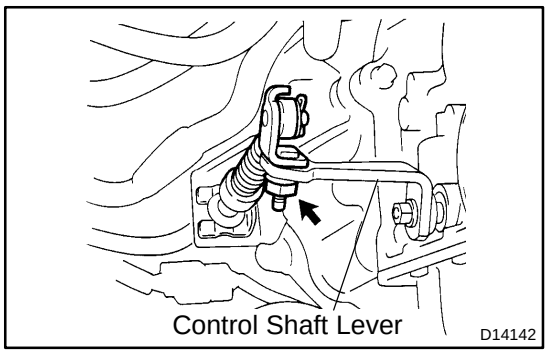
HINT:

- ”Overflow” indicates the condition under which ATF drains out from the overflow tube.
- The capacity of the overflow tube is approximately 3 cc. If the amount of drained ATF is little, only the fluid remaining in the tube has drained out. This condition is not considered as ”overflow”.

(i) Remove the refill plug.
(j) Add ATF through the refill hole until it flows out from the overflow hole.
Fluid type: Toyota genuine ATF WS
(k) When the draining ATF has become a trickle, install the overflow plug with a new gasket.
(l) Install the refill plug if removed.
(m) Lower the vehicle.
(n) Turn the ignition switch off to stop the engine.

2. CHECK FLUID CONDITION

If the fluid smells burnt or is black, replace it (see step 6).



3. INSPECT AND ADJUST SHIFT LEVER POSITION

(a) When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator comes on in accordance with the shift lever position.

If the indicator and shift lever position do not match, carry out the following adjustment procedures.

(1) Remove the nut and disconnect the shift control cable from the control shaft lever.
(2) Move the control shaft fully rearward.
(3) Return the control shaft lever 2 notches to the N position.
(4) Set the shift lever to the N position.
(5) Connect the shift control cable and temporarily install the control shaft lever nut.
(6) While holding the shift lever lightly toward the R position side, tighten the control shaft lever nut.
Torque: 14.5 N·m (148 kgf·cm, 11 ft·lbf)

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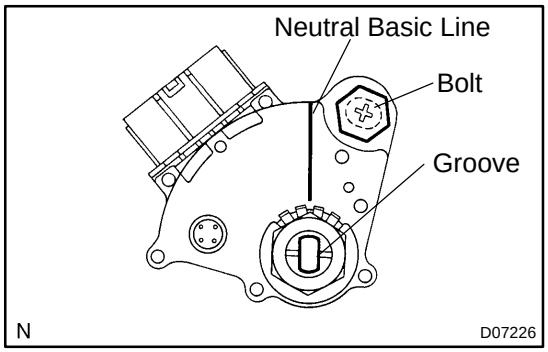
(7) Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to the D position and reverses when shifting it to the R position.



4. INSPECT AND ADJUST PARK/NEUTRAL POSITION

(a) Check that the engine can be started when the shift lever is in the N or P position, but cannot be started in other positions.

If operation cannot be done as stated above, carry out the following adjustment procedures.

- Loosen the park/neutral position switch bolt and set the shift lever to the N position.
- Align the groove with the neutral basic line.
- Hold in position and tighten the bolt.

Torque:13 N·m (130 kgf·cm, 9 ft·lbf)

(b) For continuity inspection of the park/neutral position switch, see page DI–576.

5. CHECK IDLE SPEED

Idle speed (In N position and air conditioner OFF): 700 ± 50 rpm

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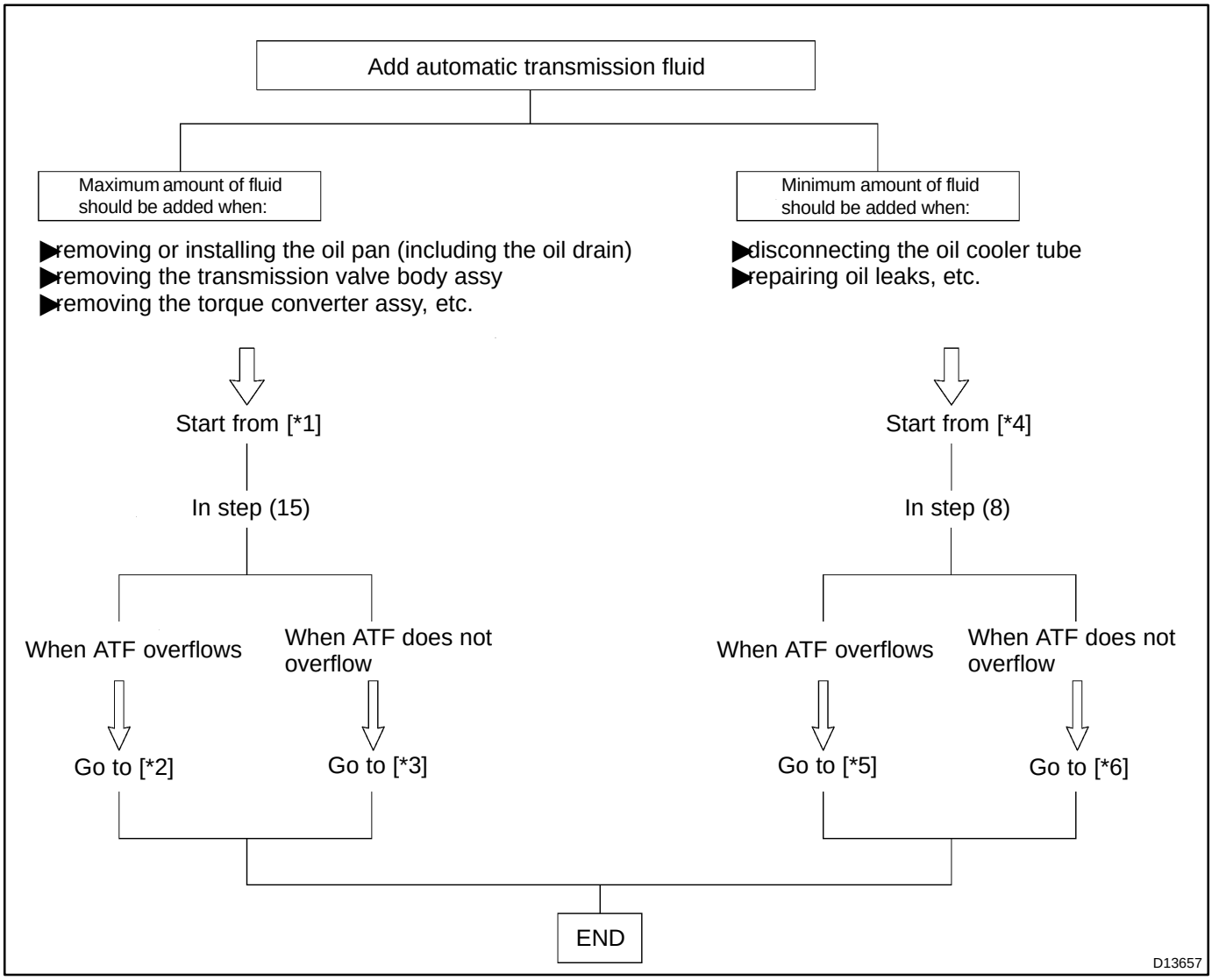
6. ADD AUTOMATIC TRANSMISSION FLUID



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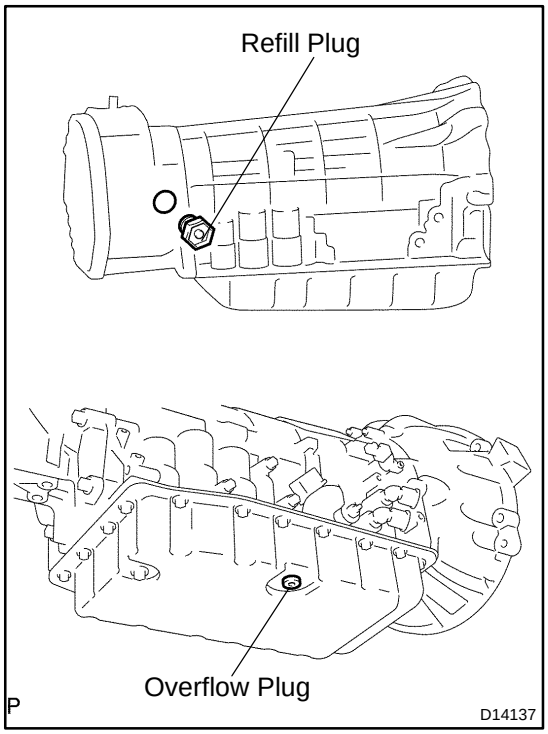
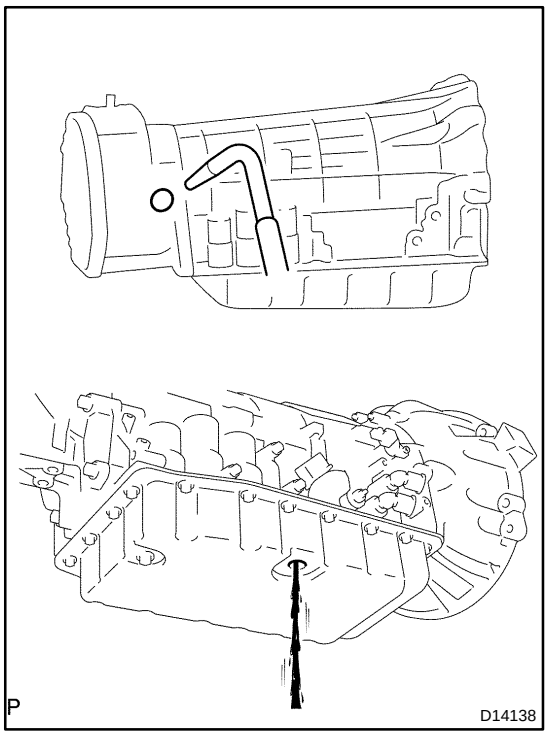
(a) When adding maximum amount of fluid: [*1]
(1) Lift up the vehicle while keeping it level.



(2) Remove the refill plug and overflow plug.



(3) Add ATF through the refill hole until it drains out from the overflow hole.

NOTICE:
Be sure to add Toyota genuine ATF WS.

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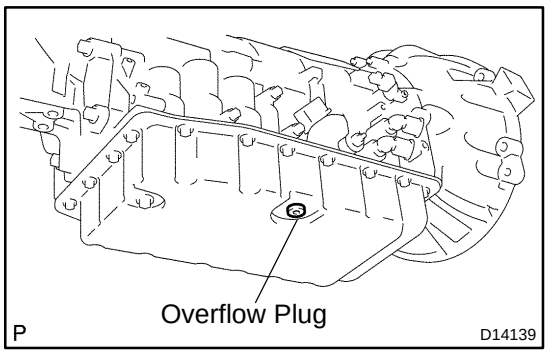
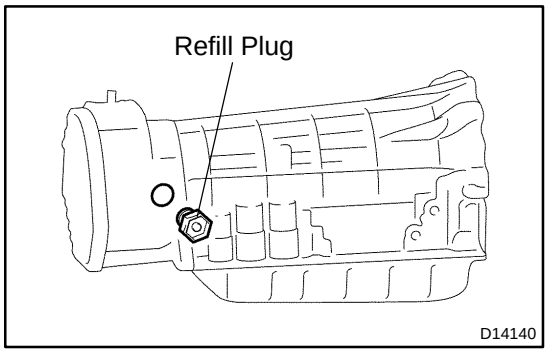


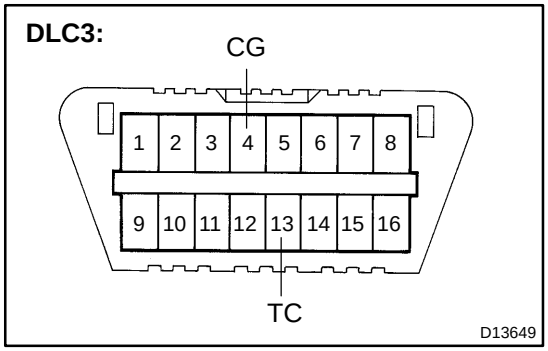
(4) Temporarily install the gasket and overflow plug.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)
(5) Add the proper amount of ATF through the refill hole.

NOTICE:
Refill amount differs depending on the related procedures indicated below.

Related procedures	Refill amount
Removal and installation of oil pan	1.7 liters (1.8 us qts, 1.5 lmp.qts)
Removal of transmission valve body assy	4.3 liters (4.5 us qts, 3.8 lmp.qts)
Removal of torque converter assy	5.4 liters (5.7 us qts, 4.8 lmp.qts)



(6) Temporarily install the O–ring and refill plug.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
(7) Lower down the vehicle.



(8) Using SST, create a short–circuit between terminals TC and CG of the DLC3.
SST 09843–18040
(9) Start the engine and run at idle.

NOTICE:
- **The A/C switch must be turned off.**
- **On models with active height control suspension & adaptive variable suspension, turn the height control switch off.**

(10) Slowly move the shift lever from the P to the 2–L position.
Return the shift lever to the P position.

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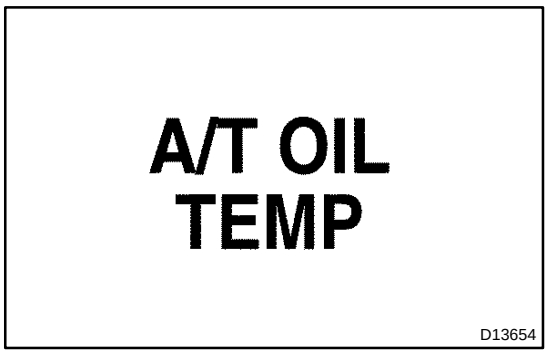
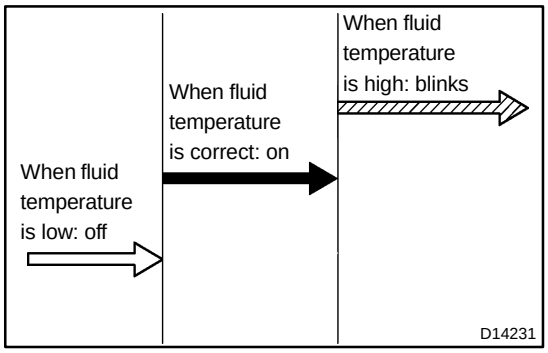


(11) Switch to the fluid temperature detection mode. Move the shift lever from the N to the D position, or from D to N, within 1.5 seconds. (Repeat this operation for 6 seconds or more.)

OK: The A/T OIL TEMP warning light comes on for 2 seconds and then goes off.

(12) Disconnect terminals TC and CG after confirming the above condition.

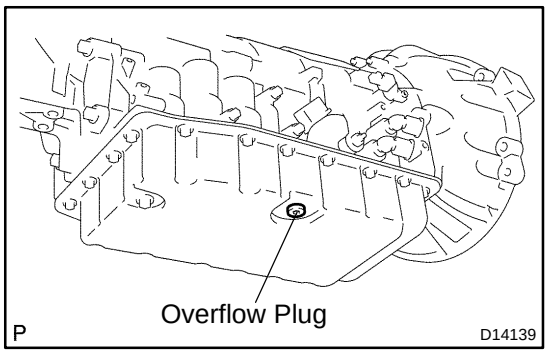
(13) Idle the engine to raise the fluid temperature.



(14) Lift up the vehicle immediately after the meter indicator light (ATF temperature warning light) comes on.

NOTICE:

- **Add fluid only when the meter indicator light is on.**
- **Perform this procedure while the engine is idling.**



(15) Remove the overflow plug. If ATF overflows, proceed to [*2].
If ATF does not overflow, proceed to [*3].

HINT:

”Overflow” indicates the condition under which ATF drains out from the overflow tube.

NOTICE:

Capacity of the overflow tube is approximately 3 cc.

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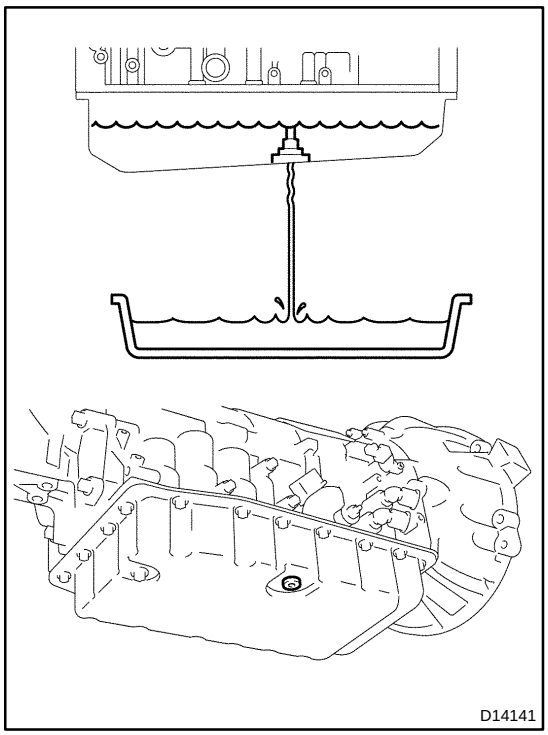
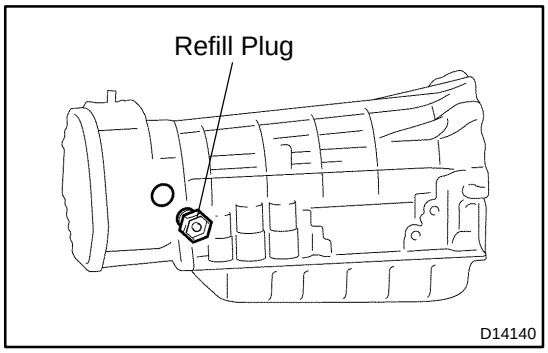
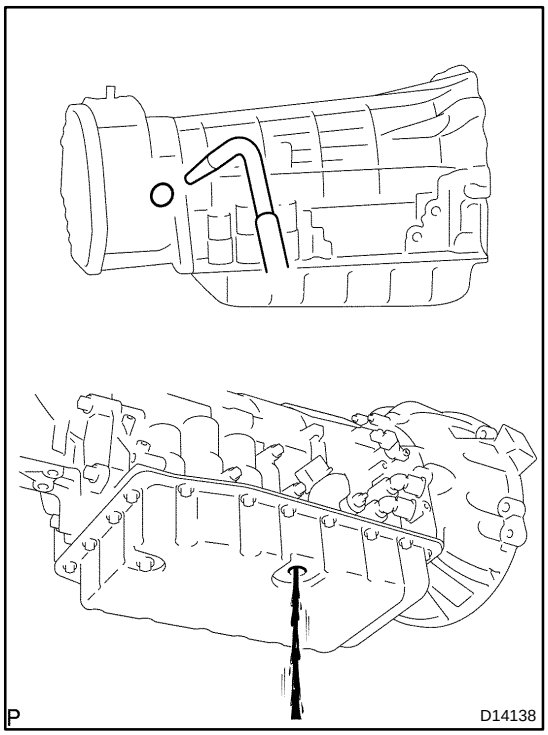


(b) When fluid overflows: [*2]
(1) Install the overflow plug with a new gasket when the draining ATF has become a trickle.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)
(2) Install the refill plug with a new O–ring.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
(3) Lower down the vehicle.
(4) Turn the ignition switch off and remove the SST.
(5) Check for fluid leaks in the transmission.

If there are leaks, it is necessary to repair or replace O–rings, FIPGs, oil seals, plugs or other related parts.



(c) When fluid does not overflow: [*3]
(1) Remove the refill plug.



(2) Add ATF through the refill hole until it drains out from the overflow hole.

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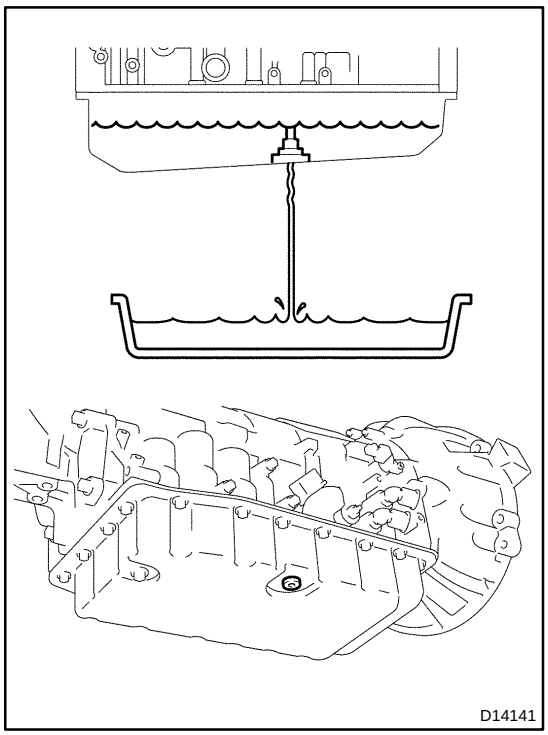


(3) Install the overflow plug with a new gasket when the draining ATF has becomes a trickle.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(4) Install the refill plug with a new O–ring.

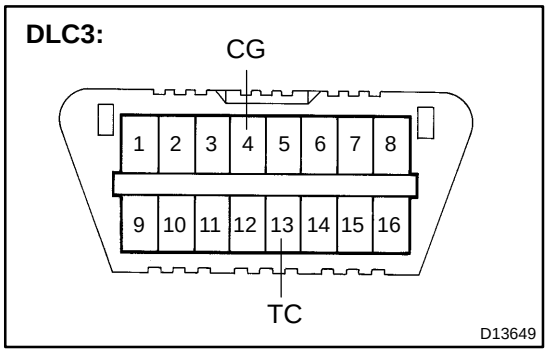
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(5) Lower down the vehicle.

(6) Turn the ignition switch off.

(7) Check for fluid leaks in the transmission.

If there are leaks, it is necessary to repair or replace O–rings, FIPGs, oil seals, plugs or other related parts.



(d) When adding a minimum amount of fluid: [*4]

(1) Using SST, create a short–circuit between terminals TC and CG of the DLC3.

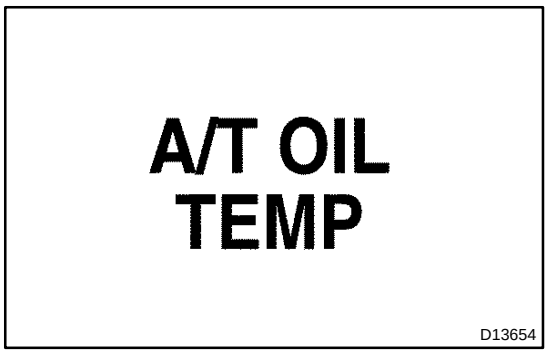
SST 09843–18040

(2) Start the engine and run at idle.

NOTICE:

The A/C switch must be turned off.

(3) Slowly move the shift lever from the P to the 2–L position. Return the shift lever to the P position.



(4) Switch to the fluid temperature detection mode. Move the shift lever from the N to the D position, or from D to N, within 1.5 seconds. (Repeat this operation for 6 seconds or more.)

OK: The A/T OIL TEMP warning light comes on for 2 seconds and then goes off.

(5) Disconnect terminals TC and CG after confirming the above condition.

(6) Idle the engine to raise the fluid temperature.

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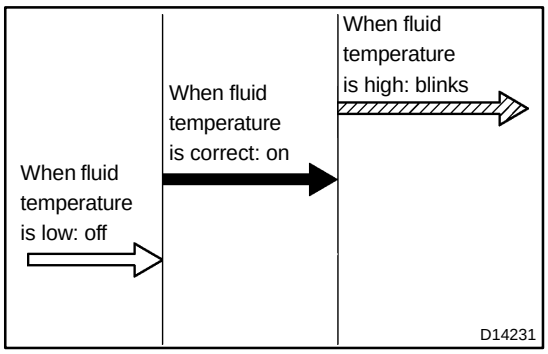
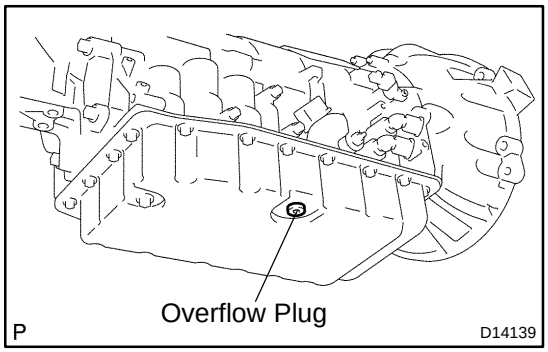


(7) Lift up the vehicle immediately after the meter indicator light (ATF temperature warning light) comes on.

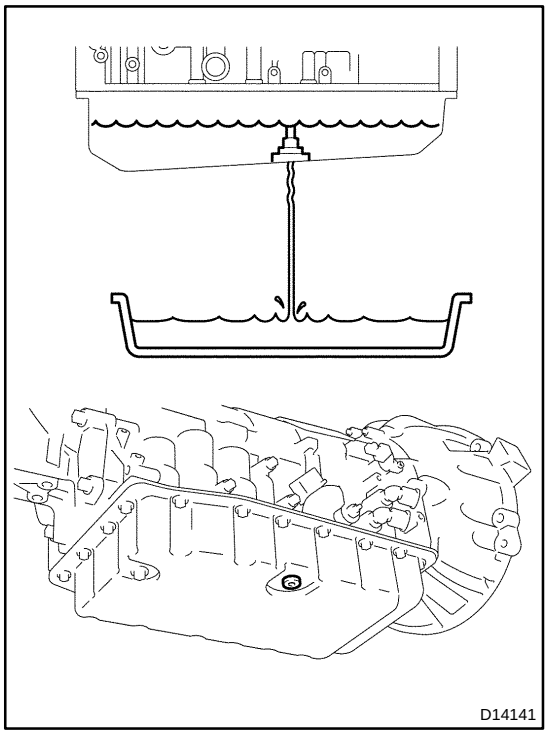
NOTICE:

- **Add fluid only when the meter indicator light is on.**
- **Perform this procedure while the engine is idling.**



(8) Remove the overflow plug. If ATF overflows, proceed to [*5]. If ATF does not overflow, proceed to [*6].

HINT:
”Overflow” indicates the condition under which ATF drains out from the overflow tube.



(e) When fluid overflows: [*5]

(1) Install the overflow plug with a new gasket when the draining ATF has become a trickle.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

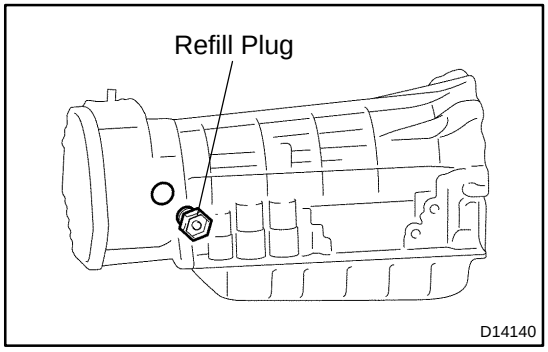
(2) Install the refill plug with a new O–ring.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(3) Lower down the vehicle.

(4) Turn the ignition switch off.

(5) Check for fluid leaks in the transmission.

If there are leaks, it is necessary to repair or replace O–rings, FIPGs, oil seals, plugs or other related parts.



(f) When fluid does not overflow: [*6]

(1) Remove the refill plug.

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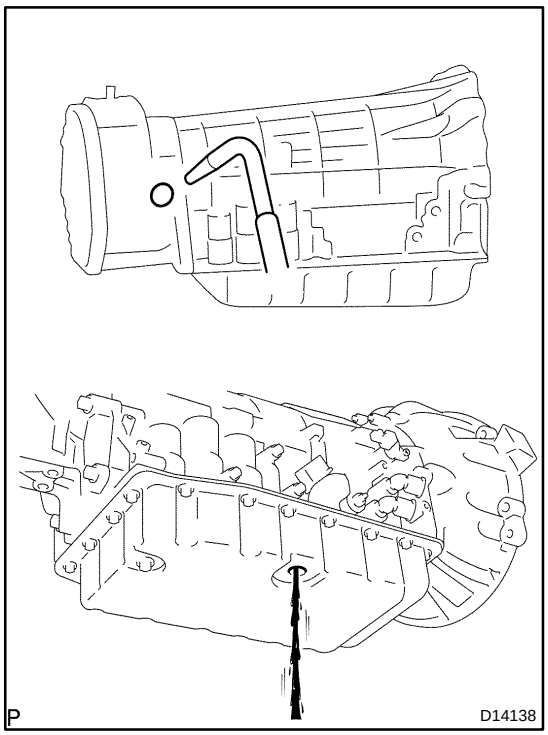
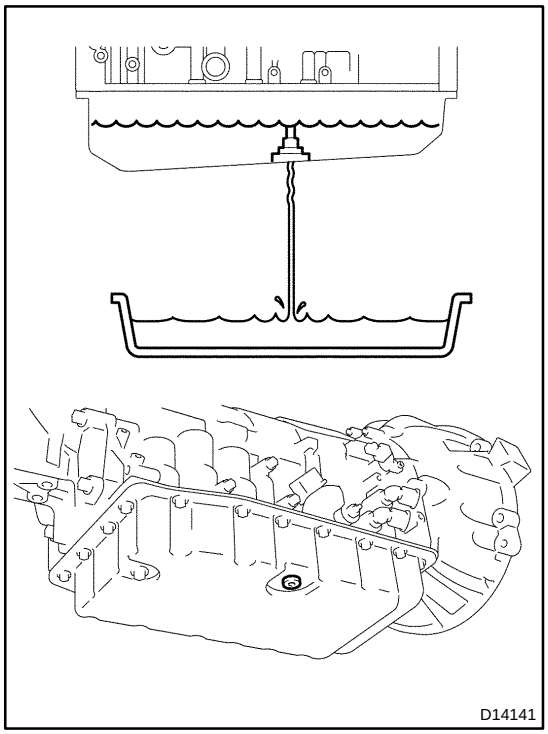


(2) Add ATF through the refill hole until it drains out from the overflow hole.



(3) Install the overflow plug with a new gasket when the draining ATF has become a trickle.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(4) Install the refill plug with a new O–ring.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(5) Lower down the vehicle.

(6) Turn the ignition switch off.

(7) Check for fluid leaks in the transmission.

If there are leaks, it is necessary to repair or replace O–rings, FIPGs, oil seals, plugs or other related parts.

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DIDIQ–01

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transaxle does not shift up, shift down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

2. ROAD TEST

NOTICE:

Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80˚C (122 to 176˚F).

(a) D position test:

Shift into the D position and fully depress the accelerator pedal and check the following points. Check up–shift operation.

(1) Check up–shift operation.

Check that 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up–shifts take place, and that the shift points conform to the automatic shift schedule (See page SS–24).

HINT:

5th Gear Up–shift Prohibition Control

▶ Engine coolant temperature is 55 ˚C (131 ˚F) or less and vehicle speed is at 51 km/h (32 mph) or less.

4th Gear Up–shift Prohibition Control

▶ Engine coolant temperature is 40 ˚C (104 ˚F) or less and vehicle speed is at 45 km/h (28 mph) or less.

5th Gear Lock–up Prohibition Control

▶ Brake pedal is depressed.

▶ Accelerator pedal is released.

▶ Engine coolant temperature is 60 ˚C (140 ˚F) or less.

(2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up–shifts.

(3) Check for abnormal noise and vibration.

Check for abnormal noise and vibration when up–shifting from 1 → 2, 2 → 3, 3 → 4 and 4 → 5 while driving with the shift lever in the D position, and check while driving in the lock–up condition.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick–down operation.

Check vehicle speeds when the 2nd to 1st, 3rd to 2nd, 4th to 3rd, and 5th to 4th kick–downs take place while driving with the shift lever in the D position. Confirm that each speed is within the applicable vehicle speed range indicated in the automatic shift schedule (See page SS–24).

(5) Check abnormal shock and slip at kick–down.

(6) Check the lock–up mechanism.

▶ Drive in the D position (5th gear), at a steady speed (lock–up ON).

▶ Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

If there is a big jump in engine speed, there is no lock–up.

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(b) 4 (O/D OFF) position test:
Shift into the 4 (O/D OFF) position and fully depress the accelerator pedal and check the following points.
(1) Check up–shift operation.
Check that the 1 → 2, 2 → 3 and 3 → 4 up–shifts take place and that the shift point conforms to the automatic shift schedule (See page SS–24).

HINT:
- There is no 5th up–shift in the 4 position.
- 4th Gear Lock–up Prohibition Control
  - Brake pedal is depressed.
  - Accelerator pedal is released.
  - Engine coolant temperature is 60 °C (140 °F) or less.

(2) Check engine braking.
While driving in the 4 position and 4th gear, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration, and for shock at up–shift and down–shift.
(4) Check the lock–up mechanism.
- Drive in 4 position 4th gear, at a steady speed (lock–up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:
If there is a big jump in engine speed, there is no lock–up.

(c) 3 position test:
Shift into the 3 position and fully depress the accelerator pedal and check the following points.
(1) Check up–shift operation.
Check that the 1 → 2 and 2 → 3 up–shifts takes place and that the shift point conforms to the automatic shift schedule (See page SS–24).

HINT:
- There is no 4th up–shift and lock–up in the 3 position.
- When the 2nd start switch is ON, there is no 1 → 2 up–shift and 2 → 1 down–shift.

(2) Check engine braking.
While running in the 3 position and 3rd gear, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration, and for shock at up–shift and down–shift.

(d) 2 position test:
Shift into the 2 position and fully depress the accelerator pedal and check the following points.
(1) Check up–shift operation.
Check that the 1 → 2 up–shift takes place and that the shift point conforms to the automatic shift schedule (See page SS–24).

HINT:
- There is no 3rd up–shift and lock–up in the 2 position.
- When the 2nd start switch is ON, there is no 1 → 2 up–shift and 2 → 1 down–shift.

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(2) Check engine braking.
While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up–shift and down–shift.

(e) L position test:
Shift into the L position and fully depress the accelerator pedal and check the following points.

(1) Check no up–shift.
While running in the L position, check that there is no up–shift to 2nd gear.

(2) Check engine braking.
While running in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration.

(f) R position test:
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.

CAUTION:
Before conducting this test, ensure that the test area is free from people and obstruction.

(g) P position test:
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

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DIDIR–01

MECHANICAL SYSTEM TESTS

1. PERFORM MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D positions.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, do this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock all 4 wheels.
(2) Connect a hand–held tester to DLC3.
(3) Fully apply the parking brake.
(4) Using your left foot, keep the brake pedal firmly depressed.
(5) Start the engine.
(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot.
(7) Quickly read the stall speed at this time.

Stall speed: 2,200 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D position	▶Engine power output may be insufficient ▶Stator one–way clutch is not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	▶Line pressure is too low ▶Clutch No.1 (C_1) slipping ▶One–way clutch No.3 (F_3) is not operating properly ▶Improper fluid level

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(b) Measure the time lag.

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the direct clutch, forward clutch, and 1st and reverse brake.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).**
- **Be sure to allow for a 1 minute interval between tests.**
- **Perform the test three times, and measure the time lags. Calculate the average value of the three time lags.**

(1) Connect a hand–held tester to DLC3.

(2) Fully apply the parking brake.

(3) Start and warm up the engine and check idle speed.

Idle speed: approx. 700 rpm (In N position and A/C OFF)

(4) Shift the lever from the N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag:

N → D Less than 1.2 seconds

(5) In the same manner, measure the time lag for N → R.

Time lag:

N → R Less than 1.5 seconds

Evaluation (If N → D time or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer than specified	▶Line pressure is too low ▶Clutch No.1 (C_1) worn ▶One–way clutch No.3 (F_3) is not operating properly
N → R time lag is longer than specified	▶Line pressure is too low ▶Clutch No.3 (C_3) worn ▶Brake No.4 (B_4) worn ▶One–way clutch No.1 (F_1) is not operating properly

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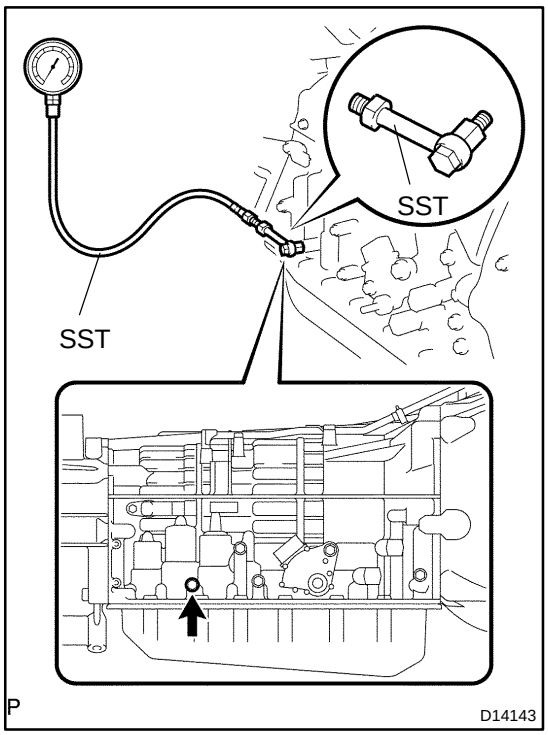

HYDRAULIC TEST

1. PERFORM HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **This check must be conducted after checking and adjusting engine.**
- **Perform under condition that A/C is OFF.**
- **When conducting stall test, do not continue more than 10 seconds.**

(1) Warm up the ATF (Automatic Transmission Fluid).
(2) Lift the vehicle up.
(3) Remove the test plug on the transmission case center right side and connect SST.

SST 09992–00095 (09992–00231, 09992–00271)

(4) Fully apply the parking brake and chock the 4 wheels.
(5) Start the engine and check idling speed.
(6) Keep your left foot pressing firmly on the brake pedal and shift into D position.
(7) Measure the line pressure when the engine is idling.
(8) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.
(9) In the same manner, do the test in R position.

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Specified line pressure:

Condition	D position kPa (kgf / cm^2, psi)	R position kPa (kgf / cm^2, psi)
Idling	361 to 421 kPa (3.7 to 4.3 kgf/cm^2, 52 to 61 psi)	495 to 576 kPa (5.0 to 5.9 kgf/cm^2, 72 to 84 psi)
Stall test	1,236 to 1,332 kPa (12.6 to 13.6 kgf/cm^2, 179 to 193 psi)	1,229 to 1,349 kPa (12.5 to 13.8 kgf/cm^2, 178 to 196 psi)

Evaluation

Problem	Possible cause
Measured values are higher than specified in all positions	▶Shift solenoid valve (SLT) defective ▶Regulator valve defective
Measured values are lower than specified in all positions	▶Shift solenoid valve (SLT) defective ▶Regulator valve defective ▶Oil pump defective
Pressure is low in the D position only	▶D position circuit fluid leak ▶Clutch No.1 (C_1) defective
Pressure is low in the R position only	▶R position circuit fluid leak ▶Clutch No.3 (C_3) defective ▶Brake No.4 (B_4) defective

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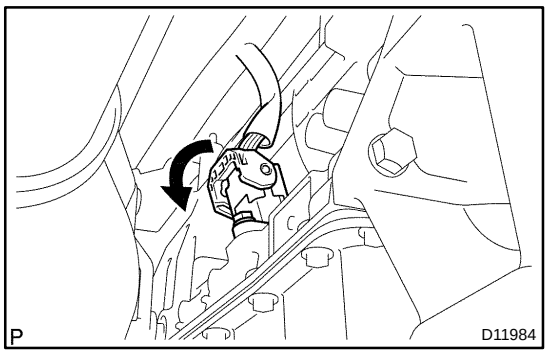

MANUAL SHIFTING TEST

1. MANUAL SHIFTING TEST

HINT:

- With this test, it can be determined whether the trouble occurs in the electrical circuit or is a mechanical problem in the transmission.
- If any abnormalities are found in the following test, the problem is in the transmission itself.

(a) Disconnect the connector of the transmission wire.

(b) Drive with the transmission wire disconnected.
Shifting the shift lever to the L, 2, 3, 4 and D position to check whether the shifting condition changes the table below.

Shift Position	Shifting Condition
L ⇔ 2	No Shift (Not Change)
2 ⇔ 3	Down Shift ⇔ Up Shift
3 ⇔ 4	Down Shift ⇔ Up Shift
4 ⇔ D	No Shift (Not Change)

HINT:

When driving with the transmission wire disconnected, the gear position will be as follows:

- When the shift lever is in the L or the 2 position, the gear is held in the 1st position.
- When the shift lever is in the 3rd position, the gear is held in the 3rd position.
- When the shift lever is in the 4 or the D position, the gear is held in the 4th position.
- When the shift lever is in the R or the P position, the gear is also in the R or the P position respectively.

(c) Connect the connector of the transmission wire.

(d) Clear the DTC (See page DI–565).

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DIDIU–01

INITIALIZATION

1. RESET MEMORY

NOTICE:

- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assy or ECM.**
- **The RESET MEMORY can be performed only with the Hand–held tester.**

HINT:

The ECM memorizes the condition that the ECT controls the automatic transmission assy and engine assy according to those characteristics. Therefore, when the automatic transmission assy, engine assy, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information. Reset procedure is as follows.

(a) Turn the ignition switch off.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn the hand–held tester main switch on.
(e) Select the item ”DIAGNOSIS/ENHANCED OBD II”.
(f) Perform the reset memory procedure from the ENGINE menu.

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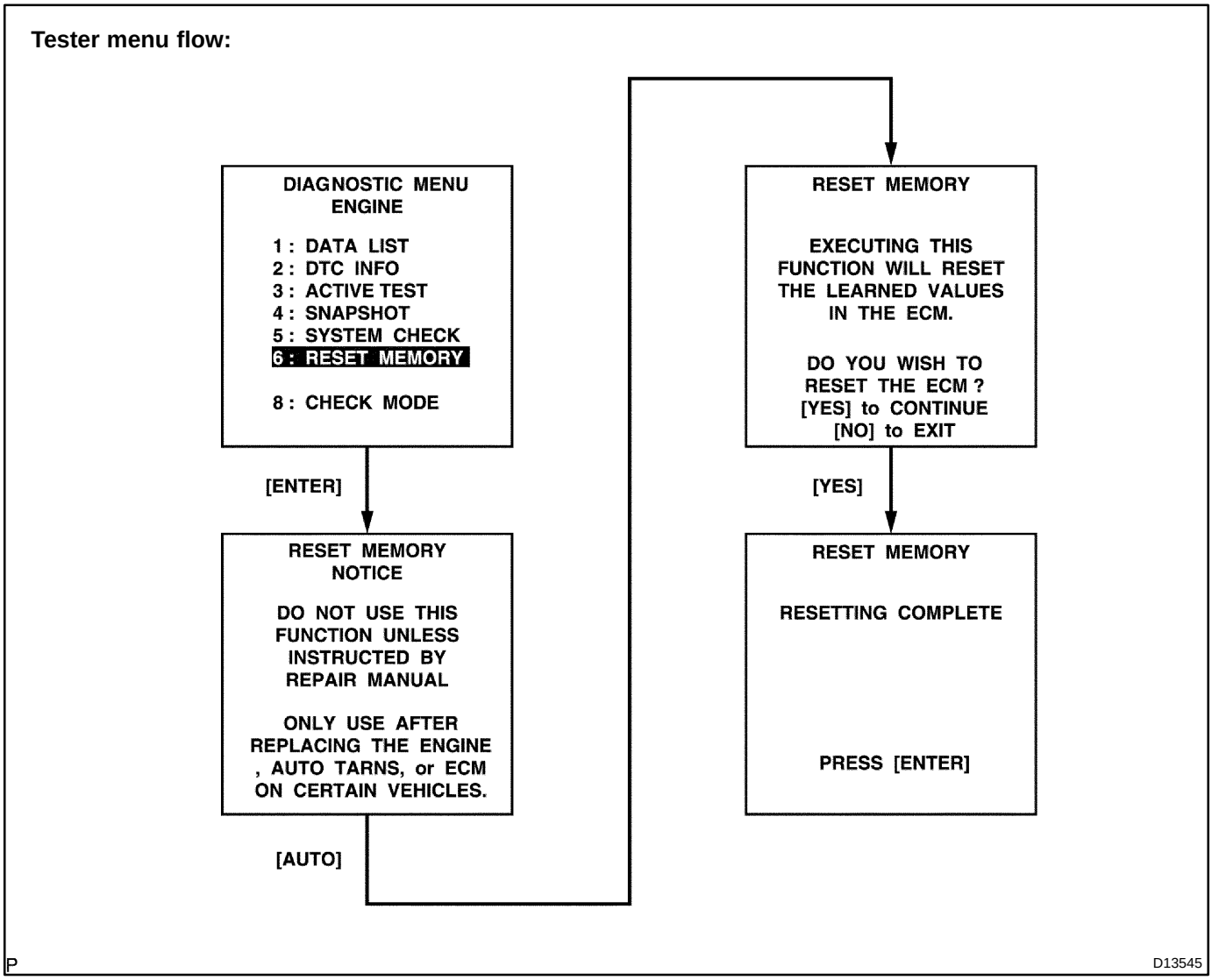
NOTICE:

After performing the RESET MEMORY, be sure to perform the ROAD TEST (See page DI–535) described earlier.

HINT:

The ECM learns through use of the ROAD TEST.

Tester menu flow:



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DIDIV–01

LIST OF DISABLE A MONITOR

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																										
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
	P0010,P0020	P0010,P0020	VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0010,P0020	P0010,P0020	VVT VSV1,2																				X					X	
P0011	P0011	VVT System1 - Advance				X		X														X					X	
P0012	P0012	VVT System1 - Retard				X		X														X					X	
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance			X	X																X					X	
P0022	P0022	VVT System2 - Retard			X	X																X					X	
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X	
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X	
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X		
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																								X		
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X	
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																										
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X		
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X		
P0325,P0330	P0325-P0333	Knock sensor																										X
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X						
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X					X	
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X
P0401	P0401	EGR system (closed)																				X					X	
P0402	P0402	EGR system (open)																				X	X	X	X	X	X	
P0405,P0409	P0405-P0409	Lift sensor																										
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X		
P0450,P0451	P0450-P0453	EVAP press sensor																										

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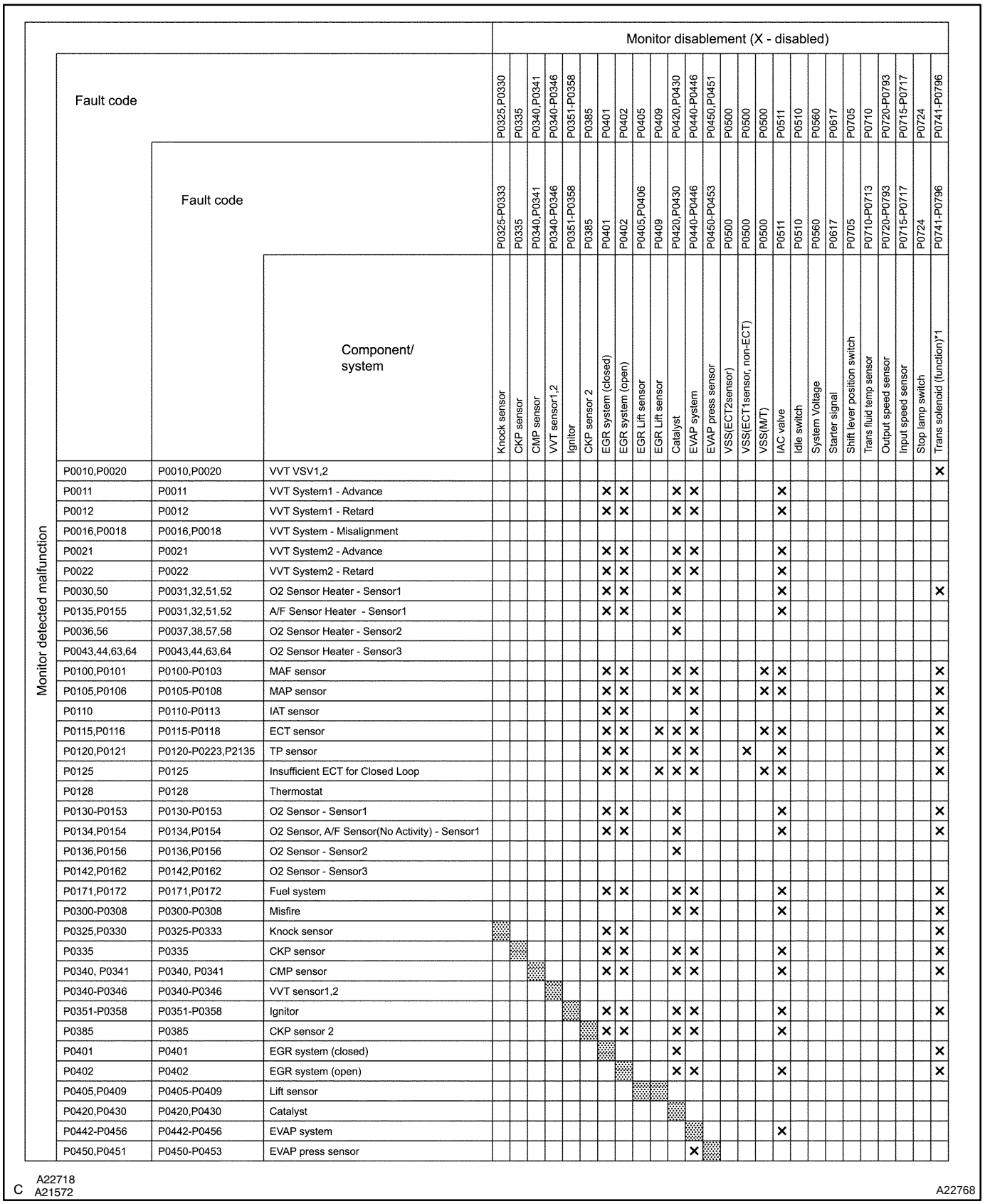
Monitor detected malfunction

| Fault code | Fault code | Component/ system | Monitor disablement (X - disabled) | | |



Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
			P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
			Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
P0010,P0020	P0010,P0020	VVT VSV1,2																										X
P0011	P0011	VVT System1 - Advance							X	X			X	X					X									
P0012	P0012	VVT System1 - Retard							X	X			X	X					X									
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance							X	X			X	X					X									
P0022	P0022	VVT System2 - Retard							X	X			X	X					X									
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1							X	X			X						X									X
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1							X	X			X						X									
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2											X															
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																										
P0100,P0101	P0100-P0103	MAF sensor							X	X			X	X				X	X									X
P0105,P0106	P0105-P0108	MAP sensor							X	X			X	X				X	X									X
P0110	P0110-P0113	IAT sensor							X	X				X														X
P0115,P0116	P0115-P0118	ECT sensor							X	X		X	X	X				X	X									X
P0120,P0121	P0120-P0223,P2135	TP sensor							X	X			X	X			X		X									X
P0125	P0125	Insufficient ECT for Closed Loop							X	X		X	X	X				X	X									X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1							X	X			X						X									X
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1							X	X			X						X									X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2											X															
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system							X	X			X	X					X									X
P0300-P0308	P0300-P0308	Misfire											X	X					X									X
P0325,P0330	P0325-P0333	Knock sensor							X	X									X									X
P0335	P0335	CKP sensor							X	X			X	X					X									X
P0340, P0341	P0340, P0341	CMP sensor							X	X			X	X					X									X
P0340-P0346	P0340-P0346	VVT sensor1,2																										
P0351-P0358	P0351-P0358	Ignitor							X	X			X	X					X									X
P0385	P0385	CKP sensor 2							X	X			X	X					X									
P0401	P0401	EGR system (closed)											X															X
P0402	P0402	EGR system (open)											X	X					X									X
P0405,P0409	P0405-P0409	Lift sensor																										
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																	X									
P0450,P0451	P0450-P0453	EVAP press sensor												X														

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																														
			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
			P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
			Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
P0500	P0500	VSS							X	X			X	X					X						X	X		X
P0511	P0511	IAC valve																										
P0510	P0510	Idle switch								X			X	X					X									X
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										X
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																							X	X		X
P0850	P0850	PNP switch																	X									X
P1010,P1020	P1010,P1020	VVTL																										
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							X	X			X	X					X									
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor												X	X													
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)							X	X			X						X									X
P2226	P2226	BARO sensor																										X
P2237,P2240	P2237,P2240	A/F sensor (open)							X	X			X						X									X
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open							X	X			X															
P2441	P2441	AIR control valve stuck close							X	X			X															
P2444	P2444	AIP stuck On							X	X			X															
P2445	P2445	AIP stuck Off							X	X			X															
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										X
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							X	X			X						X									X

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Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																											
				P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			Trans solenoid (function)*2																												
			Trans solenoid (range)																												
			PNP switch																												
			VVTL																												
			VVTL system1(,2)																												
			Electronic magnet clutch																												
			Electronic throttle system																												
			HC adsorber ACT press sensor																												
			Intake Manifold Runner Control																												
			Intake Manifold Runner Control Circuit																												
			Intake Manifold Runner Position Sensor																												
			Throttle motor																												
			Accel position sensor																												
			A/F Sensor(Rationality) - Sensor1																												
			BARO sensor																												
			A/F Sensor(Open) - Sensor1																												
			HC Adsorption Catalyst																												
			AIR Pressure Sensor(Low/High)																												
			AIR Pressure Sensor(Rationality)																												
			AIR control valve stuck open																												
			AIR control valve stuck close																												
			AIP stuck On																												
			AIP stuck Off																												
			Trans solenoid(SLU-SLD)																												
			A/F Sensor (Slow response) - Sensor1																												
	P0010,P0020	P0010,P0020	VVT VSV1,2																				X	X	X	X					
	P0011	P0011	VVT System1 - Advance																				X	X	X	X					
	P0012	P0012	VVT System1 - Retard																				X	X	X	X					
	P0016,P0018	P0016,P0018	VVT System - Misalignment																				X	X	X	X					
	P0021	P0021	VVT System2 - Advance																				X	X	X	X					
	P0022	P0022	VVT System2 - Retard																				X	X	X	X					
	P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	X			X	X	X	X					
	P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														X		X	X			X	X	X	X		X			
	P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														X			X											
	P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	X											
	P0100,P0101	P0100-P0103	MAF sensor				X	X									X		X	X			X	X	X	X		X			
	P0105,P0106	P0105-P0108	MAP sensor				X	X									X		X	X			X	X	X	X		X			
	P0110	P0110-P0113	IAT sensor									X					X		X				X	X	X	X		X			
	P0115,P0116	P0115-P0118	ECT sensor	X			X	X				X					X		X	X			X	X	X	X		X			
	P0120,P0121	P0120-P0223,P2135	TP sensor														X		X	X			X	X	X	X		X			
	P0125	P0125	Insufficient ECT for Closed Loop	X			X										X		X	X			X	X	X	X		X			
	P0128	P0128	Thermostat																												
	P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	X			X	X	X	X					
	P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														X		X	X			X	X	X	X		X			
	P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														X			X											
	P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	X											
	P0171,P0172	P0171,P0172	Fuel system														X		X	X			X	X	X	X		X			
	P0300-P0308	P0300-P0308	Misfire														X		X	X			X	X	X	X		X			
	P0325,P0330	P0325-P0333	Knock sensor																				X	X	X	X					
	P0335	P0335	CKP sensor				X	X									X		X	X			X	X	X	X		X			
	P0340, P0341	P0340, P0341	CMP sensor				X	X									X		X	X			X	X	X	X		X			
	P0340-P0346	P0340-P0346	VVT sensor1,2																				X	X	X	X					
	P0351-P0358	P0351-P0358	Ignitor																	X			X	X	X	X					
	P0385	P0385	CKP sensor 2				X	X									X		X	X			X	X	X	X		X			
	P0401	P0401	EGR system (closed)																	X											
	P0402	P0402	EGR system (open)														X		X	X			X	X	X	X		X			
	P0405,P0409	P0405-P0409	Lift sensor																												
	P0420,P0430	P0420,P0430	Catalyst																												
	P0442-P0456	P0442-P0456	EVAP system														X		X				X	X	X	X		X			
	P0450,P0451	P0450-P0453	EVAP press sensor																				X	X	X	X					

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																										
			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
	P0741-P0796	Trans solenoid (function)*2																											
	P0748-P0999	Trans solenoid (range)																											
	P0850	PNP switch																											
	P1010,P1020	VVTL																											
	P1011,12(,21,22)	VVTL system1(,2)																											
	P1126	Electronic magnet clutch																											
	P1129	Electronic throttle system																											
	P1430	HC adsorber ACT press sensor																											
	P2004,P2006	Intake Manifold Runner Control																											
	P2009,P2010	Intake Manifold Runner Control Circuit																											
	P2014,16,17	Intake Manifold Runner Position Sensor																											
	P2102,P2103	Throttle motor																											
	P2120-P2138	Accel position sensor																											
	P2196,P2198	A/F Sensor(Rationality) - Sensor1																											
	P2226	BARO sensor																											
	P2237,P2240	A/F Sensor(Open) - Sensor1																											
	P2423,24	HC Adsorption Catalyst																											
	P2430,2,3	AIR Pressure Sensor(Low/High)																											
	P2431	AIR Pressure Sensor(Rationality)																											
	P2440	AIR control valve stuck open																											
	P2441	AIR control valve stuck close																											
	P2444	AIP stuck On																											
	P2445	AIP stuck Off																											
	P2714-P2759	Trans solenoid(SLU-SLD)																											
	P2A00,P2A03	A/F Sensor (Slow response) - Sensor1																											
P0500	P0500	VSS	×													×		×	×			×	×	×	×		×
P0511	P0511	IAC valve														×		×										×
P0510	P0510	Idle switch														×		×	×									×
P0560	P0560	System Voltage																											
P0617	P0617	Starter signal																											
P0705	P0705	Shift lever position switch																											
P0710	P0710-P0713	Trans fluid temp sensor																											
P0720-P0793	P0720-P0793	Output speed sensor																											
P0715-P0717	P0715-P0717	Input speed sensor																											
P0724	P0724	Stop lamp switch																											
P0741-P0796	P0741-P0796	Trans solenoid (function)																											
P0748-P0798	P0748-P0799	Trans solenoid (range)	×																										
P0850	P0850	PNP switch																											
P1010,P1020	P1010,P1020	VVTL																				×	×	×	×		
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				×	×	×	×		×
P1126	P1126	Electronic magnet clutch																											
P1129	P1129	Electronic throttle system																											
P1430	P1430	HC adsorber ACT press sensor																											
P2004,6	P2004,6	Intake Manifold Runner Control																											
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																											
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																											
P2102,P2103	P2102,P2103	Throttle motor																											
P2120-P2138	P2120-P2138	Accel position sensor																											
P2196,P2198	P2196,P2198	A/F sensor (rationality)																	×			×	×	×	×		×
P2226	P2226	BARO sensor														×		×				×	×	×	×		×
P2237,P2240	P2237,P2240	A/F sensor (open)																	×			×	×	×	×		×
P2423,24	P2423,24	HC Adsorption Catalyst																											
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																			×	×	×	×	×		
P2431	P2431	AIR Pressure Sensor(Rationality)																				×	×	×	×		
P2440	P2440	AIR control valve stuck open														×		×	×								×
P2441	P2441	AIR control valve stuck close														×		×	×								×
P2444	P2444	AIP stuck On														×		×	×								×
P2445	P2445	AIP stuck Off														×		×	×								×
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																									
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																	×			×	×	×	×		

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DIDIW–01

MONITOR DRIVE PATTERN

1. MONITOR DRIVE PATTERN FOR ECT TEST

(a) Perform this drive pattern as one method to simulate the detection conditions of the ECT malfunctions. (The DTCs may not be detected due to the actual driving conditions. And some codes may not be detected through this drive pattern.)

HINT:

Preparation for driving

- Warm up the engine sufficiently. (Engine coolant temperature is 60 °C (140 °F) or higher).
- Drive the vehicle when the atmospheric temperature is –10 °C (14 °F) or higher. (Malfunction is not detected when the atmospheric temperature is –10 °C (14 °F) or less).

Notice in driving

- Drive the vehicle through all gears.
  Stop → 1st → 2nd → 3rd → 4th → 5th → 5th (lock–up ON).
- Repeat the above driving pattern three times or more.

NOTICE:

- **The monitor status can be checked using the OBD II scan tool. When using the hand–held tester, monitor status can be found in the "ENHANCED OBD II / DATA LIST" or under "CARB OBD II".**
- **In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors), the drive pattern can be resumed and, in most cases, the monitor can be completed.**
- **Perform this drive pattern on a level road as much as possible and strictly observe the posted speed limits and traffic laws while driving.**

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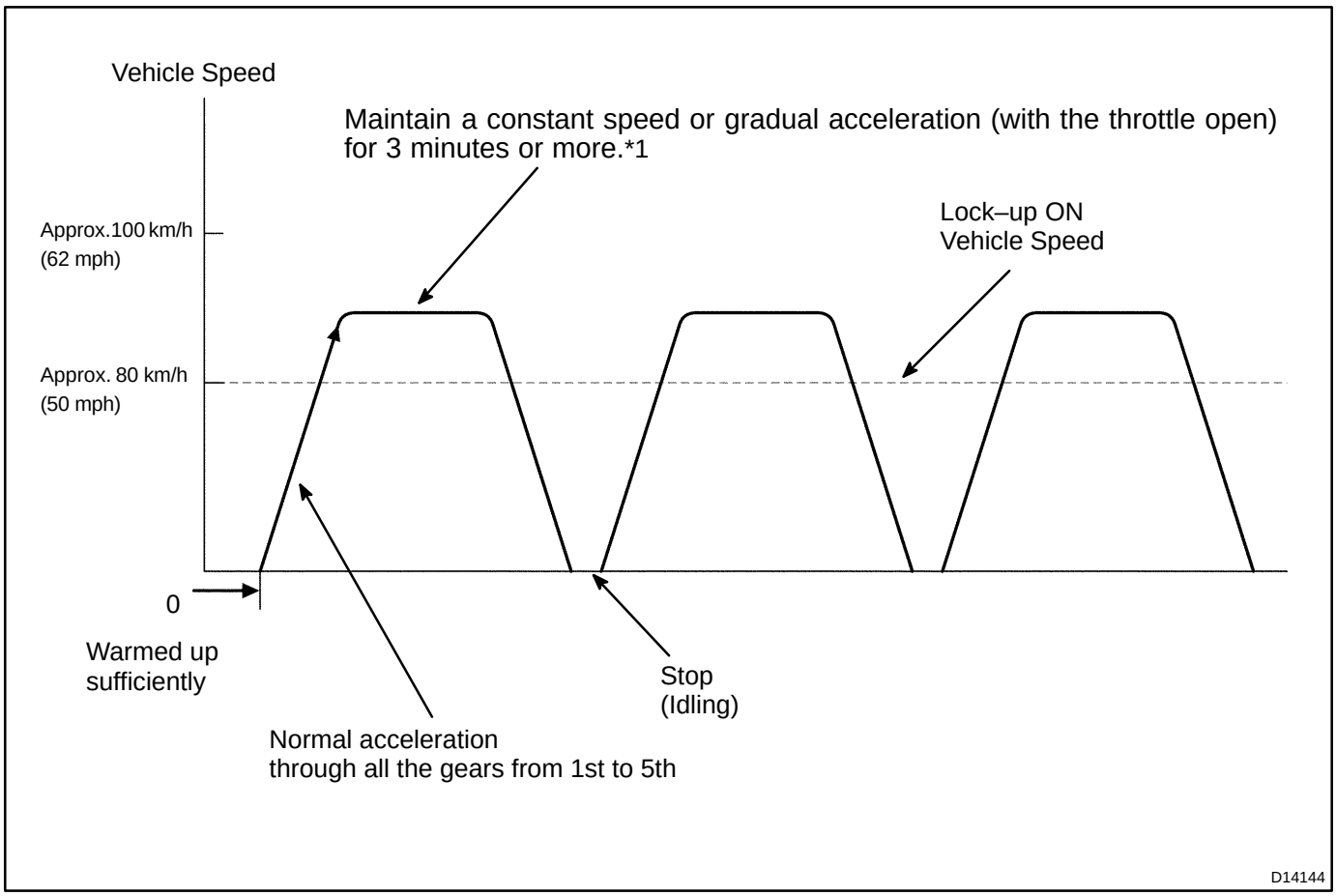

HINT:

*1: Drive at such a speed in the uppermost gear, to engage lock–up. The vehicle can be driven at a speed lower than that in the above diagram under the lock–up condition.

NOTICE:

It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

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DIDIX–01

PROBLEM SYMPTOMS TABLE

HINT:

If a normal code is displayed during the diagnostic trouble code check although the trouble still occurs, check the electrical circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for troubleshooting.

The Matrix Chart is divided into 3 chapters.

1. Chapter 1: Electronic Circuit Matrix Chart

- ◀ Refer to the table below when the trouble cause is considered to be electrical.
- ◀ If the instruction ”Proceed to next circuit inspection shown on matrix chart” is given in the flow chart of each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- ◀ If the trouble still occurs even though there are no abnormalities in any of the other circuits, check and replace the ECM.

HINT:

*1: When the circuit on which mark *1 is attached is defective, DTC could be output (see page DI–573).

Symptom	Suspect Area	See page
No up–shift (A particular gear, from 1st to 4th gear, is not up–shifted)	1. Shift solenoid valve (S1) circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI–641 DI–646 IN–35
No up–shift (4th → 5th)	1. O/D main switch circuit 2. Engine coolant temp. sensor circuit *1 3. Speed sensor NT circuit *1 4. Shift solenoid valve (SL1) circuit *1 5. Shift solenoid valve (SL2) circuit *1 6. Shift solenoid valve (SR) circuit *1 7. ECM	DI–688 DI–58 DI–591 DI–603 DI–631 DI–651 IN–35
No up–shift (3rd → 4th)	1. Engine coolant temp. sensor circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI–58 DI–646 IN–35
No up–shift (1st → 2nd)	1. Shift position L switch circuit 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI–691 DI–646 IN–35
No down–shift (5th → 4th)	1. O/D main switch circuit 2. Shift solenoid valve (SL1) circuit *1 3. Shift solenoid valve (SL2) circuit *1 4. Shift solenoid valve (SR) circuit *1 5. ECM	DI–688 DI–603 DI–631 DI–651 IN–35
No down–shift (2nd → 1st)	1. Shift position L switch circuit 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI–691 DI–646 IN–35
No down–shift (A particular gear, from 1st to 4th gear, is not down–shifted)	1. Shift solenoid valve (S1) circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI–641 DI–646 IN–35
No lock–up	1. ATF temperature sensor circuit *1 2. Stop light switch circuit *1 3. Speed sensor NT circuit *1 4. Shift solenoid valve (SLU) circuit *1 5. Engine coolant temp. sensor circuit *1 6. ECM	DI–582 DI–600 DI–591 DI–680 DI–58 IN–35
No lock–up off	4. Shift solenoid valve (SLU) circuit *1 6. ECM	DI–680 IN–35

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Shift point too high or too low	1. Shift solenoid valve (SLT) circuit *1 2. Speed sensor NT circuit *1 3. Speed sensor SP2 circuit *1 4. Throttle position sensor circuit *1 5. ATF temperature sensor circuit *1 6. ECM	DI–662 DI–591 DI–596 DI–58 DI–582 IN–35
Up–shift to 5th from 4th while shift lever is in 4 position	1. O/D main switch circuit 2. ECM	DI–688 IN–35
Up–shift to 5th from 4th while engine is cold	1. Engine coolant temp. sensor circuit *1 2. ECM	DI–58 IN–35
Up–shift to 4th from 3rd while shift lever is in 3 position	1. Park/neutral position switch circuit *1 2. ECM	DI–576 IN–35
Up–shift to 3rd from 2nd while shift lever is in 2 position	1. Park/neutral position switch circuit *1 2. ECM	DI–576 IN–35
Up–shift to 2nd from 1st while shift lever is in L position	1. Shift position L switch circuit 2. ECM	DI–691 IN–35
Harsh engagement (N → D)	1. Speed sensor NT circuit *1 2. Shift solenoid valve (SL1) circuit *1 3. Shift solenoid valve (SLT) circuit *1 4. ECM	DI–591 DI–603 DI–662 IN–35
Harsh engagement (Lock–up)	1. Speed sensor NT circuit *1 2. Speed sensor SP2 circuit *1 3. Shift solenoid valve (SLU) circuit *1 4. ECM	DI–591 DI–596 DI–680 IN–35
Harsh engagement (Any driving position)	ECM	IN–35
Poor acceleration	1. ATF temperature sensor No.2 circuit *1 2. Engine coolant temp. sensor circuit *1 3. Shift solenoid valve (SLT) circuit *1 4. ECM	DI–666 DI–58 DI–662 IN–35
No engine braking	ECM	IN–35
No kick–down	ECM	IN–35
Engine stalls when starting off or stopping	1. Shift solenoid valve (SLU) circuit *1 2. ECM	DI–680 IN–35
AT Oil Temp. warning light remains on Lock–up at 3rd gear Shift point too high	1. ATF temperature sensor No.2 circuit *1 2. Engine coolant temp. sensor circuit *1 3. ECM	DI–666 DI–58 IN–35
Malfunction in shifting	1. Park/neutral position switch circuit *1 2. ECM	DI–576 IN–35

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Chapter 2: On–Vehicle Repair
(▶: A750E, A750F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM999U)

Symptom	Suspect Area	See page
Vehicle does not move with shift lever in any forward position and reverse position	1. Transmission control cable 2. Manual valve 3. Parking lock pawl 4. Off–vehicle repair matrix chart	DI–524 ▶ ▶ –
Vehicle does not move with shift lever in R position	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No up–shift (1st → 2nd)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No up–shift (2nd → 3rd)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No up–shift (3rd → 4th)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No up–shift (4th → 5th)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No down–shift (5th → 4th)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No down–shift (4th → 3rd)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No down–shift (3rd → 2nd)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No down–shift (2nd → 1st)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No lock–up or No lock–up off	1. Shift solenoid valve (SLU) 2. Valve body assy 3. Off–vehicle repair matrix chart	DI–672 AT–10 –
Harsh engagement (N → D)	1. Shift solenoid valve (SL1) 2. Valve body assy 3. C_1 accumulator 4. Off–vehicle repair matrix chart	DI–620 AT–10 ▶ –
Harsh engagement (Lock–up)	1. Shift solenoid valve (SLU) 2. Valve body assy 3. Off–vehicle repair matrix chart	DI–672 AT–10 –
Harsh engagement (N → R)	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SLU) 3. Valve body assy 4. C_3 accumulator 5. Off–vehicle repair matrix chart	DI–656 DI–672 AT–10 ▶ –
Harsh engagement (1st →2nd → 3rd → 4th → 5th)	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SL1) 3. Valve body assy	DI–656 DI–620 AT–10
Harsh engagement (1st → 2nd)	1. Valve body assy 2. B_3 accumulator 3. Off–vehicle repair matrix chart	AT–10 ▶ –
Harsh engagement (2nd → 3rd)	1. Valve body assy 2. C_3 accumulator 3. Off–vehicle repair matrix chart	AT–10 ▶ –
Harsh engagement (3rd → 4th)	1. Valve body assy 2. C_2 accumulator 3. Off–vehicle repair matrix chart	AT–10 ▶ –

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Harsh engagement (4th → 5th)	1. Shift solenoid valve (SL1) 2. Shift solenoid valve (SL2) 3. Valve body assy 4. Off–vehicle repair matrix chart	DI–620 DI–625 AT–10 –
Harsh engagement (5th → 4th)	1. Shift solenoid valve (SL1) 2. Shift solenoid valve (SL2) 3. Valve body assy 4. Off–vehicle repair matrix chart	DI–620 DI–625 AT–10 –
Slip or shudder (Forward and reverse)	1. Transmission control cable 2. Valve body assy 3. Oil strainer 4. Off–vehicle repair matrix chart	DI–524 AT–10 AT–10 –
No engine braking (1st: L position)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No engine braking (2nd: 2 position)	1. Valve body assy 2. Off–vehicle repair matrix chart	AT–10 –
No kick–down	Valve body assy	AT–10
Shift point too high or too low	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SL1) 3. Valve body assy	DI–656 DI–620 AT–10
Poor acceleration	1. Shift solenoid valve (SLT) 2. Valve body assy	DI–656 AT–10
Engine stalls when starting off or stopping	1. Shift solenoid valve (SLU) 2. Valve body assy	DI–672 AT–10

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Chapter 3: Off–Vehicle Repair
(▶: A750E, A750F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM999U)

Symptom	Suspect Area	See page
Vehicle does not move with shift lever in any forward position and reverse position	1. Rear planetary gear unit 2. Torque converter clutch	▶ AT–30
Vehicle does not move with shift lever in R position	1. Brake No. 4 (B_4) 2. Clutch No. 3 (C_3) 3. One–way clutch No.4 (F_1)	▶ ▶ ▶
No up–shift (1st → 2nd)	1. Brake No. 3 (B_3) 2. One–way clutch No.1 (F_1) 3. One–way clutch No. 2 (F_2)	▶ ▶ ▶
No up–shift (2nd → 3rd)	Clutch No. 3 (C_3)	▶
No up–shift (3rd → 4th)	Clutch No. 2 (C_2)	▶
No up–shift (4th → 5th)	1. Brake No. 1 (B_1) 2. Clutch No. 1 (C_1)	▶ ▶
No lock–up or No lock–up off	Torque converter clutch	AT–30
Harsh engagement (N → D)	1. Clutch No. 1 (C_1) 2. One–way clutch No.3 (F_3)	▶ ▶
Harsh engagement (N → R)	1. Clutch No. 3 (C_3) 2. Brake No. 4 (B_4) 3. One–way clutch No.1 (F_1)	▶ ▶ ▶
Harsh engagement (1 → 2)	1. Brake No. 3 (B_3) 2. One–way clutch No.1 (F_1) 3. One–way clutch No. 2 (F_2)	▶ ▶ ▶
Harsh engagement (2 → 3)	Clutch No. 3 (C_3)	▶
Harsh engagement (3 → 4)	Clutch No. 2 (C_2)	▶
Harsh engagement (4 → 5th)	1. Brake No. 1 (B_1) 2. Clutch No. 1 (C_1)	▶ ▶
Harsh engagement (Lock–up)	Torque converter clutch	AT–30
Slip or shudder (Forward and reverse: After warm–up)	1. One–way clutch No.1 (F_1) 2. Clutch No. 3 (C_3) 3. Torque converter clutch clutch	▶ ▶ ▶
Slip or shudder (Particular position: Just after engine starts)	Torque converter clutch	AT–30
Slip or shudder (R position)	1. Brake No. 4 (B_4) 2. One–way clutch No.1 (F_1) 3. Clutch No. 3 (C_3)	▶ ▶ ▶
Slip or shudder (1st)	1. Clutch No. 1 (C_1) 2. One–way clutch No.3 (F_3)	▶ ▶
Slip or shudder (2nd)	1. Clutch No. 1 (C_1) 2. Brake No. 3 (B_3) 3. One–way clutch No.1 (F_1) 4. One–way clutch No.2 (F_2)	▶ ▶ ▶ ▶
Slip or shudder (3rd)	1. Clutch No. 1 (C_1) 2. Clutch No. 3 (C_3) 3. One–way clutch No.1 (F_1)	▶ ▶ ▶
Slip or shudder (4th)	1. Clutch No. 1 (C_1) 2. Clutch No. 2 (C_2)	▶ ▶
Slip or shudder (5th)	1. Clutch No. 2 (C_2) 2. Clutch No. 3 (C_3) 3. Brake No. 1 (B_1)	▶ ▶ ▶
No engine braking (1st – 4th: D position)	Clutch No. 1 (C_1)	▶

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No engine braking (1st: L position)	Brake No. 4 (B_4)	▶
No engine braking (2nd: 2 position)	Brake No. 2 (B_2)	▶
No engine braking (3rd: 3 position)	Brake No. 1 (B_1)	▶
Poor acceleration (All positions)	Torque converter clutch	AT–30
Poor acceleration (5th)	1. Clutch No. 1 (C_1) 2. Clutch No. 3 (C_3) 3. Brake No. 1 (B_1) 4. Front planetary gear unit	▶ ▶ ▶ ▶
Engine stalls when starting off or stopping	Torque converter clutch	AT–30

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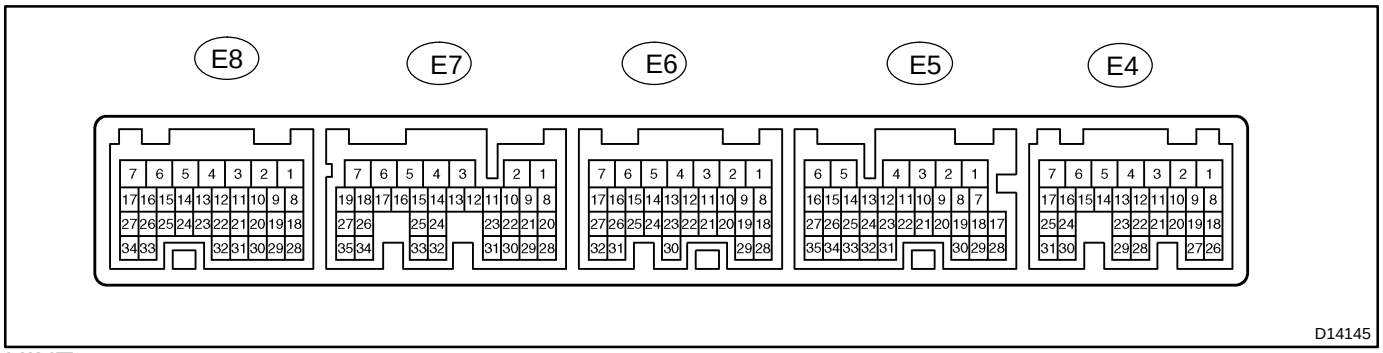
DIDIY–01

TERMINALS OF ECM

1. ECM



HINT:

Each ECM terminal's standard voltage is shown in the table below.

In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specific Condition".

Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
LMS (E5–9) – E1 (E6–1)	P–L – BR	L shift position switch signal	IG switch ON	10 to 14 V
↑	↑	↑	IG switch ON and Press continuously shift position L switch	Below 1 V
2 (E5–10) – E1 (E6–1)	L – BR	2 shift position switch signal	IG switch ON and shift lever 2 and L position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except 2 and L position	Below 1 V
R (E5–11) – E1 (E6–1)	B–Y – BR	R shift position switch signal	IG switch ON and shift lever R position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except R position	Below 1 V
D (E5–21) – E1 (E6–1)	W–R – BR	D shift position switch signal	IG switch ON and shift lever D and 4 position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except D and 4 position	Below 1 V
3 (E5–19) – E1 (E6–1)	L – BR	3 shift position switch signal	IG switch ON and shift lever 3 position	10 to 14 V
↑	↑	↑	IG switch ON and shift lever except 3 position	Below 1 V
ODMS (E4–12) – E1 (E6–1)	L–W – BR	O/D main switch signal	IG switch ON	10 to 14 V
↑	↑	↑	IG switch ON and press continuously O/D main switch	Below 1 V
STP (E4–15) – E1 (E6–1)	G–Y – BR	Stop lamp switch signal	Brake pedal is depressed	7.5 to 14 V
↑	↑	↑	Brake pedal is released	Below 1.5 V
SLU+ (E7–15) – SLU– (E7–14)	P–L – L–W	SLU solenoid signal	5th (lock–up) gear	Pulse generation (See waveform 2)
S2 (E7–10) – E1 (E6–1)	W–L – BR	S2 solenoid signal	2nd or 3rd gear	10 to 14 V
↑	↑	↑	1st, 4th or 5th gear	Below 1 V
S1 (E7–11) – E1 (E6–1)	R – BR	S1 solenoid signal	1st or 2nd gear	10 to 14 V
↑	↑	↑	3rd, 4th or 5th gear	Below 1 V

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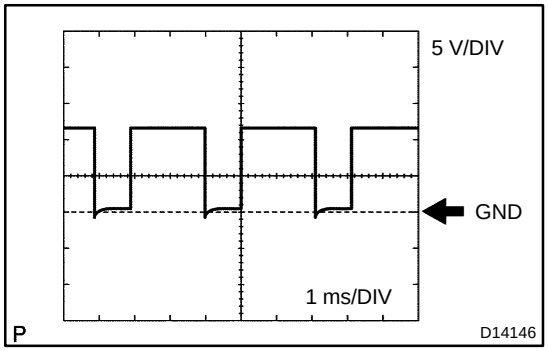
SLT+ (E7–13) – SLT– (E7–12)	B–R – G–Y	SLT solenoid signal	Engine idle speed	Pulse generation (See waveform 1)
SR (E7–9) – E1 (E6–1)	G–R – BR	SR solenoid signal	5th gear	10 to 14 V
↑	↑	↑	1st gear	Below 1 V
SL2+ (E7–17) – SL2– (E7–16)	GR – LG–B	SL2 solenoid signal	Engine idle speed	Pulse generation (See waveform 3)
SL1+ (E7–19) – SL1– (E7–18)	R–B – L	SL1 solenoid signal	Engine idle speed	Pulse generation (See waveform 4)
THO1 (E7–24) – E2 (E8–28)	G – G–W	No.1 ATF temperature sensor signal	No.1 ATF temperature: 115 °C (239 °F) or more	Below 1.5 V
THO2 (E7–32) – E2 (E8–28)	V – G–W	No.2 ATF temperature sensor signal	No.2 ATF temperature: 115 °C (239 °F) or more	Below 1.5 V
SP2+ (E7–34) – SP2– (E7–26)	W–R – Y–R	Speed sensor (SP2) signal	Vehicle speed 20 km/h (12 mph)	Pulse generation (See waveform 6)
NT+ (E7–35) – NT– (E7–27)	B – W	Speed sensor (NT) signal	Engine idle speed	Pulse generation (See waveform 5)
STAR/NSW (E7–8) – E1 (E6–1)	B – BR	Park neutral switch signal	IG switch ON and shift lever P and N position	Below 2 V
↑	↑	↑	IG switch ON and shift lever except P and N position	10 to 14 V
L4* (E6–13) – E1 (E6–1)	L–R – BR	Transfer L position switch signal	IG switch ON and transfer L position	Below 1 V
↑	↑	↑	IG switch ON and transfer except L position	10 to 14 V

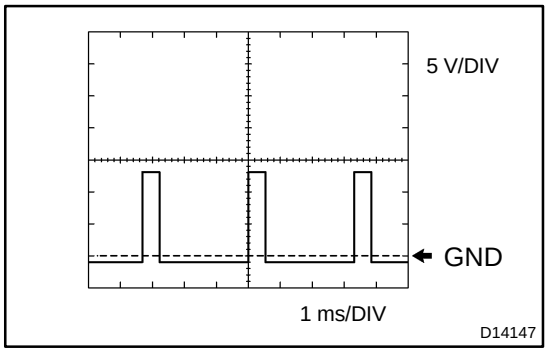
HINT:
*: 4WD



Waveform 1

Reference:

Terminal	SLT+ – SLT–
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 2

Reference:

Terminal	SLU+ – SLU–
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	5th (lock–up) or 6th (lock–up) gear

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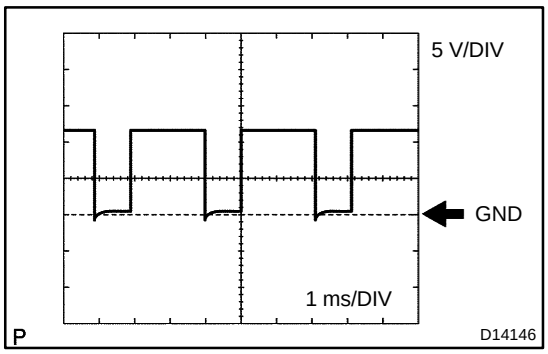
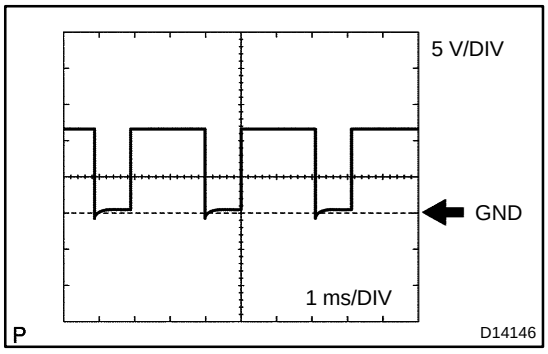


Waveform 3

Reference:

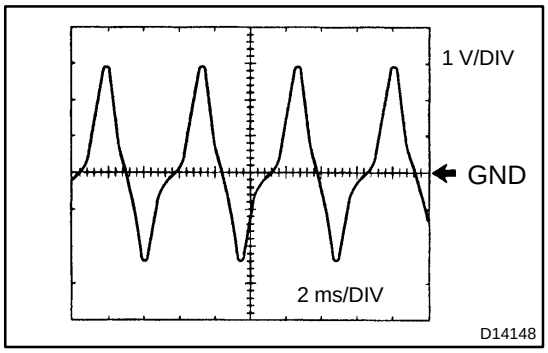
Terminal	SL2+ – SL2–
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 4

Reference:

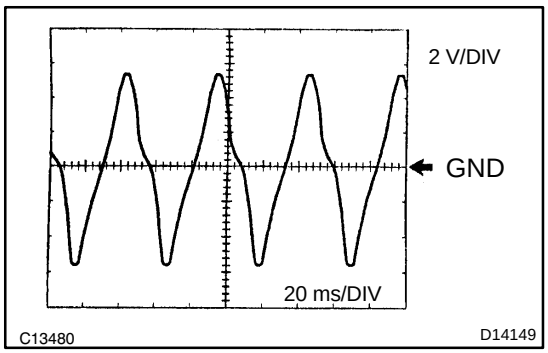
Terminal	SL1+ – SL1–
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Waveform 5

Reference:

Terminal	NT+ – NT–
Tool setting	1V/DIV, 2ms/DIV
Vehicle condition	Engine idle speed (P or N position)



Waveform 6

Reference:

Terminal	SP2+ – SP2–
Tool setting	2V/DIV, 20ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

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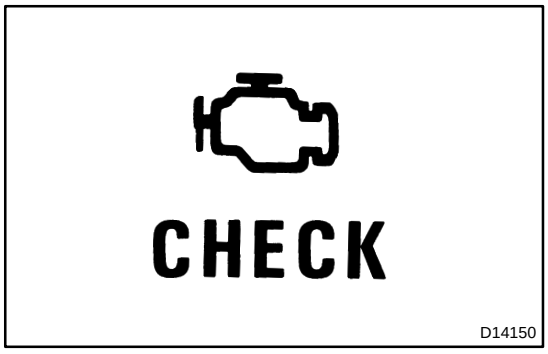
DIDIZ–01

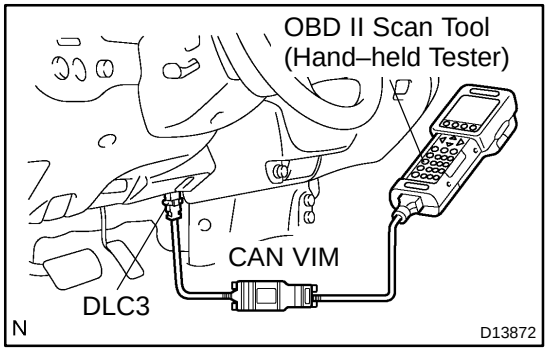
DIAGNOSIS SYSTEM

DESCRIPTION

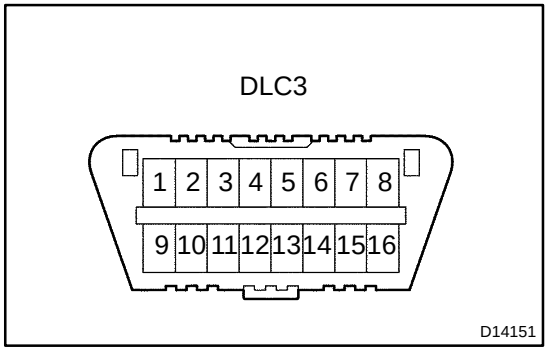
When troubleshooting On–Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle's ECM can then be read.



OBD II regulations require that the vehicle's on–board computer illuminates the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:
1) The emission control system/components
2) The powertrain control components (which affect vehicle emissions)
3) The computer
In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory.
If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.



To check DTCs, connect the scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The scan tool displays DTCs, the freeze frame data and a variety of the engine data.
The DTCs and freeze frame data can be erased with the scan tool (See page DI–565).



NORMAL MODE AND CHECK MODE

The diagnosis system operates in "normal mode" during normal vehicle use. In normal mode, "2–trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available to technicians as an option. In check mode, "1–trip detection logic" is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions.

2–TRIP DETECTION LOGIC

When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate.

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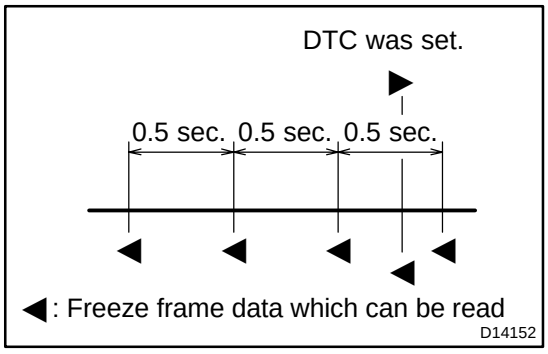
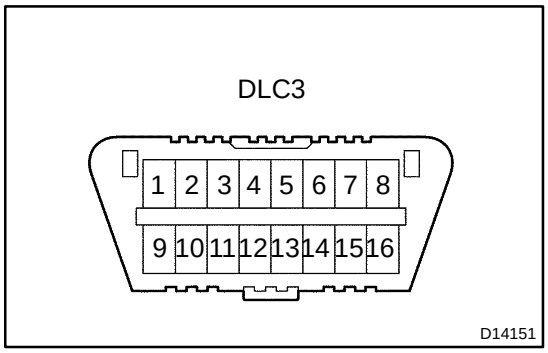
FREEZE FRAME DATA

Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air/fuel ratio was Lean or Rich, and other data from the time the malfunction occurred.



The hand–held tester records freeze frame data in five different instances: 1) 3 times before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. These data can be used to simulate the vehicle's condition around the time when the malfunction occurred. The data may help find the cause of the malfunction, or judge if the DTC is being caused by a temporary malfunction or not.



DLC3 (Data Link Connector 3)

The vehicle's ECM uses the ISO 15765–4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765–4 format.

HINT:

Connect the cable of the hand–held tester to the DLC3, turn the ignition switch ON and attempt to use the hand–held tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.

If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	Below 1 Ω	Always
SG	5	Signal ground	Body ground	Below 1 Ω	Always
BAT	16	Battery positive	Body ground	11 to 14 V	Always
CANH	6	HIGH–level CAN bus line	CANL	54 to 69 Ω	IG switch OFF
CANH	6	HIGH–level CAN bus line	Battery positive	1 MΩ or higher	IG switch OFF
CANH	6	HIGH–level CAN bus line	CG	1 kΩ or higher	IG switch OFF
CANL	14	LOW–level CAN bus line	Battery positive	1 MΩ or higher	IG switch OFF
CANL	14	LOW–level CAN bus line	CG	1 kΩ or higher	IG switch OFF

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CHECK BATTERY VOLTAGE

Battery voltage: 11 to 14 V

If voltage is below 11 V, replace the battery before proceeding.

CHECK MIL

(a) Check that the MIL illuminates when turning the ignition switch ON.

If the MIL does not illuminate, there is a problem in the MIL circuit (refer to MIL CIRCUIT on page DI–512)

(b) When the engine is started, the MIL should turn off.

ALL READINESS

For this vehicle, using the hand–held tester allows readiness codes corresponding to all DTCs to be read. When diagnosis (normal or malfunctioning) has been complete, readiness codes are set. Enter the following menus: ENHANCED OBD II / MONITOR STATUS on the hand–held tester.

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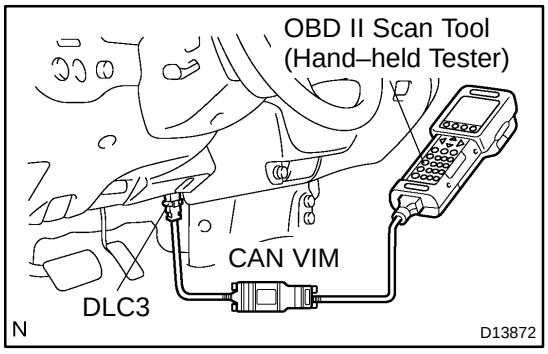
DIDJ0–01

DTC CHECK / CLEAR

1. CHECK DTC

DTCs which are stored in the ECM can be displayed with the hand–held tester or generic OBD II scan tool.

These scan tools can display pending DTCs and current DTCs. Some DTC aren't stored if the ECM doesn't detect a malfunction during consecutive driving. However, the detected malfunction during once driving is stored as pending DTC.



(a) Connect the hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connector 3 (DLC3).

(b) Turn the ignition switch ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES (or PENDING CODE).

(d) Confirm the DTCs and freeze frame data and then write them down.

(e) See page DI–573 to confirm the details of the DTCs.

NOTICE:

When simulating a symptom with the scan tool to check for DTCs, use normal mode. For codes on DIAGNOSTIC TROUBLE CODE CHART subject to "2–trip detection logic", perform the following actions.

Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL illuminates and the DTCs are recorded in the ECM.

2. CLEAR DTC

(a) Connect the hand–held tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES and press YES.

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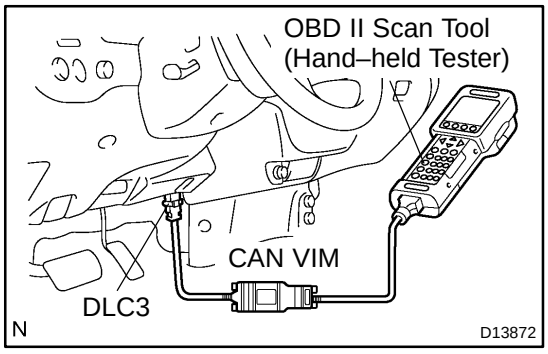
DIDJ1–01

CHECK MODE PROCEDURE

DESCRIPTION

Check mode has a higher sensitivity to malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect. In check mode, DTCs are detected with 1–trip detection logic.



CHECK MODE PROCEDURE

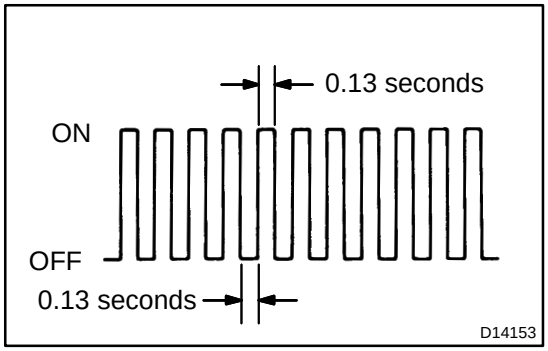
(a) Make sure that the items below are true:
  (1) Battery positive voltage 11 V or more
  (2) Throttle valve fully closed
  (3) Transmission in the P or N position
  (4) A/C switched OFF

(b) Turn the ignition switch OFF.

(c) Connect the hand–held tester together with the Controller Area Network Vehicle Interface Module (CAN VIM) to the DLC3.

(d) Turn the ignition switch ON.

(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.



(f) Change the ECM to check mode. Make sure the MIL flashes as shown in the illustration.

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the hand–held tester is used to change the ECM from normal mode to check mode or vice–versa; or 2) during check mode, the ignition switch is turned from ON to ACC or LOCK.

Before check mode, make notes of the DTCs and freeze frame data.

(g) Start the engine. The MIL should turn off after the engine starts.

(h) Perform ”MONITOR DRIVE PATTERN” for the ECT test (See page DI–551).
(Or, simulate the conditions of the malfunction described by the customer).

(i) After simulating the malfunction conditions, use the hand–held tester diagnosis selector to check the DTC and freeze frame data.

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DIDJ2–01

FAIL–SAFE CHART

1. FAIL–SAFE

This function minimizes the loss of the ECT functions when any malfunction occurs in a sensor or solenoid.

Malfunction Part	Function
Output Speed Sensor (SP2)	During an output speed sensor malfunction, shift control is effected through the input speed sensor signal (NT).
ATF Temp. Sensor No. 1	During an ATF temperature sensor No. 1 malfunction, up–shift to the 5th and flex lock–up clutch control are prohibited.
Shift Solenoid Valve S1, S2 and SR	The current to the failed solenoid valve is cut off and control is effected by operating the other solenoid valves with normal operation. Shift control is effected depending on the failed solenoid as described in the table on the next page.
Shift Solenoid Valve SL1 and SL2	During a solenoid valve SL1 or SL2 malfunction, up–shift to the 5th is prohibited.
Shift Solenoid Valve SLU	During a solenoid valve SLU malfunction, the current to the solenoid valve is stopped. This stops lock–up control and flex lock–up control, fuel economy decreases.
Shift Solenoid Valve SLT	During a solenoid valve SLT malfunction, the current to the solenoid valve is stopped. This stops line pressure optimal control, the shift shock increases. However, shifting is effected through normal clutch pressure control.

Fail Safe Function:

If either of the shift solenoid valve circuits has an open or short failure, the ECM turns the other shift solenoid ”ON” and ”OFF” in order to shift into the gear positions shown in the table below.

In case of a short circuit, the ECM stops sending current to the short circuited solenoid.

Even if starting the engine again in the fail–safe mode, the gear position remains in the same position.

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◀: ON
X: OFF
→: Condition in the electrical malfunction is shown on the left of "→".
Condition in the fail–safe mode is shown on the right of "→".
E/B: Engine brake.

Position	NORMAL						S1 OFF						S2 OFF						SR OFF					
	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2
"R"	R	○	×	×	×	○	R	×	×	×	×	○	R	○	×	×	×	○	R	○	×	×	×	○
"D"	1 st	○	×	×	×	○	4 th → 3 rd	×	× → ○	×	×	○	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd	○	○	×	×	○	3 rd	×	○	×	×	○	1 st → 4 th	○ → ×	×	×	×	○	2 nd	○	○	×	×	○
	3 rd	×	○	×	×	○	3 rd	×	○	×	×	○	4 th	×	×	×	×	○	3 rd	×	○	×	×	○
	4 th	×	×	×	×	○	4 th	×	×	×	×	○	4 th	×	×	×	×	○	4 th	×	×	×	×	○
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	4 th	×	×	×	○	×
"3"	1 st	○	×	×	×	○	3 rd → 3 rd E/B	×	× → ○	×	×	○ → ×	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd	○	○	×	×	○	3 rd → 3 rd E/B	×	○	×	×	○ → ×	1 st → 3 rd E/B	○ → ×	×	×	×	○ → ×	2 nd	○	○	×	×	○
	3 rd E/B	×	○	×	×	×	3 rd E/B	×	○	×	×	×	3 rd E/B	×	×	×	×	×	3 rd E/B → 3 rd	×	○	×	×	× → ○
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	3 rd	×	× → ○	×	×	○ → ○
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	3 rd E/B → 3 rd	×	× → ○	×	○ → ×	× → ○
"2"	1 st	○	×	×	×	○	1 st	×	×	×	×	○	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd E/B	○	○	○	×	×	3 rd E/B	×	○	○	×	×	2 nd E/B → 4 th	○ → ×	×	○	×	× → ○	2 nd	○	○	×	×	×
	3 rd E/B	×	○	○	×	×	3 rd E/B	×	○	○	×	×	Fail 4th	×	×	○	×	× → ○	2 nd	× → ○	○	×	×	×
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	1 st → 2 nd	× → ○	× → ○	×	×	○ → ×
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	1 st E/B → 2 nd	× → ○	○	×	○ → ×	×
"L"	1 st E/B	○	×	×	×	×	1 st E/B	×	×	×	×	×	1 st E/B	○	×	×	×	×	1 st E/B	○	×	×	×	×
	2 nd E/B	○	○	○	×	×	3 rd E/B	×	○	○	×	×	2 nd E/B → 4 th	○ → ×	×	○	×	× → ○	2 nd	○	○	×	×	×
	3 rd E/B	×	○	○	×	×	3 rd E/B	×	○	○	×	×	Fail 4 th	×	×	○	×	× → ○	2 nd	× → ○	○	×	×	×
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	1 st → 2 nd	× → ○	× → ○	×	×	○ → ×
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	1 st E/B → 2 nd	× → ○	× → ○	×	○ → ×	×

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◀: ON
X: OFF
→: Condition in the electrical malfunction is shown on the left of "→".
Condition in the fail–safe mode is shown on the right of "→".
E/B: Engine brake.

Position	S1 S2 OFF						S2 SR OFF						S1 SR OFF						S1 S2 SR OFF					
	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2
"R"	R	X	X	X	X	○	R	○	X	X	X	○	R	X	X	X	X	○	R	X	X	X	X	○
"D"	4 th	X	X	X	X	○	1 st	○	X	X	X	○	4 th → 3 rd	X	X→○	X	X	○	4 th	X	X	X	X	○
	4 th	X	X	X	X	○	1 st → 4 th	○→X	X	X	X	○	3 rd	X	○	X	X	○	4 th	X	X	X	X	○
	4 th	X	X	X	X	○	4 th	X	X	X	X	○	3 rd	X	○	X	X	○	4 th	X	X	X	X	○
	4 th	X	X	X	X	○	4 th	X	X	X	X	○	4 th	X	X	X	X	○	4 th	X	X	X	X	○
	5 th	X	X	○	○	X	4 th	X	X	X	○→X	X→○	4 th	X	X	X	○→X	X→○	4 th	X	X	X	○→X	X→○
"3"	3 rd → 3 rd E/B	X	X	X	X	○→X	1 st	○	X	X	X	○	3 rd	X	X→○	X	X	○→○	3 rd	X	X	X	X	○→○
	3 rd → 3 rd E/B	X	X	X	X	○→X	1 st → 3 rd	○→X	X	X	X	○→○	3 rd	X	○	X	X	○→○	3 rd	X	X	X	X	○→○
	3 rd E/B	X	X	X	X	X	3 rd E/B → 3 rd	X	X	X	X	X→○	3 rd E/B → 3 rd	X	○	X	X	X→○	3 rd E/B → 3 rd	X	X	X	X	X→○
	4 th	X	X	○	X	○	3 rd	X	X	X	X	○→○	3 rd	X	X→○	X	X	○→○	3 rd	X	X	X	X	○→○
	5 th	X	X	○	○	X	1 st E/B → 3 rd	X	X	X	○→X	X→○	3 rd E/B → 3 rd	X	X→○	X	○→X	X→○	3 rd E/B → 3 rd	X	X	X	○→X	X→○
"2"	1 st	X	X	X	X	○	1 st	○	X	X	X	○	1 st	X	X	X	X	○	1 st	X	X	X	X	○
	Fail 4 th	X	X	○	X	X→○	1 st E/B → 1 st	○	X	X	X	X→○	2 nd	X	○	X	X	X	1 st E/B → 1 st	X	X	X	X	X→○
	Fail 4 th	X	X	○	X	X→○	1 st E/B → 1 st	X→○	X	X	X	X→○	2 nd	X	○	X	X	X	1 st E/B → 1 st	X	X	X	X	X→○
	4 th	X	X	○	X	○	1 st	X→○	X	X	X	○	1 st → 2nd	X	X→○	X	X	○→X	1 st	X	X	X	X	○
	5 th	X	X	○	○	X	1 st E/B → 1 st	X→○	X	X	○→X	X→○	1 st E/B → 2nd	X	X→○	X	○→X	X	1 st E/B → 1 st	X	X	X	○→X	X→○
"L"	1 st E/B	X	X	X	X	X	1 st E/B	○	X	X	X	X	1 st E/B	X	X	X	X	X	1 st E/B	X	X	X	X	X
	Fail 4 th	X	X	○	X	X→○	1 st E/B → 1 st	○	X	X	X	X→○	2 nd	X	○	X	X	X	1 st E/B → 1 st	X	X	X	X	X→○
	Fail 4 th	X	X	○	X	X→○	1 st E/B → 1 st	X→○	X	X	X	X→○	2 nd	X	○	X	X	X	1 st E/B → 1 st	X	X	X	X	X→○
	4 th	X	X	○	X	○	1 st	X→○	X	X	X	○	1 st → 2nd	X	X→○	X	X	○→X	1 st	X	X	X	X	○
	5 th	X	X	○	○	X	1 st E/B → 1 st	X→○	X	X	○→X	X→○	1 st E/B → 2nd	X	X→○	X	○→X	X	1 st E/B → 1 st	X	X	X	○→X	X→○

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DIDJ3–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand–held tester.
(f) When you use the hand–held tester:
Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST”.
(g) According to the display on the tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light SW Status/ ON or OFF	▶Brake Pedal is depressed: ON ▶Brake Pedal is released: OFF	–
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the hand–held tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, See page DI–576.
LOW	PNP SW Status/ ON or OFF	▶Shift lever position is 2: OFF ↓ ▶Shift position L switch Push: ON ↓ ▶Shift position L switch Push: OFF	↑
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2 and L: ON Except 2 and L: OFF	↑
3RD	PNP SW Status/ ON or OFF	Shift lever position is; 3: ON Except 3: OFF	↑
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D: ON Except D: OFF	↑
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	↑
OVERDRV CUT SW2	O/D SW Status/ ON or OFF	▶HG SW ON: ON ↓ ▶O/D SW Push: OFF ↓ ▶O/D SW Push: ON	–
SHIFT	Actual Gear Position/ 1st, 2nd, 3rd, 4th or 5th	Shift lever position is; ▶L: 1st ▶2: 1st or 2nd ▶3: 1st, 2nd or 3rd ▶4(O/D OFF): 1st, 2nd, 3rd or 4th ▶D: 1st, 2nd, 3rd, 4th or 5th	–

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LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	▶Lock Up: ON ▶Except Lock Up: OFF	–
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	▶Accelerator pedal is depressed: OFF ▶Accelerator pedal is released: ON	–
SOLENOID (SLU)	Shift Solenoid SLU Status/ ON or OFF	▶Lock Up: ON ▶Except Lock Up: OFF	–
AT FLUID TEMP 1	ATF Temp. Sensor No.1 Value/ min.: –40°C (–40°F) max.: 215°C (419°F)	▶After Stall Test; Approx. 80°C (176°F) ▶Equal to ambient temperature when cold soak	If the value is "–40°C (–40°F)" or "215°C (419°F)", ATF temp. sensor No.1 circuit is open or shorted.
AT FLUID TEMP 2	ATF Temp. Sensor No.2 Value/ min.: –40°C (–40°F) max.: 215°C (419°F)	▶After Stall Test; Approx. 80°C (176°F) ▶Equal to ambient temperature when cold soak	If the value is "–40°C (–40°F)" or "215°C (419°F)", ATF temp. sensor No.2 circuit is open or shorted.
SPD (SP2)	Output shaft Speed/ min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph) [HINT] Equal to vehicle speed	–
SPD (NT)	Input Turbine Speed/ display: 50 r/min	[HINT] ▶Lock–up ON (After warming up the engine); Input Turbine speed (NT) equal to the engine speed. ▶Lock–up OFF (Idling at N position); Input Turbine speed (NT) nearly equal to the engine speed.	–

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2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST”.
(g) According to the display on the tester, perform the ”ACTIVE TEST”.

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ▶Press ”→” button: Shift up ▶Press ”←” button: Shift down	Possible to check the operation of the shift solenoid valves.
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transmission to the lock–up condition. [Vehicle Condition] ▶Throttle valve opening angle: Less than 35 % ▶Vehicle Speed: 60 km/h (37 mph) or more	Possible to check the SLU operation.
LINE PRESS UP *	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] ▶Vehicle Stopped. ▶IDL: ON [HINT] OFF: Line pressure up (When the active test of ”Control the Line Pressure Up” is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	–

*: ”LINE PRESS UP” in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle, which is used in the HYDRAULIC TEST (See page DI–540) as well.

HINT:

The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.

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DIDJ4–01

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the parts listed in the table below and proceed to the page given.

HINT:

- *1 : ▶ ... The MIL (Malfunction Indicator Lamp) lights up
- *2 : ○ ... The ECM memorizes the trouble code if the ECM detects the DTC detection condition.
- This DTC may be output when the clutch, brake and gear components etc. inside the automatic transmission are damaged.

DTC No. (See Page)	Detection Item	Trouble Area	MIL *1	Memory *2
P0500 (DI–278)	Vehicle Speed Sensor ”A”	◀Open or short in speed sensor (SP2) circuit ◀Speed sensor (SP2) ◀ECM	▶	○
P0705 (DI–576)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	◀Open or short in park/neutral position switch circuit ◀Park/neutral position switch ◀ECM	▶	○
P0710 (DI–582)	Transmission Fluid Temperature Sensor ”A” Circuit	◀Open or short in ATF temperature sensor No.1 circuit ◀Transmission wire (ATF temperature sensor No.1) ◀ECM	▶	○
P0711 (DI–588)	Transmission Fluid Temperature Sensor ”A” Performance	◀Transmission wire (ATF temperature sensor No.1)	▶	○
P0712 (DI–582)	Transmission Fluid Temperature Sensor ”A” Circuit Low Input	◀Short in ATF temperature sensor No.1 circuit ◀Transmission wire (ATF temperature sensor No.1) ◀ECM	▶	○
P0713 (DI–582)	Transmission Fluid Temperature Sensor ”A” Circuit High Input	◀Open in ATF temperature sensor No.1 circuit ◀Transmission wire (ATF temperature sensor No.1) ◀ECM	▶	○
P0717 (DI–591)	Input Speed Sensor Circuit No Signal	◀Open or short in speed sensor (NT) circuit ◀Speed sensor (NT) ◀ECM ◀Automatic transmission (clutch, brake or gear, etc.)	▶	○
P0722 (DI–596)	Output Speed Sensor Circuit No Signal	◀Open or short in speed sensor (SP2) circuit ◀Speed sensor (SP2) ◀ECM ◀Automatic transmission (clutch, brake or gear, etc.)	▶	○
P0724 (DI–600)	Brake Switch ”B” Circuit High	◀Short in stop light switch signal circuit ◀Stop light switch ◀ECM	▶	○
P0748 (DI–603)	Pressure Control Solenoid ”A” Electrical (Shift Solenoid Valve SL1)	◀Open or short in shift solenoid valve SL1 circuit ◀Shift solenoid valve SL1 ◀ECM	▶	○
P0751 (DI–608)	Shift Solenoid ”A” Performance (Shift Solenoid Valve S1)	◀Shift solenoid valve S1 remains open or closed ◀Valve body is blocked ◀Automatic transmission (clutch, brake or gear, etc.)	▶	○
P0756 (DI–614)	Shift Solenoid ”B” Performance (Shift Solenoid Valve S2)	◀Shift solenoid valve S2 remains open or closed ◀Valve body is blocked ◀Automatic transmission (clutch, brake or gear, etc.)	▶	○
P0771 (DI–620)	Shift Solenoid ”E” Performance (Shift Solenoid Valve SR)	◀Shift solenoid valve SR remains open or closed ◀Shift solenoid valve SL1 remains open or closed ◀Valve body is blocked ◀Automatic transmission (clutch, brake or gear, etc.)	▶	○

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P0776 (DI–625)	Pressure Control Solenoid ”B” Performance (Shift Solenoid Valve SL2)	◀Shift solenoid valve SL2 remains open or closed ◀Valve body is blocked ◀Automatic transmission (clutch, brake or gear, etc.)	▶	○
P0778 (DI–631)	Pressure Control Solenoid ”B” Electrical (Shift Solenoid Valve SL2)	◀Open or short in shift solenoid valve SL2 circuit ◀Shift solenoid valve SL2 ◀ECM	▶	○
P0781 (DI–636)	1–2 Shift (1 –2 Shift Valve)	◀Valve body is blocked up or stuck (1–2 shift valve) ◀Automatic transmission (clutch, brake or gear, etc.)	▶	○
P0973 (DI–641)	Shift Solenoid ”A” Control Circuit Low (Shift Solenoid Valve S1)	◀Short in shift solenoid valve S1 circuit ◀Shift solenoid valve S1 ◀ECM	▶	○
P0974 (DI–641)	Shift Solenoid ”A” Control Circuit High (Shift Solenoid Valve S1)	◀Open in shift solenoid valve S1 circuit ◀Shift solenoid valve S1 ◀ECM	▶	○
P0976 (DI–646)	Shift Solenoid ”B” Control Circuit Low (Shift Solenoid Valve S2)	◀Short in shift solenoid valve S2 circuit ◀Shift solenoid valve S2 ◀ECM	▶	○
P0977 (DI–646)	Shift Solenoid ”B” Control Circuit High (Shift Solenoid Valve S2)	◀Open in shift solenoid valve S2 circuit ◀Shift solenoid valve S2 ◀ECM	▶	○
P0985 (DI–651)	Shift Solenoid ”E” Control Circuit Low (Shift Solenoid Valve SR)	◀Short in shift solenoid valve SR circuit ◀Shift solenoid valve SR ◀ECM	▶	○
P0986 (DI–651)	Shift Solenoid ”E” Control Circuit High (Shift Solenoid Valve SR)	◀Open in shift solenoid valve SR circuit ◀Shift solenoid valve SR ◀ECM	▶	○
P2714 (DI–656)	Pressure Control Solenoid ”D” Performance (Shift Solenoid Valve SLT)	◀Shift solenoid valve SLT remains open or closed ◀Valve body is blocked ◀Automatic transmission (clutch, brake or gear, etc.)	▶	○
P2716 (DI–662)	Pressure Control Solenoid ”D” Electrical (Shift Solenoid Valve SLT)	◀Open or short in shift solenoid valve SLT circuit ◀Shift solenoid valve SLT ◀ECM	▶	○
P2740 (DI–666)	Transmission Fluid Temperature Sensor ”B” Circuit	◀Open or short in ATF temperature sensor No.2 circuit ◀Transmission wire (ATF temperature sensor No.2) ◀ECM	▶	○
P2742 (DI–666)	Transmission Fluid Temperature Sensor ”B” Circuit Low Input	◀Short in ATF temperature sensor No.2 circuit ◀Transmission wire (ATF temperature sensor No.2) ◀ECM	▶	○
P2743 (DI–666)	Transmission Fluid Temperature Sensor ”B” Circuit High Input	◀Open in ATF temperature sensor No.2 circuit ◀Transmission wire (ATF temperature sensor No.2) ◀ECM	▶	○
P2757 (DI–672)	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	◀Shift solenoid valve SLU remains open or closed ◀Valve body is blocked ◀Torque converter clutch ◀Automatic transmission (clutch, brake or gear, etc.) ◀Line pressure is too low	▶	○
P2759 (DI–680)	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	◀Open or short in shift solenoid valve SLU circuit ◀Shift solenoid valve SLU ◀ECM	▶	○

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P2772* (DI–685)	Transfer L4 SW Circuit	◀Short in transfer L4 position switch circuit ◀Transfer L4 position switch ◀4WD control ECU ◀ECM	▶	○

HINT:
*: 4WD

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DIDJ5–01

CIRCUIT INSPECTION

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(2–trip detection logic) ▶All switches are OFF simultaneously for NSW, R, N, D, 3 and 2 positions. ▶2 or more switches are ON simultaneously for NSW, R, D, 3 and 2 positions.	▶Open or short in park/neutral position switch circuit ▶Park/neutral position switch ▶ECM

MONITOR DESCRIPTION

These DTCs indicate a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.
The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that engine can be started only when the shift lever is in the P or N position.
The park/neutral position switch sends a signal to the ECM according to the shift position (NSW, R, D, 3 or 2).
The ECM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705	Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch	
Frequency of operation	Continuous	
Duration	Condition (A)	2 sec.
	Condition (B)	60 sec.
MIL operation	2 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
Ignition switch	ON	
Battery voltage	10.5 V or more	

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TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
One of the following conditions is met: Condition (A) or (B)	
Condition (A)	
Number of the following signal input at the same time	2 or more
NSW switch	ON
R switch	
D switch	
3 switch	
2 switch	
Condition (B)	
All of following conditions are met	
N switch	OFF
NSW switch	
R switch	
D switch	
3 switch	
2 switch	

COMPONENT OPERATING RANGE

Parameter	Standard value
Park/neutral position switch	The park/neutral position switch sends only one signal to the ECM.

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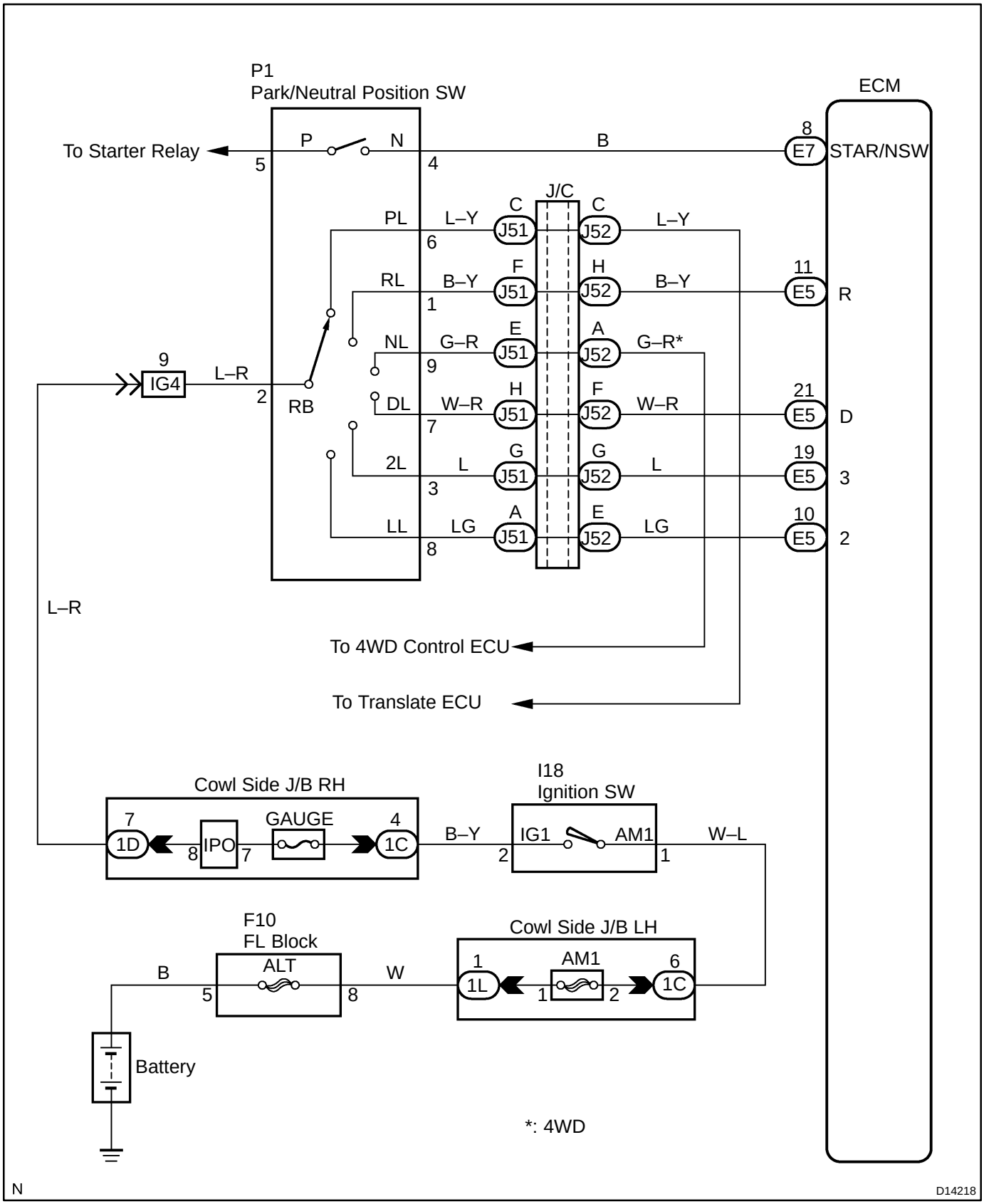
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand–held tester.
(f) When you use the hand–held tester:
Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST”.
(g) According to the display on the tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the hand–held tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
LOW	PNP SW Status/ ON or OFF	▶Shift lever position is 2: OFF ↓ ▶Shift position L switch Push: ON ↓ ▶Shift position L switch Push: OFF	↑
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2 and L: ON Except 2 and L: OFF	↑
3RD	PNP SW Status/ ON or OFF	Shift lever position is; 3: ON Except 3: OFF	↑
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D: ON Except D: OFF	↑
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	↑

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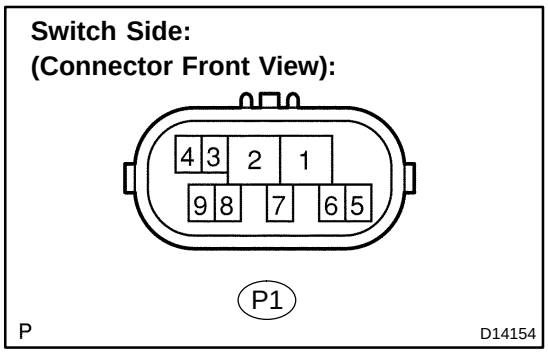
1	Inspect park/neutral position switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Disconnect the park/neutral position switch connector.

CHECK:

Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

OK:

Shift Position	Tester Connection	Specified Condition
P	2 – 6 and 4 – 5	Below 1 Ω
Except P	↑	10 kΩ or higher
R	2 – 1	Below 1 Ω
Except R	↑	10 kΩ or higher
N	2 – 9 and 4 – 5	Below 1 Ω
Except N	↑	10 kΩ or higher
D	2 – 7	Below 1 Ω
Except D	↑	10 kΩ or higher
3	2 – 3	Below 1 Ω
Except 3	↑	10 kΩ or higher
2	2 – 8	Below 1 Ω
Except 2	↑	10 kΩ or higher

NG → **Replace park/neutral position switch (See page AT–9).**

OK

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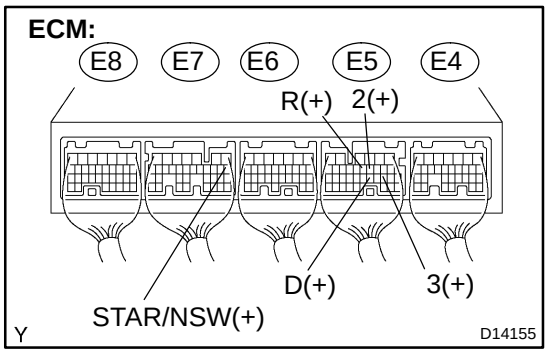
2	Check harness and connector (Park/neutral position switch – ECM).



PREPARATION:

(a) Connect the park/neutral position switch connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

OK:

Shift Position	Tester connection	Specified condition
P and N	E7 – 8 (STAR/NSW) – Body ground	Below 2 V
Except P and N	↑	10 to 14 V
R	E5 – 11 (R) – Body ground	10 to 14 V*
Except R	↑	Below 1 V
D and 4	E5 – 21 (D) – Body ground	10 to 14 V
Except D and 4	↑	Below 1 V
3	E5 – 19 (3) – Body ground	10 to 14 V
Except 3	↑	Below 1 V
2 and L	E5 – 10 (2) – Body ground	10 to 14 V
Except 2 and L	↑	Below 1 V

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

NG → **Repair or replace the harness or connector (See page IN–35).**

OK →

Replace the ECM (See page SF–80).

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DIDJ6–01

DTC	P0710	Transmission Fluid Temperature Sensor ”A” Circuit

DTC	P0712	Transmission Fluid Temperature Sensor ”A” Circuit Low Input

DTC	P0713	Transmission Fluid Temperature Sensor ”A” Circuit High Input

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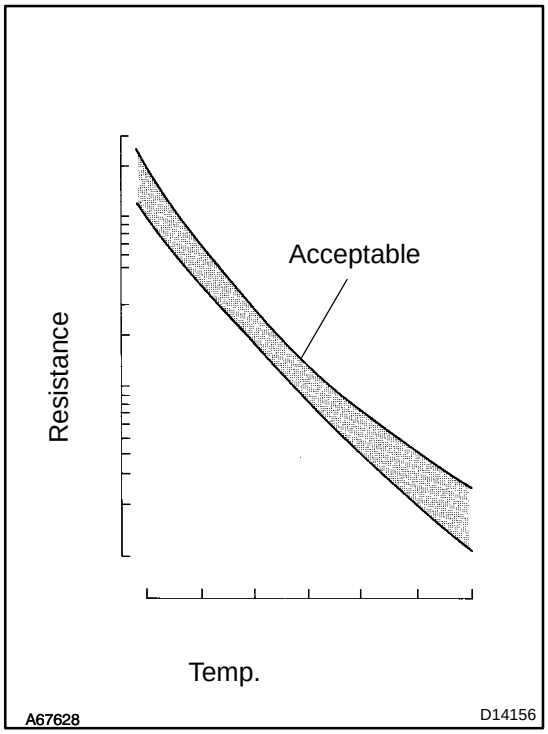
CIRCUIT DESCRIPTION



The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies a voltage to the temperature sensor through ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0710	(a) and (b) are detected momentarily within 0.5 sec. when neither P0712 nor P0713 is detected (1–trip detection logic) (a) ATF temperature sensor No.1 resistance is less than 79 Ω. (b) ATF temperature sensor No.1 resistance is more than 156 kΩ. HINT: Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a)	▶Open or short in ATF temperature sensor No.1 circuit ▶Transmission wire (ATF temperature sensor No.1) ▶ECM
P0712	ATF temperature sensor No.1 resistance is less than 79 Ω for 0.5 sec. or more (1–trip detection logic)	▶Short in ATF temperature sensor No.1 circuit ▶Transmission wire (ATF temperature sensor No.1) ▶ECM
P0713	ATF temperature No.1 sensor resistance is more than 156 kΩ when 15 minutes or more have elapsed after the engine start DTC is detected for 0.5 sec. or more (1–trip detection logic)	▶Open in ATF temperature sensor No.1 circuit ▶Transmission wire (ATF temperature sensor No.1) ▶ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the automatic transmission fluid (ATF) temperature sensor circuit. The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79Ω*1 or more than 156kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.
*1: 150◀C (302◀F) or more is indicated regardless of the actual ATF temperature.
*2: –40◀C (–40◀F) is indicated regardless of the actual ATF temperature.
HINT:
The ATF temperature can be checked on the OBD II scan tool or hand–held tester display.

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MONITOR STRATEGY

Related DTCs	P0710	ATF temperature sensor/Range check (Fluttering)
	P0712	ATF temperature sensor/Range check (Low resistance)
	P0713	ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT sensor)	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present.	See page DI–545	
Range check (Fluttering, Low resistance)		
The typical enabling condition is not available.	–	
Range check (High resistance)		
Time after engine start	15 min. or more	–

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Fluttering)	
TFT (transmission fluid temperature) sensor resistance	Less than 79 Ω or More than 156 kΩ
Range check (Low resistance)	
TFT (transmission fluid temperature) sensor resistance	Less than 79 Ω
Range check (High resistance)	
TFT (transmission fluid temperature) sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

Parameter	Standard value
TFT (transmission fluid temperature) sensor	Atmospheric temperature to approx. 130˚C (266˚F)

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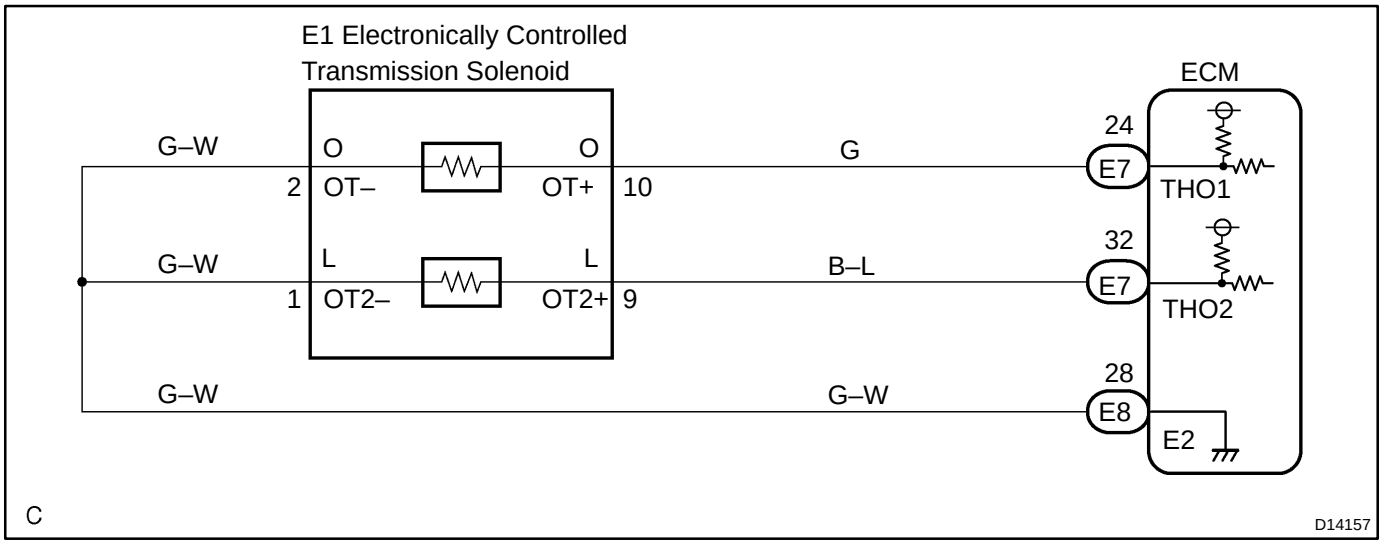
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand–held tester.
(f) When you use the hand–held tester:
Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST”.
(g) According to the display on the tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP 1	ATF Temp. Sensor Value/ min.: –40◀C (–40◀F) max.: 215◀C (419◀F)	▶After Stall Test; Approx. 80◀C (176◀F) ▶Equal to ambient temperature when cold soak

HINT:

When DTC P0712 is output and hand–held tester output is 150◀C (302◀F) or more, there is a short circuit.
When DTC P0713 is output and hand–held tester output is –40◀C (–40◀F), there is an open circuit.
Measure the resistance between terminal THO1 (OT) and body ground.

Temperature Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
150˚C (302˚F) or more	Short circuit

HINT:

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 second).
When P0713 is set, P0711 cannot be detected.
It is not necessary to inspect the circuit when P0711 is set.

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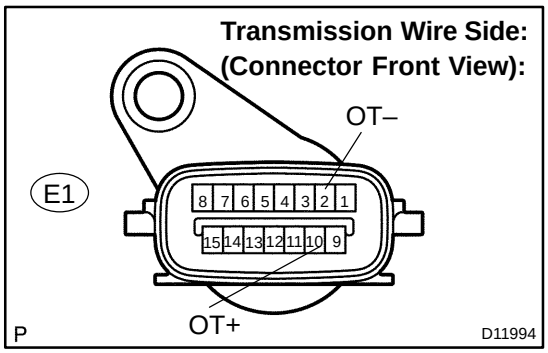
1	Inspect transmission wire (ATF temperature sensor No.1).



PREPARATION:

Disconnect the transmission wire connector from the transmission.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
2 (OT–) – 10 (OT+)	79 Ω to 156 kΩ
2 (OT–) – Body ground	10 kΩ or higher
10 (OT+) – Body ground	10 kΩ or higher

HINT:

If the resistance is out of the specified range with either the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

ATF Temperature	Specified Condition
20°C (68°F)	3 to 4 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → **Repair or replace the transmission wire (ATF temperature sensor No.1) (See page AT–7).**

OK

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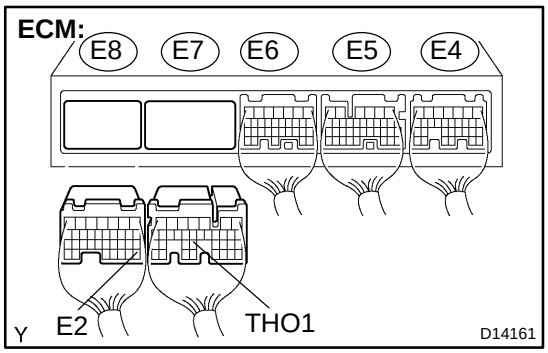
2	Check harness and connector (Transmission wire – ECM).



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 24 (THO1) – E8 – 28 (E2)	79 Ω to 156 kΩ

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 24 (THO1) – Body ground	10 kΩ or higher
E8 – 28 (E2) – Body ground	↑

NG → **Repair or replace the harness or connector (See page IN–35).**

OK

Replace the ECM (See page SF–80).

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DIDJ7–01

DTC	P0711	Transmission Fluid Temperature Sensor ”A” Performance

CIRCUIT DESCRIPTION

See page DI–582.

DTC No.	DTC Detection Condition	Trouble Area
P0711	Both (a) and (b) are detected: (2–trip detection logic) (a) Intake air and engine coolant temps. are more than –20°C (–4°F) at engine start (b) After normal driving for over 22 min. and 9 km (6 mile) or more, ATF temp. is less than 10°C (50°F)	▶Transmission wire (ATF temperature sensor No.1)

MONITOR DESCRIPTION

This DTC indicates that there is a problem with output from the automatic transmission fluid (ATF) temperature sensor and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an open or short in the ATF temperature circuit or a fault in the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 20°C (68°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.

MONITOR STRATEGY

Related DTCs	P0711	ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor (TFT sensor)	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
TFT (transmission fluid temperature) sensor circuit	Not circuit malfunction	
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction	
IAT (Intake air temperature) sensor circuit	Not circuit malfunction	
Time after engine start	21 min. and 40 sec.	
Driving distance after engine start	9 km (5.6 mile) or more	–
IAT (12 sec. after engine start)	–10°C (14°F) or more	–
ECT (12 sec. after engine start)	–10°C (14°F) or more	–

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TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
TFT (transmission fluid temperature)	Less than 20°C (68°F) (varies with TFT (transmission fluid temperature) at engine start)

WIRING DIAGRAM

See page DI–582.

INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand–held tester.
(f) When you use the hand–held tester:
Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST”.
(g) According to the display on the tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP 1	ATF Temp. Sensor Value/ min.: –40◀C (–40◀F) max.: 215◀C (419◀F)	▶After Stall Test; Approx. 80◀C (176◀F) ▶Equal to ambient temperature when cold soak

HINT:

When DTC P0712 is output and hand–held tester output is 150◀C (302◀F) or more, there is a short circuit.
When DTC P0713 is output and hand–held tester output is –40◀C (–40◀F), there is an open circuit.
Measure the resistance between terminal THO1 (OT) and body ground.

Temperature Displayed	Malfunction
–40°C (–40°F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 second).
When P0713 is set, P0711 cannot be detected.
It is not necessary to inspect the circuit when P0711 is set.

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1	**Check other DTCs output (in addition to DTC P0711).**

PREPARATION:

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the item ”DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0711” is output	A
”P0711” and other DTCs	B

HINT:

If any other codes besides ”P0711” are output, perform troubleshooting for those DTCs first.

B → **Go to DTC chart (See page DI–573).**

A

2	**Check transmission fluid level (See page DI–524).**

OK:

Automatic transmission fluid level is correct.

NG → **Add fluid (See page DI–524).**

OK

Replace the transmission wire (ATF temperature sensor) (See page AT–7).

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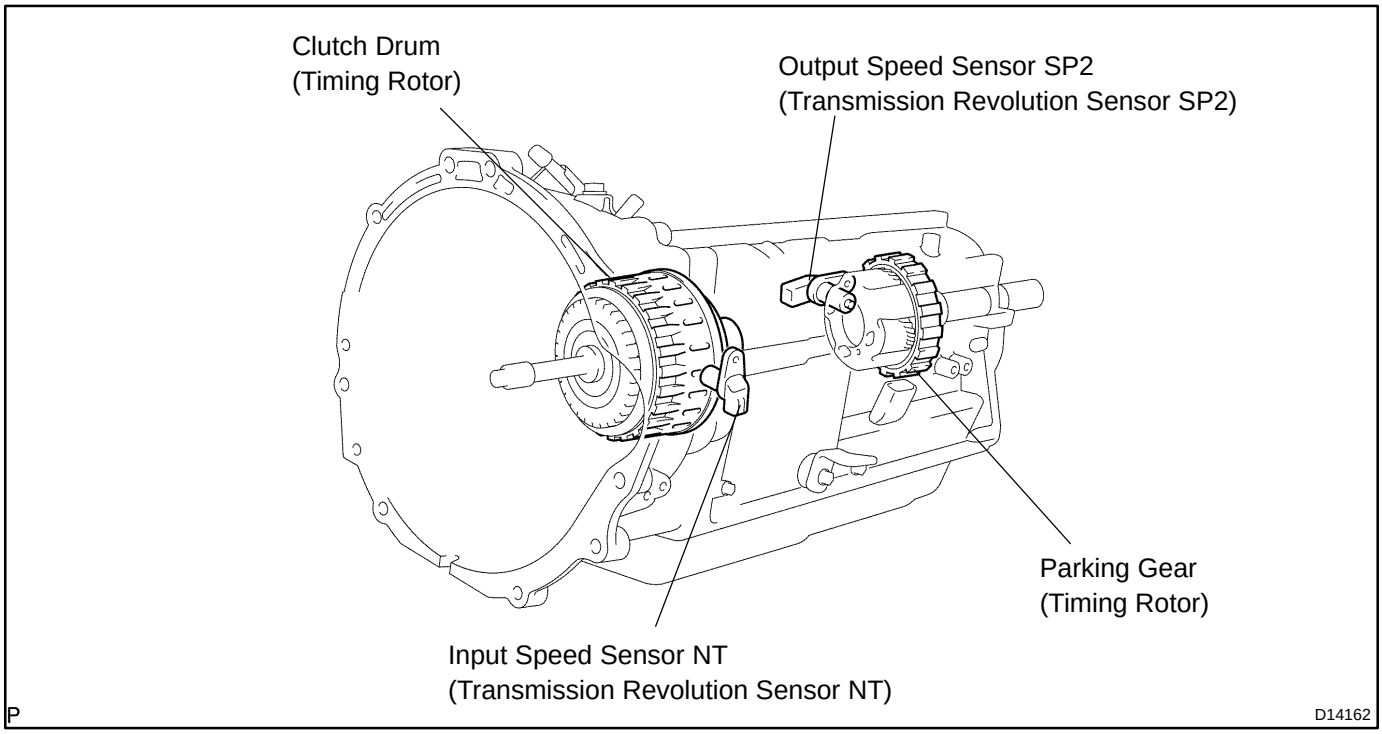
DIDJ8–01

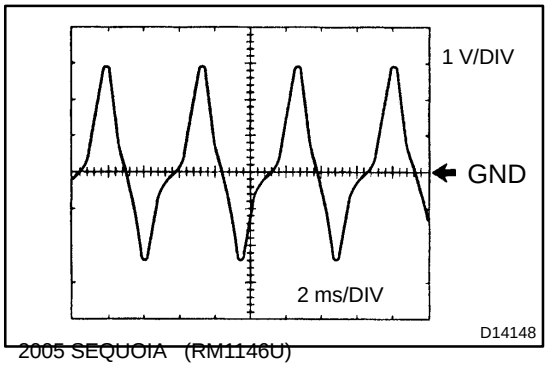
DTC	P0717	Input Speed Sensor Circuit No Signal

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input revolution of transmission. By comparing the input turbine speed signal (NT) with the counter gear speed sensor signal (SP2), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions, thus, providing smooth gear shift.



DTC No.	DTC Detection Condition	Trouble Area
P0717	All conditions below are detected for 5 secs. or more (1–trip detection logic) (a) Gear change is not performed (b) Gear position: 4th or 5th (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 1,000 rpm or more (e) Park/neutral position switch: • NSW input signal is OFF • R input signal is OFF • L input signal is OFF (f) Shift solenoid valves, park/neutral position switch and vehicle speed sensor are in normal operation	▶Open or short in speed sensor (NT) circuit ▶Speed sensor (NT) ▶ECM ▶Automatic transmission (clutch, brake or gear, etc.)



Reference (Using an oscilloscope):

Check the waveform between terminals NT+ and NT– of the ECM connector.

Standard: Refer to the illustration.

Terminal	NT+ – NT–
Tool setting	1V/DIV, 2ms/DIV
Vehicle condition	Engine idle speed (P or N position)

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MONITOR DESCRIPTION

This DTC indicates that pulse is not output from the speed sensor NT (Turbine (input) speed sensor) or is output only little. The NT terminal of the ECM detects the revolving signal from the speed sensor (NT) (input RPM). The ECM outputs a gearshift signal comparing the input speed sensor (NT) with the output speed sensor (SP2).

While the vehicle is operating in the 4th or 5th gear position in the shift position of D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is more than 1000 rpm or more*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.

*1: Pulse is not output or is irregularly output.

*2: The vehicle speed is approx. 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0717	Speed sensor (NT)/Verify pulse input
Required sensors/Components	Main	Speed sensor (NT)
	Sub	Speed sensor (NO)
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
Shift change	Shift change is completed and before starting next shift change operation	
ECM selected gear	4th or 5th	
Output shaft rpm	1,000 rpm or more	–
NSW switch	OFF	
R switch	OFF	
L switch	OFF	
Engine	Running	
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

Parameter	Standard value
Speed sensor (NT)	Input speed is equal to engine speed when lock–up ON.

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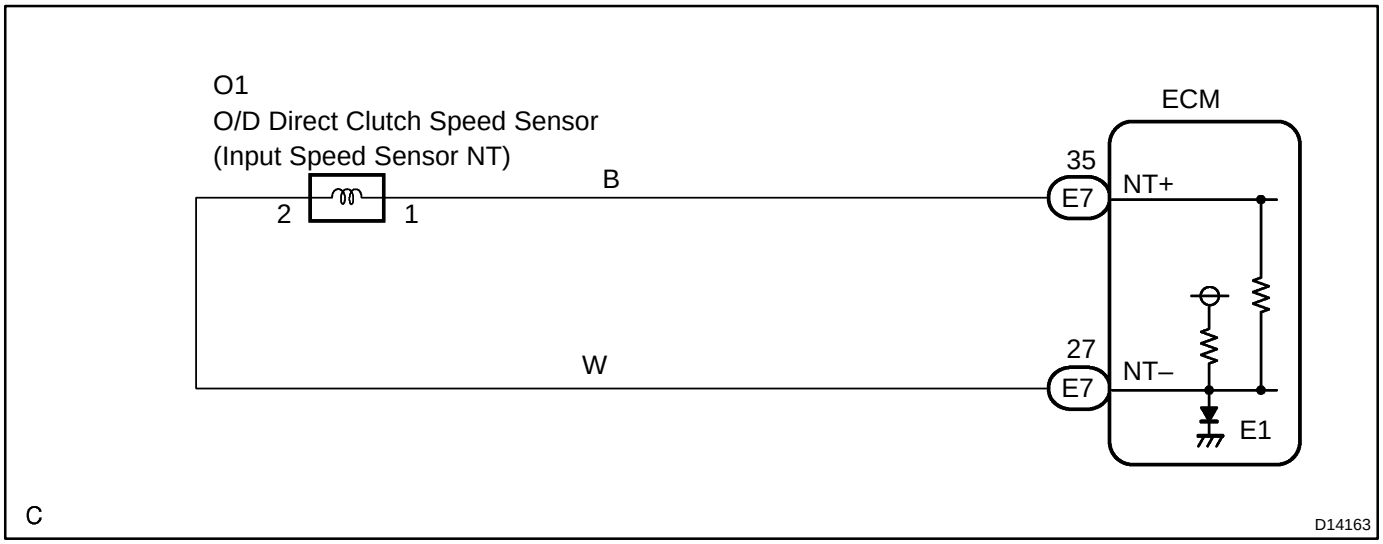
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand–held tester.
(f) When you use the hand–held tester:
Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST”.
(g) According to the display on the tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NT)	Input Turbine Speed/ display: 50 r/min	[HINT] ▶Lock–up ON (After warming up the engine); Input Turbine speed (NT) equal to the engine speed. ▶Lock–up OFF (Idling at N position); Input Turbine speed (NT) nearly equal to the engine speed.

HINT:

- ▶ SPD (NT) is always 0 while driving:
Open or short in the sensor or circuit.
- ▶ SPD (NT) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:
Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

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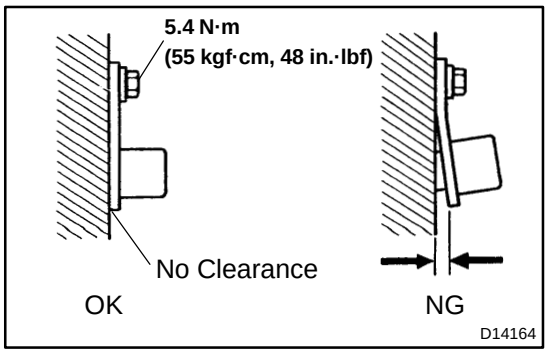
1	Inspect speed sensor installation.



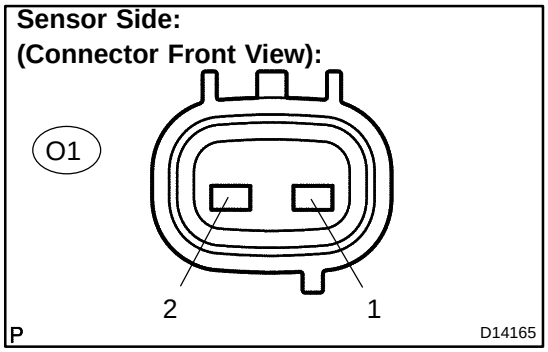
PREPARATION:
Jack up the vehicle.
CHECK:
Check the speed sensor (NT) installation.
OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transmission case.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NG	Replace speed sensor NT (See page AT–5).

OK

2	Inspect speed sensor NT.



PREPARATION:
Disconnect the speed sensor connector from the transmission.
CHECK:
Measure the resistance according to the value(s) in the table below.
OK:

Tester Connection	Specified Condition 20 ◀C (68 ◀F)
1 – 2	560 to 680 Ω

NG	Replace speed sensor NT (See page AT–5).

OK

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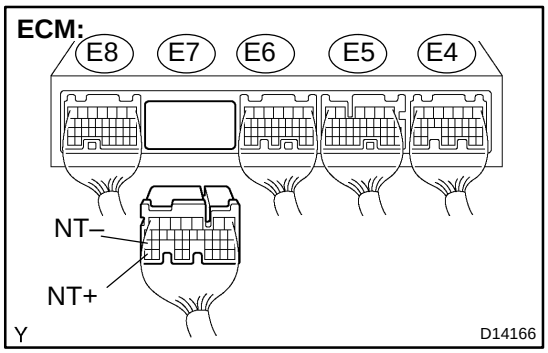
3	Check harness and connector (ECM – speed sensor NT).



PREPARATION:

(a) Connect the speed sensor connector.

(b) Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
E7 – 35 (NT+) – E7 – 27 (NT–)	560 to 680 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 35 (NT+) – Body ground	10 kΩ or higher
E7 – 27 (NT–) – Body ground	↑

NG → **Repair or replace the harness or connector (See page IN–35).**

OK →

Replace the ECM (See page SF–80).

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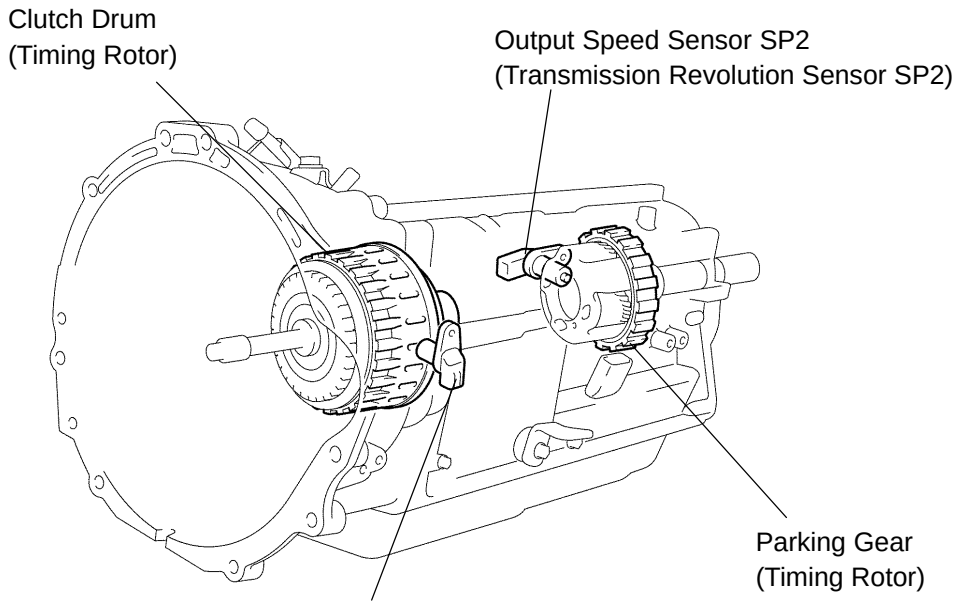
DIDJ9–01

DTC	P0722	Output Speed Sensor Circuit No Signal

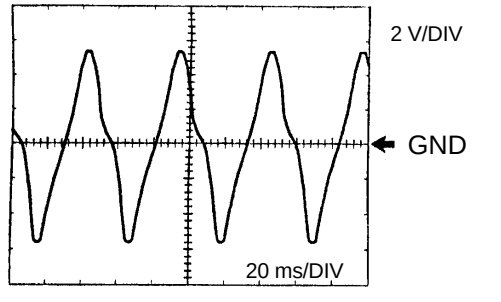
CIRCUIT DESCRIPTION

The speed sensor SP2 detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals. An AC voltage is generated in the speed sensor SP2 coil as the parking gear mounted on the rear planetary gear assy rotates, and this voltage is sent to the ECM. The parking gear on the rear planetary gear is used as the timing rotor for this sensor. The gear shift point and lock–up timing are controlled by the ECM based on the signals from this vehicle speed sensor and the throttle position sensor signal.



P D14162

DTC No.	DTC Detection Condition	Trouble Area
P0722	All conditions below are detected 500 times or more continuously (1–trip detection logic) (a) No signal from speed sensor (SP2) is input to ECM while 4 pulses of No. 1 vehicle speed sensor signal are sent (b) Vehicle speed is 9 km/h (6 mph) or more for at least 4 sec. (c) Park/neutral position switch is OFF. (d) Transfer position is except neutral (4WD).	▶Open or short in speed sensor (SP2) circuit ▶Speed sensor (SP2) ▶ECM ▶Automatic transmission (clutch, brake or gear, etc.)



C13480 D14149

Reference (Using an oscilloscope):

Check the waveform between terminals SP2+ and SP2– of the ECM connector.

Standard: Refer to the illustration.

Terminal	SP2+ – SP2–
Tool setting	2V/DIV, 20ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

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MONITOR DESCRIPTION

The output speed sensor SP2 monitors the output shaft speed. The ECM controls the gearshift point and the lock up timing based on the signals from the output speed sensor SP2 and throttle position sensor.
If the ECM detects no signal from the output shaft speed sensor SP2 even while the vehicle is moving, it will conclude that is a malfunction of the output speed sensor SP2. The ECM will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0722	Speed sensor SP2/Verify pulse input
Required sensors/Components	Speed sensor SP2	
Frequency of operation	Continuous	
Duration	500 output shaft revolution	
MIL operation	Immediate	
Sequence of operation	None	

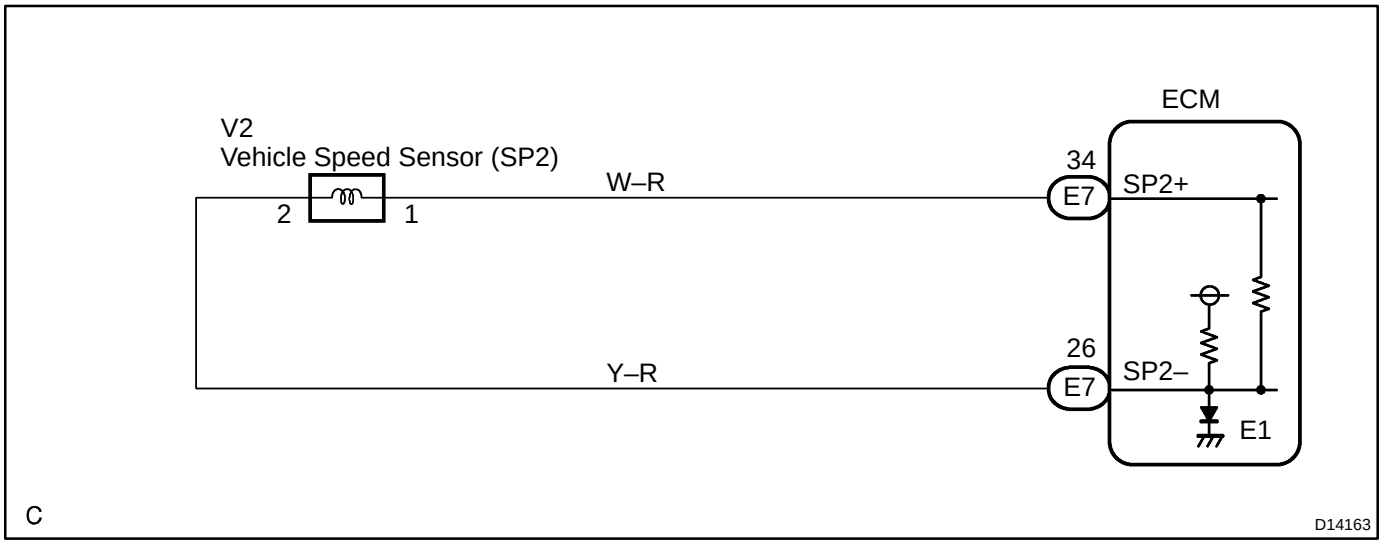
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
Vehicle speed sensor pulse input	4	
Vehicle speed range (4 sec. or more)	9 km/h (5.59 mph) or more	–
NSW switch	OFF	
Battery voltage	8 V or more	–
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output speed sensor pulse input	No input

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

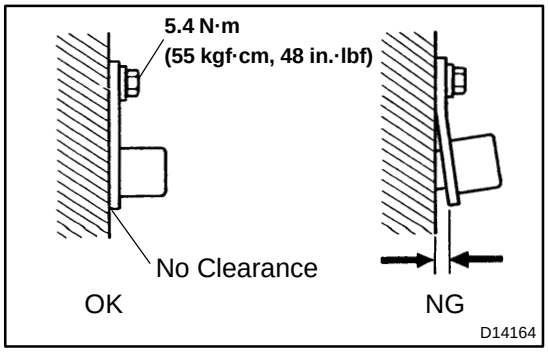
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand–held tester.
(f) When you use the hand–held tester:
Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST”.
(g) According to the display on the tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition
SPD (SP2)	Output shaft Speed/ min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph) [HINT] Equal to vehicle speed

HINT:

- SPD (SP2) is always 0 while driving:
Open or short in the sensor or circuit.
- SPD (SP2) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:
Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1	**Inspect speed sensor installation.**



PREPARATION:

Jack up the vehicle.

CHECK:

Check the speed sensor (SP2) installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transmission case.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NG → **Replace speed sensor SP2 (See page AT–5).**

OK

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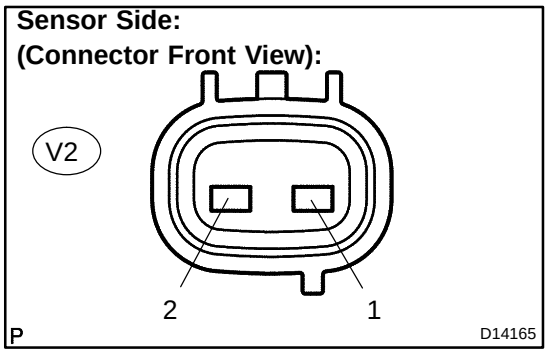
2	Inspect speed sensor SP2.



PREPARATION:

Disconnect the speed sensor connector from the transmission.

CHECK:

Measure the resistance according to the value(s) in the table below.

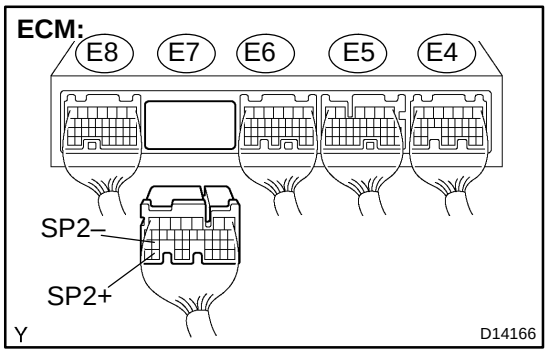
OK:

Tester Connection	Specified Condition 20 ◀C (68 ◀F)
1 – 2	560 to 680 Ω

NG → **Replace speed sensor SP2 (See page AT–5).**

OK

3	Check harness and connector (ECM – speed sensor SP2).



PREPARATION:

(a) Connect the speed sensor connector.

(b) Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20◀C (68◀F)
E7 – 34 (SP2+) – E7 – 26 (SP2–)	560 to 680 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 34 (SP2+) – Body ground	10 kΩ or higher
E7 – 26 (SP2–) – Body ground	↑

NG → **Repair or replace the harness or connector (See page IN–35).**

OK

Replace the ECM (See page SF–80).

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DIDJA–01

DTC	P0724	Brake Switch ”B” Circuit High

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in lock–up condition when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to the ECM. Then the ECM cancels the operation of the lock–up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	The stop light switch remains ON even when the vehicle is driven in a STOP (less than 3 km/h (2 mph)) and GO (30 km/h (19 mph) or more) fashion 5 times. (2–trip detection logic).	▶Short in stop light switch signal circuit ▶Stop light switch ▶ECM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains on. When the stop light switch remains ON during ”stop and go” driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop (less than 3 km/h (2 mph)) and go (30 km/h (19 mph) or more) ten times for two driving cycles in order to detect a malfunction.

MONITOR STRATEGY

Related DTCs	P0724	Stop light switch/Range check/Rationality
Required sensors/Components	Main	Stop light switch
	Sub	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	GO and STOP 5 times	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
Battery voltage	8 V or more	–
Ignition switch	ON	
Starter	OFF	
GO (Vehicle speed is 30 km/h (18.63 mph) or more)	Once	
STOP (Vehicle speed is less than 3 km/h (1.86 mph))	Once	

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Brake switch	Remain ON during GO and STOP 5 times

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WIRING DIAGRAM

See page DI–283.

INSPECTION PROCEDURE

1	**Read value of DATA LIST (STP signal).**

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand–held tester.
(f) When you use the hand–held tester:
Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST”.
(g) According to the display on the tester, read the ”DATA LIST”.
Standard:

Item	Measurement Item/ Range (display)	Normal Condition
Stop Light Switch	Stop light SW Status/ ON or OFF	▶Brake Pedal is depressed: ON ▶Brake Pedal is released: OFF

NOTICE:

In the table above, the conditions listed under ”Normal Condition” are reference conditions. Do not depend solely on these reference conditions when deciding whether a part is faulty or not.

OK:

Brake Pedal Condition	Specified Condition
Depressed	ON
Released	OFF

NG → **Go to step 2.**

OK

Go to step 3.

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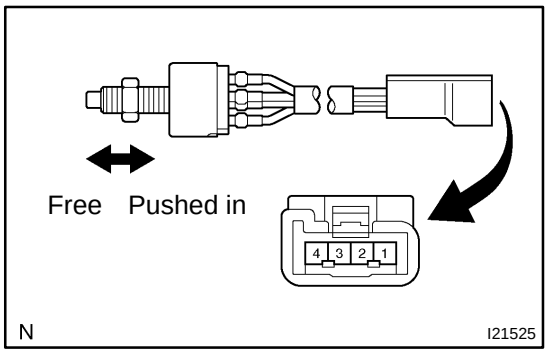
2	Inspect stop light switch.



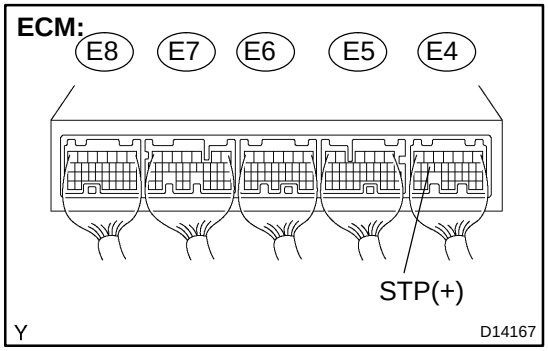
PREPARATION:
Remove the stop lamp switch assy.
CHECK:
Measure the resistance according to the value(s) in the table below.
OK:

Switch position	Tester Connection	Specified Condition
Switch pin free	1 – 4	Below 1 Ω
Switch pin pushed in	↑	10 kΩ or higher
Switch pin free	2 – 3	10 kΩ or higher
Switch pin pushed in	↑	Below 1 Ω

NG → **Replace stop light switch (See page BR–8).**

OK

3	Check harness and connector (ECM – stop light switch).



PREPARATION:
Install the stop lamp switch assy.
CHECK:
Measure the voltage according to the value(s) in the table below when the brake pedal is depressed and released.
OK:

Condition	Tester Connection	Specified Condition
Brake pedal is depressed	E4 – 15 (STP) – Body ground	10 to 14 V
Brake pedal is released	↑	Below 1 V

NG → **Repair or replace the harness or connector (See page IN–35).**

OK

Replace the ECM (See page SF–80).

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DIDJB–01

DTC	P0748	Pressure Control Solenoid ”A” Electrical (Shift Solenoid Valve SL1)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, S1, S2 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page DI–567).

DTC No.	DTC Detection Condition	Trouble Area
P0748	ECM checks for an open or short circuit in shift solenoid valves SL1 (1–trip detection logic) (a) When solenoid, duty ratio equal to 100% (b) When solenoid is not energized, duty ratio is less than 3%	▶Open or short in shift solenoid valve SL1 circuit ▶Shift solenoid valve SL1 ▶ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL1 circuit. The ECM commands gearshift by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail–safe function and turns the other normal shift solenoid valves ”ON/OFF”. (In case of an open or short circuit, the ECM stops sending current to the circuit.)
While driving and shifting between 4th and 5th gears, if the ECM detects an open or short in the shift solenoid valve SL1 circuit, the ECM determines there is a malfunction (See page DI–567).

MONITOR STRATEGY

Related DTCs	P0748	Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
Battery voltage	10 V or more	–
CPU commanded duty	–	Less than 75%
Ignition switch	ON	
Switch	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output signal duty	100%

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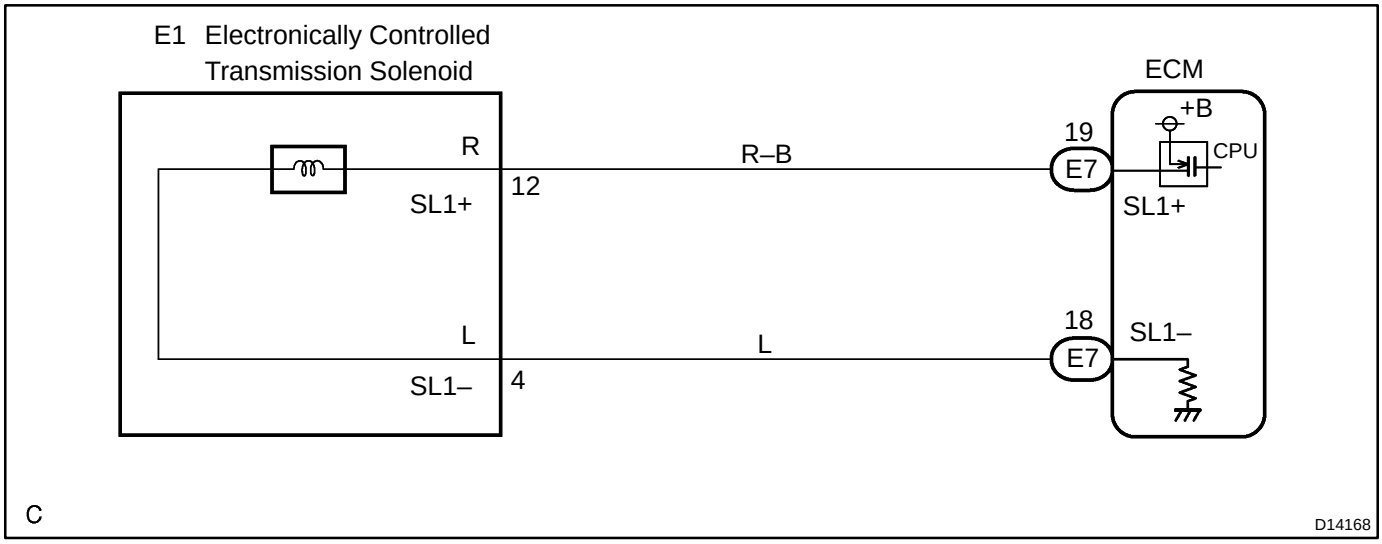
COMPONENT OPERATING RANGE

Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



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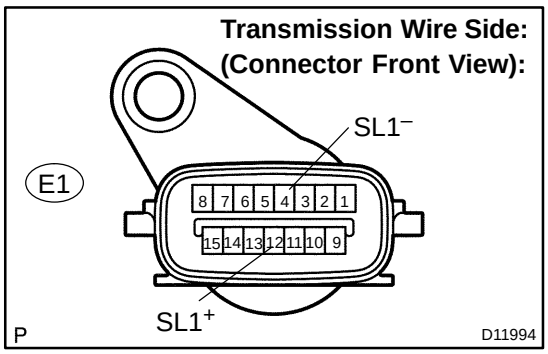
INSPECTION PROCEDURE

HINT:

▶ The shift solenoid valve SL1 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve SL1	OFF	OFF	OFF	OFF	ON

1	**Inspect transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20◀C (68◀F)
12 (SL1+) – 4 (SL1–)	5.0 to 5.6 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
12 (SL1+) – Body ground	10 kΩ or higher
4 (SL1–) – Body ground	↑

NG → **Go to step 3.**

OK

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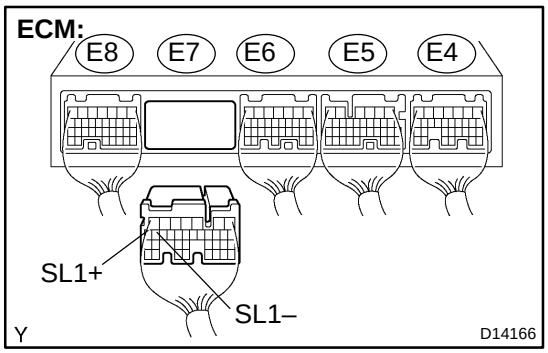
2	Check harness and connector (Transmission wire – ECM)



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
E7 – 19 (SL1+) – E7 – 18 (SL1–)	5.0 to 5.6 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 19 (SL1+) – Body ground	10 kΩ or higher
E7 – 18 (SL1–) – Body ground	↑

NG → **Repair or replace the harness or connector (See page IN–35).**

OK →

Replace the ECM (See page SF–80).

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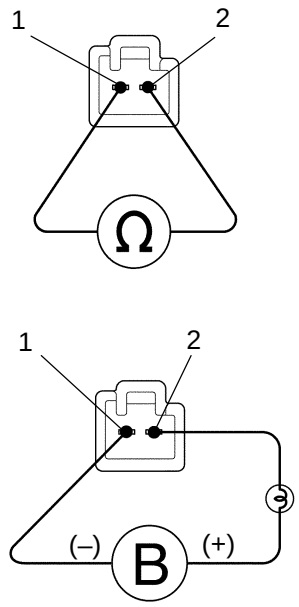
3	Inspect shift solenoid valve SL1.

Shift Solenoid Valve SL1:



D12795

PREPARATION:

Remove the shift solenoid valve SL1 (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve SL1 (See page AT–10).**

OK →

Repair or replace the transmission wire (See page AT–7).

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DIDJC–01

DTC	P0751	Shift Solenoid ”A” Performance (Shift Solenoid Valve S1)

SYSTEM DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear, etc.).

DTC No.	DTC Detection Condition	Trouble Area
P0751	The gear required by the ECM does not match the actual gear when driving (2–trip detection logic)	▶Shift solenoid valve S1 remains open or closed ▶Valve body is blocked ▶Automatic transmission (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

This DTC indicates ”stuck ON malfunction” or ”stuck OFF malfunction” of the shift solenoid valve S1.
The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0751	Shift solenoid valve S1/OFF malfunction
		Shift solenoid valve S1/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S1
	Sub	Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A) and (B)	0.4 sec.
	OFF malfunction (C)	Immediate
	ON malfunction (A), (B) and (C)	0.4 sec.
	ON malfunction (D)	3 sec.
	ON malfunction (E)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
Turbine speed sensor circuit	Not circuit malfunction	
Output speed sensor circuit	Not circuit malfunction	
Shift solenoid valve S1 circuit	Not circuit malfunction	
Shift solenoid valve S2 circuit	Not circuit malfunction	
Shift solenoid valve SR circuit	Not circuit malfunction	
Shift solenoid valve SL1 circuit	Not circuit malfunction	

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Shift solenoid valve SL2 circuit	Not circuit malfunction	
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction	
KCS sensor circuit	Not circuit malfunction	
ETCS (Electric throttle control system)	Not system down	
Transmission range	”D”	
ECT	40˚C (104˚F) or more	–
Spark advance from Max. retard timing by KCS control	0˚ CA or more	–
Engine	Starting	
Transfer range	”HIGH”*1	
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor circuit	Not circuit malfunction	
Output shaft speed sensor circuit	Not circuit malfunction	
Transfer output speed	143 rpm or more	–
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 to 1.1	
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 to 40 km/h (1.2 to 24.9 mph)	
Throttle valve opening angle	8% or more and 7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	–
Actual gear when ECM selected 4th gear	4th	
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 to 40 km/h (1.2 to 24.9 mph)	
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1.2 mph) or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction (C)		
ECM selected gear	3rd	
Vehicle speed	2 km/h (1.2 mph) or more	–

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Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	–	Less than 100 km/h (62.2 mph)
ON malfunction (E)		
ECM selected gear	5th	
Engine speed – Turbine speed (NE – NT) (After transition from 4th to 5th gear)	–	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	–	Less than 100 km/h (62.2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: Conditions (A), (B) and (C)	
2 detections are necessary per driving cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A)	
Turbine speed/Output speed	0.93 to 1.07
OFF malfunction (B)	
Turbine speed/Output speed	0.65 to 0.79
OFF malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
Either of the following conditions is met: **▶ON malfunction (A) and (B)** **▶ON malfunction (B) or (C), and ON malfunction (D) or (E)**	
ON malfunction (A) and (B)	
Turbine speed/Output speed	3.30 to 7.50
ON malfunction (C)	
Turbine speed/Output speed	1.91 to 2.35
ON malfunction (D)	
Turbine speed – Output speed x 4th gear ratio (NT – NO x 4th gear ratio)	1,000 rpm or more
ON malfunction (E)	
Turbine speed – Output speed x 5th gear ratio (NT – NO x 5th gear ratio)	1,000 rpm or more

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INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST”.
(g) According to the display on the tester, perform the ”ACTIVE TEST”.

HINT:

While driving, the shift position can be forcibly changed with the hand–held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page DI–567).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ▶Press ”→” button: Shift up ▶Press ”←” button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

- ▶ This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- ▶ The 4th to 5th up–shiftings must be performed with the accelerator pedal released.
- ▶ The 5th to 4th down–shiftings must be performed with the accelerator pedal released.
- ▶ Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.
- ▶ The shift position commanded by the ECM is shown in the DATA LIST (SHIFT) display on the hand–held tester.
- ▶ The shift solenoid valve S1 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve S1	ON	ON	OFF	OFF	OFF

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1	**Check other DTCs output (in addition to DTC P0751).**

PREPARATION:

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the item ”DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0751” is output	A
”P0751” and other DTCs	B

HINT:

If any other codes besides ”P0751” are output, perform troubleshooting for those DTCs first.

B → **Go to DTC chart (See page DI–573).**

A

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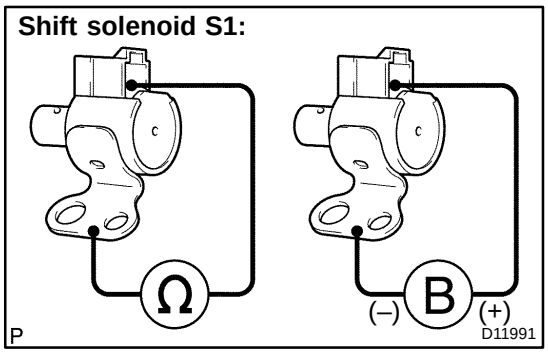
2	Check shift solenoid valve S1 operation.



PREPARATION:

Remove the shift solenoid valve S1 (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (S1) – Solenoid Body (S1)	11 to 15 Ω

CHECK:

Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (–) lead to the solenoid body.

OK:

The solenoid makes an operating sound.

NG → **Replace shift solenoid valve S1 (See page AT–10).**

OK

3	Inspect valve body (See page AT–10).

OK:

There are no foreign objects on each valve.

NG → **Repair or replace valve body.**

OK

Repair or replace transmission (See page AT–25).

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DIDJD–01

DTC	P0756	Shift Solenoid ”B” Performance (Shift Solenoid Valve S2)

SYSTEM DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear, etc.).

DTC No.	DTC Detection Condition	Trouble Area
P0756	The gear required by the ECM does not match the actual gear when driving (2–trip detection logic)	▶Shift solenoid valve S2 remains open or closed ▶Valve body is blocked ▶Automatic transmission (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

This DTC indicates ”stuck ON malfunction” or ”stuck OFF malfunction” of the shift solenoid valve S2.
The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0756	Shift solenoid valve S2/OFF malfunction
		Shift solenoid valve S2/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S2
	Sub	Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A), (B), (C)	0.4 sec.
	OFF malfunction (D)	Immediate
	ON malfunction (A) and (B)	0.4 sec.
	ON malfunction (C)	3 sec.
	ON malfunction (D)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
Turbine speed sensor circuit	Not circuit malfunction	
Output speed sensor circuit	Not circuit malfunction	
Shift solenoid valve S1 circuit	Not circuit malfunction	
Shift solenoid valve S2 circuit	Not circuit malfunction	
Shift solenoid valve SR circuit	Not circuit malfunction	
Shift solenoid valve SL1 circuit	Not circuit malfunction	
Shift solenoid valve SL2 circuit	Not circuit malfunction	
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction	
KCS sensor circuit	Not circuit malfunction	
ETCS (Electric throttle control system)	Not system down	
Transmission range	”D”	
ECT	40˚C (104˚F) or more	–
Spark advance from Max. retard timing by KCS control	0˚ CA or more	–
Engine	Starting	
Transfer range	”HIGH”*1	
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor circuit	Not circuit malfunction	
Output shaft speed sensor circuit	Not circuit malfunction	
Transfer output speed	143 rpm or more	–
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 to 1.1	
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 to 40 km/h (1.2 to 24.9 mph)	
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
OFF malfunction (B)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1.2 mph) or more	–
Output speed	2nd → 1st down shift point or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	–
Actual gear when ECM selected 4th gear	4th	
OFF malfunction (D)		
Current ECM selected gear	5th	

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Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 to 40 km/h (1.2 to 24.9 mph)	
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1.2 mph) or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	–	Less than 100 km/h (62 mph)
ON malfunction (D)		
ECM selected gear	5th	
Engine speed – Turbine speed (NE – NT) (After transition from 4th to 5th gear)	–	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	–	Less than 100 km/h (62 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: Conditions (A), (B), (C) and (D)	
2 detections are necessary per driving cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A) and (B)	
Turbine speed/Output speed	3.30 to 7.50
OFF malfunction (C)	
Turbine speed/Output speed	0.65 to 0.79
OFF malfunction (D)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
Both of the following conditions are met: ON malfunction (A) or (B), and ON malfunction (C) or (D)	
ON malfunction (A)	
Turbine speed/Output speed	1.91 to 2.35
ON malfunction (B)	
Turbine speed/Output speed	1.28 to 1.53
ON malfunction (C)	
Turbine speed – Output speed x 4th gear ratio (NT – NO x 4th gear ratio)	1,000 rpm or more

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ON malfunction (E)	
Turbine speed – Output speed x 5th gear ratio (NT – NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST”.
(g) According to the display on the tester, perform the ”ACTIVE TEST”.

HINT:

While driving, the shift position can be forcibly changed with the hand–held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page DI–567).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ▶Press ”→” button: Shift up ▶Press ”←” button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

- ▶ This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- ▶ The 4th to 5th up–shiftings must be performed with the accelerator pedal released.
- ▶ The 5th to 4th down–shiftings must be performed with the accelerator pedal released.
- ▶ Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.
- ▶ The shift position commanded by the ECM is shown in the DATA LIST (SHIFT) display on the hand–held tester.
- ▶ The shift solenoid valve S2 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve S2	OFF	ON	ON	OFF	OFF

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1	**Check other DTCs output (in addition to DTC P0756).**

PREPARATION:

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the item ”DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0756” is output	A
”P0756” and other DTCs	B

HINT:

If any other codes besides ”P0756” are output, perform troubleshooting for those DTCs first.

B → **Go to DTC chart (See page DI–573).**

A

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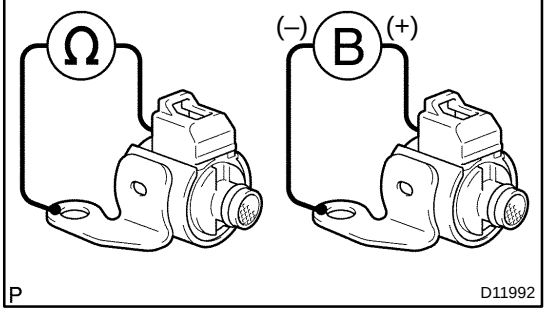
2	Inspect shift solenoid valve S2 operation.

Shift solenoid S2:



PREPARATION:

Remove the shift solenoid valve S2 (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (S2) – Solenoid Body (S2)	11 to 15 Ω

CHECK:

Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (–) lead to the solenoid body.

OK:

The solenoid makes an operating sound.

NG → **Replace shift solenoid valve S2 (See page AT–10).**

OK

3	Inspect valve body (See page AT–10).

OK:

There are no foreign objects on each valve.

NG → **Repair or replace valve body.**

OK

Repair or replace transmission (See page AT–25).

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DTC P0771 Shift Solenoid ”E” Performance (Shift Solenoid Valve SR)

SYSTEM DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear, etc.).

DTC No.	DTC Detection Condition	Trouble Area
P0771	The gear required by the ECM does not match the actual gear when driving (2–trip detection logic)	▶Shift solenoid valve SR remains open or closed ▶Shift solenoid valve SL1 remains open or closed ▶Valve body is blocked ▶Automatic transmission (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

This DTC indicates ”stuck ON malfunction” or ”stuck OFF malfunction” of the shift solenoid valve SR or SL1. The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0771	Shift solenoid valve SR/Rationality check
Required sensors/Components	Main	Shift solenoid valve SR
	Sub	Speed sensor (NT), Speed sensor (NO), Crankshaft position sensor (NE)
Frequency of operation	Continuous	
Duration	OFF malfunction (A)	0.4 sec.
	OFF malfunction (B) and (C)	Immediate
	ON malfunction	0.15 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
Turbine speed sensor circuit	Not circuit malfunction	
Output speed sensor circuit	Not circuit malfunction	
Shift solenoid valve S1 circuit	Not circuit malfunction	
Shift solenoid valve S2 circuit	Not circuit malfunction	
Shift solenoid valve SR circuit	Not circuit malfunction	
Shift solenoid valve SL1 circuit	Not circuit malfunction	
Shift solenoid valve SL2 circuit	Not circuit malfunction	
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction	
KCS sensor circuit	Not circuit malfunction	

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ETCS (Electric throttle control system)	Not system down	
Transmission range	"D"	
ECT	40˚C (104˚F) or more	–
Spark advance from Max. retard timing by KCS control	0˚ CA or more	–
Engine	Starting	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor circuit	Not circuit malfunction	
Output shaft speed sensor circuit	Not circuit malfunction	
Transfer output speed	143 rpm or more	–
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 to 1.1	
OFF malfunction (A)		
ECM selected gear	5th	
Vehicle speed	2 km/h (1.2 mph) or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	–
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction		
Current ECM selected gear	2th	
Last ECM selected gear	1st	
Throttle valve opening angle (During transition from 1st to 2nd gear)	6.0% or more at 3,000 rpm (Conditions vary with engine speed)	–

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunctions (A), (B) and (C)	
2 detections are necessary per driving cycle 1st detection; temporary flag ON 2nd detection; temporary pending fault code ON	
OFF malfunction (A)	
Turbine speed/Output speed	0.93 to 1.07
OFF malfunction (B)	
Turbine speed/Output speed	Not change as follow 0.93 to 1.07 ↓ 0.65 to 0.79

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OFF malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
2 detections are necessary per driving cycle 1st detection; temporary flag ON 2nd detection; temporary pending fault code ON	
Turbine speed – Output speed x 1st gear ratio (NT – NO x 1st gear ratio)	150 rpm or more

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST”.
(g) According to the display on the tester, perform the ”ACTIVE TEST”.

HINT:

While driving, the shift position can be forcibly changed with the hand–held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page DI–567).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ▶Press ”→” button: Shift up ▶Press ”←” button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

- ▶ This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- ▶ The 4th to 5th up–shiftings must be performed with the accelerator pedal released.
- ▶ The 5th to 4th down–shiftings must be performed with the accelerator pedal released.
- ▶ Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.
- ▶ The shift position commanded by the ECM is shown in the DATA LIST (SHIFT) display on the hand–held tester.
- ▶ The shift solenoid valve SR and SL1 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve SR	OFF	OFF	OFF	OFF	ON
Shift solenoid valve SL1	OFF	OFF	OFF	OFF	ON

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1	Check other DTCs output (in addition to DTC P0771).

PREPARATION:

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the item ”DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0771” is output	A
”P0771” and other DTCs	B

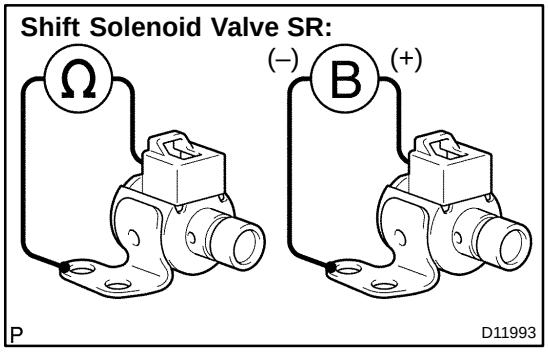
HINT:

If any other codes besides ”P0771” are output, perform troubleshooting for those DTCs first.

B → **Go to DTC chart (See page DI–573).**

A

2	Inspect shift solenoid valve SR operation.



PREPARATION:

Remove the shift solenoid valve SR (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20◀ (68◀)
Solenoid Connector (SR) – Solenoid Body (SR)	11 to 15 Ω

CHECK:

Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (–) lead to the solenoid body.

OK:

The solenoid makes an operating sound.

NG → **Replace shift solenoid valve SR (See page AT–10).**

OK

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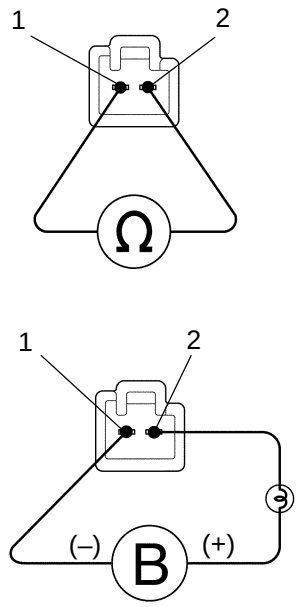
3	Inspect shift solenoid valve SL1.

Shift Solenoid Valve SL1:



PREPARATION:

Remove the shift solenoid valve SL1 (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve SL1 (See page AT–10).**

OK ↓

4	Inspect valve body (See page AT–10).

OK:

There are no foreign objects on each valve.

NG → **Repair or replace valve body.**

OK ↓

Repair or replace transmission (See page AT–25).

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DIDJF–01

DTC	P0776	Pressure Control Solenoid ”B” Performance (Shift Solenoid Valve SL2)

SYSTEM DESCRIPTION

The ECM uses signals from the output shaft speed sensor and input speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transmission (clutch, brake or gear, etc.).

DTC No.	DTC Detection Condition	Trouble Area
P0776	The gear required by the ECM does not match the actual gear when driving (2–trip detection logic)	◀Shift solenoid valve SL2 remains open or closed ◀Valve body is blocked ◀Automatic transmission (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

This DTC indicates ”stuck ON malfunction” or ”stuck OFF malfunction” of the shift solenoid valve SL2.
The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776	Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SL2
	Sub	Speed sensor (NT), Speed sensor (NO), Crankshaft position sensor (NE)
Frequency of operation	Continuous	
Duration	ON malfunctions (A), (B) and (C)	0.4 sec.
	ON malfunction (D)	3 sec.
	ON malfunction (E)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
Turbine speed sensor circuit	Not circuit malfunction	
Output speed sensor circuit	Not circuit malfunction	
Shift solenoid valve S1 circuit	Not circuit malfunction	
Shift solenoid valve S2 circuit	Not circuit malfunction	
Shift solenoid valve SR circuit	Not circuit malfunction	
Shift solenoid valve SL1 circuit	Not circuit malfunction	
Shift solenoid valve SL2 circuit	Not circuit malfunction	
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction	
KCS sensor circuit	Not circuit malfunction	
ETCS (Electric throttle control system)	Not system down	
Transmission range	”D”	
ECT	40˚C (104˚F) or more	–
Spark advance from Max. retard timing by KCS control	0˚ CA or more	–
Engine	Starting	
Transfer range	”HIGH”*1	
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor circuit	Not circuit malfunction	
Output shaft speed sensor circuit	Not circuit malfunction	
Transfer output speed	143 rpm or more	–
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 to 1.1	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 to 40 km/h (1.2 to 24.9 mph)	
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction (B)		
ECM selected gear	3rd	
Vehicle speed	2 km/h (1.2 mph) or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction (C)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1.2 mph) or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	

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Vehicle speed (During transition from 4th to 5th gear)	–	Less than 100 km/h (62.2 mph)
ON malfunction (E)		
ECM selected gear	5th	
Engine speed – Turbine speed (NE – NT) (After transition from 4th to 5th gear)	–	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	–	Less than 100 km/h (62 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions are met: ◀ **ON malfunctions (A) and (B), or ON malfunction (C)** ◀ **ON malfunction (D) or (E)**	
ON malfunction (A)	
Turbine speed/Output speed	3.30 to 7.50
ON malfunction (B)	
Turbine speed/Output speed	1.28 to 1.53
ON malfunction (C)	
Turbine speed/Output speed	0.93 to 1.07
ON malfunction (D)	
Turbine speed – Output speed x 4th gear ratio (NT – NO x 4th gear ratio)	1,000 rpm or more
ON malfunction (E)	
Turbine speed – Output speed x 5th gear ratio (NT – NO x 5th gear ratio)	1,000 rpm or more

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INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST”.
(g) According to the display on the tester, perform the ”ACTIVE TEST”.

HINT:

While driving, the shift position can be forcibly changed with the hand–held tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page DI–567).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ◀Press ”→” button: Shift up ◀Press ”←” button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:

- ◀ This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- ◀ The 4th to 5th up–shiftings must be performed with the accelerator pedal released.
- ◀ The 5th to 4th down–shiftings must be performed with the accelerator pedal released.
- ◀ Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.
- ◀ The shift position commanded by the ECM is shown in the DATA LIST (SHIFT) display on the hand–held tester.
- ◀ The shift solenoid valve SL2 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve SL2	ON	ON	ON	ON	OFF

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1	**Check other DTCs output (in addition to DTC P0776).**

PREPARATION:

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the item ”DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0776” is output	A
”P0776” and other DTCs	B

HINT:

If any other codes besides ”P0776” are output, perform troubleshooting for those DTCs first.

B → **Go to DTC chart (See page DI–573).**

A

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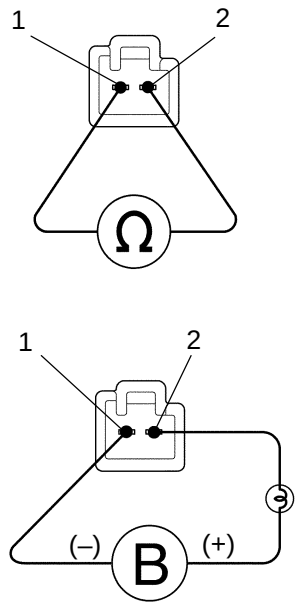
2	Inspect shift solenoid valve SL2.

Shift Solenoid Valve SL2:



D12795

PREPARATION:

Remove the shift solenoid valve SL2 (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve SL2 (See page AT–10).**

OK

3	Inspect valve body (See page AT–10).

OK:

There are no foreign objects on each valve.

NG → **Repair or replace valve body.**

OK

Repair or replace transmission (See page AT–25).

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DTC	P0778	Pressure Control Solenoid ”B” Electrical (Shift Solenoid Valve SL2)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, S1, S2 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page DI–567).

DTC No.	DTC Detection Condition	Trouble Area
P0778	The ECM checks for an open or short in the shift solenoid valve SL2 circuit while driving and shifting gears. (1–trip detection logic) ▶Output signal duty equals to 100%. (NOTE: SL2 output signal duty is less than 100% under normal condition.)	▶Open or short in shift solenoid valve SL2 circuit ▶Shift solenoid valve SL2 ▶ECM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL2 circuit. The ECM commands gear shift by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail–safe function and turns the other normal shift solenoid valves ”ON/OFF”. (In case of an open or short circuit, the ECM stops sending current to the circuit.)
While driving and shifting gears, if the ECM detects an open or short in the shift solenoid valve SL2 circuit, the ECM determines there is a malfunction (See page DI–567).

MONITOR STRATEGY

Related DTCs	P0778	Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
Battery voltage	10 V or more	–
CPU commanded duty	–	Less than 75%
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output signal duty	100%

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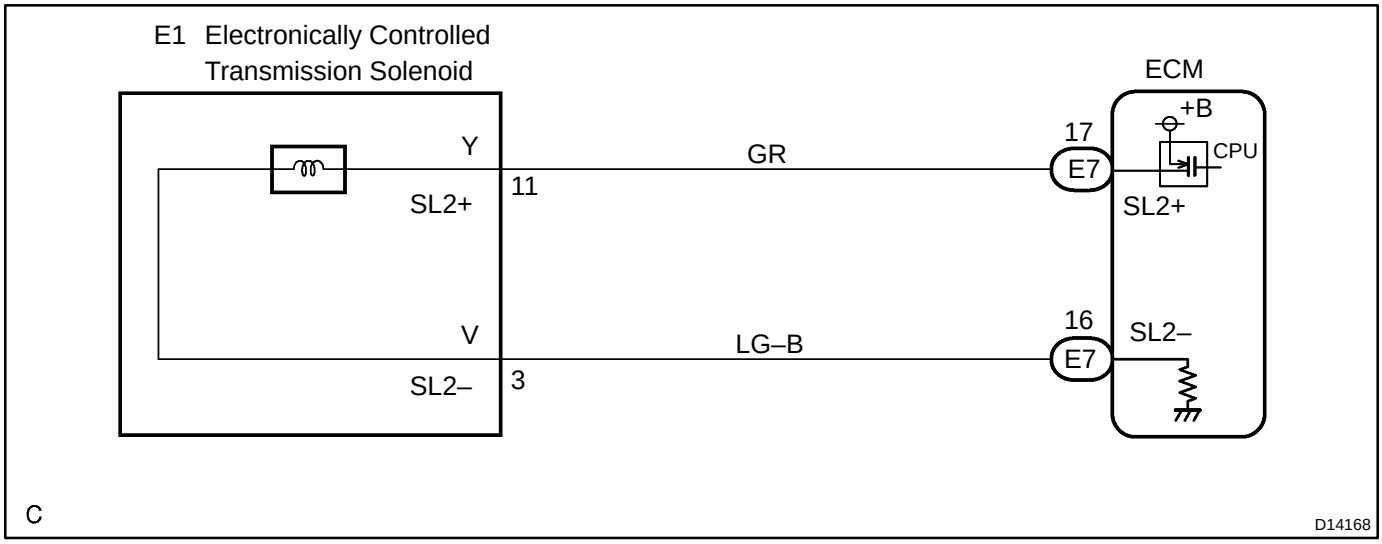
COMPONENT OPERATING RANGE

Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



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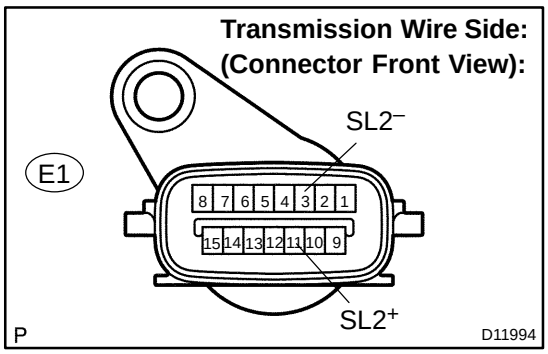
INSPECTION PROCEDURE

HINT:

▶ The shift solenoid valve SL2 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve SL2	ON	ON	ON	ON	OFF

1	**Inspect transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20◀C (68◀F)
11 (SL2+) – 3 (SL2–)	5.0 to 5.6 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
11 (SL2+) – Body ground	10 kΩ or higher
3 (SL2–) – Body ground	↑

NG → **Go to step 3.**

OK

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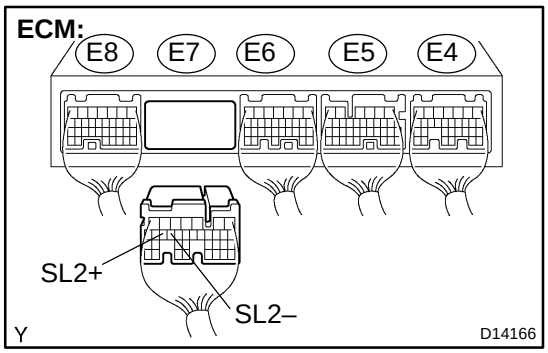
2	Check harness and connector (Transmission wire – ECM)



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
E7 – 17 (SL2+) – E7 – 16 (SL2–)	5.0 to 5.6 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 17 (SL2+) – Body ground	10 kΩ or higher
E7 – 16 (SL2–) – Body ground	↑

NG → **Repair or replace the harness or connector (See page IN–35).**

OK →

Replace the ECM (See page SF–80).

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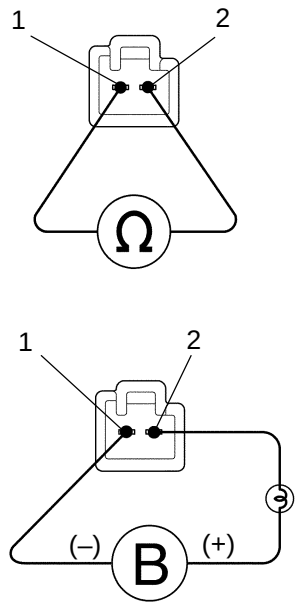
3	Check shift solenoid valve SL2.

Shift Solenoid Valve SL2:



D12795

PREPARATION:

Remove the shift solenoid valve SL2 (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve SL2 (See page AT–10).**

OK →

Repair or replace the transmission wire (See page AT–7).

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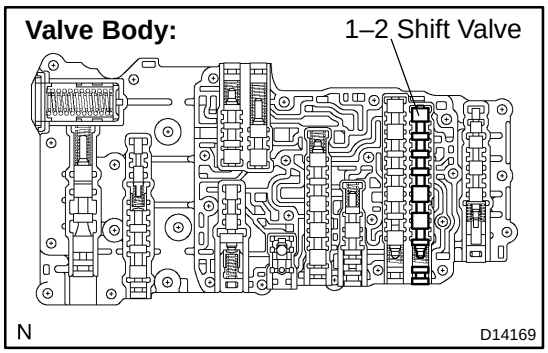
DIDJH–01

DTC	P0781	1–2 Shift (1–2 Shift Valve)



SYSTEM DESCRIPTION

The 1–2 shift valve performs shifting to 1st gear and other gears.

DTC No.	DTC Detection Condition	Trouble Area
P0781	The gear required by the ECM does not match the actual gear when driving (2–trip detection logic)	▶Valve body is blocked up or stuck (1–2 shift valve) ▶Automatic transmission (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

This DTC indicates that the 1–2 shift valve in the valve body is locked in the direction the spring compresses. The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF” and switching oil pressure to the valves in the valve body.

The ECM calculates the ”actual” transmission gear by comparing the signals from the input speed sensor (NCO) and the output speed sensor (SP2). The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and the commanded gear position are different, it will illuminate the MIL and store the DTC .

MONITOR STRATEGY

Related DTCs	P0781	Valve body/Rationality check
Required sensors/Components	Main	Valve body
	Sub	Automatic transmission assembly, Speed sensor (NT), Speed sensor (NO), Vehicle speed sensor, Throttle speed sensor
Frequency of operation	Continuous	
Duration	Conditions (A) and (B)	0.4 sec.
	Condition (C)	3 sec.
	Condition (D)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
Turbine speed sensor circuit	Not circuit malfunction	
Output speed sensor circuit	Not circuit malfunction	
Shift solenoid valve S1 circuit	Not circuit malfunction	
Shift solenoid valve S2 circuit	Not circuit malfunction	
Shift solenoid valve SR circuit	Not circuit malfunction	
Shift solenoid valve SL1 circuit	Not circuit malfunction	
Shift solenoid valve SL2 circuit	Not circuit malfunction	
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction	
KCS sensor circuit	Not circuit malfunction	
ETCS (Electric throttle control system)	Not system down	
Transmission range	”D”	
ECT	40˚C (104˚F) or more	–
Spark advance from Max. retard timing by KCS control	0˚ CA or more	–
Engine	Starting	
Transfer range	”HIGH”*1	
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor circuit	Not circuit malfunction	
Output shaft speed sensor circuit	Not circuit malfunction	
Transfer output speed	143 rpm or more	–
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 to 1.1	
Condition (A)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1.2 mph) or more	–
Output speed	2nd → 1st down shift point or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
Condition (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1.2 mph) or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
Condition (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	–	Less than 100 km/h (62.2 mph)
Condition (D)		
ECM selected gear	5th	

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Engine speed – Turbine speed (NE – NT) (After transition from 4th to 5th gear)	–	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	–	Less than 100 km/h (62.2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions are met: Condition (A), and Condition (B), (C) or (D)	
Condition (A)	
Turbine speed/Output speed	3.30 to 7.50
Condition (B)	
Turbine speed/Output speed	1.28 to 1.53
Condition (C)	
Turbine speed – Output speed x 4th gear ratio (NT – NO x 4th gear ratio)	1,000 rpm or more
Condition (D)	
Turbine speed – Output speed x 5th gear ratio (NT – NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	**Check other DTCs output (in addition to DTC P0781).**

PREPARATION:

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the item ”DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0781” is output	A
”P0781” and other DTCs	B

HINT:

If any other codes besides ”P0781” are output, perform troubleshooting for those DTCs first.

B → **Go to DTC chart (See page DI–573).**

A

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2	Perform active test

HINT:
Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.
It is possible to display the DATA LIST during the ACTIVE TEST.
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST".
(g) According to the display on the tester, perform the "ACTIVE TEST".
HINT:
While driving, the shift position can be forcibly changed with the hand–held tester.
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page DI–567).

Standard:

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ▶Press "→" button: Shift up ▶Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:
- ▶ This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- ▶ The 4th to 5th up–shiftings must be performed with the accelerator pedal released.
- ▶ The 5th to 4th down–shiftings must be performed with the accelerator pedal released.
- ▶ Do not operate the accelerator pedal for at least 2 seconds after shifting and do not shift successively.
- ▶ The shift position commanded by the ECM is shown in the DATA LIST (SHIFT) display on the hand–held tester.

OK:

Gear position changes in accordance with the tester command.

NG → **Repair or replace valve body (See page AT–10).**

OK

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3	**Clear the DTC and running test.**

CHECK:

Clear the DTC, and check DTC again after conducting the ”MONITOR DRIVE PATTERN FOR ECT TEST” (See page DI–551).

OK:

No DTC code

NG → **Repair or replace valve body (See page AT–10).**

OK

END

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DIDJI–01

DTC	P0973	Shift Solenoid ”A” Control Circuit Low (Shift Solenoid Valve S1)

DTC	P0974	Shift Solenoid ”A” Control Circuit High (Shift Solenoid Valve S1)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, S1, S2 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page DI–567).

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve S1 circuit 2 times when solenoid valve S1 is operated (1–trip detection logic)	▶Short in shift solenoid valve S1 circuit ▶Shift solenoid valve S1 ▶ECM
P0974	ECM detects open in solenoid valve S1 circuit 2 times when solenoid valve S1 is not operated (1–trip detection logic)	▶Open in shift solenoid valve S1 circuit ▶Shift solenoid valve S1 ▶ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S1 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. When the shift solenoid valve S1 is on, if resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S1 circuit.

When the shift solenoid valve S1 is off, if resistance is 100 kΩ or more, the ECM determines there is an open in the shift solenoid valve S1 circuit (See page DI–567).

MONITOR STRATEGY

Related DTCs	P0973	Shift solenoid valve S1/Range check (Low resistance)
	P0974	Shift solenoid valve S1/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S1	
Frequency of operation	Continuous	
Duration	0.064 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present.	See page DI–545	
Range check (Low resistance)		
Shift solenoid valve S1	ON	
Range check (High resistance)		
Shift solenoid valve S1	OFF	

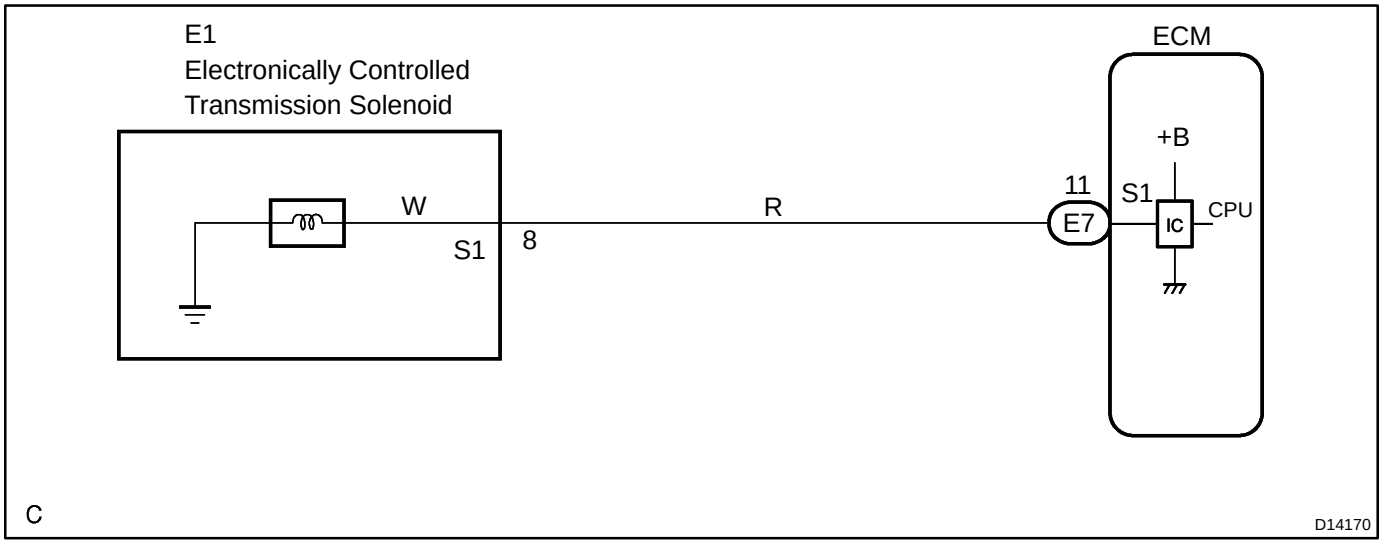
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Shift solenoid valve S1 resistance	8 Ω or less
Range check (High resistance)	
Shift solenoid valve S1 resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Parameter	Standard value
Shift solenoid valve S1	Resistance: 11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM



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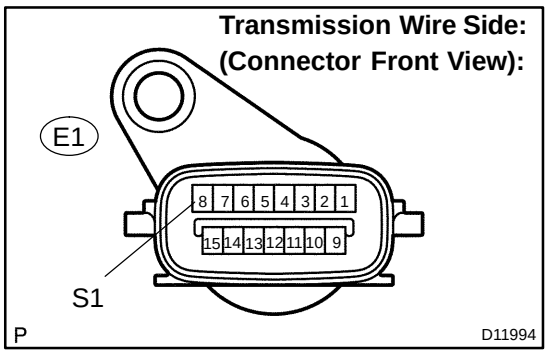
INSPECTION PROCEDURE

HINT:

▶ The shift solenoid valve S1 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve S1	ON	ON	OFF	OFF	OFF

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
8 – Body ground	11 to 15 Ω

NG → **Go to step 3.**

OK

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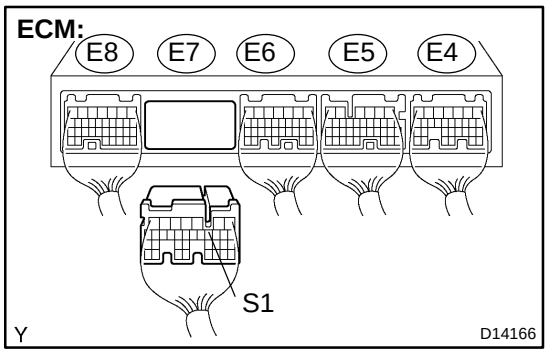
2	Check harness and connector (Transmission wire – ECM)



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
E7 – 11 (S1) – Body ground	11 to 15 Ω

NG → **Repair or replace the harness or connector (See page IN–35).**

OK →

Replace the ECM (See page SF–80).

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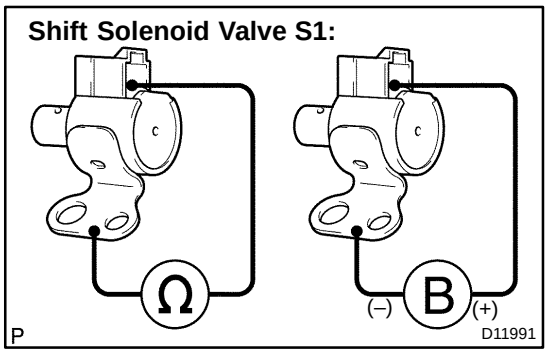
3	Check shift solenoid valve S1.



PREPARATION:

Remove the shift solenoid valve S1 (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (S1) – Solenoid Body (S1)	11 to 15 Ω

CHECK:

Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (–) lead to the solenoid body.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve S1 (See page AT–10).**

OK

Repair or replace the transmission wire (See page AT–7).

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DIDJJ–01

DTC	P0976	Shift Solenoid ”B” Control Circuit Low (Shift Solenoid Valve S2)

DTC	P0977	Shift Solenoid ”B” Control Circuit High (Shift Solenoid Valve S2)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, S1, S2 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page DI–567).

DTC No.	DTC Detection Condition	Trouble Area
P0976	ECM detects short in solenoid valve S2 circuit 2 times when solenoid valve S2 is operated (1–trip detection logic)	▶Short in shift solenoid valve S2 circuit ▶Shift solenoid valve S2 ▶ECM
P0977	ECM detects open in solenoid valve S2 circuit 2 times when solenoid valve S2 is not operated (1–trip detection logic)	▶Open in shift solenoid valve S2 circuit ▶Shift solenoid valve S2 ▶ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve S2 circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. When the shift solenoid valve S2 is on, if resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve S2 circuit.

When the shift solenoid valve S2 is off, if resistance is 100 kΩ or more, the ECM determines there is an open in the shift solenoid valve S2 circuit (See page DI–567).

MONITOR STRATEGY

Related DTCs	P0976	Shift solenoid valve S2/Range check (Low resistance)
	P0977	Shift solenoid valve S2/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S2	
Frequency of operation	Continuous	
Duration	0.064 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present.	See page DI–545	
Range check (Low resistance)		
Shift solenoid valve S2	ON	
Range check (High resistance)		
Shift solenoid valve S2	OFF	

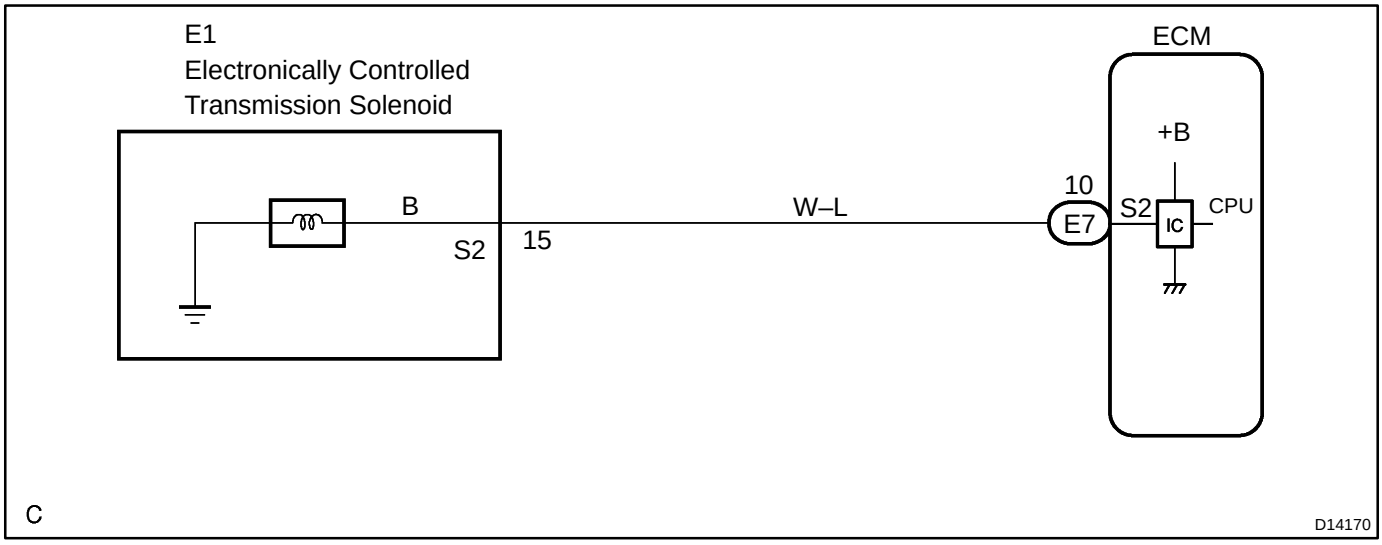
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Shift solenoid valve S2 resistance	8 Ω or less
Range check (High resistance)	
Shift solenoid valve S2 resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Parameter	Standard value
Shift solenoid valve S2	Resistance: 11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM



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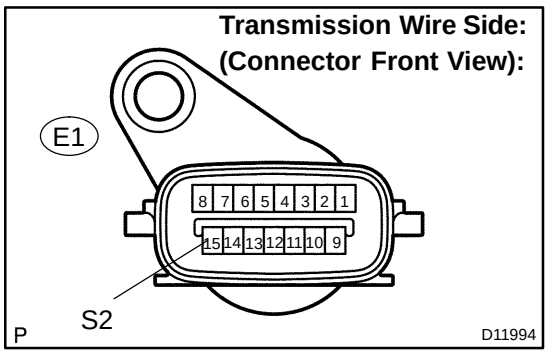
INSPECTION PROCEDURE

HINT:

▶ The shift solenoid valve S2 is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve S2	OFF	ON	ON	OFF	OFF

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
15 – Body ground	11 to 15 Ω

NG → **Go to step 3.**

OK

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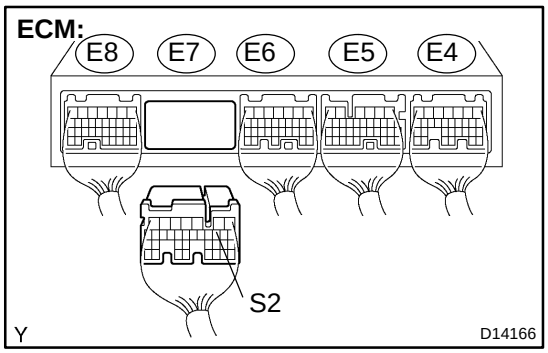
2	Check harness and connector (Transmission wire – ECM)



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
E7 – 10 (S2) – Body ground	11 to 15 Ω

NG → **Repair or replace the harness or connector (See page IN–35).**

OK

Replace the ECM (See page SF–80).

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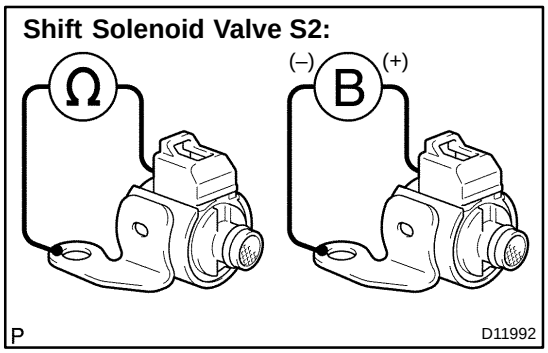
3	Check shift solenoid valve S2.



PREPARATION:

Remove the shift solenoid valve S2 (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (S2) – Solenoid Body (S2)	11 to 15 Ω

CHECK:

Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (–) lead to the solenoid body.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve S2 (See page AT–10).**

OK

Repair or replace the transmission wire (See page AT–7).

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DIDJK–01

DTC	P0985	Shift Solenoid ”E” Control Circuit Low (Shift Solenoid Valve SR)

DTC	P0986	Shift Solenoid ”E” Control Circuit High (Shift Solenoid Valve SR)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ”ON” and ”OFF” operation of the shift solenoid valves SL1, SL2, S1, S2 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page DI–567).

DTC No.	DTC Detection Condition	Trouble Area
P0985	ECM detects short in solenoid valve SR circuit 2 times when solenoid valve SR is operated (1–trip detection logic)	▶Short in shift solenoid valve SR circuit ▶Shift solenoid valve SR ▶ECM
P0986	ECM detects open in solenoid valve SR circuit 2 times when solenoid valve SR is not operated (1–trip detection logic)	▶Open in shift solenoid valve SR circuit ▶Shift solenoid valve SR ▶ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the shift solenoid valve SR circuit. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. When the shift solenoid valve SR is on, if resistance is 8 Ω or less, the ECM determines there is a short in the shift solenoid valve SR circuit.

When the shift solenoid valve SR is off, if resistance is 100 kΩ or more, the ECM determines there is an open in the shift solenoid valve SR circuit (See page DI–567).

MONITOR STRATEGY

Related DTCs	P0985	Shift solenoid valve SR/Range check (Low resistance)
	P0986	Shift solenoid valve SR/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SR	
Frequency of operation	Continuous	
Duration	0.064 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present.	See page DI–545	
Range check (Low resistance)		
Shift solenoid valve SR	ON	
Battery voltage	8 V or more	–
Ignition switch	ON	
Starter	OFF	
Range check (High resistance)		
Shift solenoid valve SR	OFF	
Battery voltage	8 V or more	–
Ignition switch	ON	
Starter	OFF	

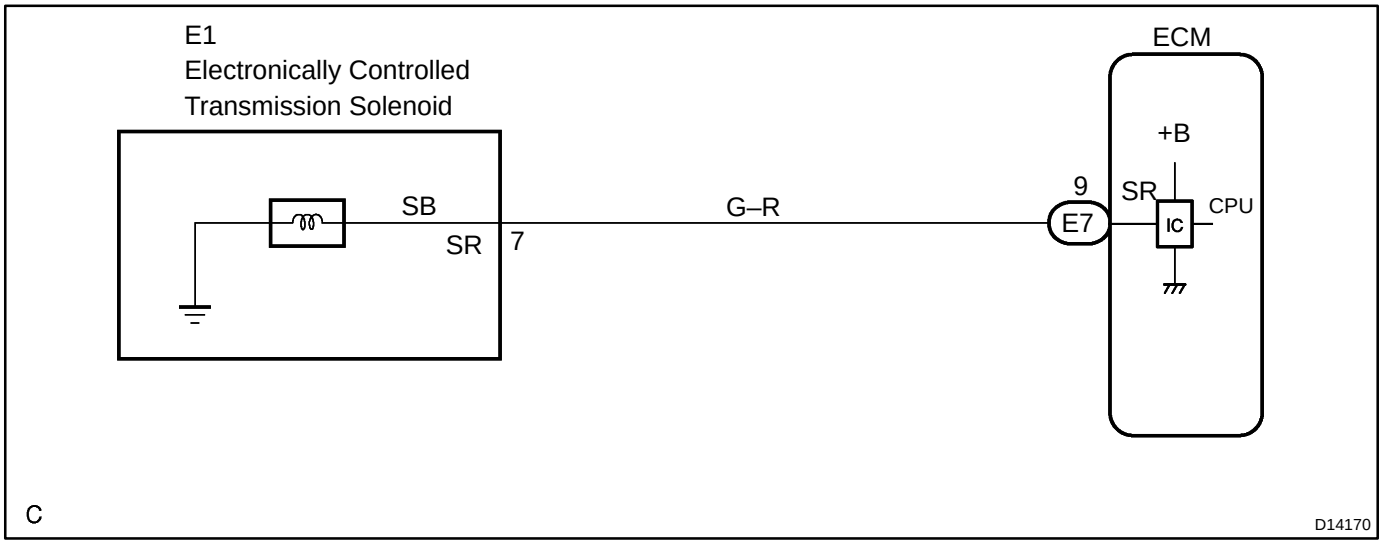
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Shift solenoid valve SR resistance	8 Ω or less
Range check (High resistance)	
Shift solenoid valve SR resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Parameter	Standard value
Shift solenoid valve SR	Resistance: 11 to 15 at 20°C (68°F)

WIRING DIAGRAM



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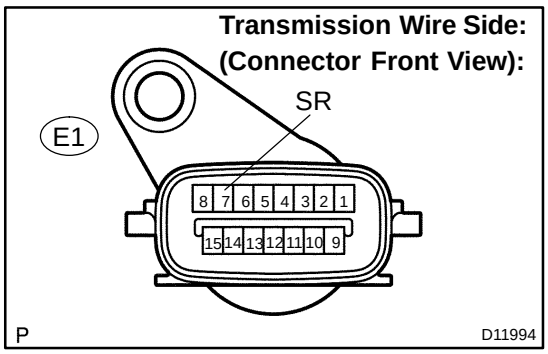
INSPECTION PROCEDURE

HINT:

▶ The shift solenoid valve SR is turned on/off normally when the shift lever is in the D position:

ECM command gearshift	1st	2nd	3rd	4th	5th
Shift solenoid valve SR	OFF	OFF	OFF	OFF	ON

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20◀C (68◀F)
7 – Body ground	11 to 15 Ω

NG → **Go to step 3.**

OK

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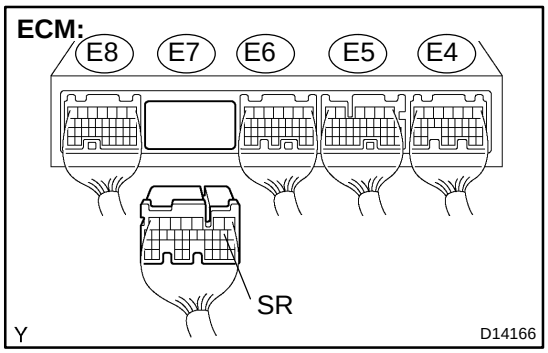
2	Check harness and connector (Transmission wire – ECM)



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
E7 – 9 (SR) – Body ground	11 to 15 Ω

NG → **Repair or replace the harness or connector (See page IN–35).**

OK

Replace the ECM (See page SF–80).

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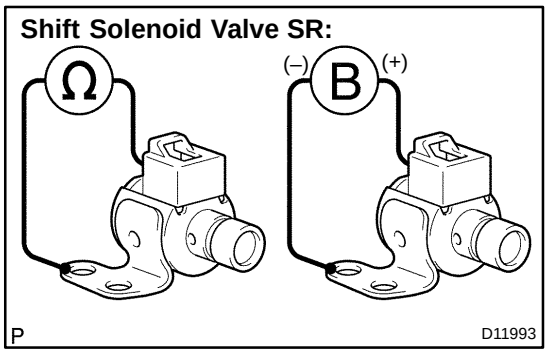
3	Check shift solenoid valve SR.



PREPARATION:

Remove the shift solenoid valve SR (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (SR) – Solenoid Body (SR)	11 to 15 Ω

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds an operation noise.

NG → **Replace the shift solenoid valve SR (See page AT–10).**

OK

Repair or replace the transmission wire (See page AT–7).

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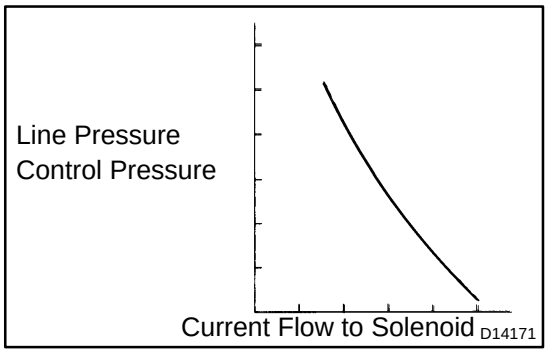
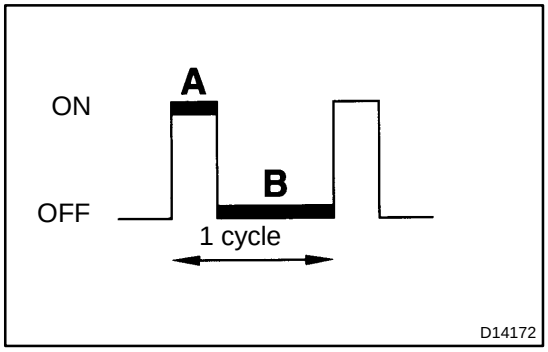
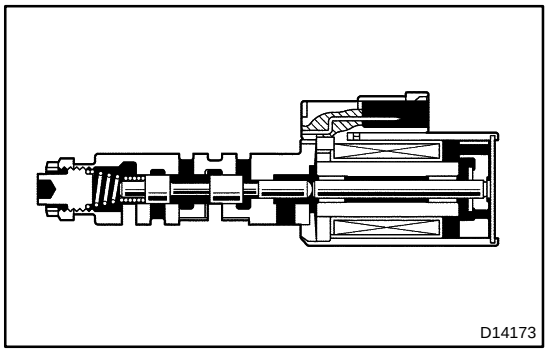
DTC	P2714	Pressure Control Solenoid ”D” Performance (Shift Solenoid Valve SLT)







SYSTEM DESCRIPTION

The linear solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The ECM adjusts the duty cycle of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

(*): Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non–continuity, then

Duty Ratio = A/(A + B) x 100 (%)

DTC No.	DTC Detection Condition	Trouble Area
P2714	ECM detects a malfunction on SLT (ON side) according to the revolution difference of the turbine and the output shaft, and also by the oil pressure. (2–trip detection logic)	▶Shift solenoid valve SLT remains open or closed ▶Valve body is blocked ▶Automatic transmission (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

The ECM calculates the amount of heat absorbed by the friction material based on the difference in revolution (clutch slippage) between the turbine and output shaft. The ECM turns on the MIL and outputs this DTC when the amount of heat absorption exceeds the specified value.

When the shift solenoid valve SLT remains on, oil pressure goes down and clutch engagement force decreases.

NOTE: If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

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MONITOR STRATEGY

Related DTCs	P2714	Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SLT
	Sub	Valve body, ATF temperature sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	Immediate	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
Turbine speed sensor circuit	Not circuit malfunction	
Output speed sensor circuit	Not circuit malfunction	
Transmission Fluid Temperature Sensor circuit	Not circuit malfunction	
Shift solenoid valve S1 circuit	Not circuit malfunction	
Shift solenoid valve S2 circuit	Not circuit malfunction	
Shift solenoid valve SR circuit	Not circuit malfunction	
Shift solenoid valve SL1 circuit	Not circuit malfunction	
Shift solenoid valve SL2 circuit	Not circuit malfunction	
Shift solenoid valve SLT circuit	Not circuit malfunction	
ECT (Engine coolant temperature) sensor circuit	Not circuit malfunction	
KCS sensor circuit	Not circuit malfunction	
ETCS (Electric throttle control system)	Not system down	
Transmission range	”D”	
ECT	40˚C (104˚F) or more	–
Spark advance from Max. retard timing by KCS control	0˚ CA or more	–
Engine	Starting	
Transfer range	”HIGH”*1	
TFT (transmission fluid temperature)	10˚C or more	–
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor circuit	Not circuit malfunction	
Output shaft speed sensor circuit	Not circuit malfunction	
Transfer output speed	143 rpm or more	–
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 to 1.1	

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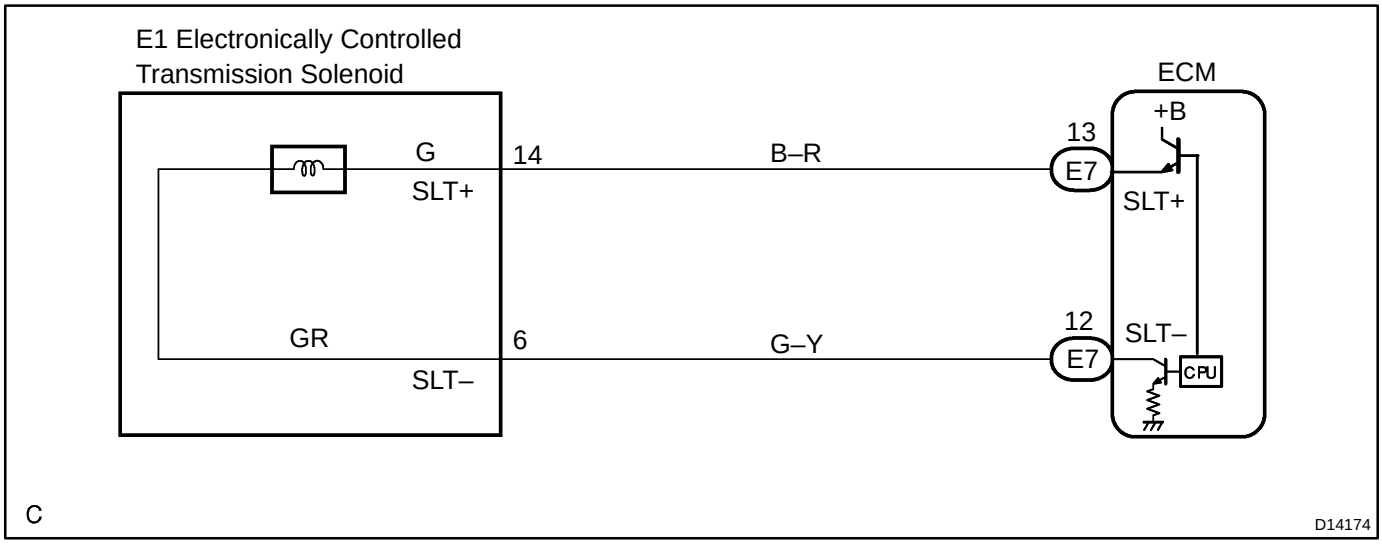
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Summation of C1 clutch heat generations = ∑ (Turbine speed – Output speed x Temporary ratio)	Specified value

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST”.
(g) According to the display on tester, perform the ”ACTIVE TEST”.

Item	Test Details	Diagnostic Note
LINE PRESS UP *	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] ▶Vehicle Stopped. ▶IDL: ON [HINT] OFF: Line pressure up (When the active test of ”Control the Line Pressure Up” is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	–

*: ”LINE PRESS UP” in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle, which is used in the HYDRAULIC TEST (See page DI–540) as well.

HINT:

- ▶ The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.
- ▶ Normally, the line pressure detected in the ACTIVE TEST is approximately half of the value detected in the HYDRAULIC TEST’s stall test.

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1	**Check other DTCs output (in addition to DTC P2714).**

PREPARATION:

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the item ”DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P2714” is output	A
”P2714” and other DTCs	B

HINT:

If any other codes besides ”P2714” are output, perform troubleshooting for those DTCs first.

B → **Go to DTC chart (See page DI–573).**

A

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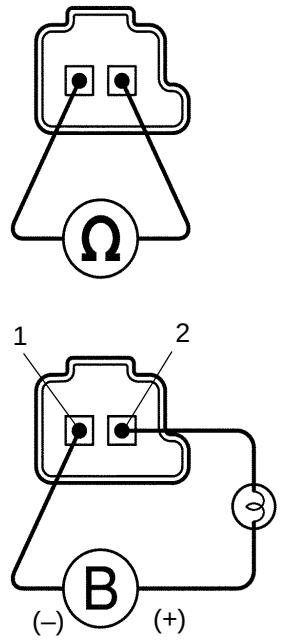
2	Inspect shift solenoid valve SLT operation.

Shift Solenoid Valve SLT:



PREPARATION:

Remove the shift solenoid valve SLT (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve SLT (See page AT–10).**

OK

3	Inspect valve body (See page AT–10).

OK:

There are no foreign objects on each valve.

NG → **Repair or replace valve body.**

OK

Repair or replace transmission (See page AT–25).

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DIDJM–01

DTC P2716 Pressure Control Solenoid ”D” Electrical (Shift Solenoid Valve SLT)

CIRCUIT DESCRIPTION

See page DI–656

DTC No.	DTC Detection Condition	Trouble Area
P2716	Open or short is detected in shift solenoid valve SLT circuit for 1 second or more while driving (1–trip detection logic).	▶Open or short in shift solenoid valve SLT circuit ▶Shift solenoid valve SLT ▶ECM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716	Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	–
CPU command duty ratio to SLT	19% or more	–
Ignition switch	ON	
Starter	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

Parameter	Standard value
Output signal duty	Less than 100%

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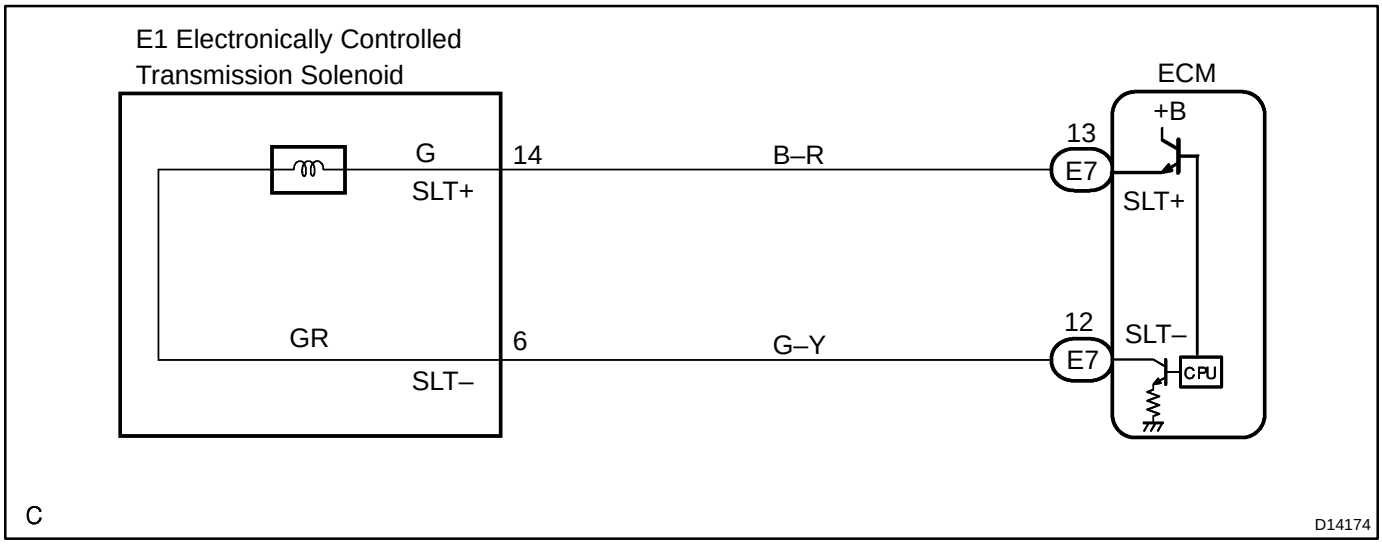
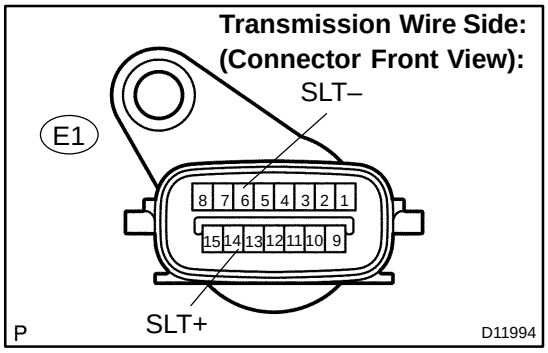
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
14 (SLT+) – 6 (SLT–)	5.0 to 5.6 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
14 (SLT+) – Body ground	10 kΩ or higher
6 (SLT–) – Body ground	↑

NG → **Go to step 3.**

OK

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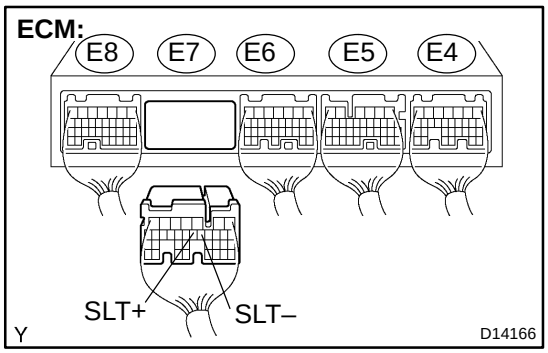
2	Check harness and connector (Transmission wire – ECM)



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
E7 – 13 (SLT+) – E7 – 12 (SLT–)	5.0 to 5.6 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 13 (SLT+) – Body ground	10 kΩ or higher
E7 – 12 (SLT–) – Body ground	↑

NG → **Repair or replace the harness or connector (See page IN–35).**

OK →

Replace the ECM (See page SF–80).

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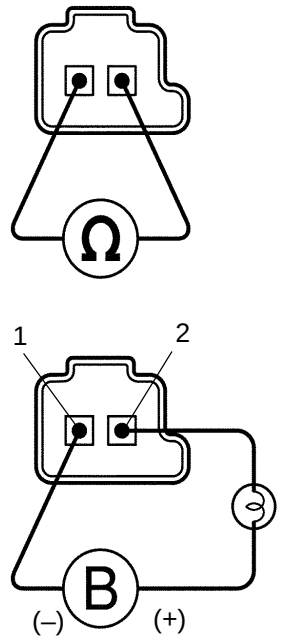
3	Inspect shift solenoid valve SLT.

Shift Solenoid Valve SLT:



PREPARATION:

Remove the shift solenoid valve SLT (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve SLT (See page AT–10).**

OK

Repair or replace the transmission wire (See page AT–7).

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DTC	P2740	Transmission Fluid Temperature Sensor ”B” Circuit

DTC	P2742	Transmission Fluid Temperature Sensor ”B” Circuit Low Input

DTC	P2743	Transmission Fluid Temperature Sensor ”B” Circuit High Input

CIRCUIT DESCRIPTION

ATF (Automatic Transmission Fluid) temperature sensor No.2 is on the transmission and just in front of the oil cooler inlet pipeline.

If ECM detects the abnormally high temperature of ATF by this sensor, it draws driver’s attention by illuminating the warning lamp.

HINT:

- The temperature of ATF easily rises when towing, climbing hills and in traffic, etc.
- If the ATF temperature sensor No.2 becomes short–circuited, the signal that indicates the ATF temperature is 150°C (302°F) or higher is input in ECM.

Vehicle conditions when the sensor is normal and when the sensor is short–circuited are indicated in the table below.

ATF temperature Sensor No.2 State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	AT fluid temp. more than 150°C (302°F).	AT Oil Temp. warning light remains on	AT fluid temp. less than 135°C (275°F). *2
	AT fluid temp. more than 130°C (266°F).	Shift point too high.	AT fluid temp. less than 110°C (230°F).
	When the conditions (a) and (b) are satisfied. (a) AT fluid temp. more than 130°C (266°F). (b) Engine coolant temp. more than 95°C (203°F).	Lock–up at 3rd gear. *1	AT fluid temp. less than 110°C (230°F) *2 and engine coolant temp. less than 95°C (203°F).
Sensor is short–circuited	Any conditions.	AT Oil Temp. warning light remains on Shift point too high.	Symptoms still occur
	Engine coolant temp. more than 95°C (203°F).	Lock–up at 3rd gear. *1	Symptoms still occur

HINT:

*1: When AT fluid temperature is normal, transmission locks up at 5th gear with the shift lever in D position and at 4th gear with the shift lever in 4 position.

*2: When AT fluid temperature is in normal range, it decreases to less than 135°C (275°F) within 5 minutes with the shift lever in P or N position in an idling state.

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DTC No.	DTC Detecting Condition	Trouble Area
P2740	(a) and (b) are detected momentarily within 0.5 sec. when neither P2742 nor P2743 is detected (1–trip detection logic) (a) ATF temperature sensor No.2 resistance is less than 25 Ω (0.046 V) (b) ATF temperature sensor No.2 resistance is more than 156 kΩ (4.915 V) HINT: Within 0.5 sec. the malfunction switches from (a) to (b) or from (b) to (a)	▶Open or short in ATF temperature sensor No.2 circuit ▶Transmission wire (ATF temperature sensor No.2) ▶ECM
P2742	ATF temperature sensor No.2 resistance is less than 25 Ω (0.046 V) for 0.5 sec. or more (1–trip detection logic)	▶Short in ATF temperature sensor No.2 circuit ▶Transmission wire (ATF temperature sensor No.2) ▶ECM
P2743	ATF temperature No.2 sensor resistance is more than 156 kΩ (4.915 V) when 15 minutes or more after the engine start DTC is detected for 0.5 sec. or more (1–trip detection logic)	▶Open in ATF temperature sensor No.2 circuit ▶Transmission wire (ATF temperature sensor No.2) ▶ECM

MONITOR DESCRIPTION

The Automatic Transmission Fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an open or short in the AFT temperature circuit. If the resistance value of the ATF temperature is less than 25 Ω (0.046 V) or more than 156 kΩ (4.915 V), the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2740	ATF temperature sensor/Range check (Fluttering)
	P2742	ATF temperature sensor/Range check (Low voltage)
	P2743	ATF temperature sensor/Range check (High voltage)
Required sensors/Components	ATF temperature sensor (TFT sensor)	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present.	See page DI–545	
Range check (Fluttering, Low voltage)		
The typical enabling condition is not available.	–	
Range check (High voltage)		
Time after engine start	15 min. or more	–

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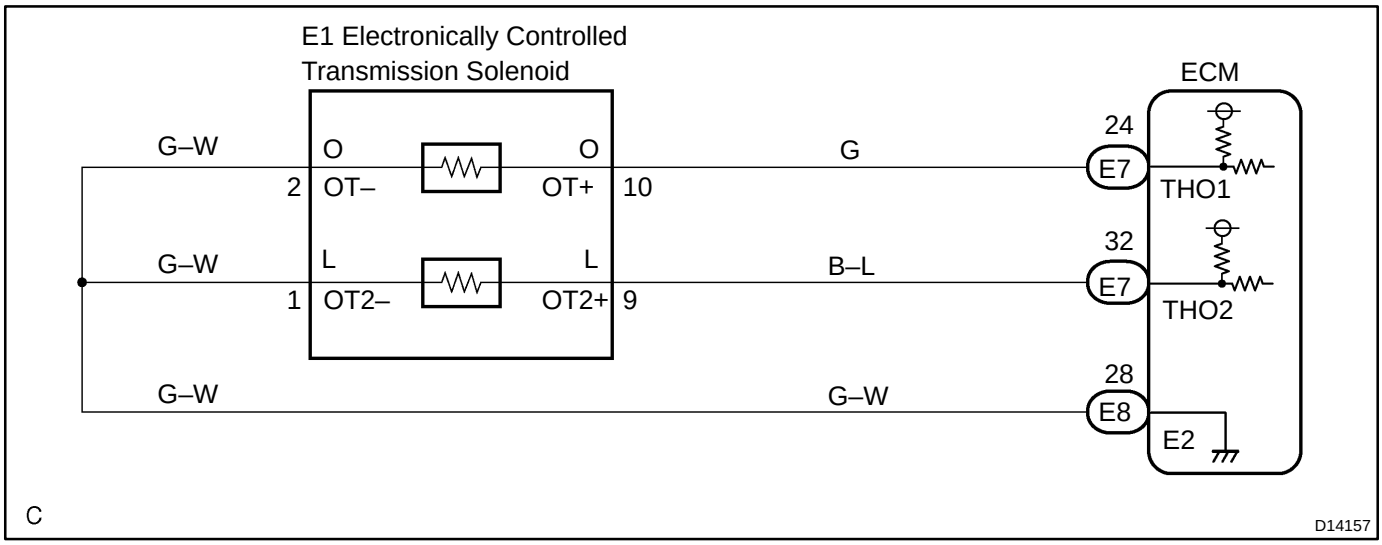
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Fluttering)	
TFT (transmission fluid temperature) sensor voltage	Less than 0.046 V or More than 4.915 V
Range check (Low voltage)	
TFT (transmission fluid temperature) sensor voltage	Less than 0.046 V
Range check (High voltage)	
TFT (transmission fluid temperature) sensor voltage	More than 4.915 V

COMPONENT OPERATING RANGE

Parameter	Standard value
TFT (transmission fluid temperature) sensor	Atmospheric temperature to approx. 130˚C (266˚F)

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand–held tester.
(f) When you use the hand–held tester:
Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST”.
(g) According to the display on the tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP 2	ATF Temp. Sensor Value/ min.: –40◀C (–40◀F) max.: 215◀C (419◀F)	▶After Stall Test; Approx. 80◀C (176◀F) ▶Equal to ambient temperature when cold soak

HINT:

When DTC P2742 is output and hand–held tester output is 150◀C (302◀F) or more, there is a short circuit.
When DTC P2743 is output and hand–held tester output is –40◀C (–40◀F), there is an open circuit.
Measure the resistance between terminal THO2 (OT2) and body ground.

Temperature Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
150˚C (302˚F) or more	Short circuit

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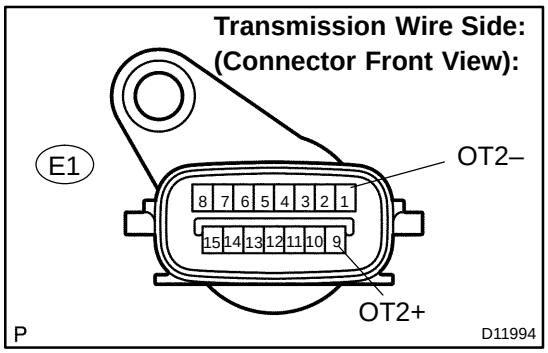
1	Inspect transmission wire (ATF temperature sensor No.2)



PREPARATION:

Disconnect the transmission wire connector from the transmission.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
1 (OT2–) – 9 (OT2+)	25 Ω to 156 kΩ
1 (OT2–) – Body ground	10 kΩ or higher
9 (OT2+) – Body ground	10 kΩ or higher

HINT:

If the resistance is out of the specified range with either the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

ATF Temperature	Specified Condition
20°C (68°F)	3 to 4 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → **Repair or replace the transmission wire (ATF temperature sensor No.2) (See page AT–7).**

OK

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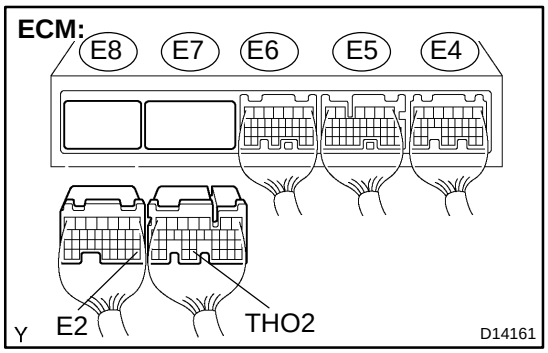
2	Check harness and connector (Transmission wire – ECM)



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 32 (THO2) – E8 – 28 (E2)	25 Ω to 156 kΩ

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 32 (THO2) – Body ground	10 kΩ or higher
E8 – 28 (E2) – Body ground	↑

NG → **Repair or replace the harness or connector (See page IN–35).**

OK

Replace the ECM (See page SF–80).

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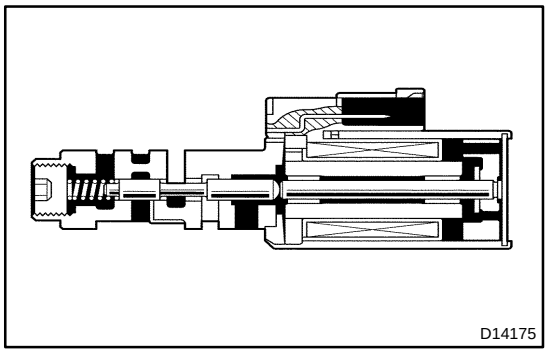
DIDJO–01

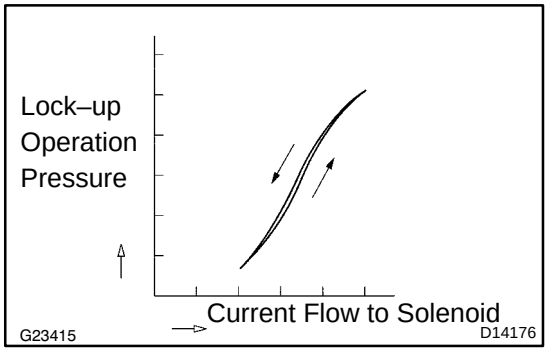
DTC	P2757	Torque Converter Clutch Pressure Control Solenoid Performance(Shift Solenoid Valve SLU)


D14175

SYSTEM DESCRIPTION

The ECM uses the signals from the throttle position sensor, Air–flow meter, turbine (input) speed sensor, output speed sensor and crankshaft position sensor to monitor the engagement condition of the lock–up clutch.

Then the ECM compares the engagement condition of the lock–up clutch with the lock–up schedule in the ECM memory to detect a mechanical problems of the shift solenoid valve SLU, valve body and torque converter clutch.



DTC No.	DTC Detection Condition	Trouble Area
P2757	Lock–up does not occur when driving in the lock–up range (normal driving at 80 km/h [50 mph]), or lock–up remains ON in the lock–up OFF range. (2–trip detection logic)	▶Shift solenoid valve SLU remains open or closed ▶Valve body is blocked ▶Torque converter clutch ▶Automatic transmission (clutch, brake or gear, etc.) ▶Line pressure is too low

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MONITOR DESCRIPTION

Torque converter lock–up is controlled by the ECM based on the turbine (input) speed sensor NT, output speed sensor SP2, engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and gear selection. The ECM determines the lock–up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to output shaft rpm (SP2). When conditions are appropriate, the ECM requests ”lock–up” by applying control voltage to the shift solenoid SLU. When the SLU is turned on, it applies pressure to the lock–up relay valve and locks the torque converter clutch.

If the ECM detects no lock–up after lock–up has been requested or if it detects lock–up when it is not requested, the ECM interprets this as a fault in the shift solenoid valve SLU or lock–up system performance. The ECM will turn on the MIL and store the DTC.

Example:

When any of the following is met, the system judges it as a malfunction.

(a) There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock–up.
(Engine speed is at least 70 rpm greater than input turbine speed.)

(b) There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock–up off.
(The difference between engine speed and input turbine speed is less than 35 rpm.)

MONITOR STRATEGY

Related DTCs	P2757	Shift solenoid valve SLU/OFF malfunction
		Shift solenoid valve SLU/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SLU
	Sub	Valve body, Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A)	2 sec.
	OFF malfunction (B)	0.4 sec.
	ON malfunction	1.8 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
Turbine speed sensor circuit	Not circuit malfunction	
Output speed sensor circuit	Not circuit malfunction	
Shift solenoid valve S1 circuit	Not circuit malfunction	
Shift solenoid valve S2 circuit	Not circuit malfunction	
Shift solenoid valve SR circuit	Not circuit malfunction	
Torque converter clutch pressure control solenoid circuit	Not circuit malfunction	
KCS sensor circuit	Not circuit malfunction	
ETCS (Electric throttle control system)	Not system down	
Transmission range	”D”	

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ECT (Engine coolant temperature)	40˚C (104˚F) or more	–
Spark advance from Max. retard timing by KCS control	0˚ CA or more	–
Engine	Starting	
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h (15.5 mph) or more	–
Shift solenoid valve S1 circuit	Not on malfunction	
Shift solenoid valve S2 circuit	Not on malfunction	
Shift solenoid valve SL2 circuit	Not on malfunction	
1–2 Shift valve	Not on malfunction	
Transfer neutral position switch	OFF	
Transfer range	”HIGH”*1	
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor circuit	Not circuit malfunction	
Output shaft speed sensor circuit	Not circuit malfunction	
Transfer output speed	143 rpm or more	–
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 to 1.1	
OFF malfunction (A)		
ECM lock–up command	ON (SLU pressure: 513kpa or more)	
Vehicle speed	–	Less than 100 km/h (62.2 mph)
OFF malfunction (B)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1.2 mph) or more	–
Output speed	2nd → 1st down shift point or more	–
Throttle valve opening angle	7.0% or more at 2,000 rpm (Conditions vary with engine speed)	–
ON malfunction		
ECM lock–up command	OFF (SLU pressure: less than 4kpa)	
Throttle valve opening angle	9% or more	–
Vehicle speed	–	Less than 60 km/h (37.3 mph)

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TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions are met: OFF malfunctions (A) and (B)	
OFF malfunction (A)	
Engine speed – Turbine speed	70 rpm or more
OFF malfunction (B)	
Turbine speed/Output speed	Not 3.30 to 7.50
ON malfunction	
2 detections are necessary per driving cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Vehicle speed must be under 10 km/h (6.2 mph) once before 2nd detection	
Difference between engine speed and turbine speed	Less then 35 rpm

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INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn on the tester.
(f) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST”.
(g) According to the display on the tester, perform the ”ACTIVE TEST”.

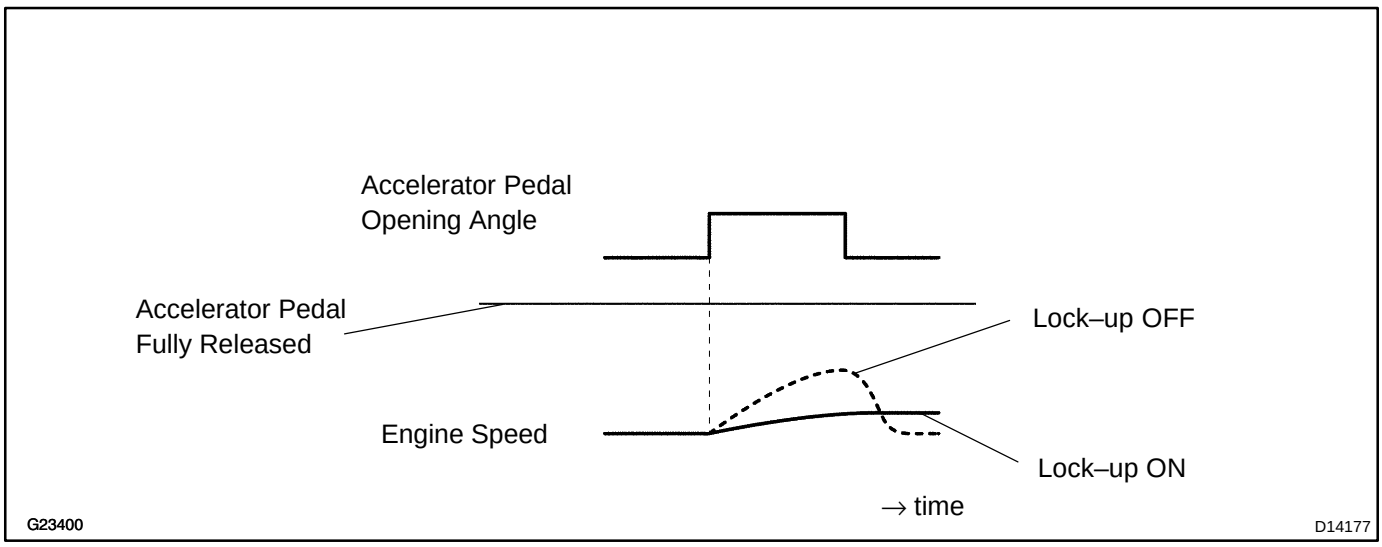
Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transmission to the lock–up condition. [Vehicle Condition] ▶Throttle valve opening angle: Less than 35 % ▶Vehicle Speed: 60 km/h (37 mph) or more	Possible to check the SLU operation.

HINT:

- ▶ This test can be conducted when the vehicle speed is 60 km/h (37 mph) or more.
- ▶ This test can be conducted in the 5th gear.
- ▶ Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

- ▶ When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock–up is on.
- ▶ Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock–up may be turned off automatically.)



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1	**Check other DTCs output (in addition to DTC P2757).**

PREPARATION:

(a) Turn the ignition switch off.
(b) Connect the OBD II scan tool or hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn on the tester.
(e) Select the item ”DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand–held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P2757” is output	A
”P2757” and other DTCs	B

HINT:

If any other codes besides ”P2757” are output, perform troubleshooting for those DTCs first.

B → **Go to DTC chart (See page DI–573).**

A

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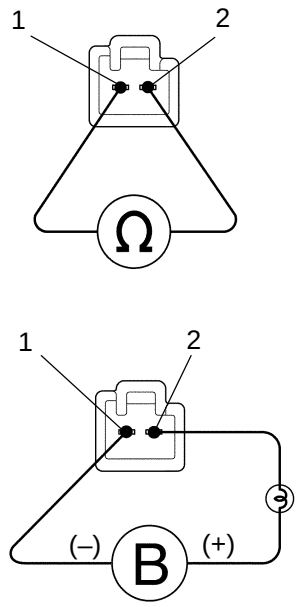
2	Check shift solenoid valve SLU operation.

Shift Solenoid Valve SLU:



PREPARATION:

Remove the shift solenoid valve SLU (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve SLU (See page AT–10).**

OK →

3	Inspect valve body (See page AT–10).

OK:

There are no foreign objects on each valve.

NG → **Repair or replace valve body.**

OK →

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4	Check torque converter clutch (See page AT–30).

OK:

The torque converter clutch operates normally.

NG → Replace the torque converter clutch (See page AT–25).

OK

Repair or replace transmission (See page AT–25).

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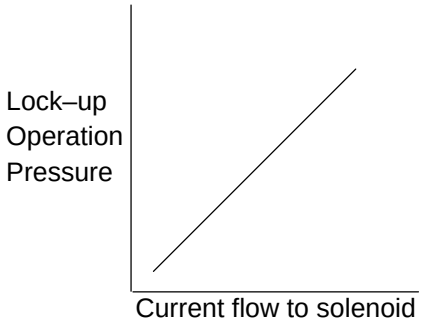
DIDJP–01

DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical(Shift Solenoid Valve SLU)



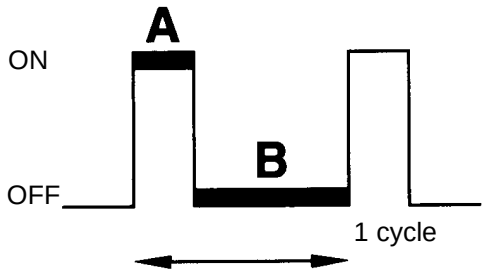
CIRCUIT DESCRIPTION

The amount of current flow to the solenoid is controlled by the (*) duty ratio of the ECM output signal. The higher the duty ratio becomes, the higher the lock–up hydraulic pressure becomes during the lock–up operation.

(*) Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non–continuity, then

Duty Ratio = A/(A + B) x 100 (%)



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D00160

DTC No.	DTC detection condition	Trouble Area
P2759	Open or short is detected in shift solenoid valve SLU circuit for 1 second or more while driving (1–trip detection logic).	▶Open or short in shift solenoid valve SLU circuit ▶Shift solenoid valve SLU ▶ECM

MONITOR DESCRIPTION

When an open or short in a shift solenoid valve (SLU) circuit is detected, the ECM determines there is a malfunction. The ECM will turn on the MIL and store this DTC.

MONITOR STRATEGY

Related DTCs	P2759	Shift solenoid valve SLU/Range check
Required sensors/Components	Shift solenoid valve SLU	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

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TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present.	See page DI–545	
Solenoid current cut status	Not cut	
CPU commanded duty	19% or more	–
Battery voltage	11 V or more	–
Ignition switch	ON	
Starter	OFF	

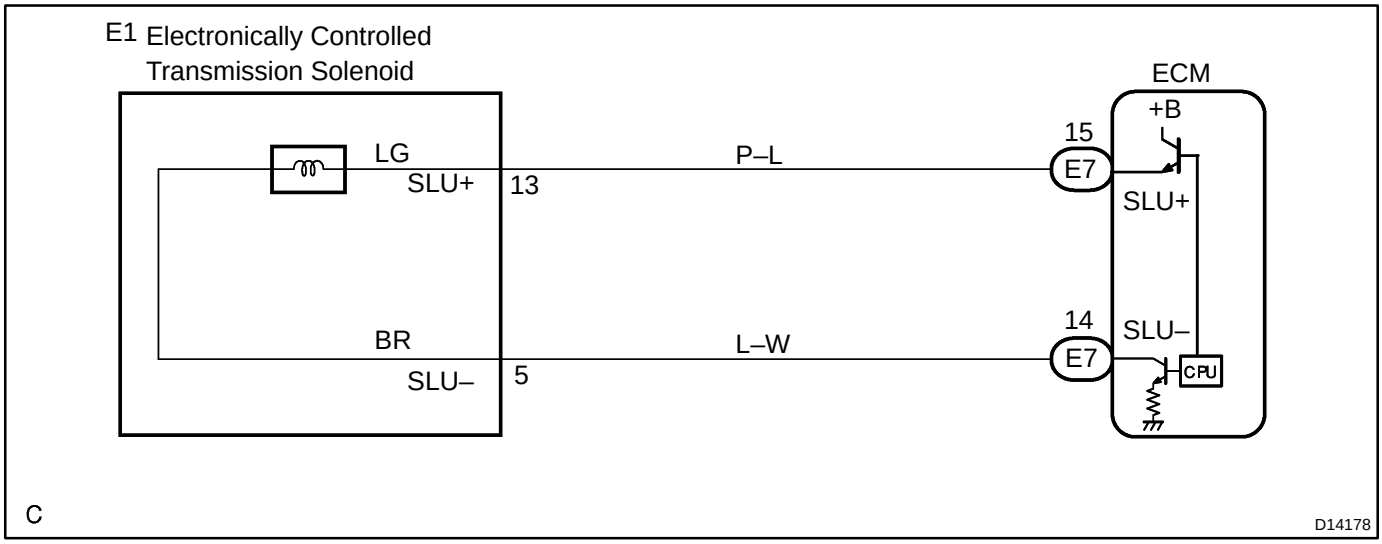
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



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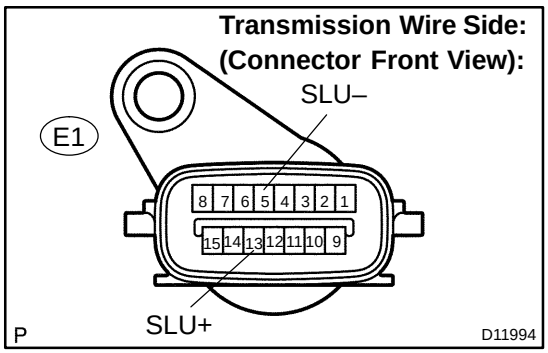
INSPECTION PROCEDURE

1	**Inspect transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
13 (SLU+) – 5 (SLU–)	5.0 to 5.6 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
13 (SLU+) – Body ground	10 kΩ or higher
5 (SLU–) – Body ground	↑

NG → **Go to step 3.**

OK

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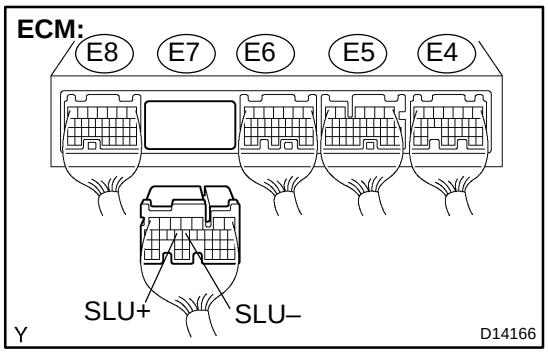
2	Check harness and connector (Transmission wire – ECM)



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
E7 – 15 (SLU+) – E7 – 14 (SLU–)	5.0 to 5.6 Ω

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
E7 – 15 (SLU+) – Body ground	10 kΩ or higher
E7 – 14 (SLU–) – Body ground	↑

NG → **Repair or replace the harness or connector (See page IN–35).**

OK →

Replace the ECM (See page SF–80).

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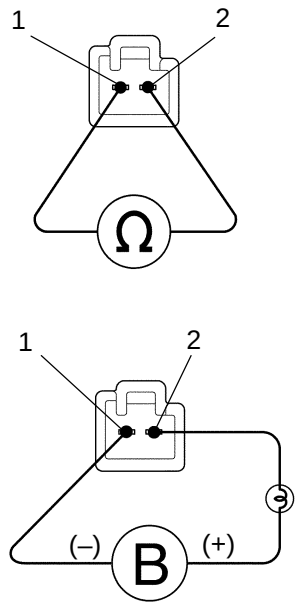
3	Inspect shift solenoid valve SLU.

Shift Solenoid Valve SLU:



D12795

PREPARATION:

Remove the shift solenoid valve SLU (See page AT–10).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition 20°C (68°F)
1 – 2	5.0 to 5.6 Ω

CHECK:

Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (–) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **Replace the shift solenoid valve SLU (See page AT–10).**

OK →

Repair or replace the transmission wire (See page AT–7).

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DIDJQ–01

DTC	P2772	Transfer L4 SW Circuit

CIRCUIT DESCRIPTION

The ECM detects the signal from the transfer L4 position switch.
This DTC indicates that the transfer L4 position switch remains ON.

DTC No.	DTC Detecting Condition	Trouble Area
P2772	Transfer L4 position switch remains ON while vehicle running under conditions for 18 seconds or more (1–trip detection logic) (a) Output shaft speed 3000 rpm or less (b) Transfer shift position is H	▶Short in transfer L4 position switch circuit ▶Transfer L4 position switch ▶4WD control ECU ▶ECM

MONITOR DESCRIPTION

The ECM monitors the transfer–case L4 position switch to determine when the transfer–case L4 gear is engaged. If the transfer–case L4 gears remain engaged under the following conditions, the ECM will conclude that there is a malfunction of the L4 position switch:

- ▶ L4 switch indicated that the L4 transfer–case gears are engaged.
- ▶ Transfer–case shifter is in the ”H” position.
- ▶ Transfer–case output shaft rpm is between 750 and 3,000 rpm.
- ▶ The specified time period has elapsed.

If all of the above conditions are detected, the ECM will conclude that there is a malfunction of the L4 switch, and illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2772	Transfer L4 position switch/ON malfunction
Required sensors/Components	Transfer L4 position switch	
Frequency of operation	Continuous	
Duration	ON malfunction (A)	1.8 sec.
	ON malfunction (B)	0.5 sec.
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
All:		
Output speed sensor circuit	Not circuit malfunction	
Vehicle speed sensor circuit	Not circuit malfunction	
Transfer neutral position switch	OFF	
ON malfunction (A)		
Output speed (Transfer output speed)	1,000 to 3,000 rpm	
ON malfunction (B)		
Output speed (Transfer output speed)	143 rpm or more	–

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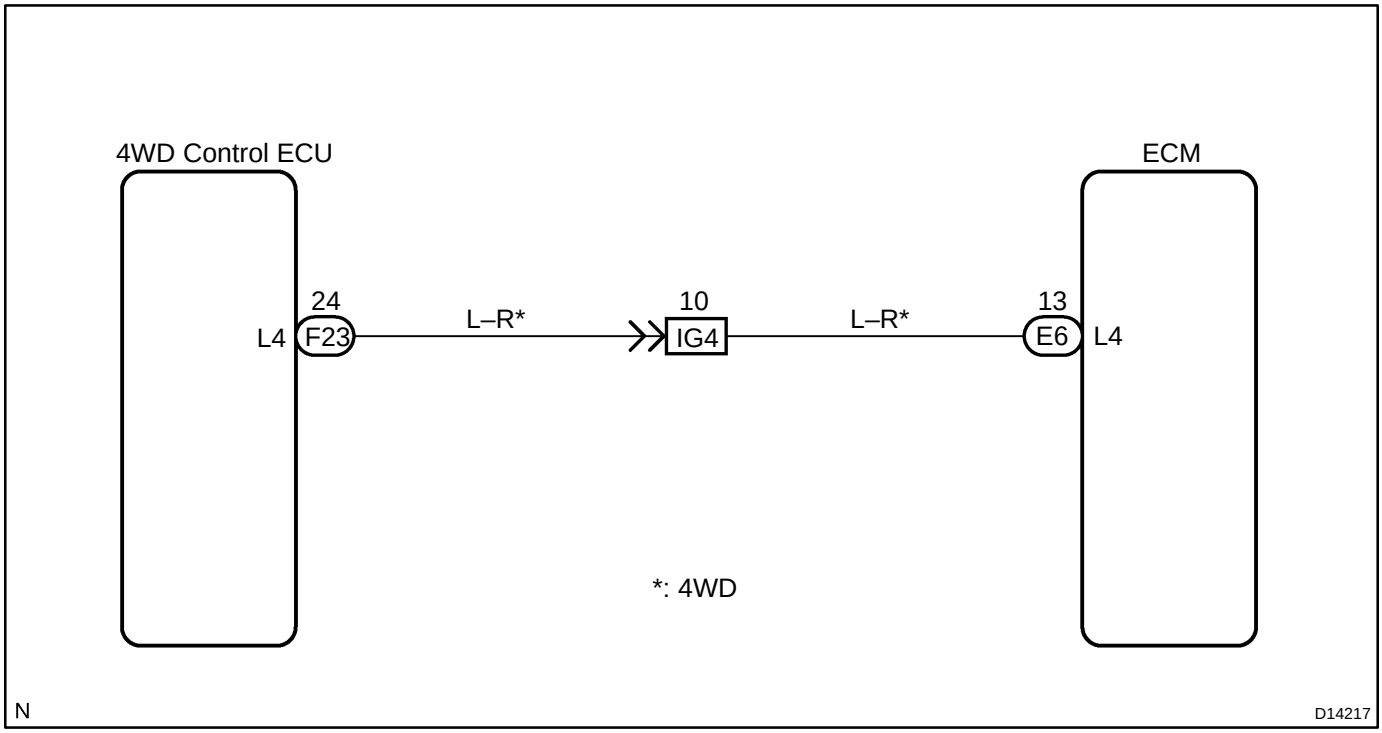
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions is met: ON malfunctions (A) and (B)	
ON malfunction (A)	
L4 switch	ON
ON malfunction (B)	
Actual Transfer gear ratio Transfer input speed/Transfer output speed	0.9 to 1.1

WIRING DIAGRAM



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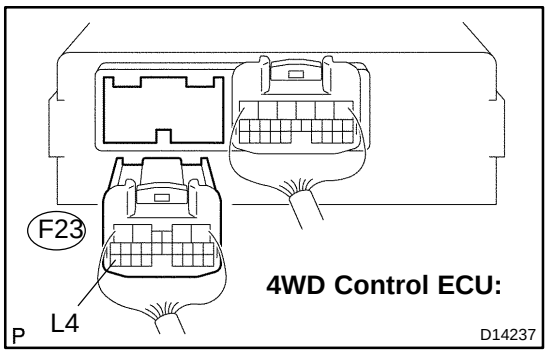
INSPECTION PROCEDURE

1	**Inspect terminal voltage (L4 – body ground).**



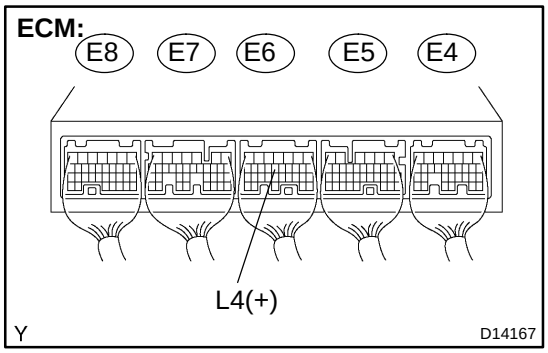
PREPARATION:
Disconnect the 4WD control ECU connector and turn the ignition switch ON.
CHECK:
Measure the voltage according to the value(s) in the table below.
OK:

Tester Connection	Specified Condition
F23 – 24 (L4) – Body ground	10 to 14 V

NG → **Check and replace 4WD control ECU (See page TR–39).**

OK

2	**Inspect terminal voltage (L4 – body ground).**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage according to the value(s) in the table below.
OK:

Tester Connection	Specified Condition
E6 – 13 (L4) – Body ground	10 to 14 V

NG → **Replace the ECM (See page SF–80).**

OK

Repair or replace the harness or connector (See page IN–35).

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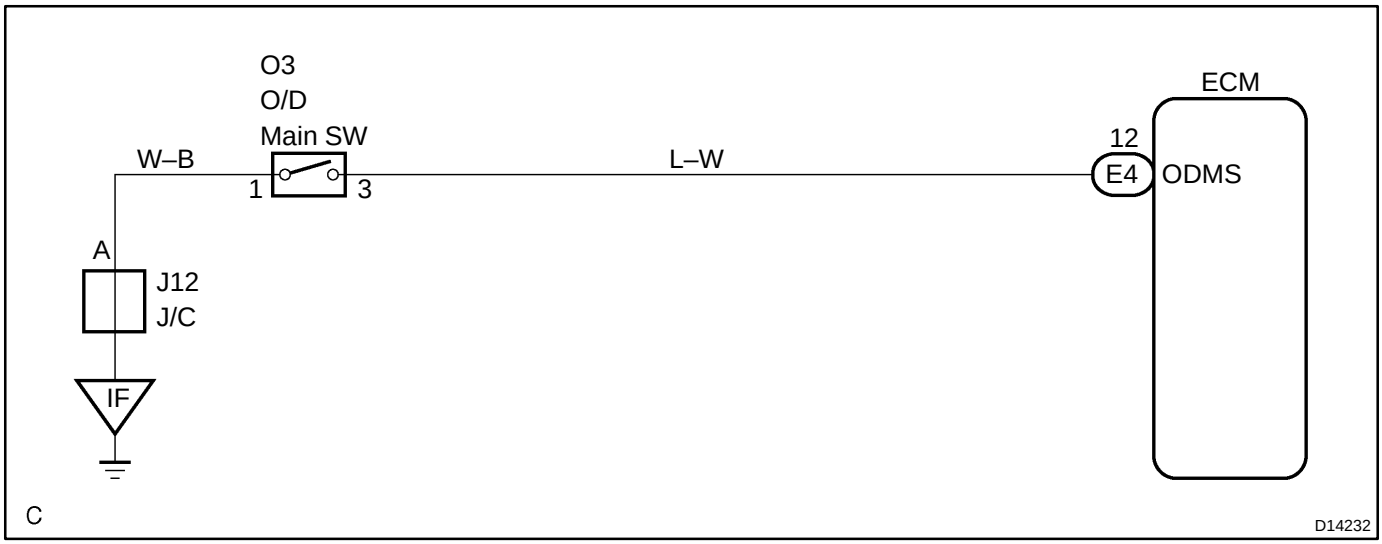
DIDJR–01

O/D Main Switch Circuit

CIRCUIT DESCRIPTION

The O/D main switch (transmission control switch) is a momentary type switch. When pressing the O/D main switch once, the O/D OFF indicator light comes on and the ECM prohibits shifting into O/D. When pressing it once again, the O/D OFF indicator light goes off and the ECM allows shifting into O/D. Turning the IG switch OFF will reset the O/D OFF indicator light.

WIRING DIAGRAM



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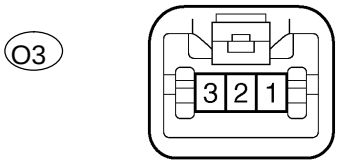
INSPECTION PROCEDURE

1	Check harness and connector (O/D main switch – body ground)

Wire Harness Side:
(Connector Front View):



PREPARATION:
Disconnect the O/D main switch connector.

CHECK:
Measure the resistance according to the value(s) in the table below.

OK:

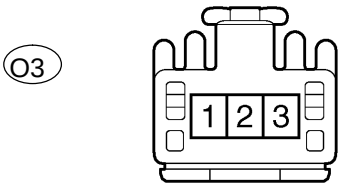
Tester Connection	Specified Condition
1 – Body ground	Below 1 Ω

NG → **Repair or replace the harness or connector (See page IN–35).**

OK

2	Inspect O/D main switch.

Switch Side:
(Connector Front View):



CHECK:
Measure the resistance according to the value(s) in the table below.

OK:

Switch Condition	Tester Connection	Specified Condition
O/D main switch pressed and held	1 – 3	Below 1 Ω
O/D main switch released	↑	10 kΩ or higher

NG → **Replace O/D main switch (See page AT–18).**

OK

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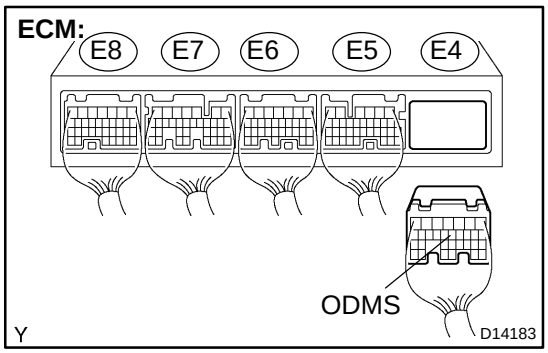
3	Check harness and connector (O/D main switch – ECM).



PREPARATION:

(a) Connect the O/D main switch connector.

(b) Disconnect the connector from the ECM.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Switch Condition	Tester Connection	Specified Condition
O/D main switch pressed and held	E4 – 12 (ODMS) – Body ground	Below 1 Ω
O/D main switch released	↑	10 kΩ or higher

NG → **Repair or replace harness or connector (See page IN–35).**

OK →

Proceed to next circuit inspection shown on matrix chart (See page DI–553).

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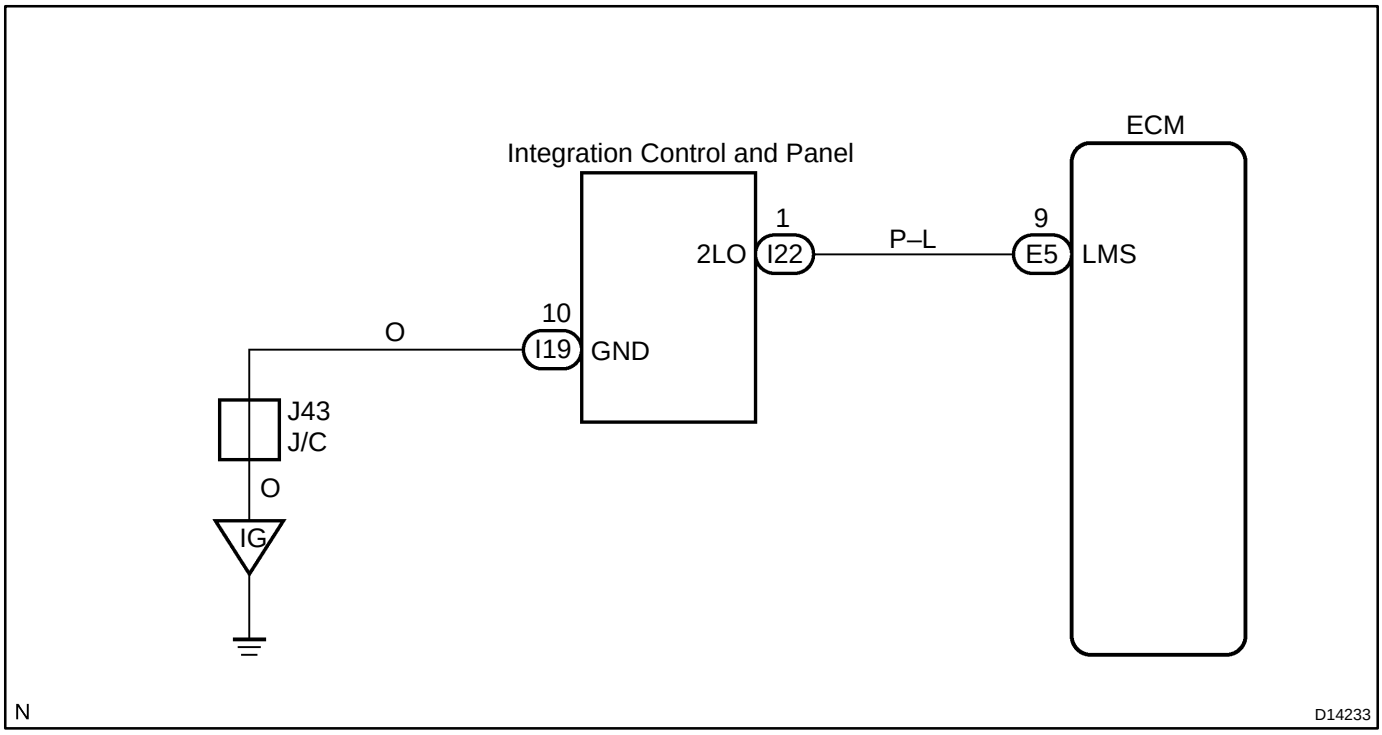
DIDJS–01

Shift Position L Switch Circuit

CIRCUIT DESCRIPTION

The shift position L switch is a momentary type switch. When the shift position L switch is pressed while driving with the shift lever in the 2 position, the L position indicator on the combination meter comes on and the transmission is locked in 1st gear. When the switch is pressed again, the indicator goes off and the transmission is released.

WIRING DIAGRAM



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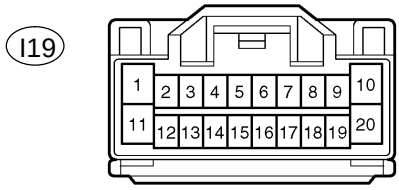
INSPECTION PROCEDURE

1	**Check harness and connector (shift position L switch – body ground).**

Wire Harness Side:
(Connector Front View):



PREPARATION:

Remove the center cluster integration panel assembly (shift position L switch).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
10 – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector (See page IN–35).**

OK

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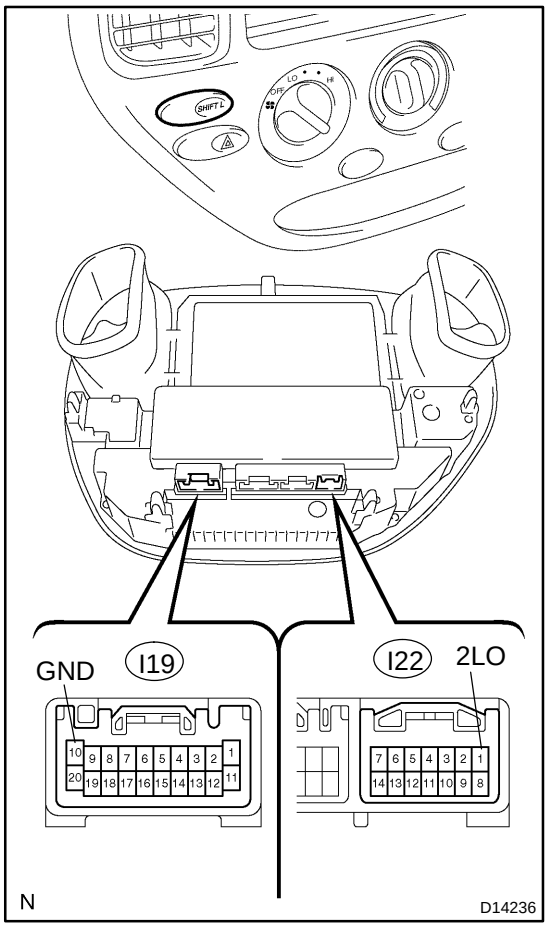
2	Inspect center cluster integration panel (shift position L switch).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Switch Condition	Tester Connection	Specified Condition
Shift position L switch pressed and held	I22 – 1 (2LO) – I19 – 10 (GND)	Below 1 Ω
Shift position L switch released	↑	10 kΩ or higher

NG → **Replace center cluster integration panel (shift position L switch).**

OK

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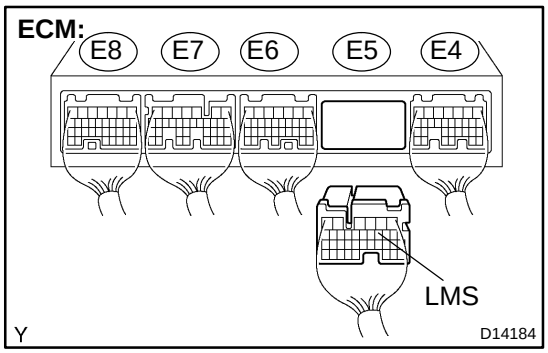
3	Check harness and connector (shift position L switch – ECM).



PREPARATION:

(a) Install the center cluster integration panel assembly (shift position L switch).

(b) Disconnect the connector from the ECM.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Switch Condition	Tester Connection	Specified Condition
Shift position L switch pressed and held	E5 – 9 (LMS) – Body ground	Below 1 Ω
Shift position L switch released	↑	10 kΩ or higher

NG → **Repair or replace harness or connector (See page IN–35).**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–553).

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AIR SUSPENSION SYSTEM

DIDCB–01

PRECAUTION

Be sure to switch the height control mode select switch to manual mode and cancel the auto leveling function when:

- **Jacking up the vehicle.**
- **A trailer etc. is attached to the vehicle.**

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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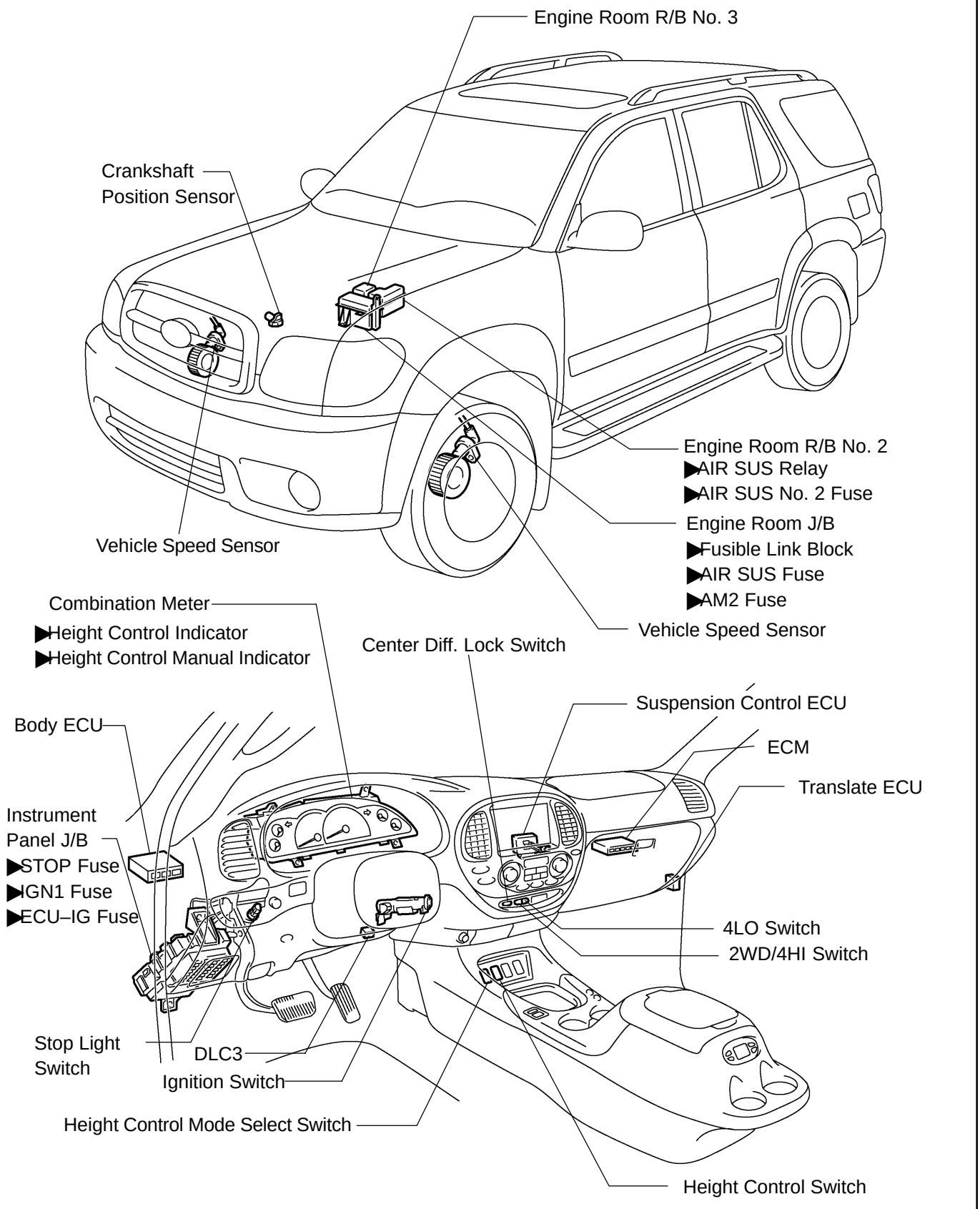
DIDCF–01

LOCATION



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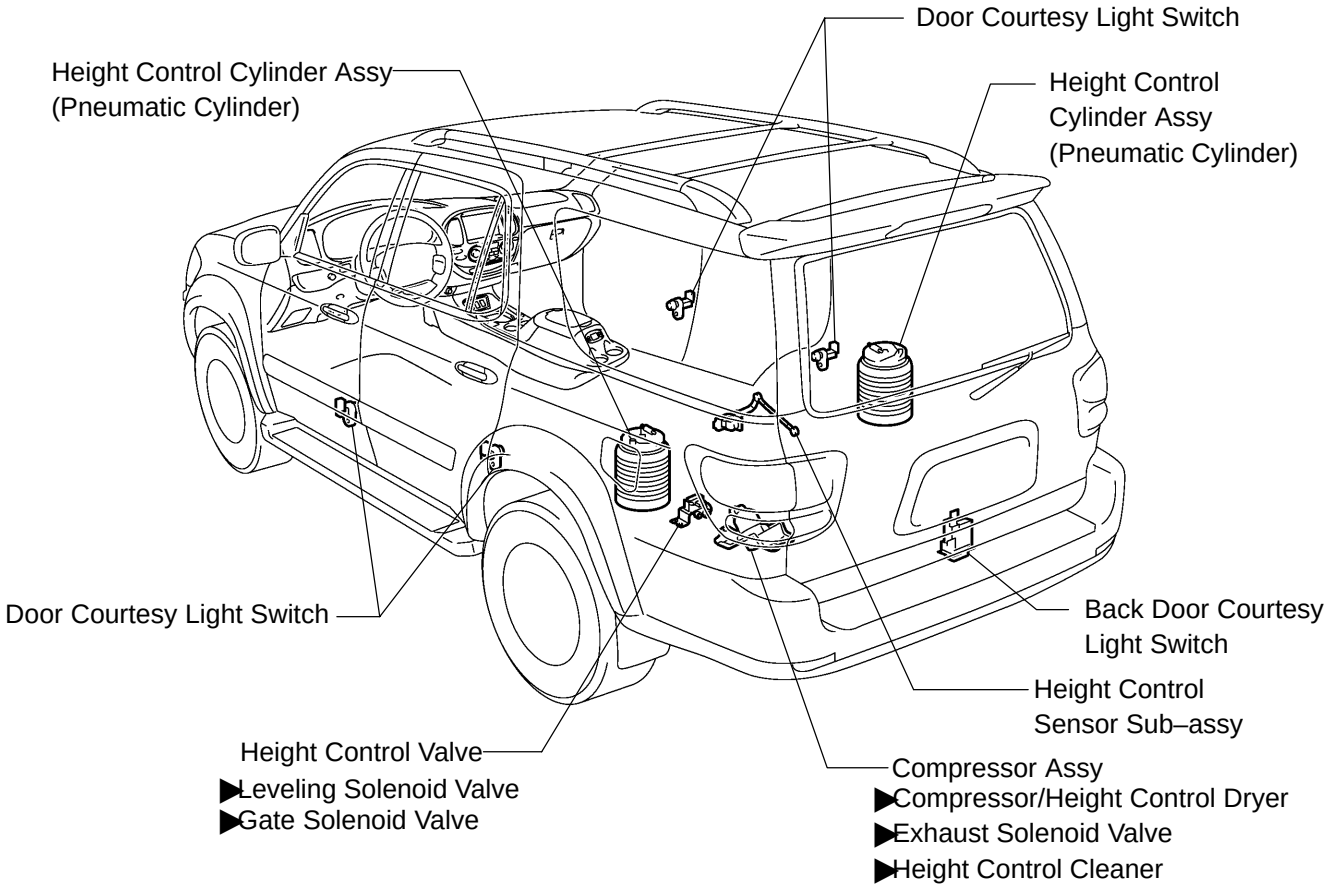

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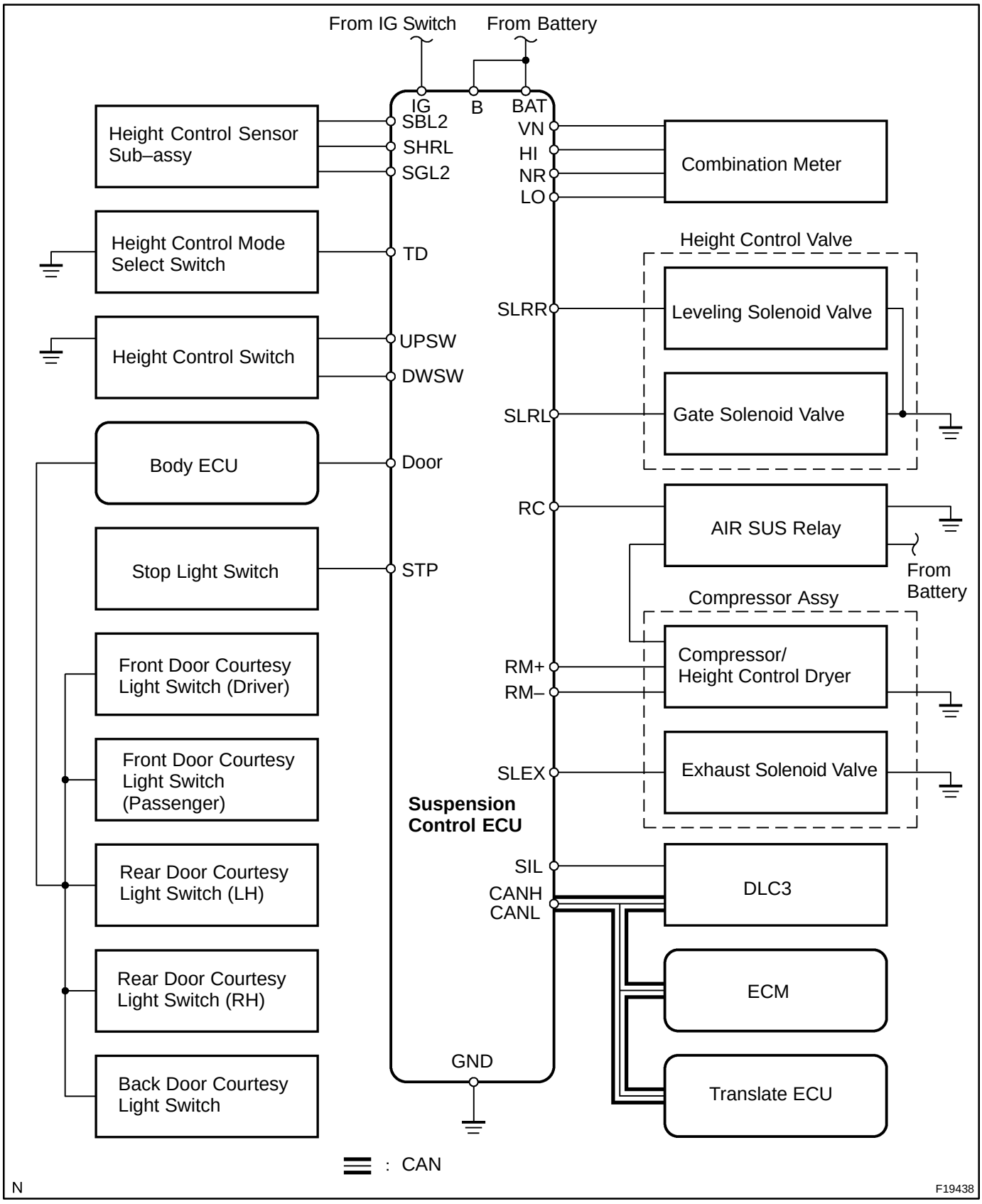
DIDCI–01

SYSTEM DIAGRAM



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Input and output signals of each ECU.

Transmitting ECU	Receiving ECU	Signal	Communication method
ECM	▶Translate ECU ▶Suspension control ECU	▶Engine speed signal ▶Transmission signal ▶Shift position signal ▶L4 switch signal ▶TC signal	CAN
Translate ECU	Suspension control ECU	▶Vehicle wheel speed signal ▶TS signal	CAN
Suspension control ECU	Translate ECU	Air suspension setting signal	CAN

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DIDCN–01

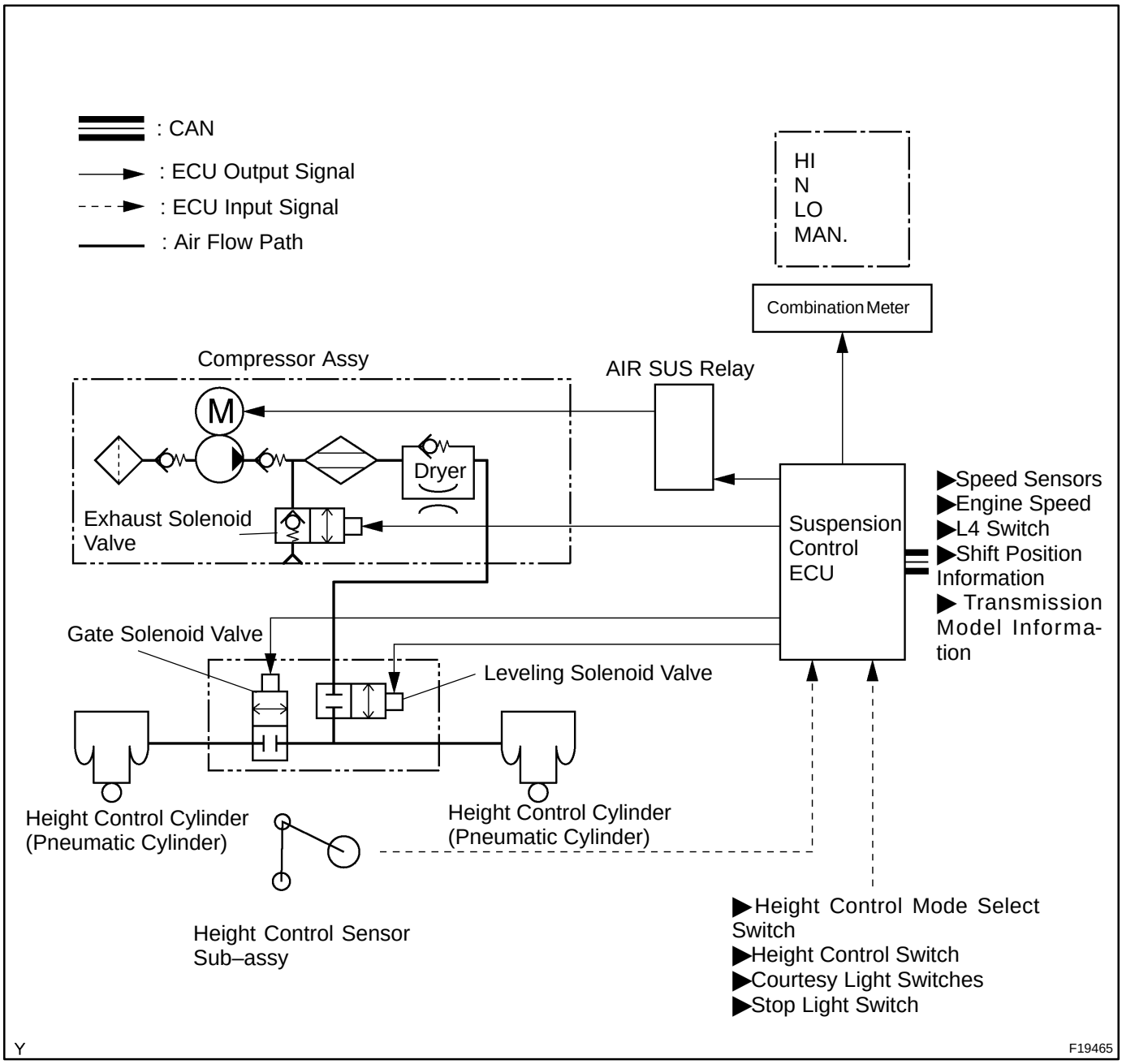
SYSTEM DESCRIPTION

1. GENERAL

◀ This system uses pneumatic cylinders instead of the coil springs that are used in a conventional rear suspension. The suspension control ECU analyzes the information based on the switches, sensors, and input signals, operates the compressor assy, and uses the solenoid valves to control the vehicle height.

◀ The suspension control ECU detects, via the height control sensor, the changes in the rear vehicle height that results from the number of occupants or the amount of the load. Then, the suspension control ECU controls the height control solenoid valves and the compressor assy in order to automatically adjust the rear vehicle height to a constant (normal) vehicle height.

◀ Furthermore, three vehicle heights can be selected by operating the height control switch: HI, NORMAL, and LO. The HI vehicle height ensures the vehicle's drive–through performance on rough roads. The LO vehicle height facilitates the entry and exit of the occupants and the loading and unloading of cargo. The NORMAL vehicle height helps realize excellent controllability and riding comfort during normal driving.



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2. REAR AIR SUSPENSION SYSTEM DESCRIPTION

(a) Auto leveling function

The function to keep the rear vehicle height fixed regardless of the change in the number of the occupants or the load.

(b) Vehicle height control function

(1) Mode change:

- The mode can be changed between the auto mode and the manual mode by operating the height control mode select switch.
- Vehicle height control can be canceled by changing the height control mode select switch to manual mode.

(2) Auto mode:

- Vehicle height can be set to NORMAL, HIGH (+40 mm (1.57 in.)) or LOW (4WD: –30 mm (–1.18 in.), 2WD: –15 mm (–0.59 in.)) by operating the height control switch.
- When vehicle speed is 12 km/h (7.46 mph) or less, vehicle height is LOW.
- When vehicle speed is 30 km/h (18.64 mph) or less, vehicle height is HIGH.

(3) Manual mode:

- Vehicle height can be set in any level within the vehicle height adjustable range by operating the height control switch.
- Vehicle speed is 30 km/h (18.64 mph) or less.

(4) Adjusting time:

- Approximately 20 seconds is needed to adjust vehicle height to UP (+40 mm (1.57 in.)).
- Approximately 30 seconds is needed to adjust vehicle height to DOWN (–40 mm (–1.18 in.)).

(c) Vehicle speed detection function

When any of the following conditions are met with the vehicle height set to any position other than NORMAL, vehicle height is automatically adjusted to NORMAL.

- AUTO MODE: When vehicle speed is 12 km/h (7.46 mph) or less, vehicle height is LOW.
- AUTO MODE: When vehicle speed is 30 km/h (18.64 mph) or less, vehicle height is HIGH.
- MANUAL MODE: Vehicle speed is 30 km/h (18.64 mph) or less.

(d) Vehicle height adjustment control after turning the ignition switch off

If the rear vehicle height is raised after the ignition switch is turned off, such as when the occupant gets out of the vehicle, vehicle height is lowered to the correct position for several seconds even after the ignition switch is turned off.

(e) Fail–safe

If the vehicle control switch is operated frequently to change vehicle height, vehicle height control is suspended for a while to prevent the compressor from becoming overheated.

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3. FUNCTION OF MAIN COMPONENTS

Component	Outline
Height Control Mode Select Switch	◀Used to select vehicle height control mode (Auto/Manual). ◀Used to operate or stop auto leveling control.
Height Control Switch	◀Auto mode: Used to select vehicle height (HIGH, NORMAL, LOW). ◀Manual mode: Used to select vehicle height optionally.
Height Control Sensor	Converts the vertical change of the rear axle, in proportion to the standard, to signals and detects vehicle height.
Height Control Indicator Lamp (Combination Meter)	◀Auto mode: Target vehicle height is displayed (HIGH, NORMAL, LOW). ◀Manual mode: Current vehicle height is displayed (HIGH, NORMAL, LOW).
Height Control Manual Indicator Lamp (Combination Meter)	◀Comes on during manual mode. ◀Blinks when the suspension control ECU detects a system malfunction. ◀Blinks during test mode. ◀Displays output DTC.
Stop light Switch	◀Detects braking condition. ◀Used to clear DTCs.
Pneumatic Cylinder (Height Control Cylinder Assy)	Supports the vehicle body and adjusts the vehicle height.
Height Control Compressor Assy (Compressor/Height Control Dryer)	◀The compressor generates compressed air that is necessary to raise vehicle height and supplies it to the height control cylinder assy. ◀The dryer removes moisture from the compressed air.
Exhaust Solenoid Valve	Drains the air in the height control cylinder assy when vehicle height is lowered. (Built into the height control compressor assy)
Leveling Solenoid Valve	Opens or closes the passage between the height cylinder assy and height control compressor assy.
Gate Solenoid Valve	Opens or closes the passage between the right and left height control cylinder assy (Built into the leveling solenoid valve).
Suspension Control ECU	◀Estimates vehicle condition based on the signals from sensors and switches, and outputs the control signals to the compressor and valves. ◀Blinks the height control manual indicator light when a system malfunction is detected.
Air Suspension Relay	Supplies power to the height control compressor assy.
Door Courtesy Switch (Body ECU)	Detects whether the 5 doors, including the back door, are opened or closed, and sends the signals to the suspension control ECU.
ECM	Sends the engine speed signal, etc. to the suspension control ECU through CAN communication.
Speed Sensor (Skid Control ECU)	Sends the vehicle wheel speed signal, etc. to the suspension control ECU through CAN communication via the translate ECU.

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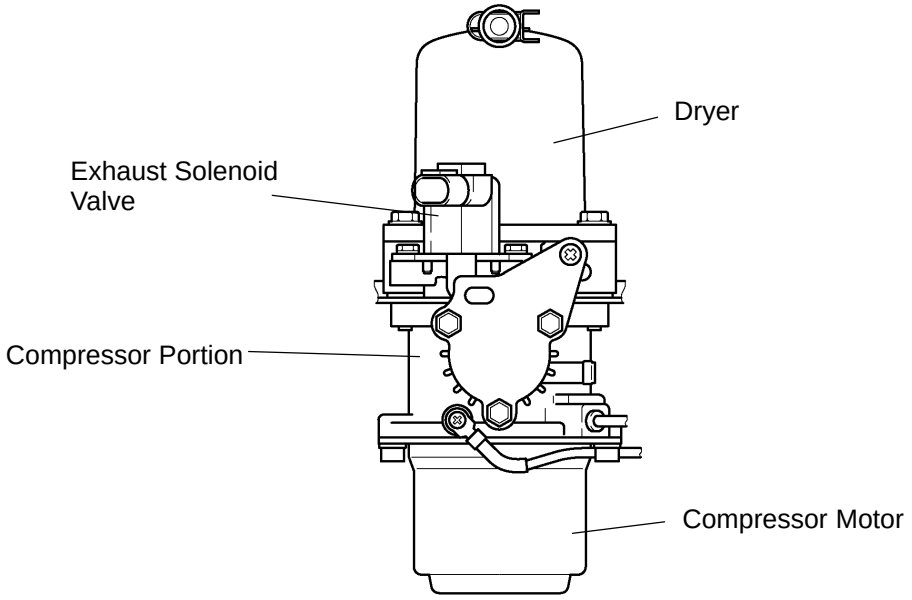
4. CONSTRUCTION AND OPERATION OF MAIN COMPONENTS

Compressor Assy

- The compressor and motor are used to make the compressed air necessary for raising the vehicle height.
- The exhaust solenoid valve is provided on the compressor assy. The exhaust solenoid valve discharges compressed air from the pneumatic cylinders to the atmosphere in order to lower the vehicle.
- The dryer is used to eliminate the moisture in the compressed air made by the compressor and motor.
- To protect the battery, this compressor assy operates only when the engine is running.



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Specification

Motor	Type	DC
Motor	Rated Voltage	12 V
Exhaust Solenoid Valve	Rated Voltage	12 V
Exhaust Solenoid Valve	Operating Voltage Range	10 to 15 V
Exhaust Solenoid Valve	Resistance	10 to 14 Ω

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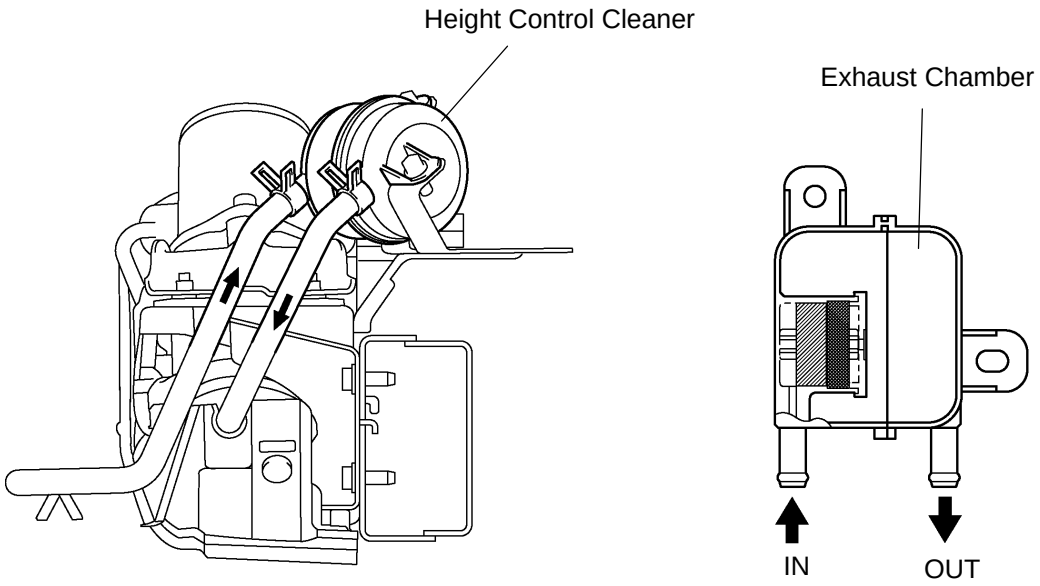
Height Control Cleaner

- The height control cleaner consists of a filter to remove dust and debris, and an expansion chamber to reduce the intake sound. In consideration of dusty areas, this cleaner draws air from the inside of the vehicle cabin.
- This cleaner cannot be disassembled; therefore, it is not possible to replace only the filter element.



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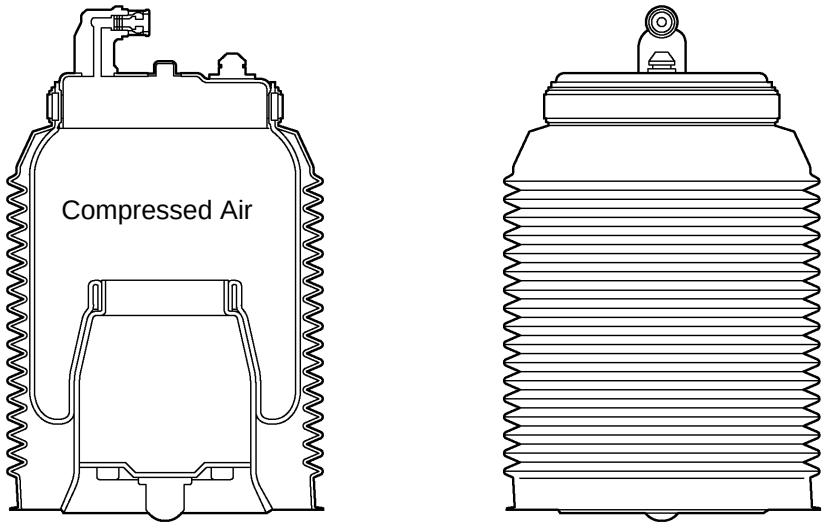
Height Control Cylinder Assy (Pneumatic Cylinder)

The pneumatic cylinder consists of a signal type air chamber with a large compressed air capacity in order to realize excellent riding comfort.



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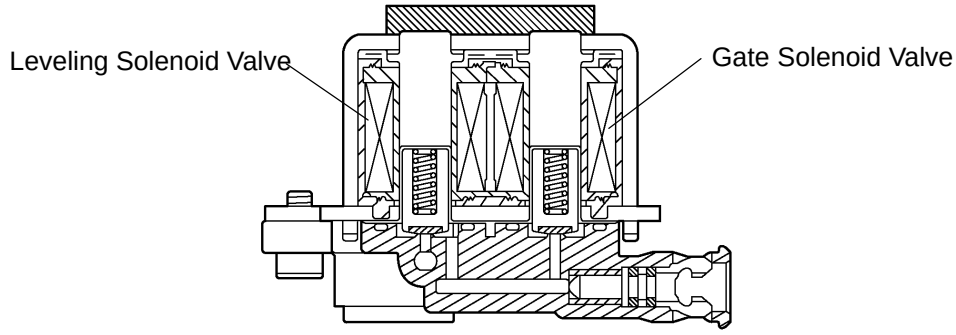
Height Control Valve

The height control valve consists of a leveling solenoid valve, and gate solenoid valve.



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Specification

Leveling Solenoid Valve	Rated Voltage	12 V
Leveling Solenoid Valve	Operating Voltage Range	10 to 15 V
Leveling Solenoid Valve	Resistance	10 to 14 Ω
Gate Solenoid Valve	Rated Voltage	12 V
Gate Solenoid Valve	Operating Voltage Range	10 to 15 V
Gate Solenoid Valve	Resistance	17.5 to 21.5 Ω

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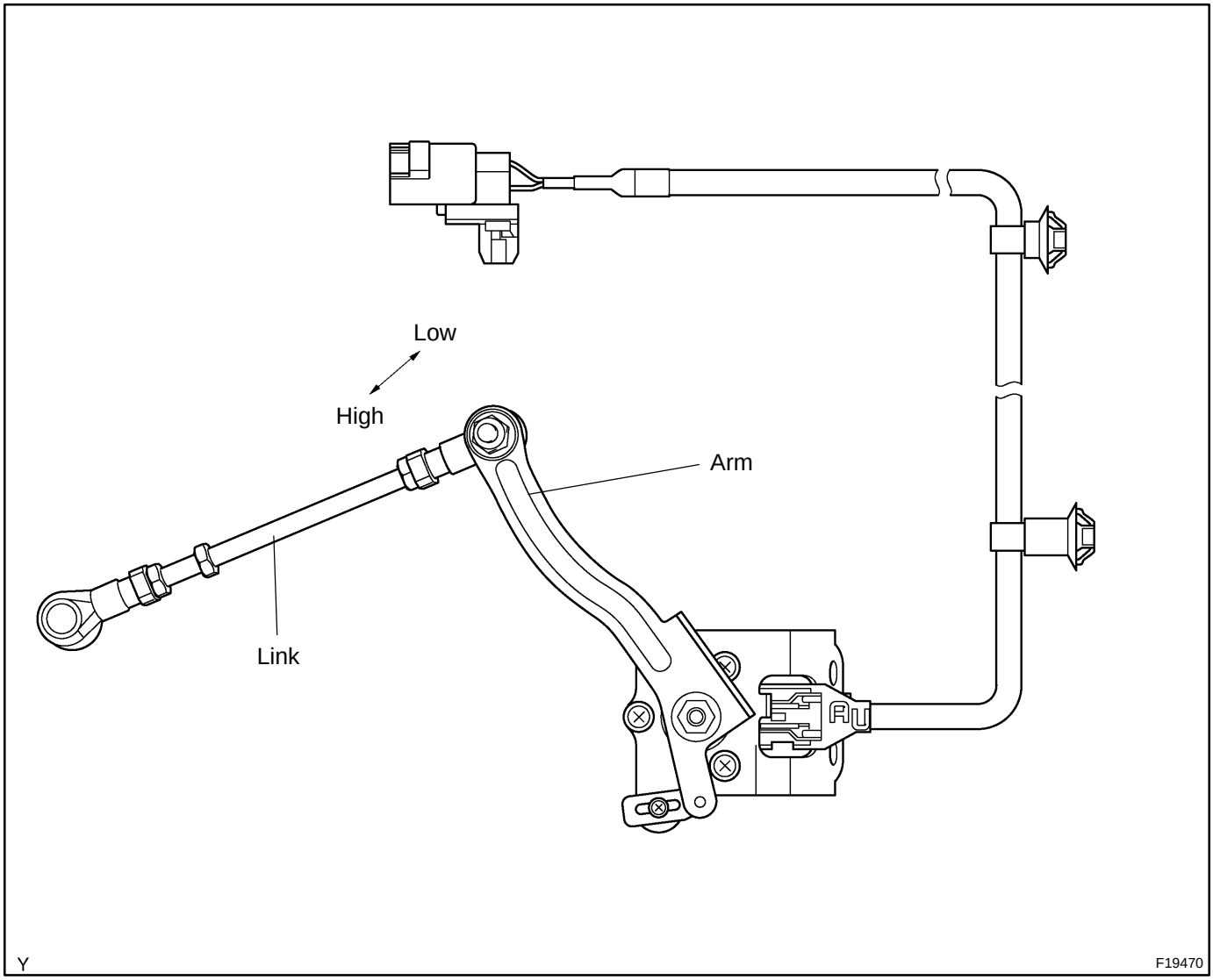
Height Control Sensor

- The height control sensor detects the vehicle height. One sensor is located in the center of the rear frame, which is connected to the center of the rear axle via a link, in order to detect the vehicle height.
- The sensor has an arm that moves along with the change in vehicle height, and the resultant change in voltage enables the suspension control ECU to detect the vehicle height.
- A semiconductor type sensor has been adopted to make it compact and heat–resistant.



HINT:

Refer to the following factors when adjusting the link of the height control sensor:

- The vehicle height changes approximately 4 mm (0.16 in.) with each turn of the link.
- The vehicle height changes approximately 2 mm (0.08 in.) by moving the link installation position by 1 mm (0.04 in.).

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DIDCP–01

HOW TO PROCEED WITH TROUBLESHOOTING

1	**Vehicle Brought to Workshop**

NEXT

2	**Customer Problem Analysis (See page DI–710)**

NEXT

3	**Check CAN Communication System (See page DI–1065)**

Check if any DTCs are output.
HINT:
The suspension control ECU of this system is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

	CAN System DTC is Output (Proceed To "CAN COMMUNICATION SYSTEM" (See page DI–1065))
	No CAN System DTC is Output (Go to step 4)

4	**Check and Clear DTCs (See page DI–723)**

NEXT

5	**Problem Symptom Confirmation**

	Symptom Does Not Occur (Go to step 6)
	Symptom Occurs (Go to step 7)

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6	Symptom Simulation (See page IN–35)

NEXT

7	DTC Check (See page DI–723), Test Mode (See page DI–711)

	Normal System Code (Go to step 8)
	Trouble Code (Go to step 9)

8	Problem Symptoms Table (See page DI–716)

NEXT	Go To Step 10

9	DTC Chart (See page DI–729)

NEXT

10	Circuit Inspection (See page DI–731 to DI–793)

NEXT

11	Identification of Problem

NEXT

12	Repair

NEXT

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13	Confirmation Test

NEXT

End

HINT:
Step 4, 7, 10, 13:
Diagnostic steps permitting use of the hand–held tester.

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DIDCS–01

CUSTOMER PROBLEM ANALYSIS CHECK

Air Suspension System Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	/ /
Date Vehicle Brought In	/ /	**Odometer Reading**	**km miles**

Date Problem First Occurred		
Frequency Problem Occurs		☐ Always ☐ Sometimes (times per day, month) ☐ Once only
Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))
	Place	☐ Highway ☐ Suburbs ☐ Inner City ☐ Hill (Up, Down) ☐ Rough Road ☐ Other

Symptoms	☐ Malfunction in vehicle height control	☐ Vehicle height cannot be changed by operating the height control switch ☐ High speed control does not operate ☐ Other ( )
	☐ Indicator lamp does not come on	☐ Height control manual indicator lamp does not come on ☐ Height control indicator lamp does not come on
	☐ Other	

DTC Check	**1st Time**	☐ Normal System Code ☐ Trouble Code (Code)
	2nd Time	☐ Normal System Code ☐ Trouble Code (Code)

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TEST MODE PROCEDURE

1. INPUT SIGNAL CHECK (Using SST check wire)

HINT:

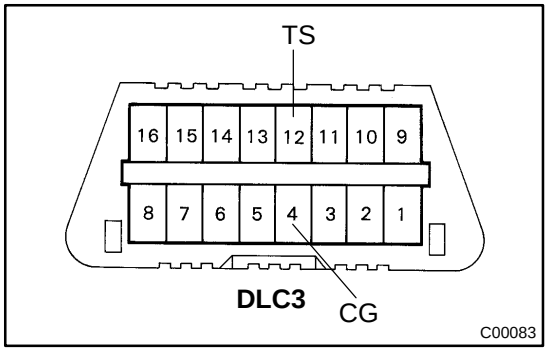
- ▶ This function checks if signals from the stop light switch assy and the door courtesy lamp switch, etc. are being input normally to the ECU.
- ▶ When entering test mode, the suspension control ECU sets all the test mode DTCs first.
  After completing the test mode for each check item, the test mode DTCs that are determined normal by the suspension control ECU will be erased.
  The test mode DTCs for other check items may not be erased when only a certain signal is inspected.
- ▶ When the test mode returns back to normal mode, all the test mode DTCs will be erased.

(a) Procedure for Input Signal Check Mode (Test Mode) using SST check wire.

SST 09843–18040

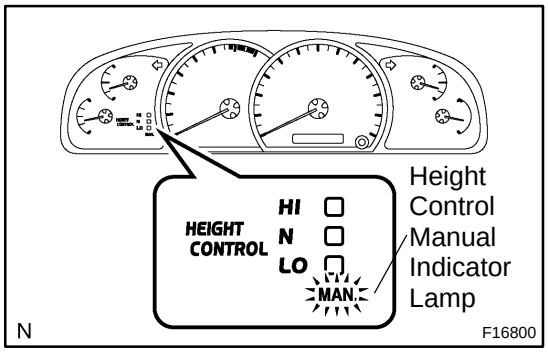
(1) Make sure the ignition switch is OFF.

(2) Set each of the check items to the condition shown under Operation (A) in the test mode table on the next page.



(3) Using SST, connect terminals TS and CG of the DLC3.

(4) Turn the ignition switch to the ON position.



(5) Check that the height control manual indicator lamp is blinking.

HINT:

- ▶ The height control manual indicator lamp comes on for 2 seconds, then blinks at 0.25 sec. intervals.
- ▶ If the height control manual indicator light does not blink, inspect the height control manual indicator lamp circuit (See page DI–789).

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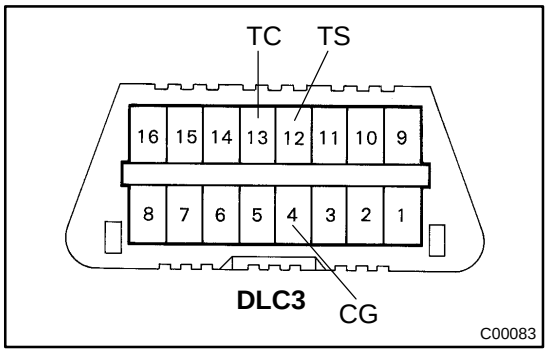
▶ The TS terminal circuit uses CAN (Controller Area Network) for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is/are output.

(6) Set each of the check items to the condition shown under Operation (B) in the test mode table below.

HINT:
When checking each item, the height control manual indicator lamp comes on for 1 second.

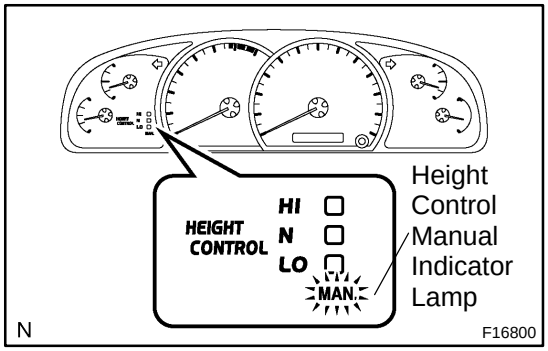
Test mode table:

Check Item	Operation (A)	Operation (B)
Stop light switch signal	OFF (Brake pedal not depressed)	ON (Brake pedal depressed)
Door courtesy light switch signal	ON (Each door opened)	OFF (All doors closed)
Height control switch signal	–	Press the height control switch ”UP” first and then press ”DOWN”
Height control mode select switch signal	OFF (Height control mode select switch not pushed in)	ON to OFF (Height control mode select switch pushed in and released)



(7) Using SST, connect the 3rd terminal of the SST check wire to terminal TC of the DLC3.

SST 09843–18040



(8) Read the number of blinks of the height control manual indicator lamp.

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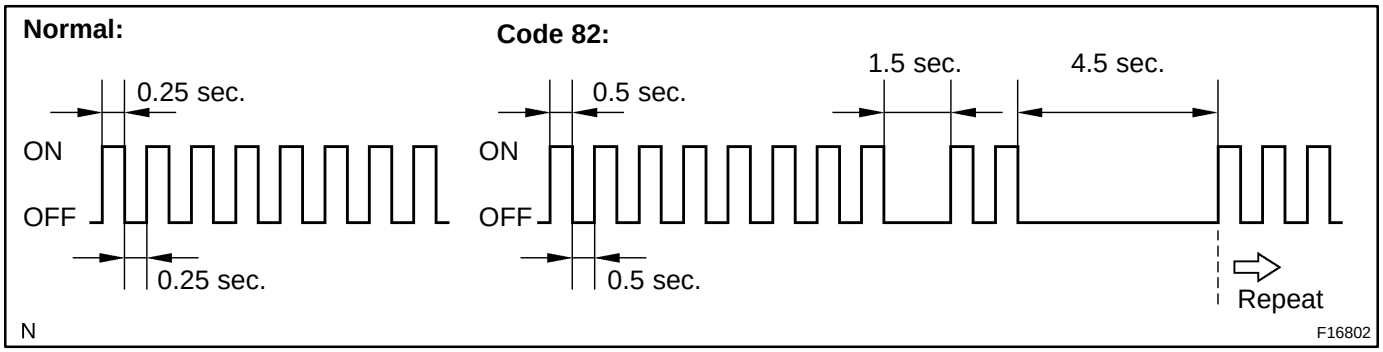
HINT:

- As examples, the blinking patterns of a normal system code and code 82 are shown in the illustration.
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code is displayed first.
- When a DTC is not output, check the TC terminal circuit on page DI–1567.

(9) Check the malfunction using the code table on the next page.



(b) Ending the Input Signal Check Mode (Test Mode) using SST check wire.

SST 09843–18040

(1) With the ignition switch OFF, disconnect the SST check wire from the terminals of the DLC3 and then turn the ignition switch to the ON position.

(c) Procedure for Sensor Test Mode (Test Mode) using the hand–held tester.

(1) Make sure the ignition switch is OFF.

(2) Set each of the check items to the condition shown under Operation (A) in the test mode table on the previous page.

(3) Connect the hand–held tester to the DLC3.

(4) Turn the ignition switch to the ON position.

(5) Select SIGNAL CHECK mode on the hand–held tester.

(6) Set each of the check items to the condition shown under Operation (B) in the test mode table on the previous page.

HINT:

In step (6), all signals can be checked together.

(7) Read the DTCs by following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator's manual for further details.

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DTC of air suspension system test mode (input signal check) function:

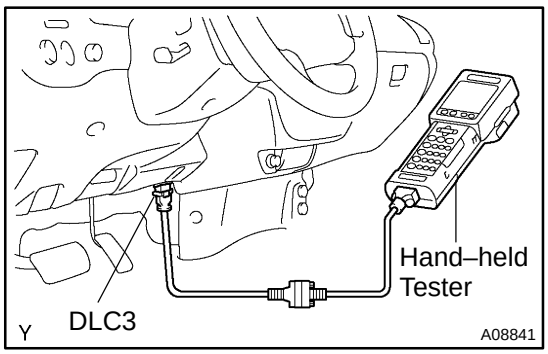
If a trouble code is displayed during the test mode DTC check, check the circuit listed for that code. For details of each code, refer to "See page" under the respective DTC No. in the chart.

DTC No. (See Page)	Detection Item	Trouble Area
C1782/82 (DI–767)	Stop light switch circuit malfunction	▶Stop light switch assy ▶Stop light switch circuit ▶Suspension control ECU
C1783/83 (DI–770)	Door courtesy switch circuit malfunction	▶Door courtesy light switch assy ▶W/ Motor back door assy ▶Door courtesy light switch circuit ▶Body ECU ▶Back door ECU ▶Suspension control ECU
C1786/86 (DI–774)	Height control switch circuit malfunction	▶Height control switch ▶Height control switch circuit ▶Suspension control ECU
C1788/88 (DI–778)	Height control mode select switch circuit malfunction	▶Height control mode select switch ▶Height control mode select switch circuit ▶Suspension control ECU

2. INPUT SIGNAL CHECK (Using Hand–held Tester)

HINT:

- ▶ This function checks if signals from the stop light switch assy and the door courtesy lamp switch, etc. are being input normally to the ECU.
- ▶ When entering test mode, the suspension control ECU sets all the test mode DTCs first.
  After completing the test mode for each check item, the test mode DTCs that are determined normal by the suspension control ECU will be erased.
  The test mode DTCs for other check items may not be erased when only a certain signal is inspected.
- ▶ When the test mode returns back to normal mode, all the test mode DTCs will be erased.



(a) Procedure for Test Mode (Input signal check).

(1) Make sure that the ignition switch is off.

(2) Set each of the check items to the condition shown under Operation (A) in the test mode table on the next page.

(3) Connect the hand–held tester to the DLC3.

(4) Turn the ignition switch to the ON position.

(5) Select TEST MODE mode on the hand–held tester.

(6) Set each of the check items to the condition shown under Operation (B) in the test mode table below.

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Test mode (input signal check) table:

Check Item	Operation (A)	Operation (B)
Stop light switch signal	OFF (Brake pedal not depressed)	ON (Brake pedal depressed)
Door courtesy light switch signal	ON (Each door opened)	OFF (All doors closed)
Height control switch signal	–	Press the height control switch ”UP” first and then press ”DOWN”
Height control mode select switch signal	OFF (Height control mode select switch not pushed in)	ON to OFF (Height control mode select switch pushed in and released)

HINT:

In step (6), all signals can be checked together.

(7) Read the test mode DTCs by following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator’s manual for further details.

(8) Check the malfunction using the code table below.

DTC of air suspension system test mode (input signal check) function:

If a trouble code is displayed during the test mode DTC check, check the circuit listed for that code. For details of each code, refer to ”See page” under the respective DTC No. in the chart.

DTC No. (See Page)	Detection Item	Trouble Area
C1782/82 (DI–767)	Stop light switch circuit malfunction	▶Stop light switch assy ▶Stop light switch circuit ▶Suspension control ECU
C1783/83 (DI–770)	Door courtesy switch circuit malfunction	▶Door courtesy light switch assy ▶W/ Motor back door assy ▶Door courtesy light switch circuit ▶Body ECU ▶Back door ECU ▶Suspension control ECU
C1786/86 (DI–774)	Height control switch circuit malfunction	▶Height control switch ▶Height control switch circuit ▶Suspension control ECU
C1788/88 (DI–778)	Height control mode select switch circuit malfunction	▶Height control mode select switch ▶Height control mode select switch circuit ▶Suspension control ECU

(9) After completing the test mode, disconnect the tester and turn the ignition switch off.

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DIDCZ–01

PROBLEM SYMPTOMS TABLE

HINT:

- ▶ If a normal system code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.
- ▶ Inspect the fuse before inspecting the suspected areas as shown in the chart below.
- ▶ Inspect each malfunction circuit in numerical order for the corresponding symptom.
- ▶ If the malfunction still exists even after checking and confirming that all the circuits are normal, replace the suspension control ECU.

Symptom	Suspected Area	See page
Vehicle height control function does not operate.	If the compressor remains on for an excessive period of time or turns on and off repeatedly, the system control will be halted for up to 70 minutes, after which the system will return to normal operation.	
	1. Air tube is seized	–
	2. Power source circuit	DI–761
	3. IG signal circuit	DI–793
	4. Crankshaft position sensor circuit	DI–210
	5. Height control mode select switch circuit	DI–778
	6. Height control switch circuit	DI–774
	7. Height control sensor circuit	DI–731
	8. Leveling solenoid valve circuit	DI–740
	9. Gate solenoid valve circuit	DI–736
	10.Exhaust solenoid valve circuit	DI–744
	11.AIR SUS relay circuit	DI–747
	12.Height control compressor circuit	DI–752
	13.Suspension control ECU	IN–35
Illuminated position of height control indicator lamp does not change by the height control switch operation.	1. Power source circuit	DI–763
	2. Crankshaft position sensor circuit	DI–761
	3. Height control mode select switch circuit	DI–793
	4. Height control switch circuit	DI–210
	5. Height control sensor circuit	DI–778
	6. Leveling solenoid valve circuit	DI–774
	7. Gate solenoid valve circuit	DI–731
	8. Exhaust solenoid valve circuit	DI–740
	9. AIR SUS relay circuit	DI–736
	10.Height control compressor circuit	DI–744
	11.Speed sensor circuit	DI–783
	12.CAN communication circuit	DI–1065
	13.Suspension control ECU	IN–35
Hunting of vehicle height occurs.	1. Air leakage (Height control cylinder assy rear)	SA–156
	2. Height control sensor circuit	DI–731
	3. Suspension control ECU	IN–35
Vehicle height control operates, but vehicle height is uneven.	1. Air leakage	SA–156
	2. Clogging of the air tube	–
	3. Height control sensor link sub–assy	SA–156
	4. Height control sensor circuit	DI–731
	5. Gate solenoid valve circuit	DI–736
	6. Suspension control ECU	IN–35
Vehicle height control operates, but vehicle height is high or low (Vehicle height in NORMAL mode differs from the standard value).	1. Height control sensor link sub–assy	SA–156
	2. Height control sensor circuit	DI–731
	3. Suspension control ECU	IN–35
When vehicle height control is adjusted, it stops at extremely high or low position.	1. Height control sensor circuit	DI–731
	2. Height control sensor link sub–assy	SA–156
	3. Suspension control ECU	IN–35

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Height control manual indicator lamp condition is abnormal.	1. Power source circuit 2. Height control mode select switch circuit 3. Height control manual indicator lamp circuit 4. Suspension control ECU	DI–763 DI–778 DI–789 IN–35
Height control indicator lamp condition is abnormal.	1. Power source circuit 2. Height control indicator lamp circuit 3. Suspension control ECU	DI–763 DI–785 IN–35
DTC check cannot be completed.	1. Power source circuit 2. CAN communication system 3. Height control manual indicator lamp circuit 4. Suspension control ECU 5. ECM	DI–763 DI–782 DI–789 IN–35 IN–35
Input signal check (test mode) cannot be completed.	1. Power source circuit 2. CAN communication system 3. Suspension control ECU 4. Translate ECU	DI–763 DI–783 IN–35 IN–35
Vehicle height is extremely low when vehicle is parked.	Although, especially in a cold district, the vehicle height may become lower due to a drop in air temperature in the height control cylinder assy, but this is not abnormal. 1. Air leakage 2. Height control cylinder assy 3. Height control sensor link sub–assy 4. Leveling solenoid valve circuit 5. Exhaust valve circuit	 SA–156 – SA–156 DI–740 DI–744
Compressor motor continues to operate.	Due to the air tube freezing, vehicle height may not rise. 1. Air leakage 2. Air tube clogged 3. Height control cylinder assy 4. Height control sensor link sub–assy 5. Height control sensor circuit 6. Leveling solenoid valve circuit 7. Exhaust valve circuit 8. AIR SUS relay circuit 9. Height control compressor circuit 10.Suspension control ECU	 SA–156 – – SA–156 DI–731 DI–740 DI–744 DI–747 DI–752 IN–35

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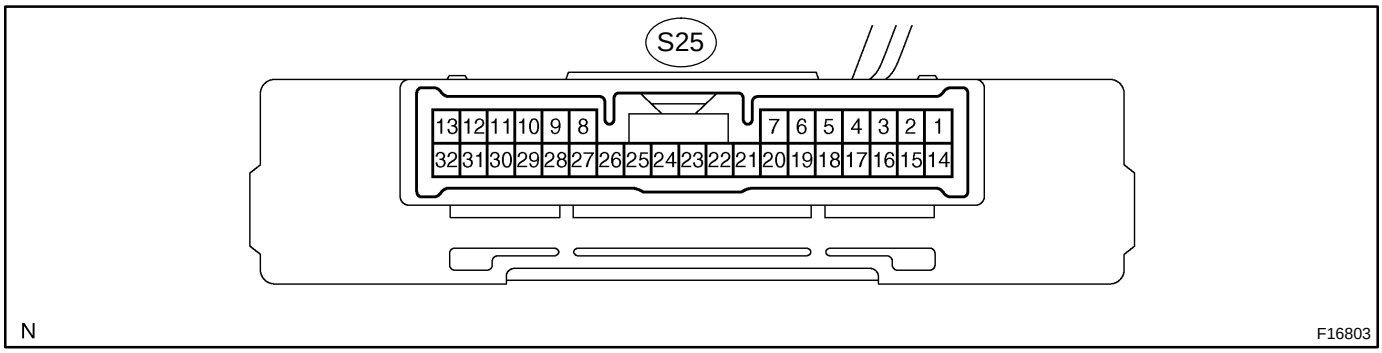
DIDD3–01

TERMINALS OF ECU



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SLEX (S25–1) – GND (S25–22)	L–R – W–B	Exhaust Solenoid Valve Signal	IG switch ON → Engine idling, button of height control switch is pushed from ”UP” to ”DOWN”	Below 1.0 V → 9 V or more
SLRR (S25–3) – GND (S25–22)	LG–R – W–B	Leveling Solenoid Valve Signal	IG switch ON → Engine idling, button of height control switch is pushed from ”DOWN” to ”UP”	Below 1.0 V → 9 V or more
SLRL (S25–4) – GND (S25–22)	W–L – W–B	Gate Solenoid Valve Signal	IG switch ON → Engine idling, button of height control switch is pushed from ”DOWN” to ”UP”	Below 1.0 V → 9 V or more
RC (S25–5) – GND (S25–22)	G–Y – W–B	AIR SUS Relay Signal	IG switch ON → Engine idling, button of height control switch is pushed from ”N” to ”UP”	Below 1.0 V → 9 V or more
HI (S25–8) – GND (S25–22)	GR–R – W–B	Height Control Indicator ”HI” Signal	Engine idling, vehicle height is ”NORMAL” → Pressing the ”UP” button of the control switch turns on the ”HI” indicator lamp (*1)	10 V or more → Below 5 V
NR (S25–9) – GND (S25–22)	B–L – W–B	Height Control Indicator ”N” Signal	Engine idling, vehicle height is ”NORMAL” → Pressing the ”UP” button of the control switch turns on the ”HI” indicator lamp (*1)	Below 5 V → 10 V or more
IG (S25–10) – GND (S25–22)	B–R – W–B	Ignition Switch	IG switch ON	10 to 14 V
VN (S25–11) – GND (S25–22)	LG – W–B	Height Control Manual Indicator Lamp Signal	IG switch ON, height control manual indicator lamp ON → Pressing and releasing the height control mode select switch turns off the height control manual indicator lamp (*1)	Below 5 V → 10 V or more
TD (S25–12) – GND (S25–22)	BR–B – W–B	Height Control Mode Select Switch	IG switch ON, height control mode select switch pushed in → Height control select switch released	Below 1.5 V → 10 to 14 V
UPSW (S25–13) – GND (S25–22)	L–B – W–B	Height Control Switch ”UP” Signal	IG switch ON, ”UP” button of height control switch pushed in → ”UP” button of height control switch released	Below 1.5 V → 10 to 14 V
SBL (S25–15) – SGL (S25–19)	G–O – L–R	Height Control Sensor Power Source	IG switch ON	4.5 to 5.5 V
SHRL (S25–17) – SGL (S25–19)	GR–L – L–R	Height Control Sensor Input Signal	IG switch ON → Engine idling, vehicle height is changed from ”HIGH” to ”NORMAL” by pressing the height control switch	0.5 to 4.5 V → Approx. 2.5 V
SGL (S25–19) – GND (S25–22)	L–R – W–B	Height Control Sensor Ground	Always	Below 1.0 V

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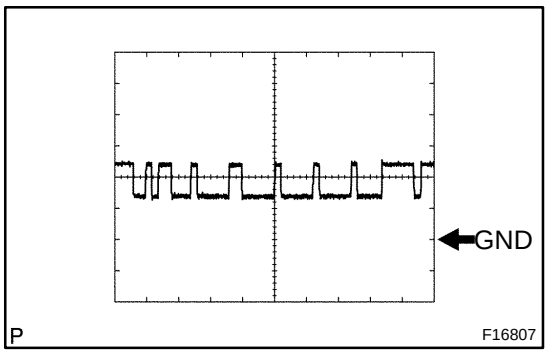
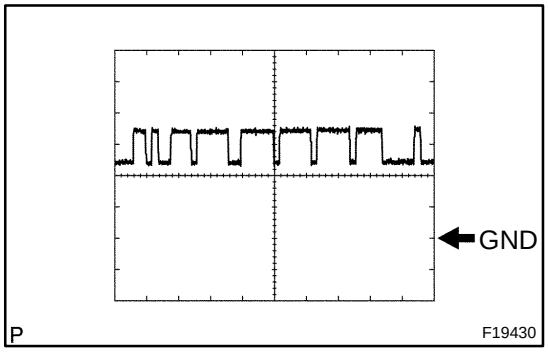
RM+ (S25–20) – GND (S25–22)	R–L – W–B	Height Control Compressor Motor Lock (+)	Engine idling, vehicle height changes from ”NORMAL” to ”HIGH” by pressing the height control switch (While height control compressor assy is working).	Below 1.0 V
RM– (S25–21) – Body ground	BR–Y – W–B	Height Control Compressor Motor Lock (–)	Always	Below 1.0 V
GND (S25–22) – Body ground	W–B – Body ground	Ground	Always	Below 1.0 V
B (S25–24) – GND (S25–22)	V – W–B	Battery	IG switch ON	10 to 14 V
LO (S25–26) – GND (S25–22)	P – W–B	Height Control Indicator ”LO” Signal	Engine idling, vehicle height is ”NORMAL” → Pressing the ”DOWN” button of the height control switch turns on the ”LO” indicator lamp (*1)	10 V or more → Below 5 V
STP (S25–27) – GND (S25–22)	G–Y – W–B	Stop Light Switch	Brake pedal depressed → Released	10 to 14 V → Below 1.5 V
SIL (S25–30) – GND (S25–22)	G–R – W–B	Diagnosis Signal	Hand–held tester is connected to DLC3	Pulse generation (See waveform 3)
DOOR (S25–31) – GND (S25–22)	R – W–B	Door Signal	IG switch ON, each door opened → All door closed	Below 1.5 V 10 to 14 V
DNSW (S25–32) – GND (S25–22)	W – W–B	Height Control Switch ”DOWN” Signal	IG switch ON, ”DOWN” button of height control switch pushed in → ”DOWN” button of height control switch released	Below 1.5 V → 10 to 14 V
BAT (S25–25) – GND (S25–22)	V – W–B	Battery	Always	10 to 14 V
CANL (S25–28) – GND (S25–22)	W – W–B	CAN Communication Signal	IG switch ON	Pulse generation (See waveform 1)
CANH (S25–29) – GND (S25–22)	G – W–B	CAN Communication Signal	IG switch ON	Pulse generation (See waveform 2)

*1: Perform inspection after checking that the height control indicator lamp switches are illuminated when the height control switch button is pressed.



Waveform 1 (Reference):

Item	Contents
Terminal	CANL – GND
Tool setting	1V/DIV, 10µs/DIV
Vehicle condition	Ignition SW ON, Engine stopped



Waveform 2 (Reference):

Item	Contents
Terminal	CANH – GND
Tool setting	1V/DIV, 10µs/DIV
Vehicle condition	Ignition SW ON, Engine stopped

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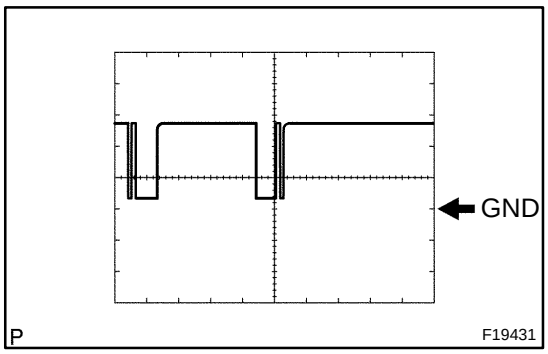

Waveform 3 (Reference):

Item	Contents
Terminal	SIL – GND
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Communicating using hand–held tester

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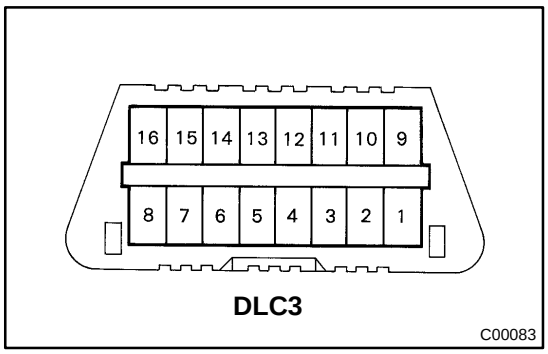
DIDD7–01



DLC3

DIAGNOSIS SYSTEM

1. DIAGNOSIS SYSTEM

(a) Inspect the battery voltage.

Battery voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(b) Check DLC3.

The suspension control ECU uses the CAN system and ISO 9141–2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Verify the conditions listed in the table below:

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL(7) – SG(5)	Bus "+" line	During communication	Pulse generation
CG(4) – Body ground	Chassis ground	Always	Below 1 Ω
SG(5) – Body ground	Signal ground	Always	Below 1 Ω
BAT(16) – Body ground	Battery positive	Always	11 to 14 V
CANH(6) – CANL (14)	HIGH–level CAN bus line	IG switch OFF	54 to 67 Ω
CANH(6) – Battery positive	HIGH–level CAN bus line	IG switch OFF	1 MΩ or higher
CANH(6) – CG(4)	HIGH–level CAN bus line	IG switch OFF	3 KΩ or higher
CANL(14) – Battery positive	LOW–level CAN bus line	IG switch OFF	1 MΩ or higher
CANL(14) – CG(4)	LOW–level CAN bus line	IG switch OFF	3 KΩ or higher

HINT:

If the hand–held tester display shows UNABLE TO CONNECT TO VEHICLE when the cable of the hand–held tester is connected to the DLC3, the ignition switch is turned ON and the tester is operated, there is a problem on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tester itself, so consult the service department listed in the tester's instruction manual.

(c) DTCs (Normal mode)

(1) DTCs are memorized in the suspension control ECU and read by using the SST check wire or the hand–held tester (see page DI–723 for the procedure of DTCs check).

SST 09843–18040

(d) Test mode (Input signal check)

(1) By switching from normal mode into test mode, you can inspect the height control switch, height control mode select switch, door courtesy lamp switch, and stop lamp switch (see page DI–711).

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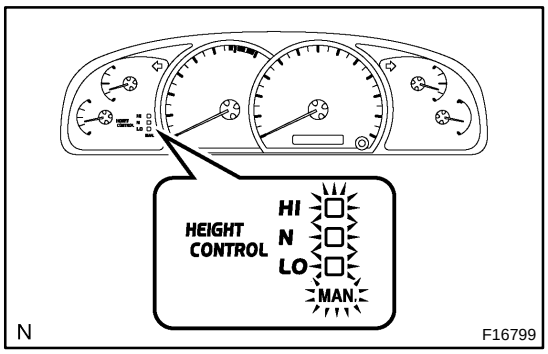

(e) Check the indicator lamp.
  (1) Turn the ignition switch to the ON position.
  (2) Check that the height control manual indicator lamp and the height control indicator lamp come on for 2 seconds.

If the indicator check result is not normal, proceed to trouble-shooting for the height control indicator lamp circuit (See page DI–785) and the height control manual indicator lamp circuit (See page DI–789).

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DIDDA–01

DTC CHECK / CLEAR

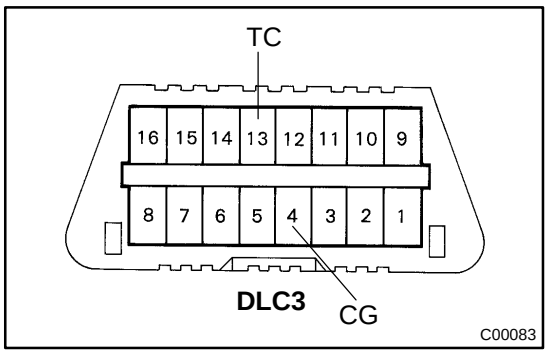
1. DTC CHECK (USING SST CHECK WIRE)

(a) Checking DTCs using the SST check wire.

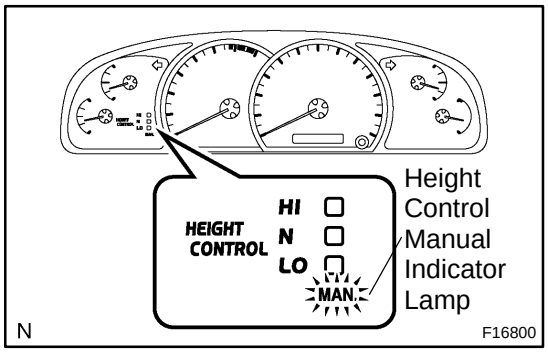
SST 09843–18040

(1) Using the SST, connect terminals TC and CG of the DLC3.

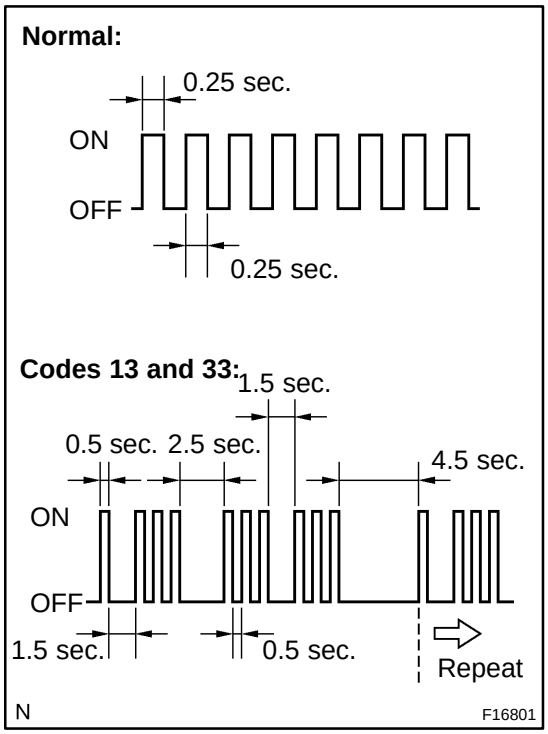
(2) Turn the ignition switch to the ON position.



(3) Read and record any DTCs from the height control manual indicator lamp on the combination meter.



As examples, the blinking patterns of a normal system code and codes 13 and 33 are shown on the left.



HINT:

- If the height control manual indicator lamp does not show any DTC or a normal system code, inspect the height control manual indicator lamp circuit (See page DI–789).
- The TC terminal circuit uses CAN for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is/are output.
- If 2 or more malfunctions are indicated at the same time, the lowest numbered DTC is displayed first.

(4) Refer to the Diagnostic Trouble Code Chart (See page DI–729) for DTC information.

(5) After completing the check, remove the SST check wire from the DLC3.

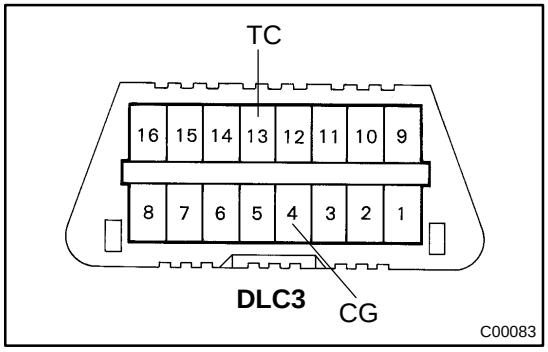
SST 09843–18040

(b) Clearing the DTCs using the SST check wire.

SST 09843–18040

(1) Using SST, connect terminals TC and CG of the DLC3.

(2) Turn the ignition switch to the ON position.



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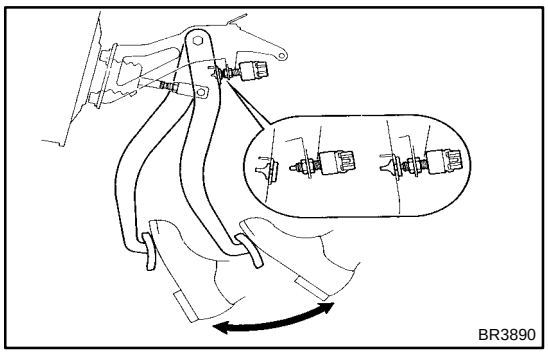
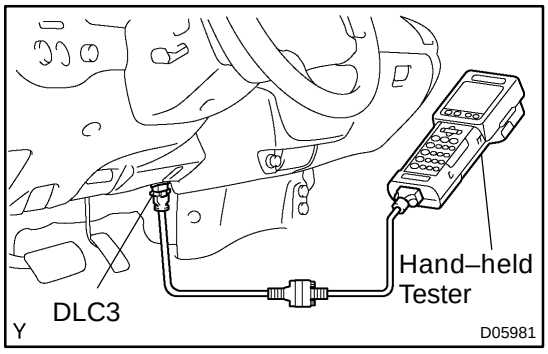


(3) Clear DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(4) Check that the height control manual indicator lamp shows a normal system code.
(5) Remove the SST check wire from the DLC3.

SST 09843–18040

HINT:
Disconnecting the battery cable during the operation will not erase DTCs in the ECU.



2. DTC CHECK (USING HAND–HELD TESTER)

(a) Checking DTCs using the hand–held tester.
(1) Connect the hand–held tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Read DTCs by following the prompts on the tester screen.

HINT:
Refer to the hand–held tester operator's manual for further details.

(b) Clearing the DTCs using the hand–held tester.
(1) Connect the hand–held tester to the DLC3
(2) Turn the ignition switch to the ON position.
(3) Erase the DTCs following the prompts on the tester screen.

HINT:
Refer to the hand–held tester operator's manual for further details.

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DIDDC–01

FAIL–SAFE CHART

FAIL–SAFE FUNCTION

When a rear air suspension system malfunction is detected under normal control operation, the suspension control ECU will suspend the switch control of the height control operation.

FAIL–SAFE CHART

DTC No.	Malfunction Item	Fail–safe Operation	Fail–safe Deactivation Condition
C1714/14	Malfunction in height control sensor	Auto mode: When the target vehicle height, just before fail, is higher than ”N”, vehicle height is lowered for 20 seconds and then system control shuts down. Manual mode: When the target vehicle height, just before switching to the manual mode, is higher than ”N”, the switch operation to lower vehicle height is available for only 20 seconds.	Return to normal condition.
C1733/33	Open or short in gate solenoid valve	System control shuts down.	Return to normal condition.
C1734/34	Open or short in leveling solenoid valve	System control shuts down.	Return to normal condition.
C1735/35	Open or short in exhaust solenoid valve	Auto mode: After vehicle height is raised through control, the system shuts down. Manual mode: When vehicle height is lower than ”N”, only the switch operation to raise vehicle height is available.	Return to normal condition.
C1741/41	Open or short in AIR SUS relay circuit	Auto mode: After vehicle height is lowered through control, the system shuts down. Manual mode: When vehicle height is higher than ”N”, only the switch operation to lower vehicle height is available.	Return to normal condition.
C1742/42	Lock in height control compressor motor	Auto mode: After vehicle height is lowered through control, the system shuts down. Manual mode: When vehicle height is higher than ”N”, only the switch operation to lower vehicle height is available.	After interrupting for 70 minutes, restart the control.
C1751/51	Powered continuously or powered excessively in height control compressor motor	Auto mode: After vehicle height is lowered through control, the system shuts down. Manual mode: When vehicle height is higher than ”N”, only the switch operation to lower vehicle height is available.	After interrupting for 70 minutes, restart the control.
C1761/61	Malfunction in suspension control ECU	System control shuts down.	Return to normal condition.
C1774/74	Power voltage dropped	System control shuts down.	Return to normal condition.
U0100/65	Lost communication with TL ECU	System control continues.	Return to normal condition.

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U0122/67	Lost communication with ECM/PCM	System control continues.	Return to normal condition.
U0132/71	Lost communication with ride level control module	System control continues.	Return to normal condition.

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DIDDE–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By accessing the DATA LIST displayed by the hand–held tester, you can read the value of the switches and sensors and so on without removing any parts. Reading the DATA LIST is the first step of troubleshooting and is one method to shorten labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Following the display on the tester, read the DATA LIST.

AIR SUSPENSION:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle speed reading / min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	Speed indicated on the combination meter
FR WHEEL SPD	Wheel speed (Front right) reading / min.: 0 km/h (0 mph), max.: 255 km/h (159 mph)	Actual vehicle speed	Speed indicated on the speedometer
FL WHEEL SPD	Wheel speed (Front left) reading / min.: 0 km/h (0 mph), max.: 255 km/h (159 mph)	Actual vehicle speed	Speed indicated on the speedometer
IG VOLTAGE	ECU power supply voltage / min.: 0 V, max.: 25.5 V	Actual ECU power supply voltage: 10 to 14 V	–
POWER VOLTAGE	+B power source voltage / min.: 0 V, max.: 25.5 V	Actual battery power supply voltage: 10 to 14 V	–
STEERING ANG	Steering angle sensor reading / min.: –49150.5 deg, max.: 49152 deg	Actual steering angle / Left turn: reading increases Right turn: reading increases	Zero point is set at the point when battery is connected
ENGINE SPD	Crankshaft position sensor reading / min.: 0 rpm, max.: 25,500 rpm	Actual engine speed	Speed indicated on the combination meter
HEIGHT SW DOWN	Height control switch (DOWN) / ON or OFF	ON: Height control switch ”DOWN” button pressed OFF: –	–
HEIGHT SW UP	Height control switch (UP) / ON or OFF	ON: Height control switch ”UP” button pressed OFF: –	–
HEIGHT SW HOLD	Height control mode select switch / ON or OFF	ON: Height control mode select switch pressed OFF: –	–
STOP LIGHT SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–
DOOR SW	Door courtesy light switch / ON or OFF	ON: Open each door OFF: Close all doors	–
L4 SW	4LO switch / ON or OFF	ON: 2WD/4HI switch pressed OFF: –	–
TS	TS terminal / ON or OFF	ON: During test mode OFF: Normal mode	–
TC	TC terminal / ON or OFF	ON: DTC recorded OFF: No DTC recorded	–
SOL SLRL	Height control valve solenoid (Levelling solenoid valve) / ON or OFF	ON: Leveling solenoid operated OFF: Leveling solenoid not operated	–
SOL SLRG	Height control valve solenoid (Gate solenoid valve) / ON or OFF	ON: Gate solenoid operated OFF: Gate solenoid not operated	–

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MAIN RELAY	MAIN relay / ON or OFF	ON: MAIN relay operated OFF: MAIN relay not operated	–
MOTOR RELAY	AIR SUS relay / ON or OFF	ON: Compressor operated OFF: Compressor not operated	–
RR HEIGHT	Right rear height control sensor reading / min.: –3276.7 mm (–129.004 in.), max.: 3276.8 mm (129.008 in.)	Always: 0 mm (0 in.)	–
RL HEIGHT	Left rear height control sensor reading / min.: –3276.7 mm (–129.004 in.), max.: 3276.8 mm (129.008 in.)	2WD: Min.: –15 mm (–0.59 in.) Max.: 40 mm (1.57 in.) 4WD: Min.: –30 mm (–1.18 in.) Max.: 40 mm (1.57 in.)	–
#CODES	Number of DTC recorded / min.: 0, max.: 255	Min.: 0, Max.: XX	–

2. ACTIVE TEST LIST

HINT:

Perform the ACTIVE TEST using the hand–held tester to operate the sensors, relays and solenoids without removing any parts. Performing the ACTIVE TEST is the first step of troubleshooting and is one of the methods to shorten labor time. It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Following the display on the tester, perform the ACTIVE TEST.

AIR SUSPENSION:

Item	Vehicle Condition / Test Details	Diagnostic Note
RR HEIGHT	Turn height control switch / UP or DOWN	–
LEVEL SOL REAR	Turn leveling solenoid valve / ON or OFF	Operation sound of solenoid (clicking sound) can be heard
GATE SOL REAR	Turn gate solenoid valve / ON or OFF	Operation sound of solenoid (clicking sound) can be heard
MOTOR RELAY	Turn AIR SUS relay / ON or OFF	Operation sound of motor can be heard

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DIDDG–01

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- ▶ Inspect the fuse before inspecting the suspected areas as shown in the chart below.
- ▶ If no abnormality is found when the parts are inspected, inspect the suspension control ECU.
- ▶ If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, refer to the ”See page” under respective DTC No. in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area	Manual Indicator Lamp*1	Memory*2
C1714/14 (DI–731)	Open or short in left rear height control sensor circuit	▶Height control sensor sub–assy ▶Height control sensor circuit ▶Suspension control ECU	◀	◀
C1733/33 (DI–736)	Open or short in gate solenoid valve circuit	▶Gate solenoid valve (Height control valve) ▶Gate solenoid valve (Height control valve) circuit ▶Suspension control ECU	◀	◀
C1734/34 (DI–740)	Open or short in leveling solenoid valve circuit	▶Leveling solenoid valve (Height control valve) ▶Leveling solenoid valve (Height control valve) circuit ▶Suspension control ECU	◀	◀
C1735/35 (DI–744)	Open or short in exhaust solenoid valve circuit	▶Exhaust solenoid valve (Height control compressor) ▶Exhaust solenoid valve (Height control compressor) circuit ▶Suspension control ECU	◀	◀
C1741/41 (DI–747)	Open or short in AIR SUS relay circuit	▶AIR SUS relay ▶AIR SUS relay circuit ▶Suspension control ECU	◀	◀
C1742/42 (DI–752)	Lock, open or short in height control compressor circuit	▶Height control compressor assy ▶Height control compressor circuit ▶Suspension control ECU	◀	◀
C1751/51*3 (DI–757)	Continuous electric current to height control compressor circuit	▶Height control compressor assy ▶Height control compressor circuit ▶Height control sensor circuit ▶Height control sensor sub–assy ▶Relief valve ▶AIR SUS relay circuit ▶Air leakage from the air tube or each valve ▶Clogging in the air tube or each valve ▶Suspension control ECU	X	◀
C1761/61 (DI–761)	ECU malfunction	▶Power source circuit ▶Suspension control ECU ▶Communication circuit	◀ / X	◀
C1774/74 (DI–763)	Power source drop	▶Battery ▶Power source circuit ▶Suspension control ECU	X	X
U0100/65 (DI–782)	Lost communication with ECM/PCM	▶ECM ▶Suspension control ECU ▶Communication circuit	X	X
U0122/67 (DI–783)	Lost communication with TL ECU	▶Translate ECU ▶Suspension control ECU ▶Communication circuit	X	X
U0132/71 (DI–784)	Lost communication with ride level control module	▶Suspension control ECU ▶Communication circuit	X	X

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HINT:
*1: For codes marked with a "◀" in the "Manual Indicator Lamp" column, the height control manual indicator lamp blinks at 1 second intervals.
*2: The codes marked with a "◀" in the "Memory" column are stored in the memory even when the ignition switch is OFF, but the codes marked with "X" are not.
*3: The relief pressure of the compressed air is 980 kPa (10 kgf/cm^2, 142 psi). DTC C1751/51 may be output and vehicle height control may be suspended under the following conditions (not abnormal):

- ▶ Vehicle height control is attempted on a steep slope when the vehicle is overloaded.
- ▶ The compressor remains on for an excessive period of time or repeatedly turns on and off because of continuous height control switch operation.
- ▶ The vehicle height control function (UP) operates when the vehicle height is set at a position lower than normal while the engine is running.

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DIDDK–01

CIRCUIT INSPECTION

DTC	C1714/14	Left Rear Height Control Sensor Circuit

CIRCUIT DESCRIPTION

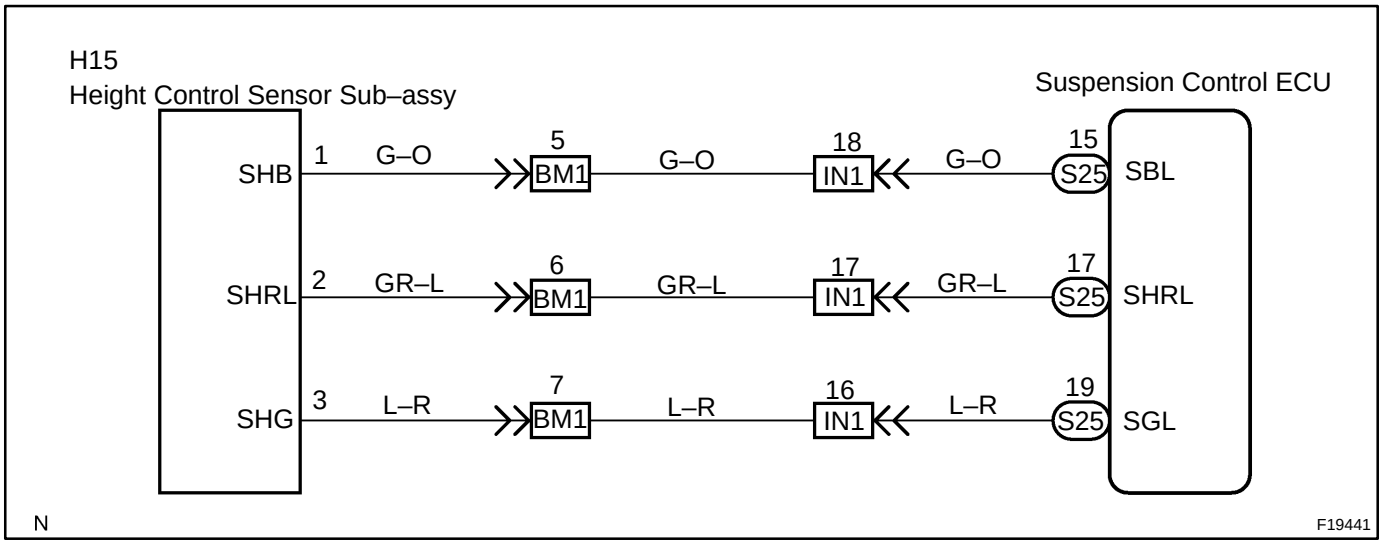
A magnetic circuit installed on the shaft inside the height control sensor rotates around the linear IC. The linear IC outputs voltage corresponding to the level of magnetic strength generated by the magnetic circuit. As a result, voltage corresponding to the shaft rotation angle is supplied to the suspension control ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1714/14	Either of the following conditions is detected: 1. With the ignition switch ON, a voltage of the height control sensor sub–assy is 4.7 V or more or 0.3 V or less for 1 sec. or more. 2. With the ignition switch ON, a voltage of the height control sensor sub–assy is 5.5 V or more or 4.3 V or less for 0.5 sec. or more.	▶Height control sensor sub–assy ▶Height control sensor circuit ▶Suspension control ECU

HINT:

- ▶ Once the ECU stores DTC C1714/14 in the memory, vehicle height control is suspended until a normal signal is input to the ECU from the height control sensor sub–assy. However, control resumes if the ignition switch is turned OFF, and then turned ON again.
- ▶ When the suspension control ECU detects a malfunction in the height control sensor, the height control indicator lamp ”N” comes on or blinks, and control of the height control sensor ”UP” and ”DOWN” operation is halted.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ Proceed to troubleshooting following the flow chart, regardless of whether or not DTC C1714/14 is displayed.
- ▶ If DTC C1761/61 (ECU malfunction) and/or C1774/74 (power source circuit) is displayed, perform the inspection necessary for DTC C1761/61 (See page DI–761) and/or C1774/74 (See page DI–763) first.
  (If DTC C1761/61 and C1774/74 are output at the same time, perform the inspection necessary for DTC C1774/74 first.)
- ▶ Start the inspection from step 1 when using the hand–held tester, and start from step 2 when not using the hand–held tester.

1	**Read value of the hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position, and push the hand–held tester main switch ON.
(c) Select the item ”RL HEIGHT” in the DATA LIST, and read its value displayed on the hand–held tester.

AIR SUSPENSION:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
RL HEIGHT	Left rear height control sensor reading / min.: –3276.7 mm (–129.004 in.), max.: 3276.8 mm (129.008 in.)	2WD: Min.: –15 mm (–0.59 in.) Max.: 40 mm (1.57 in.) 4WD: Min.: –30 mm (–1.18 in.) Max.: 40 mm (1.57 in.)	–

CHECK:

Check the vehicle height value of the height control sensor sub–assy with the hand–held tester while pressing the height control switch ”UP” or ”DOWN”.

OK:

Vehicle height value changes.

RESULT:

NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC chart)	C

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

C → **Replace suspension control ECU (See page IN–35).**

A

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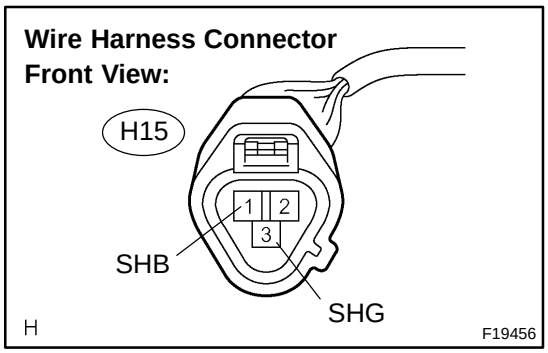
2	Check harness and connector (Height control sensor sub–assy power source).



PREPARATION:

(a) Disconnect the height control sensor sub–assy connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals 1 (SHB) and 3 (SHG) of the height control sensor sub–assy wire harness side connector.

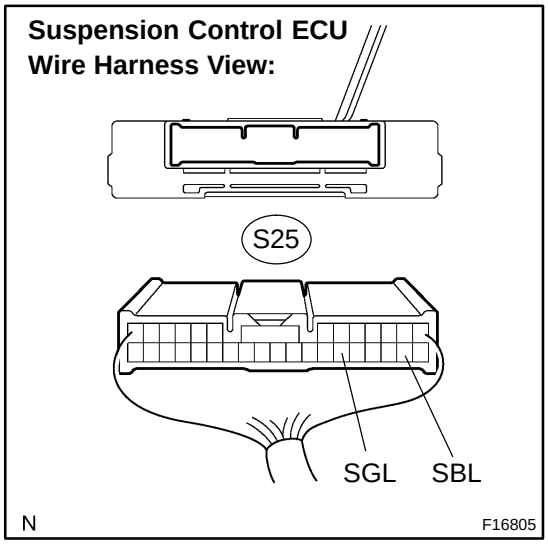
OK:

Voltage: 4.5 to 5.5 V

OK	Go to step 4.

NG

3	Check harness and connector (Height control sensor sub–assy – Suspension control ECU).



PREPARATION:

Disconnect the ECU connector.

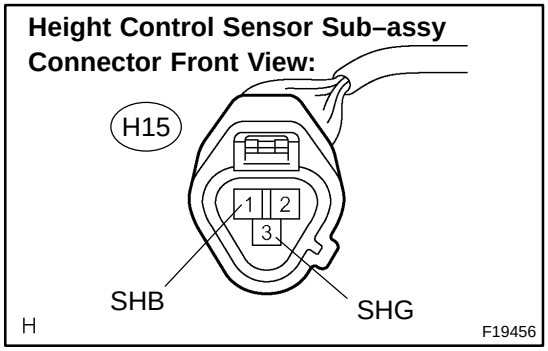
CHECK:

(a) Check for an open or short circuit in the harness and the connector between terminal 1 (SHB) of the height control sensor sub–assy and S25–15 (SBL) of the suspension control ECU.

(b) Check for an open or short circuit in the harness and the connector between terminal 3 (SHG) of the height control sensor sub–assy and S25–19 (SGL) of the suspension control ECU.

OK:

There is no open or short circuit in the wire harness.



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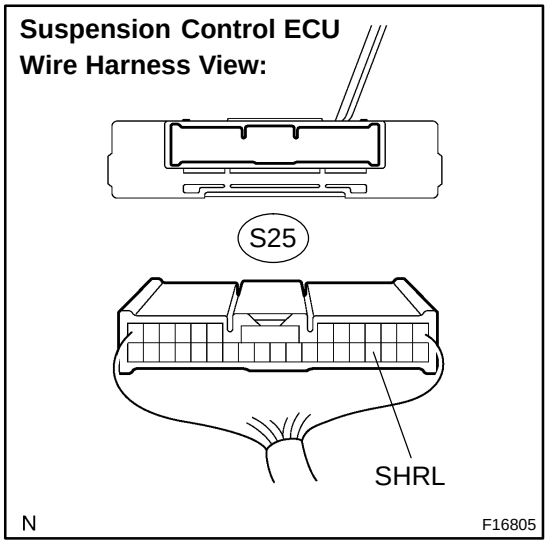
NG	Repair or replace harness or connector.

OK

4	Check harness and connector (Height control sensor sub–assy – Suspension control ECU.

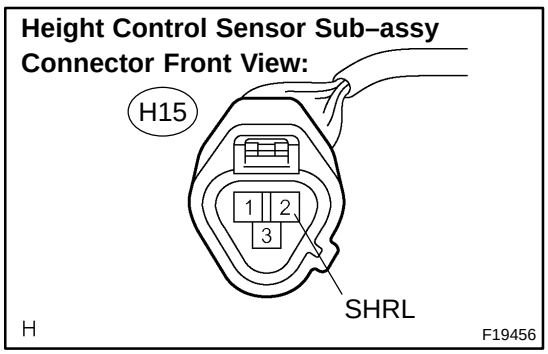


CHECK:

Check for an open or short circuit in the harness and the connector between terminal 2 (SHRL) of the height control sensor sub–assy and S25–17 (SHRL) of the suspension control ECU.

OK:

There is no open or short in the wire harness.



NG	Repair or replace harness or connector.

OK

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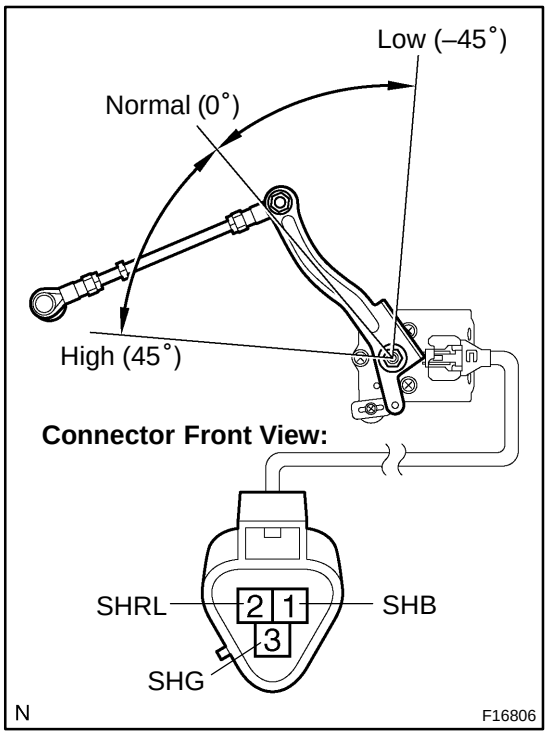
5	Inspect height control sensor sub–assy.



PREPARATION:

(a) Remove the height control sensor sub–assy.

(b) Connect 3 dry batteries of 1.5 V in series.

CHECK:

Connect terminal 1 (SHB) to the batteries' positive (+) terminal, and terminal 3 (SHG) to the batteries' negative (–) terminal, then apply approximately 4.5 V between terminals 2 (SHRL) and 3 (SHG) in the following conditions.

OK:

Position	Voltage
High (0◀ to 45◀	Approx. 2.25 to 4.05 V
Normal (0◀	Approx. 2.25 V
Low (0◀ to –45◀	Approx. 0.45 to 2.25 V

NG → **Replace height control sensor sub–assy.**

OK →

Replace suspension control ECU (See page IN–35).

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DIDDN–01

DTC	C1733/33	Gate Solenoid Valve Circuit

CIRCUIT DESCRIPTION

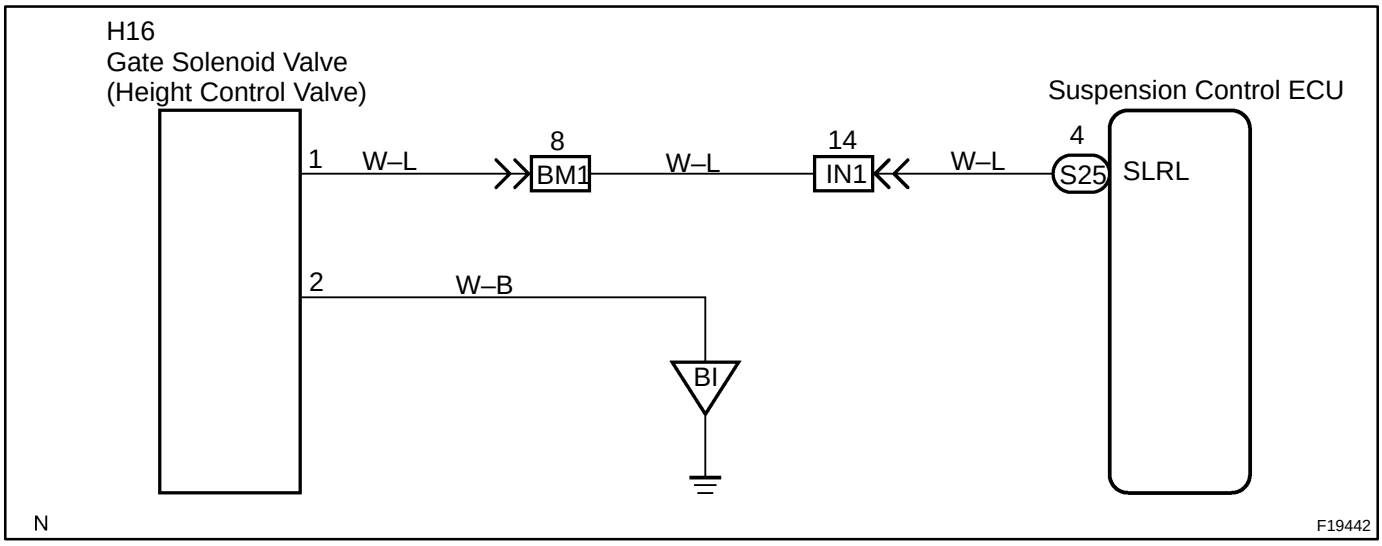
The suspension control ECU opens the gate solenoid valve (height control valve) to lead the compressed air to the height control cylinder (pneumatic cylinder) and to raise the vehicle height.
Further, the gate solenoid valve (height control valve) opens and closes the passage between the right and left height control cylinders (pneumatic cylinders).
The height control valve consists of a leveling solenoid valve and a gate solenoid valve.
The gate solenoid valve opens and closes the passage between the compressor and the height control cylinder (pneumatic cylinder).

DTC No.	DTC Detecting Condition	Trouble Area
C1733/33	Either of the following conditions is detected: 1. With the height control valve inactivated, an open signal of the height control valve is detected for 1 sec. or more. 2. With the height control valve activated, a short signal of the valve is detected 8 times successively.	▶Gate solenoid valve (Height control valve) ▶Gate solenoid valve (Height control valve) circuit ▶Suspension control ECU

HINT:

- ▶ Once the ECU stores DTC C1733/33 in the memory, the vehicle height control is suspended until a normal signal is input to the ECU from the height control solenoid valves. However, control is resumed if the ignition switch is turned OFF, then ON again.
- ▶ Malfunction in the gate solenoid valve:
  The height control operation is suspended, and the height control indicator lamp does not change by operating the height control switch.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If DTC C1761/61 (ECU malfunction) and/or C1774/74 (power source circuit) is displayed, perform the inspection necessary for DTC C1761/61 (See page DI–761) and/or C1774/74 (See page DI–763) first. (If DTC C1761/61 and the C1774/74 are output at the same time, perform the inspection necessary for DTC C1774/74 first.)
- ▶ Start the inspection from step 1 when using the hand–held tester, and start from step 2 when not using the hand–held tester.

1	**Perform active test using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.
(c) Select the item ”GATE SOL REAR” in the ACTIVE TEST, and operate it with the hand–held tester.

AIR SUSPENSION:

Item	Vehicle Condition / Test Details	Diagnostic Note
GATE SOL REAR	Turn gate solenoid valve / ON or OFF	Operation sound of solenoid (clicking sound) can be heard

CHECK:

(a) Check whether the solenoid makes sound.
(b) Check whether the height control valve has continuity (will vibrate).

OK:

The solenoid makes sound, and the height control valve has continuity (will vibrate).

RESULT:

NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC chart)	C

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

C → **Replace suspension control ECU (See page IN–35).**

A

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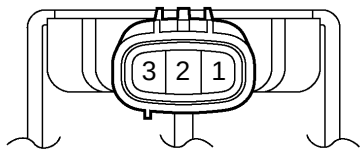
2	Inspect gate solenoid valve (height control valve).

Connector Front View:



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PREPARATION:

Disconnect the valve connector.

CHECK:

Measure the resistance between terminals.

OK:

Solenoid valve	Tester connection	Resistance
Gate solenoid valve	1 – 2	17.5 to 21.5 Ω

CHECK:

Check the operating sound of the valves when battery voltage is applied to the terminals as shown below.

Solenoid valve	Battery positive	Battery negative
Gate solenoid valve	1	2

OK:

Operating sound (clicking) can be heard.

HINT:

When a malfunction is found in the gate solenoid valve, replace the height control valve.

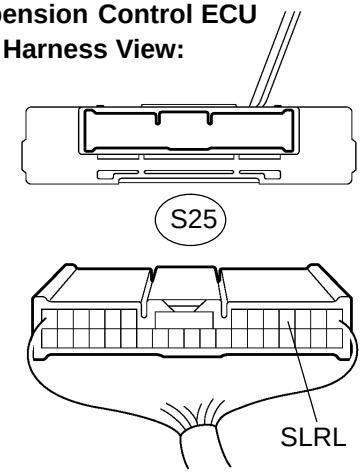
NG → **Replace height control valve (See page SA–166).**

OK

Dardoor.com

3	Check harness and connector (Height control valve – Suspension control ECU, Body ground).

Suspension Control ECU
Wire Harness View:



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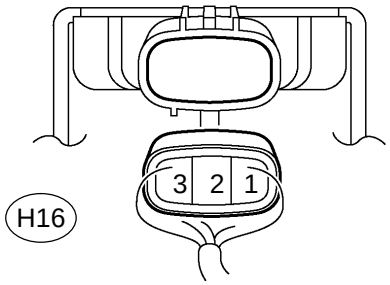
PREPARATION:
Disconnect the ECU connector.
CHECK:
Check for an open or short circuit in the harness and the connectors between terminal 1 of the height control valve and terminal S25–4 (SLRL) of the suspension control ECU.
OK:

There is no open or short in the wire harness.

CHECK:
Check for an open circuit in the harness and the connectors between terminal 2 of the height control valve and body ground.
OK:

There is no open in the wire harness.

Height Control Valve
Wire Harness View:



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NG → **Repair or replace harness or connector.**

OK

Replace suspension control ECU
(See page IN–35).

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DIDDR–01

DTC	C1734/34	Leveling Solenoid Valve Circuit

CIRCUIT DESCRIPTION

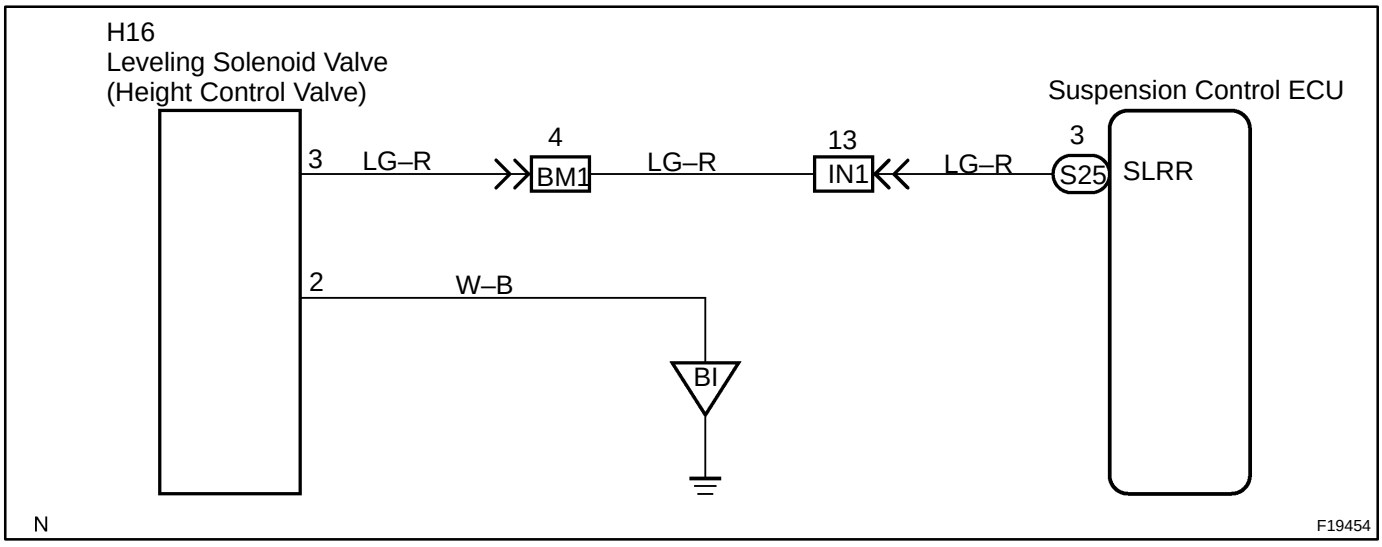
The suspension control ECU opens the leveling solenoid valve (height control valve) to lead the compressed air to the height control cylinder (pneumatic cylinder) and to raise the vehicle height.
The height control valve consists of a leveling solenoid valve and a gate solenoid valve.
The leveling solenoid valve opens and closes the passage between the compressor and the height control cylinder (pneumatic cylinder).

DTC No.	DTC Detecting Condition	Trouble Area
C1734/34	Either of the following conditions is detected: 1. With the height control valve inactivated, an open signal of the height control valve is detected for 1 sec. or more. 2. With the height control valve activated, a short signal of the valve is detected 8 times successively.	▶Leveling solenoid valve (Height control valve) ▶Leveling solenoid valve (Height control valve) circuit ▶Suspension control ECU

HINT:

- ▶ Once the ECU stores DTC C1734/34 in the memory, the vehicle height control is suspended until a normal signal is input to the ECU from the height control solenoid valves. However, control is resumed if the ignition switch is turned OFF, then ON again.
- ▶ Malfunction in the leveling solenoid valve:
  The height control operation is suspended, and the height control indicator lamp does not change by operating the height control switch.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If DTC C1761/61 (ECU malfunction) and/or C1774/74 (power source circuit) is displayed, perform the inspection necessary for DTC C1761/61 (See page DI–761) and/or C1774/74 (See page DI–763) first. (If DTC C1761/61 and the C1774/74 are output at the same time, perform the inspection necessary for DTC C1774/74 first.)
- ▶ Start the inspection from step 1 when using the hand–held tester, and start from step 2 when not using the hand–held tester

1	**Perform active test using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.
(c) Select the item ”LEVEL SOL REAR” in the ACTIVE TEST, and operate it with the hand–held tester.

AIR SUSPENSION:

Item	Vehicle Condition / Test Details	Diagnostic Note
LEVEL SOL REAR	Turn leveling solenoid valve / ON or OFF	Operation sound of solenoid (clicking sound) can be heard

CHECK:

(a) Check whether the solenoid makes sound.
(b) Check whether the height control solenoid valve has continuity (will vibrate).

OK:

The solenoid makes sound, and the height control solenoid valve has continuity (will vibrate).

RESULT:

NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC chart)	C

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

C → **Replace suspension control ECU (See page IN–35).**

A

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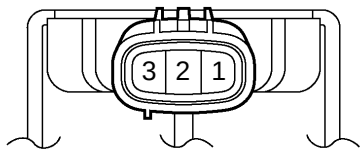
2	Inspect leveling solenoid valve (height control valve).

Connector Front View:



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PREPARATION:

Disconnect the valve connector.

CHECK:

Measure the resistance between terminals.

OK:

Solenoid valve	Tester connection	Resistance
Leveling solenoid valve	2 – 3	10 to 14 Ω

CHECK:

Check the operating sound of the valves when battery voltage is applied to the terminals as shown below.

Solenoid valve	Battery positive	Battery negative
Leveling solenoid valve	3	2

OK:

Operating sound (clicking) can be heard.

HINT:

When a malfunction is found in the the leveling solenoid valve, replace the height control valve.

NG → **Replace height control valve (See page SA–166).**

OK

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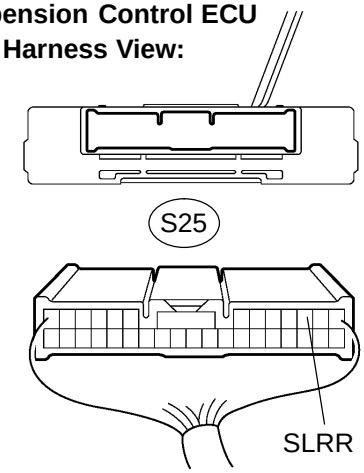
3	Check harness and connector (Height control valve – Suspension control ECU, Body ground).

Suspension Control ECU
Wire Harness View:



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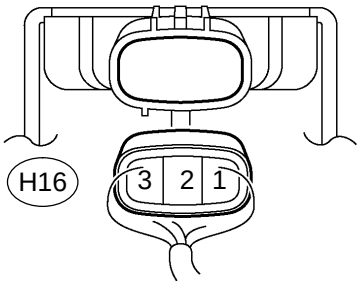
Height Control Valve
Wire Harness View:



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PREPARATION:
Disconnect the ECU connector.
CHECK:
Check for an open or short circuit in the harness and the connectors between terminal 3 of the height control valve and terminal S25–3 (SLRR) of the suspension control ECU.
OK:
There is no open or short in the wire harness.
CHECK:
Check for an open circuit in the harness and the connectors between terminal 2 of the height control valve and body ground.
OK:
There is no open in the wire harness.

NG → **Repair or replace harness or connector.**

OK

Replace suspension control ECU (See page IN–35).

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DIDDS–01

DTC	C1735/35	Exhaust Solenoid Valve Circuit

CIRCUIT DESCRIPTION

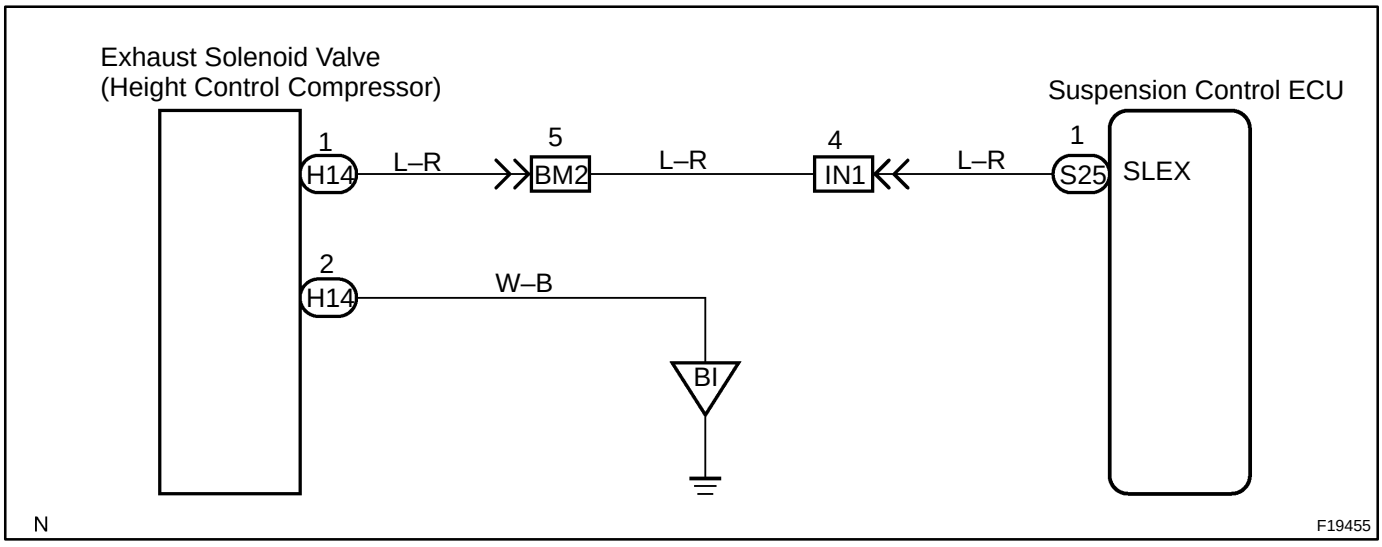
The suspension control ECU operates the exhaust solenoid valve (height control compressor), releases the air from the height control cylinder assy (pneumatic cylinder), and lowers vehicle height.
When the vehicle height is lowered, the suspension control ECU opens the height control valve and then operates the exhaust solenoid valve to release the compressed air to the outside.
The exhaust solenoid valve is on the compressor unit and has only one valve.

DTC No.	DTC Detecting Condition	Trouble Area
C1735/35	Either of the following conditions is detected: 1. With the height control valve inactivated, an open signal of the height control valve is detected for 1 sec. or more. 2. With the height control valve activated, a short signal of the valve is detected 8 times successively.	▶Exhaust solenoid valve (Height control compressor) ▶Exhaust solenoid valve (Height control compressor) circuit ▶Suspension control ECU

HINT:

- ▶ Once the ECU stores DTC C1735/35 in the memory, the vehicle height control is suspended until a normal signal is input to the ECU from the exhaust solenoid valve. However, control is resumed if the ignition switch is turned OFF, then ON again.
- ▶ Malfunction in the exhaust solenoid valve:
  The height control indicator lamp ”N” comes on or blinks, and ”HI” and ”LO” do not come on by operating the height control switch ”UP” or ”DOWN”.

WIRING DIAGRAM



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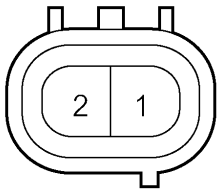
INSPECTION PROCEDURE

HINT:

▶ If DTC C1761/61 (ECU malfunction) and/or C1774/74 (power source circuit) is displayed, perform the inspection necessary for DTC C1761/61 (See page DI–761) and/or C1774/74 (See page DI–763) first. (If DTC C1761/61 and the C1774/74 are output at the same time, perform the inspection necessary for DTC C1774/74 first.)

1	**Inspect exhaust solenoid valve (height control compressor).**

Connector Front View:



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PREPARATION:

Disconnect the valve connector.

CHECK:

Measure the resistance between terminals.

OK:

Solenoid valve	Tester connection	Resistance
Exhaust solenoid valve	1 – 2	10 to 14 Ω

CHECK:

Check the operating sound of the valves when battery voltage is applied to the terminals as shown below.

Solenoid valve	Battery positive	Battery negative
Exhaust solenoid valve	1	2

OK:

Operating sound (clicking) can be heard.

HINT:

When a malfunction is found in the exhaust solenoid valve, replace the height control compressor.

NG → **Replace height control compressor assy (See page SA–162).**

OK

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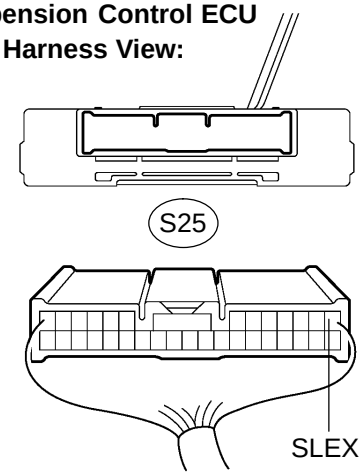
2	Check harness and connector (Height control compressor – Suspension control ECU, Body ground).

Suspension Control ECU Wire Harness View:



PREPARATION:

Disconnect the ECU connector.

CHECK:

Check for an open or short circuit in the harness and the connectors between terminal 1 of the height control compressor and terminal S25–1 (SLEX) of the suspension control ECU.

OK:

There is no open or short in the wire harness.

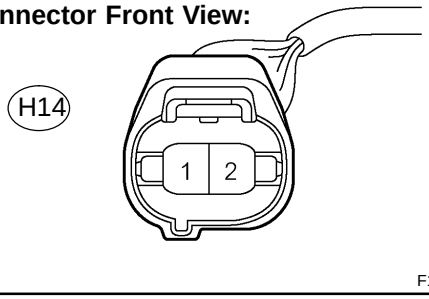
CHECK:

Check for an open circuit in the harness and the connectors between terminal 2 of the height control compressor and body ground.

OK:

There is no open in the wire harness.

Height Control Compressor Connector Front View:



NG → **Repair or replace harness or connector.**

OK

Replace suspension control ECU (See page IN–35).

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DIDDT–01

DTC	C1741/41	Air Sus Relay Circuit

CIRCUIT DESCRIPTION

When the ”UP” side of the height control switch is pressed, a signal is sent from terminal RC of the suspension control ECU to the AIR SUS relay to turn it on.
As a result, the current flows to the AIR SUS relay coil, closing the relay contact, and then the battery positive voltage is applied to the compressor, which causes the compressed air to raise the vehicle height.

DTC No.	DTC Detecting Condition	Trouble Area
C1741/41	Either of the following conditions is detected: 1. With the AIR SUS relay inactivated, an open signal of the AIR SUS relay is detected for 1 sec. or more. 2. With the AIR SUS relay activated, a short signal of the AIR SUS relay is detected 8 times successively.	▶AIR SUS relay ▶AIR SUS relay circuit ▶Suspension control ECU

HINT:
Once the ECU stores DTC C1741/41 in the memory, the vehicle height control is suspended until a normal signal is input to the ECU from the AIR SUS relay. However, the control resumes if the ignition switch is turned OFF, and then turned ON again.

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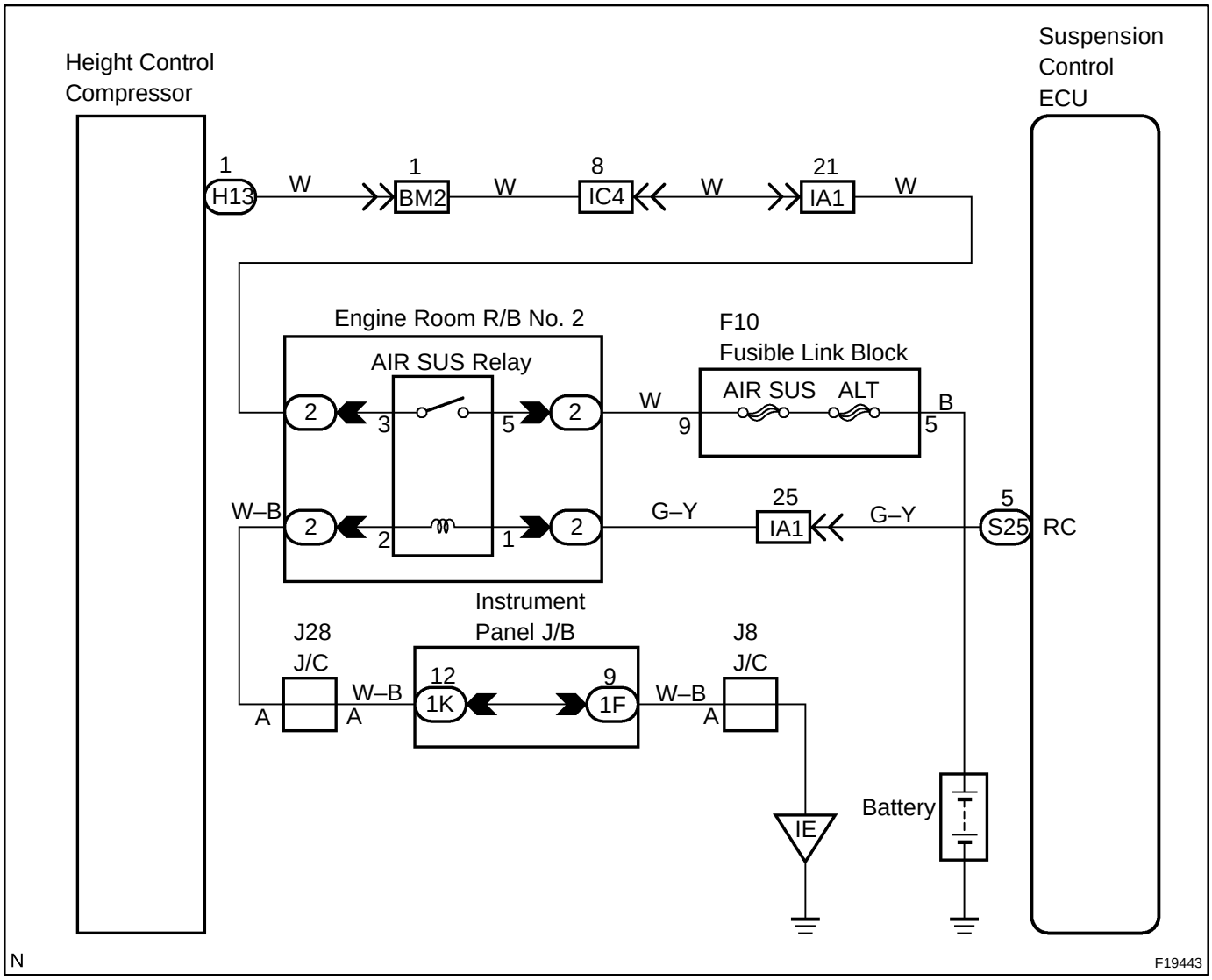
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If DTC C1761/61 (ECU malfunction) and/or C1774/74 (power source circuit) is displayed, perform the inspection necessary for DTC C1761/61 (See page DI–761) and/or C1774/74 (See page DI–763) first. (If DTC C1761/61 and C1774/74 are output at the same time, perform the inspection necessary for DTC C1774/74 first.)
- ▶ Start the inspection from step 1 when using the hand–held tester, and start from step 2 when not using the hand–held tester.

1	**Perform active test by hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.
(c) Select the item ”MOTOR RELAY” in the ACTIVE TEST, and operate it with the hand–held tester.

AIR SUSPENSION:

Item	Vehicle Condition / Test Details	Diagnostic Note
MOTOR RELAY	Turn AIR SUS relay / ON or OFF	Operation sound of motor can be heard

CHECK:

Check the operating sound of the AIR SUS relay when operating it with the hand–held tester.

OK:

The operating sound of the AIR SUS relay can be heard.

RESULT:

NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC chart)	C

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

C → **Replace suspension control ECU (See page IN–35).**

A

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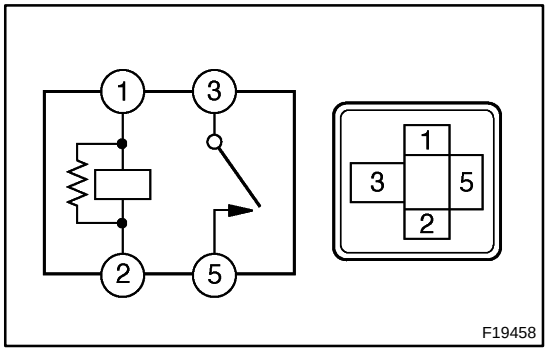
2	Inspect AIR SUS relay.



PREPARATION:

Remove the AIR SUS relay from the engine room R/B No. 2.

CHECK:

Check continuity between each terminal of the AIR SUS relay.

OK:

Tester connection	Resistance
3 – 5	10 kΩ or higher
3 – 5	Below 1 Ω (When battery voltage is applied to terminals 1–2)

NG → **Replace AIR SUS relay.**

OK

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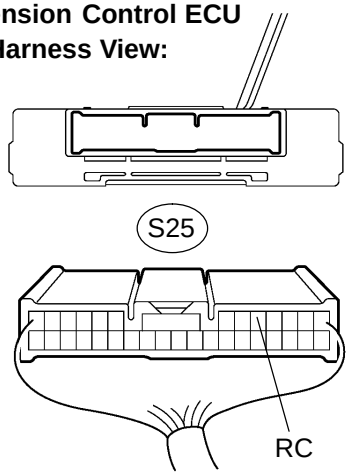
3	**Check harness and connector (Engine room R/B – Suspension control ECU, Body ground).**

Suspension Control ECU
Wire Harness View:



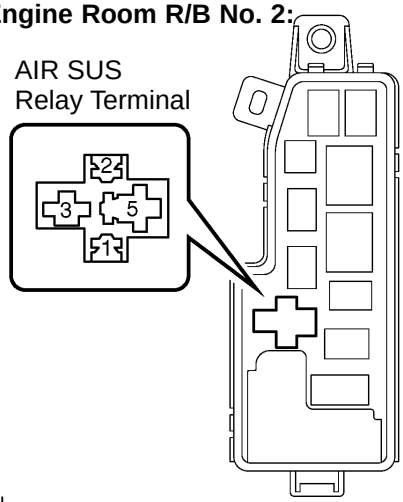
PREPARATION:
Disconnect the ECU connector.
CHECK:
Check for an open or short circuit in the harness and the connector between the AIR SUS relay terminal 1 of the engine room R/B and terminal S25–5 (RC) of the suspension control ECU.
OK:

There is no open or short in the wire harness.

CHECK:
Check for an open circuit in the harness and the connector between the AIR SUS relay terminal 2 of the engine room R/B and body ground.
OK:

There is no open in the wire harness.

Engine Room R/B No. 2:



NG → **Repair or replace harness or connector.**

OK

Replace suspension control ECU (See page IN–35).

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DIDDU–01

DTC	C1742/42	Height Control Compressor Circuit

CIRCUIT DESCRIPTION

When the ”UP” side of the height control is pressed, a signal is sent from terminal RC of the suspension control ECU to switch the AIR SUS relay ON. As a result, the relay contacts close and the compressor motor turns on, producing compressed air.

The suspension control ECU detects the amount of current flow to the compressor motor by means of the differences in potential at terminals RM+ and RM– of the suspension control ECU. In this way, the suspension control ECU monitors the compressor circuit for abnormalities.

DTC No.	DTC Detecting Condition	Trouble Area
C1742/42	With the AIR SUS relay activated, a lock, open or short signal of the height control compressor motor is detected for 4 sec. or more.	▶Height control compressor assy ▶Height control compressor circuit ▶Suspension control ECU

HINT:

Once the ECU stores DTC C1742/42 in the memory, the vehicle height control is not carried out until the normal signal is input to the ECU from the compressor motor. However, the control automatically resumes approx. 70 min. after the ignition switch is turned ON.

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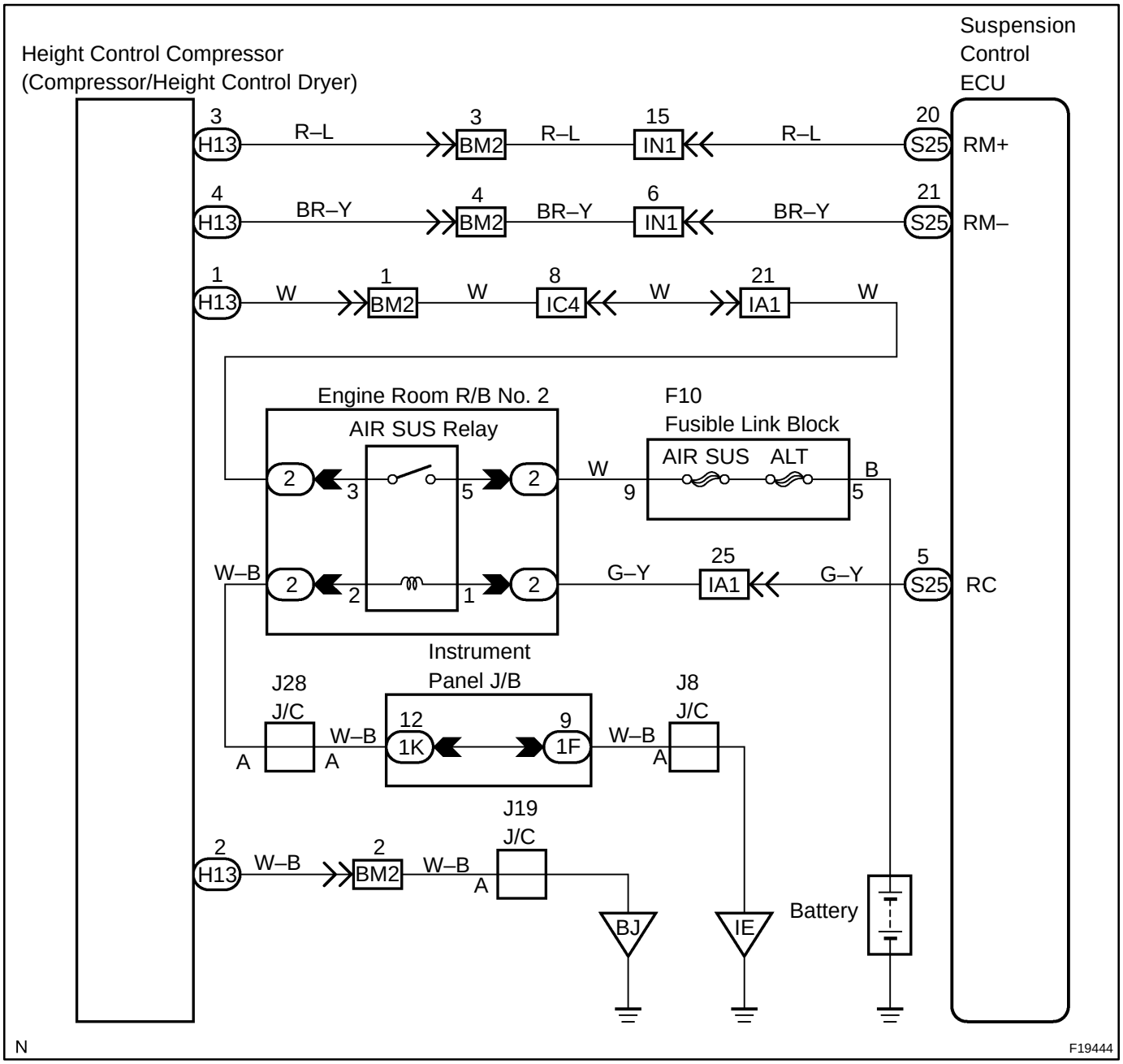
WIRING DIAGRAM



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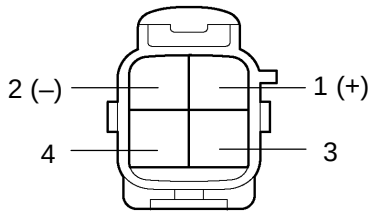
INSPECTION PROCEDURE

1	**Inspect height control compressor.**

Connector Front View:



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PREPARATION:

(a) Disconnect the height control compressor connector.

(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2.

CHECK:

Apply battery voltage between terminals 1 and 2 of the height control compressor.

OK:

Compressor motor operates.

NOTICE:

- **Do not operate the height control compressor assy for 90 sec. or more.**
- **Since a short and lock inside the height control compressor assy causes enormous current to flow, stop the operation immediately when it does not rotate.**

CHECK:

Check continuity between each terminal of the height control compressor.

OK:

Terminal No.	Specified condition
2 – 4	Continuity
3 – 4	Continuity

NG → **Replace height control compressor (See page SA–162).**

OK

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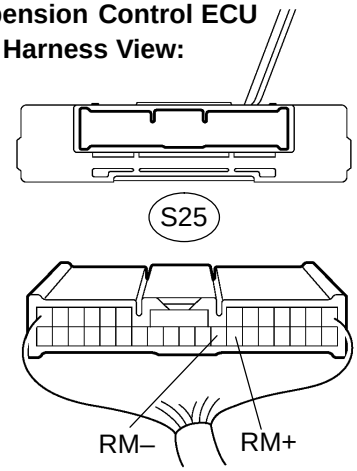
2	Check harness and connector (height control compressor – Suspension control ECU).

Suspension Control ECU
Wire Harness View:



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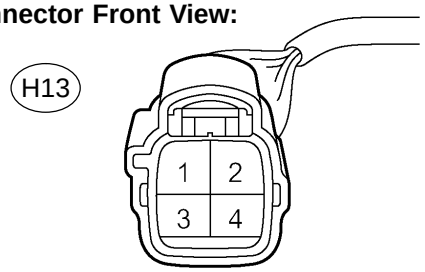
Height Control Compressor
Connector Front View:



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PREPARATION:
Disconnect the ECU connector.
CHECK:
Check for an open or short circuit in the harness and the connector between terminals 3 and 4 of the height control compressor and terminals S25–20 (RM+) and S25–21 (RM–) of the suspension control ECU.
OK:

There is no open or short in the wire harness.

NG → **Repair or replace harness or connector.**

OK

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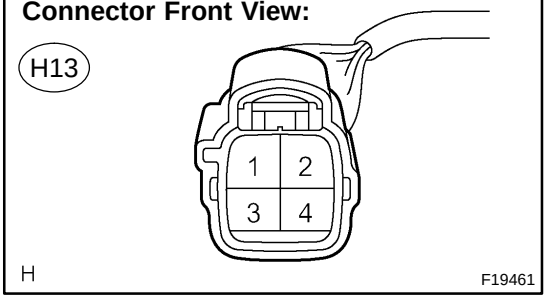
3	Check harness and connector (Height control compressor – Battery, Body ground).

Height Control Compressor Connector Front View:



PREPARATION:

(a) Reconnect the ECU connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
H13–1 – Body ground	Engine idling, height control switch is pushed from ”N” to ”UP”	10 to 14 V

HINT:

Measure the voltage within 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
H13–2 – Body ground	Always	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Replace suspension control ECU (See page IN–35).

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DIDDV–01

DTC	C1751/51	Continuous Electric Current To Height Control Compressor

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1751/51*1	With the AIR SUS relay activated, the vehicle does not go up to the standard vehicle height after the 90 sec. have elapsed.	▶Height control compressor assy ▶Height control compressor circuit ▶Height control sensor circuit ▶Height control sensor sub–assy ▶Relief valve ▶AIR SUS relay circuit ▶Air leakage from the air tube or each valve ▶Clogging in the air tube or each valve ▶Suspension control ECU

*1: The compressor motor operates continuously to raise vehicle height and allows electric current flow to the AIR SUS relay for 90 seconds or more under the following conditions:

- ▶ Vehicle height control is attempted on a steep slope when the vehicle is overloaded.
- ▶ The compressor remains on for an excessive period of time or repeatedly turns on and off because of continuous height control switch operation.
- ▶ If the compressor remains on because the vehicle is jacked up, the vehicle height is set at a position lower than normal while the engine is running and then the vehicle height control function raises the vehicle.

Thus DTC C1751/51 may be output and vehicle height control may be suspended. (This is not electrically abnormal.) In this case, however, the vehicle height operation is resumed approx. 10 min. after the ignition switch is turned ON after the ECU detects the first error. If ECU detects another error, it takes 70 minutes until control is resumed.

WIRING DIAGRAM

See page DI–752.

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INSPECTION PROCEDURE

1	**Inspect height control compressor circuit (See page DI–752).**

NEXT

2	**Inspect air leakage (See page SA–156).**

CHECK:

Check tube connections for air leakage.

OK:

No leaks

NG → **Repair or replace air tube.**

OK

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3	**Inspect height control valve (Gate solenoid valve, Leveling solenoid valve) or height control compressor (Exhaust solenoid valve).**

When using hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.
(c) Select the item ”LEVEL SOL REAR”, ”GATE SOL REAR” in the ACTIVE TEST, and operate it with the hand–held tester.

AIR SUSPENSION:

Item	Vehicle Condition / Test Details	Diagnostic Note
LEVEL SOL REAR	Turn leveling solenoid valve / ON or OFF	Operation sound of solenoid (clicking sound) can be heard
GATE SOL REAR	Turn gate solenoid valve / ON or OFF	Operation sound of solenoid (clicking sound) can be heard

HINT:

The exhaust solenoid valve cannot be tested in ACTIVE TEST.

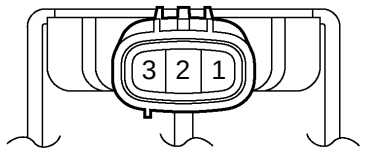
CHECK:

(a) Check whether the solenoid makes a sound.
(b) Check whether the height control solenoid valve has continuity (will vibrate).

OK:

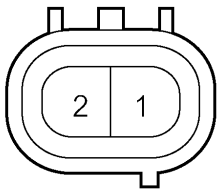
The solenoid makes a sound, and the height control solenoid valve has continuity. (It will vibrate.)

Height Control Valve Connector Front View:



H F19437

Height Control Compressor Connector Front View:



H F19457

When not using hand–held tester:

PREPARATION:

Disconnect the valve connector.

CHECK:

Check the operating sound of the valves when battery positive voltage is applied to the terminals as shown below.

Solenoid valve	Battery positive	Battery negative
Height control valve (Gate solenoid valve)	1	2
Height control valve (Leveling solenoid valve)	3	2
Height control compressor (Exhaust solenoid valve)	1	2

OK:

It make an operating sound (click).

HINT:

- When a malfunction is found in the gate solenoid valve, replace the leveling valve and the height control valve.
- When a malfunction is found in the exhaust solenoid valve, replace the height control compressor assy.

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NG → **Replace height control valve assy (See page SA–162).**

NG → **Replace height control compressor assy (See page SA–162).**

OK

4	**Inspect height control sensor sub–assy.**

CHECK:

Inspect and adjust the height control sensor sub–assy (See page SA–156).

NEXT

5	**Reconfirm DTC.**

CHECK:

Clear the DTC and repeat the procedure to re–check it (See page DI–729).

HINT:

If the DTC C1751/51 is still output, proceed to the next step.

NEXT

Check and repair or replace malfunctioning parts.

(a) Air tube is clogged (See page SA–156).
(b) Compressor is faulty (See page SA–162).
(c) Relief valve is faulty (See page SA–166).
(d) Height control sensor sub–assy is faulty (See page SA–156).
(e) Foreign material entered the height control solenoid valve (gate solenoid valve) and the exhaust solenoid valve.
(f) Air leakage due to damage to the height control cylinder assy (pneumatic cylinder).
(g) Suspension control ECU malfunctions (See page IN–35).

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DIDDY–01

DTC	C1761/61	ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1761/61	Suspension control ECU malfunction	▶Power source circuit ▶Suspension control ECU ▶Communication circuit

INSPECTION PROCEDURE

HINT:

- If DTC C1774/74 (power source circuit) is displayed, perform the inspection necessary for DTC C1774/74 first (See page DI–763).
- If DTC U0122/67, U0100/65, U0132/71 and C1761/61 (ECU malfunction) are output at the same time, perform the inspection necessary for the CAN communication system first.
- The suspension control ECU, controlling the air suspension system, is activated when the ignition switch is turned ON.
  After 2 seconds, the ”MAIN RELAY” built in the ECU is activated and the system is driven by +B power source.
  Vehicle height may increase after turning the ignition switch off and unloading the vehicle/letting people get out of the vehicle. In order to adjust the vehicle height, vehicle height control will continue for a while from then.

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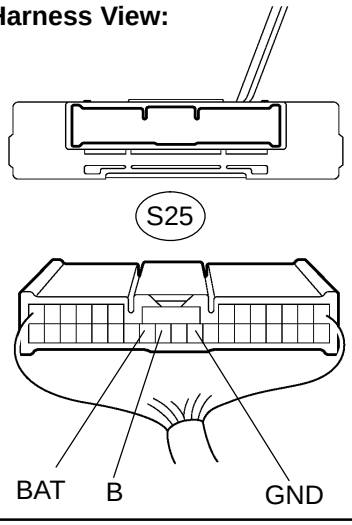
1	Inspect suspension control ECU (ECU power source).

Wire Harness View:



PREPARATION:

Disconnect the ECU connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	specified condition
S25–24 (B) – S25–22 (GND)	Always	10 to 14 V
S25–25 (BAT) – S25–22 (GND)	Always	10 to 14 V

NG → **Check power source circuit (See page DI–761).**

OK

Replace suspension control ECU (See page IN–35).

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DIDE3–01

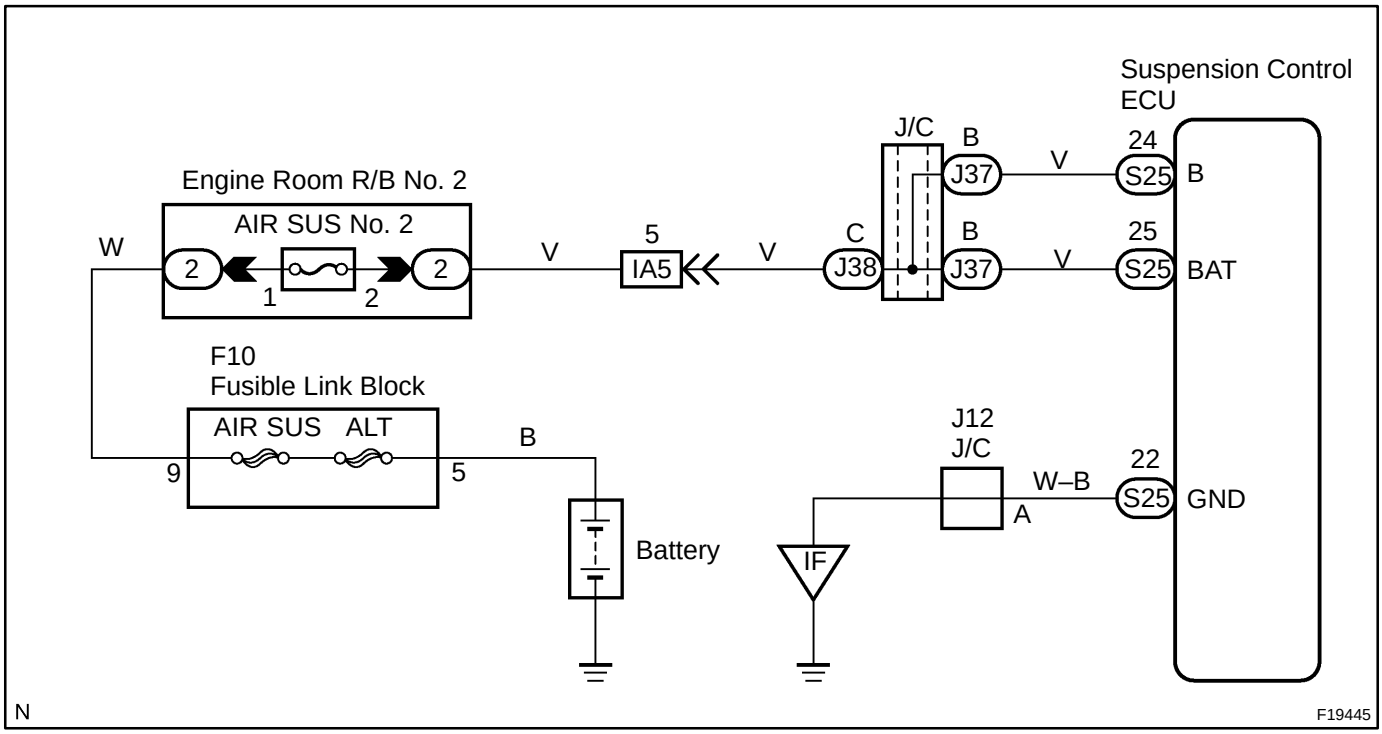
DTC	C1774/74	Power Source Circuit

CIRCUIT DESCRIPTION

- This circuit provides power to operate the suspension control ECU.
- The suspension control ECU, controlling the air suspension system, is activated when the ignition switch is turned ON. The main relay inside the ECU is activated after 2 seconds and the system is operated by +B power source.

DTC No.	DTC Detecting Condition	Trouble Area
C1774/74	The terminal B or BAT voltage is below 10 V or above 16 V for 0.5 seconds.	▶Battery ▶Power source circuit ▶Suspension control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Inspect battery voltage.**

CHECK:

Check the battery voltage.

OK:

Voltage: 11 to 14 V

NG → **Replace battery.**

OK

HINT:

Start the inspection from step 2 when using the hand–held tester, and start from step 3 when not using the hand–held tester.

2	**Read value of the hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

(c) Select the item ”POWER VOLTAGE” in the DATA LIST, and read its value displayed on the hand–held tester.

AIR SUSPENSION:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
POWER VOLTAGE	+B power source voltage / min.: 0 V, max.: 25.5 V	Actual battery power supply voltage: 10 to 14 V	–

CHECK:

Check the battery positive voltage.

OK:

Actual battery power supply voltage: 10 to 14 V

RESULT:

NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC chart)	C

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

C → **Check for intermittent problems.**

HINT:

Check the connector and terminal (See page IN–24).

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A

3	Inspect fuse (AIR SUS No. 2).

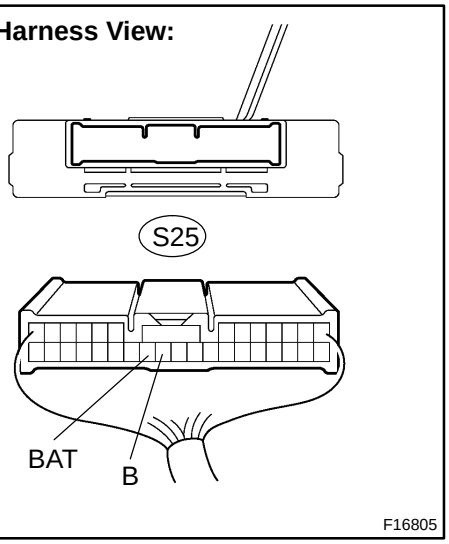
PREPARATION:
Remove the AIR SUS No. 2 fuse from the engine room R/B.
CHECK:
Check continuity of the AIR SUS No. 2 fuse.
OK:
Continuity

NG → **Inspect for short circuit in all harness and components connected to AIR SUS No. 2 fuse.**

OK

4	Inspect suspension control ECU.

Wire Harness View:



PREPARATION:
Disconnect the ECU connector.
CHECK:
Measure the voltage between terminal S25–24 (B) of the suspension control ECU connector and body ground and between terminal S25–25 (BAT) and body ground.
OK:
Voltage: 10 to 14 V

NG → **Repair or replace harness or connector.**

OK

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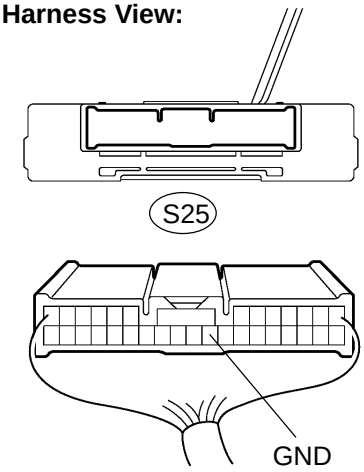
5	Check harness and connector (Suspension control ECU – Body ground).

Wire Harness View:



CHECK:

Check continuity between terminal S25–22 (GND) and body ground.

OK:

Continuity

NG → **Repair or replace harness or connector.**

OK

Replace suspension control ECU (See page IN–35).

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DIDE7–01

DTC	C1782/82	Stop Light Switch Circuit (Test Diagnosis)

CIRCUIT DESCRIPTION

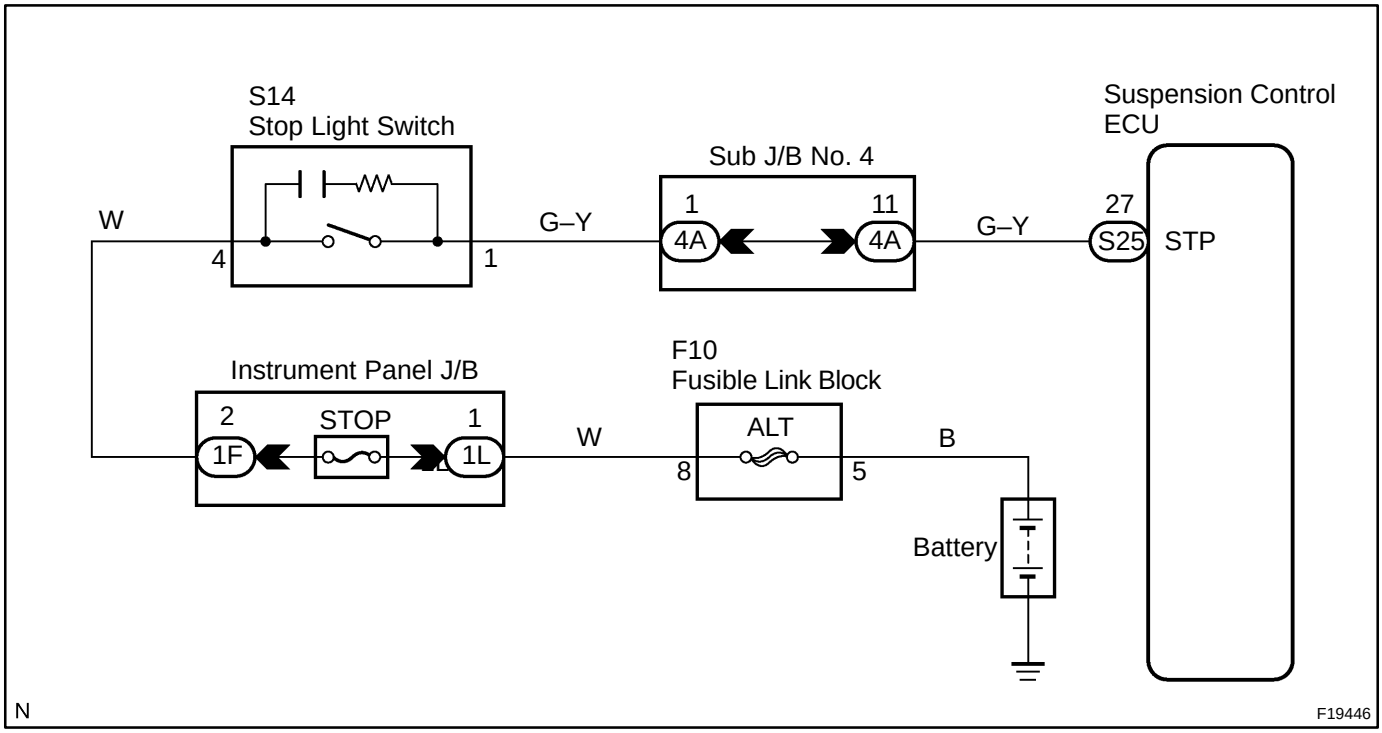
When the brake pedal is depressed, the stop light comes on and the signal is input to the STP terminal of the suspension control ECU.

HINT:

This DTC is output only when the sensor signal check is done.

DTC No.	DTC Detecting Condition	Trouble Area
C1782/82	The signal from the stop light switch assy does not change.	▶Stop light switch assy ▶Stop light switch circuit ▶Suspension control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Inspect stop light.**

CHECK:

Check that the stop light comes on when the brake pedal is depressed and goes off when the brake pedal is released.

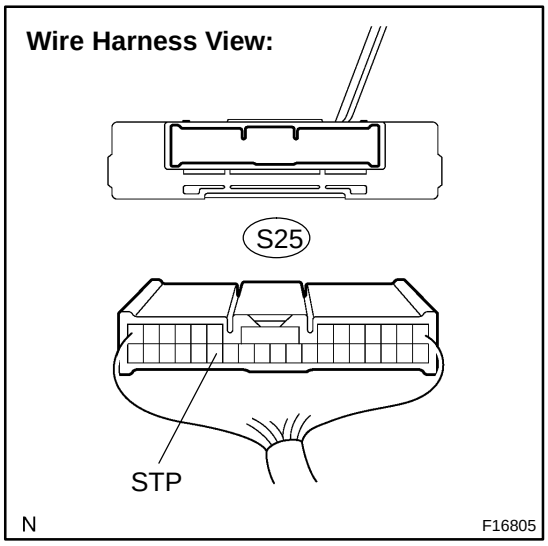
OK:

Stop light operates normally.

NG → **Go to step 3.**

OK

2	**Inspect suspension control ECU.**



PREPARATION:

Disconnect the ECU connector.

CHECK:

Measure the voltage between terminal S25–27 (STP) of the suspension control ECU and body ground when the stop light switch is ON and OFF.

OK:

Switch condition	Specified condition
Brake pedal depressed (ON)	10 to 14 V
Brake pedal released (OFF)	Below 1 V

NG → **Repair or replace harness connector.**

OK

Replace suspension control ECU (See page IN–35).

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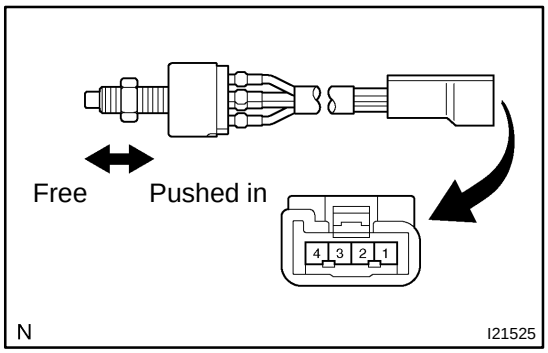
3	Inspect stop light switch assy.



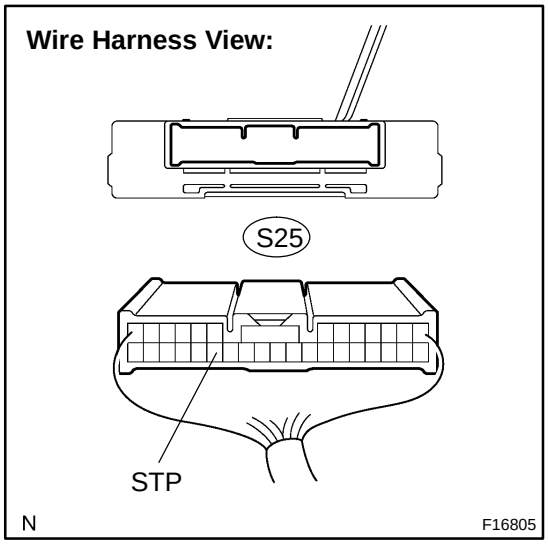
PREPARATION:
Disconnect the stop light switch assy connector.
CHECK:
Check resistance between terminals 1 and 4 of the stop light switch assy.
OK:

Switch condition	Tester connection	Specified condition
Switch pin free	1 – 4	Below 1 Ω
Switch pin pushed in	1 – 4	10 kΩ or higher

NG → **Replace stop light switch assy.**

OK

4	Inspect suspension control ECU.



PREPARATION:
Disconnect the ECU connector.
CHECK:
Measure the voltage between terminal S25–27 (STP) of the suspension control ECU and body ground when the stop lamp switch is ON and OFF.
OK:

Switch condition	Specified condition
Brake pedal depressed (ON)	10 to 14 V
Brake pedal released (OFF)	Below 1 V

NG → **Repair or replace harness connector.**

OK

Replace suspension control ECU
(See page IN–35).

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DIDEA–01

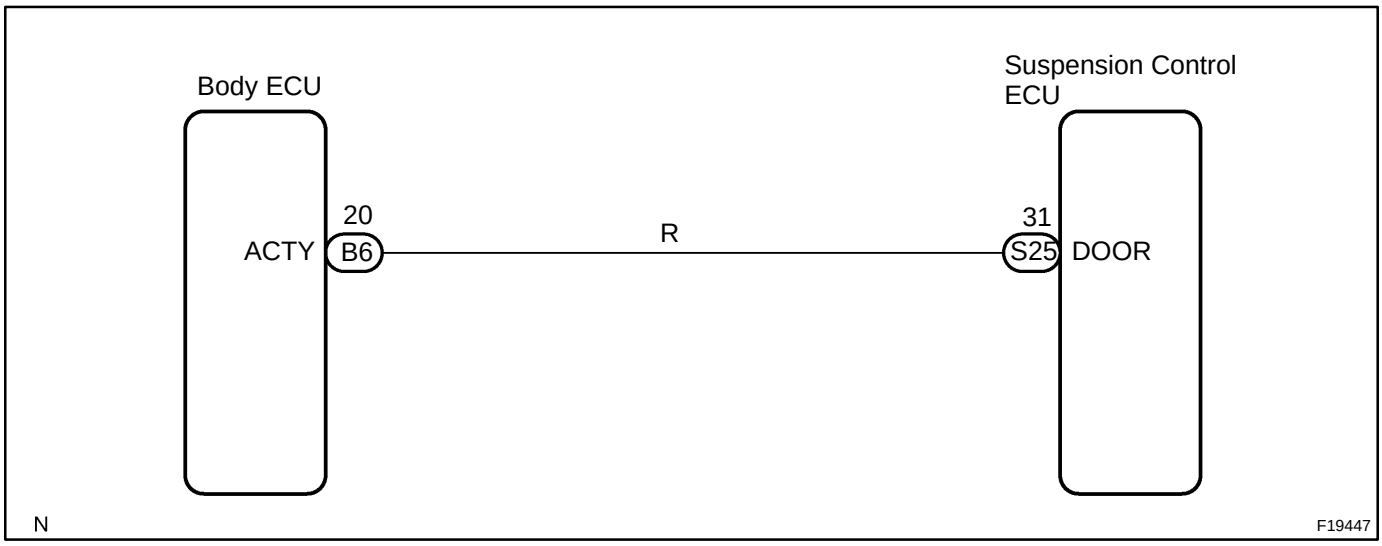
DTC	C1783/83	Door Courtesy Switch Circuit (Test Diagnosis)

CIRCUIT DESCRIPTION

The door courtesy light switch turns on when the door is opened and turns off when the door is closed. The signal is sent from the body ECU and the back door ECU into the DOOR terminal of the suspension control ECU when any door is open.
HINT:
This DTC is output only when the sensor signal check is done.
For courtesy light switch connection, see the system diagram on page DI–698.

DTC No.	DTC Detecting Condition	Trouble Area
C1783/83	Door courtesy light switch signal does not change.	▶Door courtesy light switch ▶Back door lock assy (Back door courtesy light switch) ▶Door courtesy light switch circuit ▶Body ECU ▶Back door ECU ▶Suspension control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Inspect courtesy light switch.**

CHECK:

Check that the open door warning light comes on when any door or back door is opened and goes off when all the doors are closed.

OK:

Courtesy light operates normally.

NG → **Check open door warning light (See page DI–1608).**

OK

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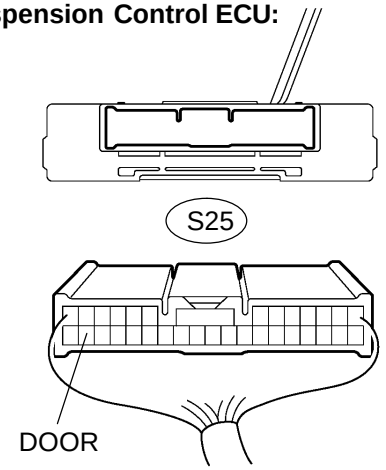
2	Check harness and connector (Suspension control ECU – Body ECU).

Suspension Control ECU:



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PREPARATION:

Disconnect the body ECU and suspension control ECU connectors.

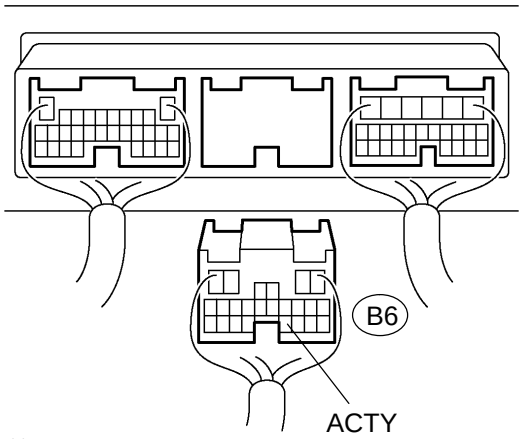
CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
B6–20 (ACTY) – S25–31 (DOOR)	Always	Below 1 Ω
B6–20 (ACTY) – Body ground	Always	10 kΩ or higher

Body ECU:



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NG → **Repair or replace harness or connector.**

OK

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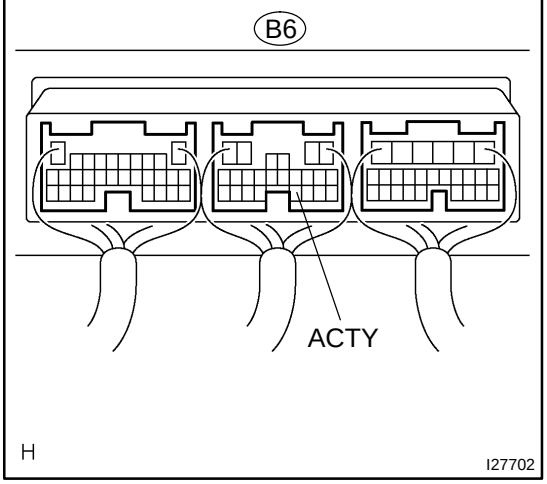
3	Inspect body ECU (ACTY output).

Body ECU Wire Harness View:



PREPARATION:

Reconnect the body ECU and suspension control ECU connectors.

CHECK:

Measure the voltage between terminal B6–20 (ACTY) of the multiplex network body ECU and body ground when doors are opened and closed.

OK:

Door condition	Specified condition
Each door opened	Below 1.5 V
All doors closed	10 to 14 V

NG → **Replace body ECU (See page IN–35).**

OK

Replace suspension control ECU (See page IN–35).

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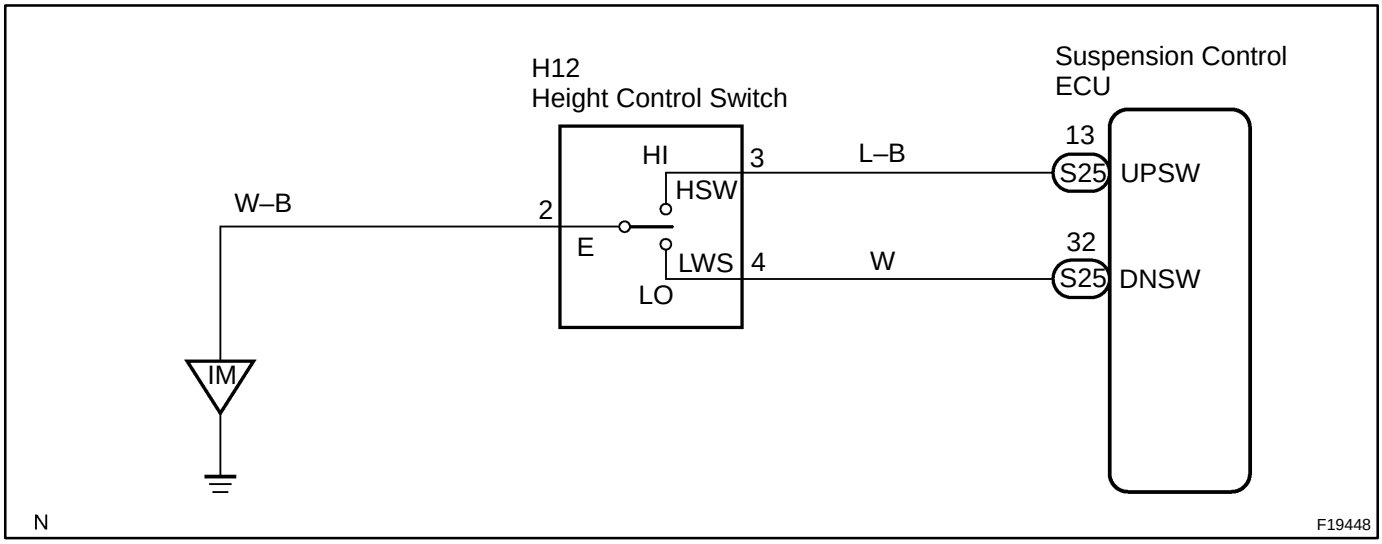
DTC	C1786/86	Height Control Switch Circuit (Test Diagnosis)

CIRCUIT DESCRIPTION

Vehicle height can be chosen by pressing the height control switch.
By pressing the ”UP” side, vehicle height goes up.
By pressing the ”DOWN” side, vehicle height goes down.
HINT:
This DTC is output only when the sensor signal check is done.

DTC No.	DTC Detecting Condition	Trouble Area
C1786/86	Height control switch signal does not change.	▶Height control switch ▶Height control switch circuit ▶Suspension control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Read value of the hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and turn the hand–held tester main switch ON.
(c) Select the item ”HEIGHT SW DOWN” or ”HEIGHT SW UP” in the DATA LIST, and read its value displayed on the hand–held tester.

AIR SUSPENSION:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
HEIGHT SW DOWN	Height control switch (DOWN) / ON or OFF	ON: Height control switch ”DOWN” button is pressed OFF: –	–
HEIGHT SW UP	Height control switch (UP) / ON or OFF	ON: Height control switch ”UP” button is pressed OFF: –	–

CHECK:

Check that the value displayed on the hand–held tester changes by pressing the height control switch ”UP” or ”DOWN”.

OK:

Height control switch value changes.

RESULT:

NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC chart)	C

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

C → **Replace suspension control ECU (See page IN–35).**

A

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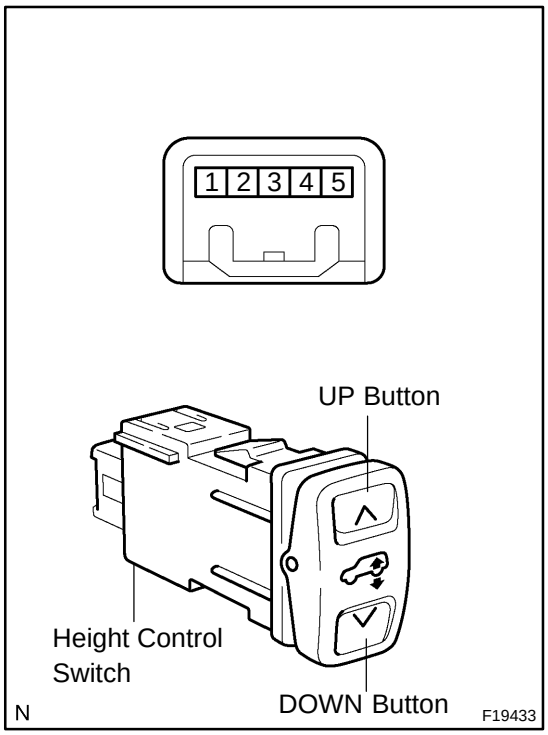
2	Inspect height control switch.



PREPARATION:

Remove the height control switch connector.

CHECK:

Check continuity between each terminal of the height control switch when the height control switch ”UP” or ”DOWN” button is pressed.

OK:

Tester connection	Switch condition	Specification
”UP” button	2 – 3	Continuity
”DOWN” button	2 – 3	No continuity
”UP” button	2 – 4	No continuity
”DOWN” button	2 – 4	Continuity

NG → **Replace height control switch.**

OK

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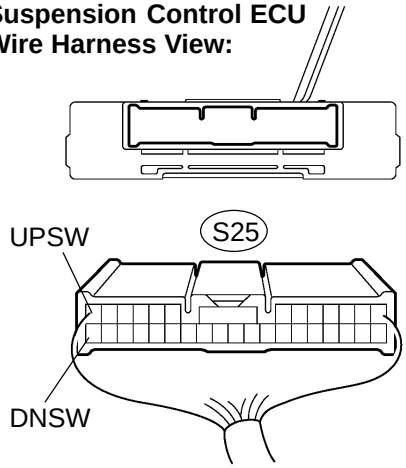
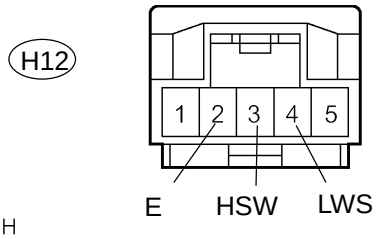
3	Check harness and connector (Height control switch – Suspension control ECU, Body ground).

Suspension Control ECU Wire Harness View:



Height Control Switch Wire Harness Side Connector Front View:



PREPARATION:

Disconnect the ECU connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
S25–13 (UPSW) – H12–3 (HSW)	Always	Below 1 Ω
S25–32 (DNSW) – H12–4 (LWS)	Always	Below 1 Ω
H12–2 (E) – Body ground	Always	Below 1 Ω
S25–13 (UPSW) – Body ground	Always	10 kΩ or higher
S25–32 (DNSW) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace suspension control ECU (See page IN–35).

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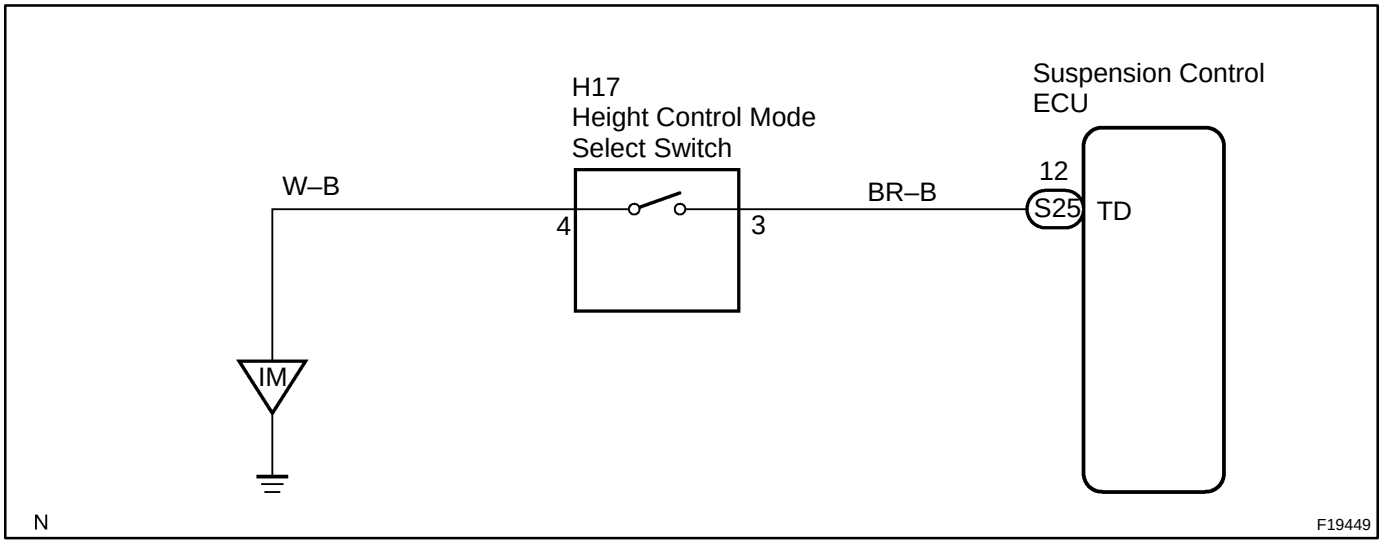
DTC	C1788/88	Height Control Mode Select Switch Circuit (Test Diagnosis)

CIRCUIT DESCRIPTION

Height control can be operated or suspended by pressing the height control mode select switch.
By pressing the switch once, height control can be suspended.
By pressing the switch one more time, height control can be operated.
HINT:
The DTC is output only when the sensor signal check is done.

DTC No.	DTC Detecting Condition	Trouble Area
C1788/88	Height control mode select switch signal does not change.	▶Height control mode select switch ▶Height control mode select switch circuit ▶Suspension control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Read value of the hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and turn the hand–held tester main switch ON.
(c) Select the item "HEIGHT SW HOLD" in the DATA LIST, and read its value displayed on the hand–held tester.

AIR SUSPENSION:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
HEIGHT SW HOLD	Height control mode select switch / ON or OFF	ON: Height control mode select switch is pressed OFF: –	–

CHECK:

Check that the value displayed on the hand–held tester changes by pressing the height control mode select switch.

OK:

Height control mode select switch value changes.

RESULT:

NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC chart)	C

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

C → **Replace suspension control ECU (See page IN–35).**

A

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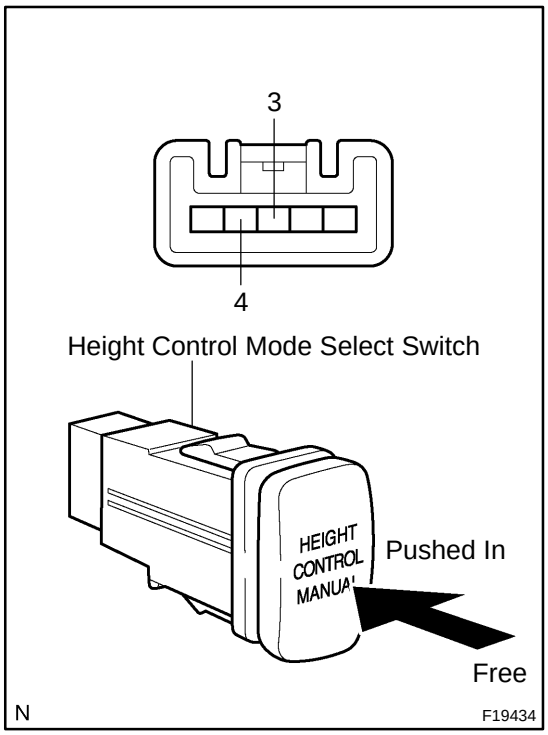
2	Inspect height control mode select switch.



PREPARATION:

Disconnect the height control mode select switch connector.

CHECK:

Check continuity between terminals 3 and 4 of the height control mode select switch when the height control mode select switch is pushed in and free.

OK:

Switch condition	Specification
Pushed in	Continuity
Free	No continuity

NG → **Replace height control mode select switch.**

OK

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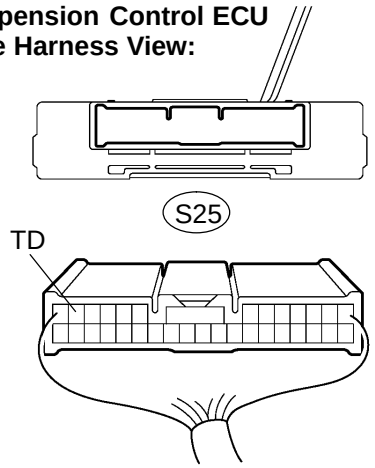
3	Check harness and connector (Height control mode select switch – Suspension control ECU).

Suspension Control ECU Wire Harness View:



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PREPARATION:

Disconnect the ECU connector.

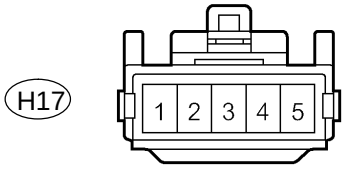
CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
S25–12 (TD) – H17–3	Always	Below 1 Ω
H17–4 – Body ground	Always	Below 1 Ω
S25–12 (TD) – Body ground	Always	10 kΩ or higher

Height Control Mode Select Switch Wire Harness Connector Front View:



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NG → **Repair or replace harness or connector.**

OK

Replace suspension control ECU (See page IN–35).

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DIDEG–01

DTC	U0100/65	Lost Communication with ECM/PCM

CIRCUIT DESCRIPTION

The ECM sends signals such as engine speed signal, transmission signal, shift position signal, L4 switch signal, TC terminal signal (diagnosis mode signal) to the suspension control ECU, etc. when the air suspension system is in operation.

DTC No.	DTC Detecting Condition	Trouble Area
U0100/65	The suspension control ECU detects the following conditions simultaneously: 1. Ignition switch ON 2. Vehicle speed signal is more than 30 km/h (18.5 mph) 3. No communication from ECM continues for more than 3 seconds	▶ECM ▶Suspension control ECU ▶Communication circuit

INSPECTION PROCEDURE

HINT:

This circuit uses CAN for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is/are output.

1	**Go to CAN communication system (See page DI–1065).**

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DIDEH–01

DTC	U0122/67	Lost Communication with Translate ECU

CIRCUIT DESCRIPTION

The translate ECU sends signals such as vehicle wheel speed signal, TS terminal signal (test mode signal) to the suspension control ECU, etc. when the air suspension system is in operation.

DTC No.	DTC Detecting Condition	Trouble Area
U0122/67	The suspension control ECU detects the following conditions simultaneously: 1. Ignition switch ON 2. No communication from translate ECU continues for more than 3 seconds	▶Translate ECU ▶Suspension control ECU ▶Communication circuit

INSPECTION PROCEDURE

HINT:

This circuit uses CAN for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is/are output.

1	**Go to CAN communication system (See page DI–1065).**

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DIDEJ–01

DTC	U0132/71	Lost Communication with Ride Level Control Module

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
U0132/71	The suspension control ECU detects the following conditions simultaneously: 1. Ignition switch ON 2. No communication from CAN bus continues for more than 10 times	▶Suspension control ECU ▶Communication circuit

INSPECTION PROCEDURE

HINT:

This circuit uses CAN for communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system is/are output.

1	**Go to CAN communication system (See page DI–1065).**

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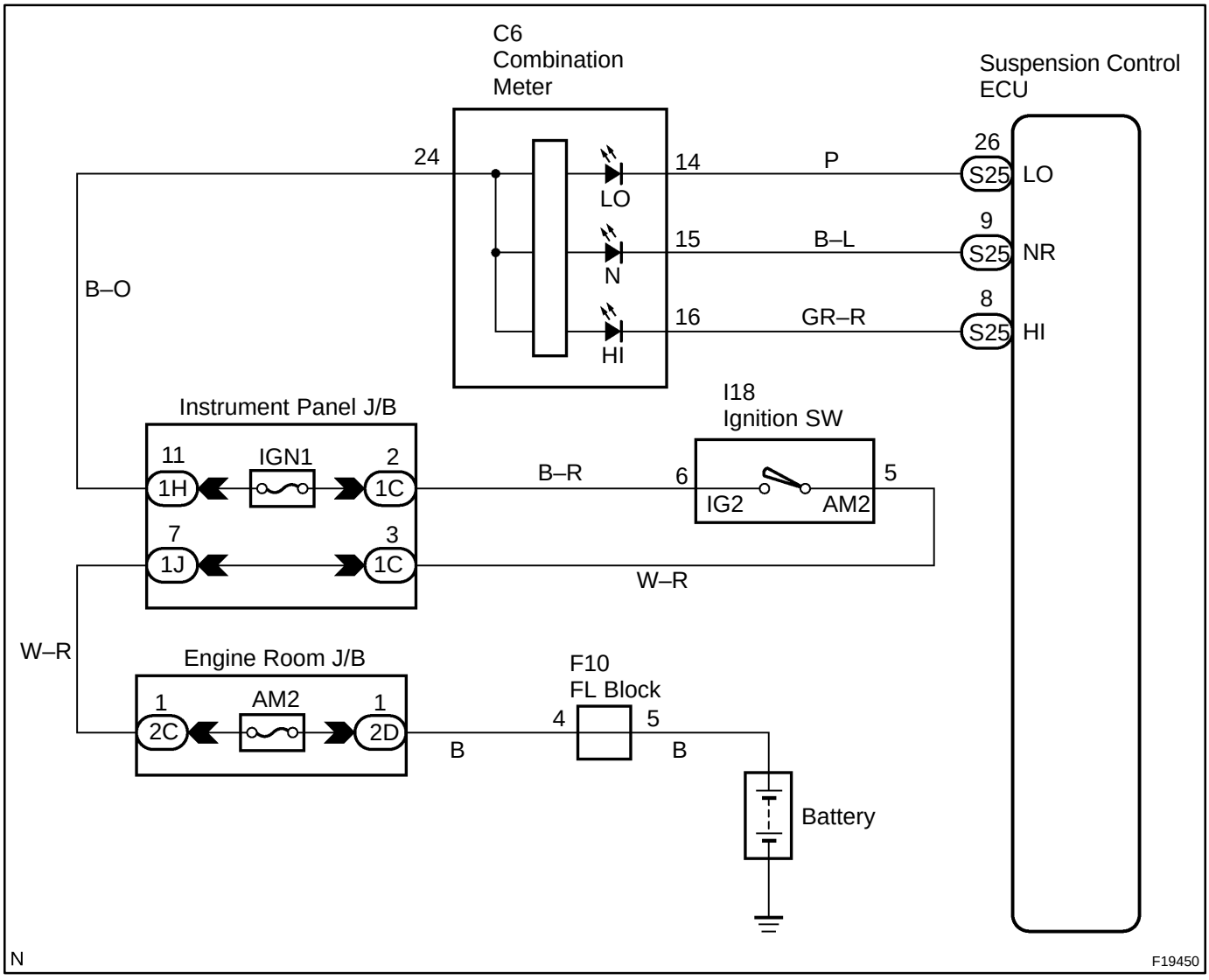
DIDEL–01

Height Control Indicator Lamp Circuit

CIRCUIT DESCRIPTION

The height control indicator lamp indicates the target height, not the actual height.
It blinks when the height control is operated by pressing the height control switch and stays on when the operation is completed.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Inspect height control indicator lamp.**

PREPARATION:

Turn the ignition switch to the ON position.

CHECK:

Check that the height control indicator lamp comes on.

OK:

Height control indicator lamp comes on, and then goes off after 2 seconds.

NG → **Go to combination meter system (See page DI–1610).**

OK

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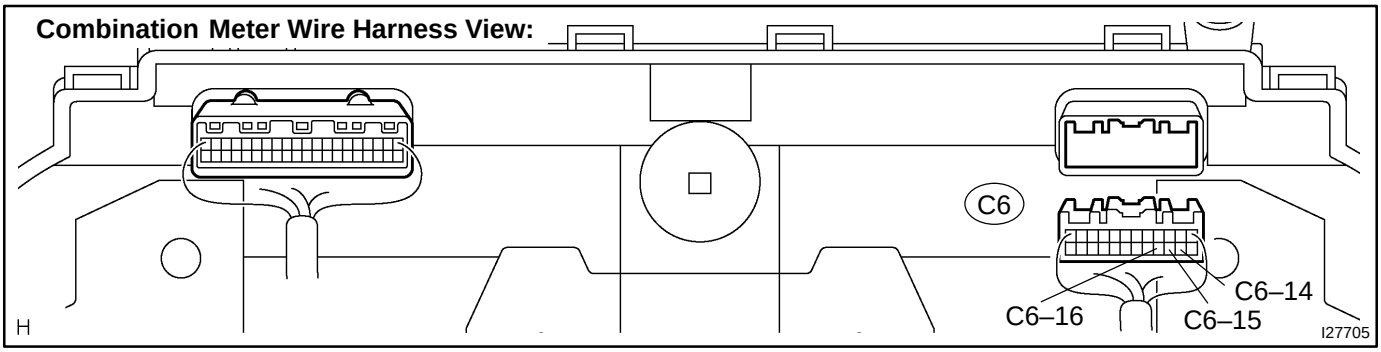
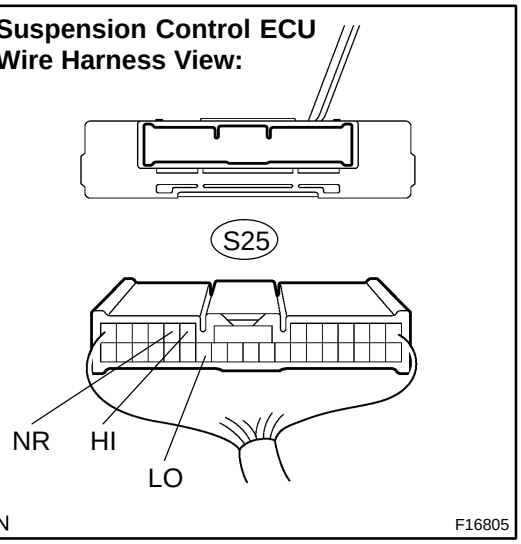
2	**Check harness and connector (Suspension control ECU – Combination meter assy).**

Combination Meter Wire Harness View:



Suspension Control ECU Wire Harness View:



PREPARATION:

Disconnect the suspension control ECU connector and the combination meter connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
S25–8 (HI) – C6–16	Always	Below 1 Ω
S25–9 (NR) – C6–15	Always	Below 1 Ω
S25–26 (LO) – C6–14	Always	Below 1 Ω
S25–8 (HI) – Body ground	Always	10 kΩ or higher
S25–9 (NR) – Body ground	Always	10 kΩ or higher
S25–26 (LO) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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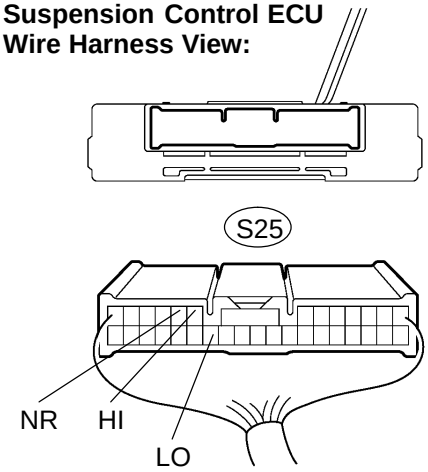
3	Check combination meter.

Suspension Control ECU Wire Harness View:



PREPARATION:

Reconnect the combination meter connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
S25–8 (HI) – Body ground	Ignition switch ON	10 to 14 V
S25–9 (NR) – Body ground	Ignition switch ON	10 to 14 V
S25–26 (LO) – Body ground	Ignition switch ON	10 to 14 V

NG → **Replace combination meter.**

OK

Replace suspension control ECU (See page IN–35).

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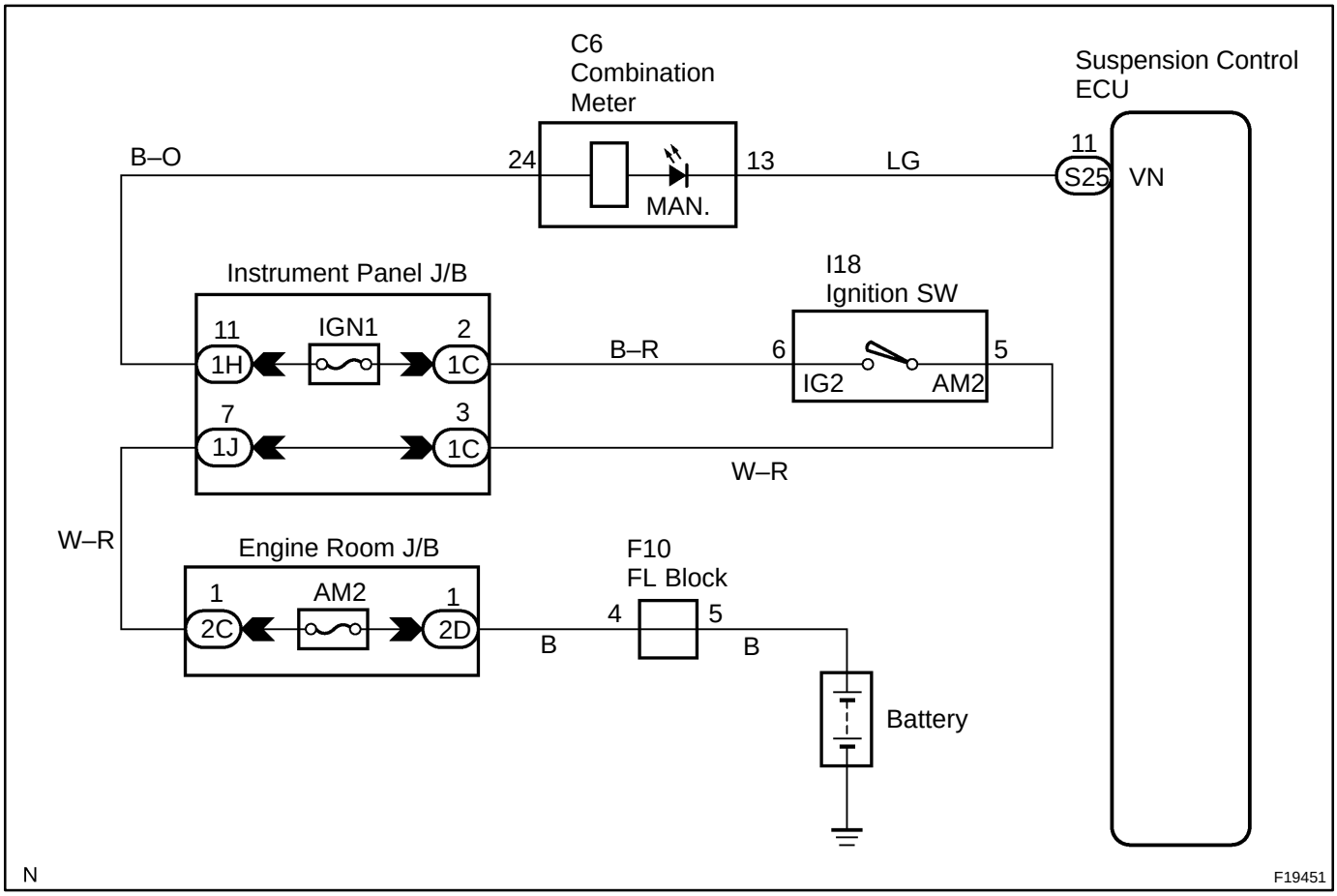
Height Control Manual Indicator Lamp Circuit

CIRCUIT DESCRIPTION

When manual mode is selected by pressing the height control mode select switch, the manual indicator lamp comes on. (For the wiring diagram of the height control mode select switch circuit, see page DI–778.) If the suspension control ECU detects a problem, the height control manual indicator lamp blinks while suspending the height control function. At the same time, the suspension control ECU records a DTC in the memory.

Connect terminals TC and CG of the DLC3 to make the height control manual indicator lamp blink and output DTCs.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Inspect height control manual indicator lamp.**

PREPARATION:

Turn the ignition switch to the ON position.

CHECK:

Check that the height control manual indicator lamp comes on.

OK:

Height control manual indicator lamp comes on, and then goes off after 2 seconds.

NG → **Go to combination meter (See page DI–1610).**

OK

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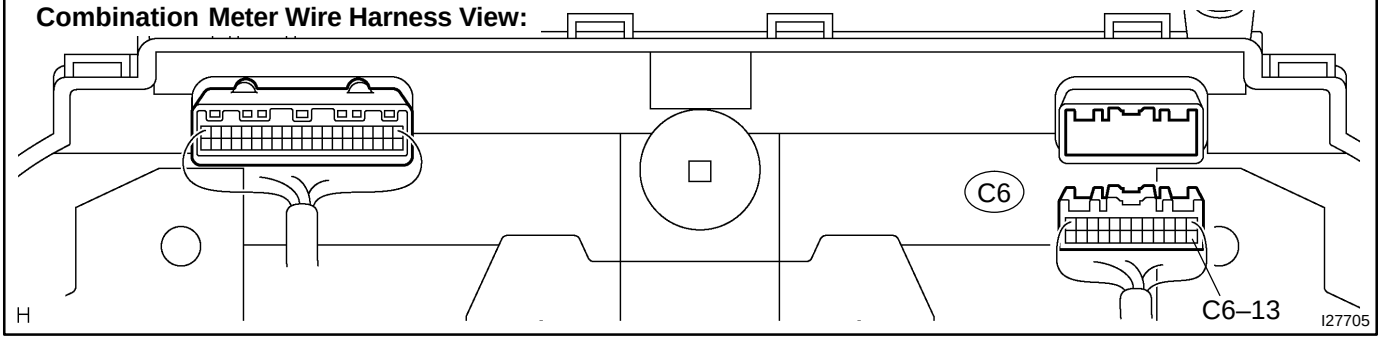
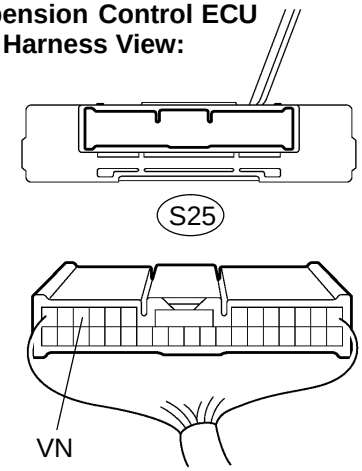
2	**Check harness and connector (Suspension control ECU – Combination meter assy).**

Combination Meter Wire Harness View:



Suspension Control ECU Wire Harness View:



PREPARATION:

Disconnect the suspension control ECU connector and the combination meter connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
S25–11 (VN) – C6–13	Always	Below 1 Ω
S25–11 (VN) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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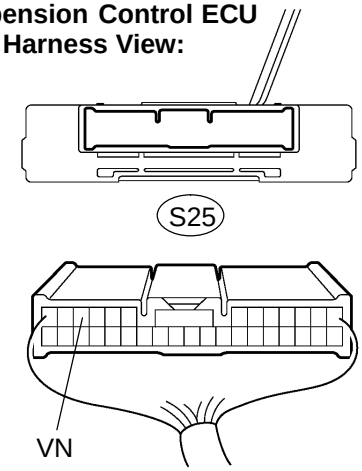
3	Check combination meter.

Suspension Control ECU Wire Harness View:



PREPARATION:

Reconnect the combination meter connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
S25–11 (VN) – Body ground	Ignition switch ON	10 to 14 V

NG → **Replace combination meter (See page IN–35).**

OK

Replace suspension control ECU (See page IN–35).

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DIDEO–01

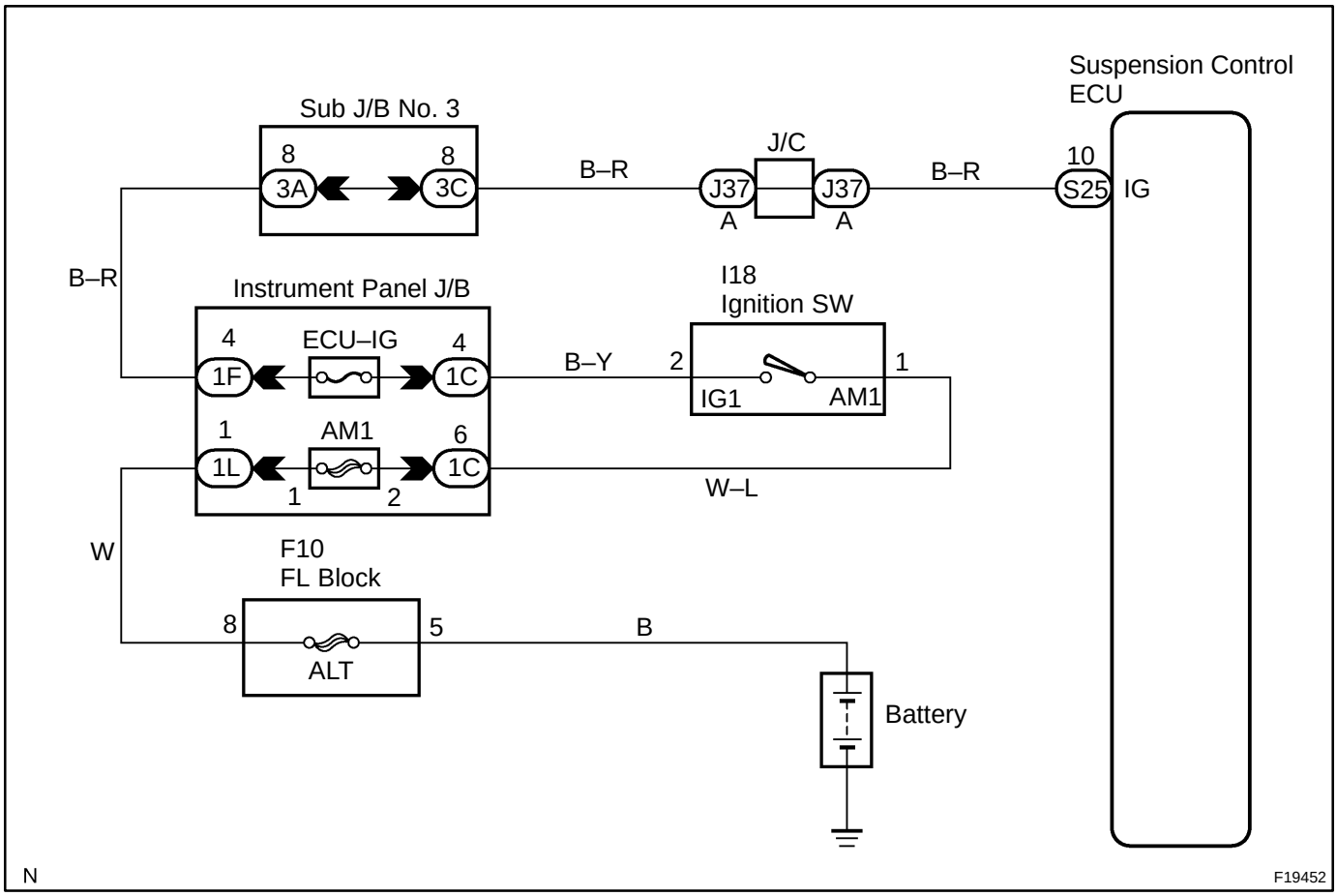
IG Signal Circuit

CIRCUIT DESCRIPTION

The suspension control ECU, controlling the air suspension system, is activated when the ignition switch is turned ON.

The main relay inside the ECU is activated after 2 seconds and the system is operated by +B power source.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester, and start from step 2 when not using the hand–held tester.

1	**Read value of the hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

(c) Select the item ”IG VOLTAGE” in the DATA LIST, and read its value displayed on the hand–held tester.

AIR SUSPENSION:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG VOLTAGE	ECU power supply voltage / min.: 0 V, max.: 25.5 V	Actual ECU power supply voltage: 10 to 14 V	–

CHECK:

Check the ECU supply voltage.

OK:

Actual ECU power supply voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

NG

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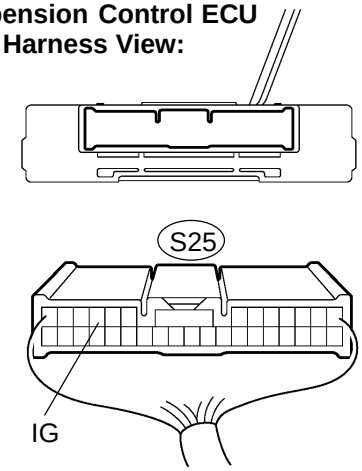
2	Inspect suspension control ECU.

Suspension Control ECU Wire Harness View:



PREPARATION:

Disconnect the ECU connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
S25–10 (IG) – Body ground	Ignition switch OFF → ON	Below 1 V → 10 to 14 V

RESULT:

NG	A
OK (When checking from step 1)	B
OK (When checking from step 2)	C

B → **Replace suspension control ECU (See page IN–35).**

C → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–716).**

A

Repair or replace harness or connector.

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TIRE PRESSURE WARNING SYSTEM

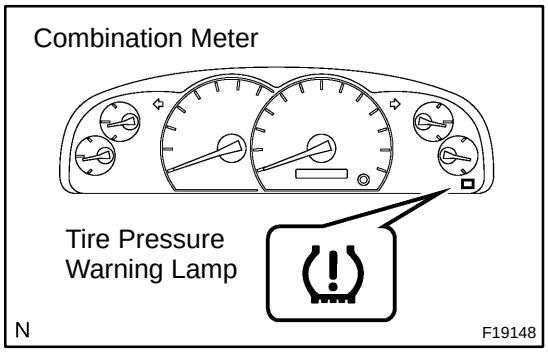
DIDJT–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77



1. TIRE PRESSURE WARNING SYSTEM PRECAUTION

(a) When the tire pressure warning lamp comes on, immediately check the tire pressure of the tire and adjust it to the specified pressure. (The tire pressure warning lamp comes on if there is an open in the tire pressure warning lamp circuit.)

NOTICE:

Check the spare tire as well since this system monitors pressure of all tires, including the spare.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

(b) When the tire pressure warning lamp blinks, there is a malfunction in the system. Check for DTCs.

(c) It is necessary to register the transmitter ID in the tire pressure monitor ECU when replacing the tire pressure monitor valve sub–assy and/or tire pressure monitor ECU (see page DI–805).

(d) When replacing the tire pressure monitor ECU.

(1) Using the DATA LIST, read the transmitter IDs registered in the ECU and make a note of them before removing the tire pressure monitor ECU.

(2) Register the transmitter IDs after installing a new tire pressure monitor ECU.

(e) When replacing the tire pressure monitor valve sub–assy.

(1) Make a note of the 7 digit number (transmitter ID) written on the tire pressure monitor valve sub–assy when replacing the tire pressure monitor valve sub–assy. Register the transmitter IDs in the tire pressure monitor ECU after replacing the tire pressure monitor valve sub–assy and installing the tires and wheels on the vehicle.

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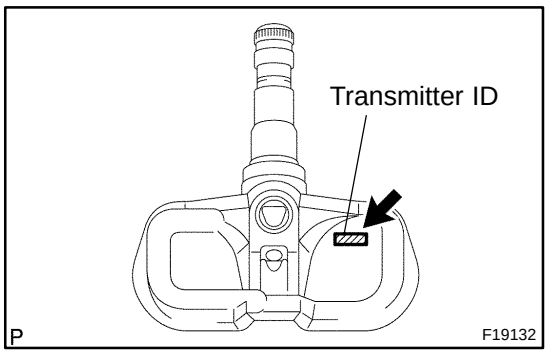

NOTICE:
The transmitter ID is written on the tire pressure monitor valve sub–assy and ID can not be seen after installing the tire pressure monitor valve sub–assy on the tire and wheel. Therefore, make a note of the transmitter ID before installing the tire pressure monitor valve sub–assy.

2. IN CASE OF TIRE AND WHEEL REPLACEMENT

(a) When tires and wheels are replaced, register the transmitter ID without fail.

3. IN CASE OF TIRE ROTATION OR REPLACEMENT OF TIRE PRESSURE MONITOR ECU, TIRE PRESSURE MONITOR VALVE SUB–ASSY, OR TIRES WITH DIFFERENT TIRE PRESSURE

(a) Initialize the tire pressure warning system after one of the following is performed:
- ▶ Replacing the tire pressure monitor ECU or the tire pressure monitor valve sub–assy
- ▶ Tire rotation
- ▶ Replacing tires with different tire pressure

HINT:
The tire pressure warning system will not operate properly if it is not initialized (see page DI–808).

4. FAIL–SAFE FUNCTION

(a) When a system malfunction occurs in the tire pressure warning system, the tire pressure warning lamp blinks and informs the driver of the system failure.

(b) The result of this diagnosis is stored in the tire pressure monitor ECU.

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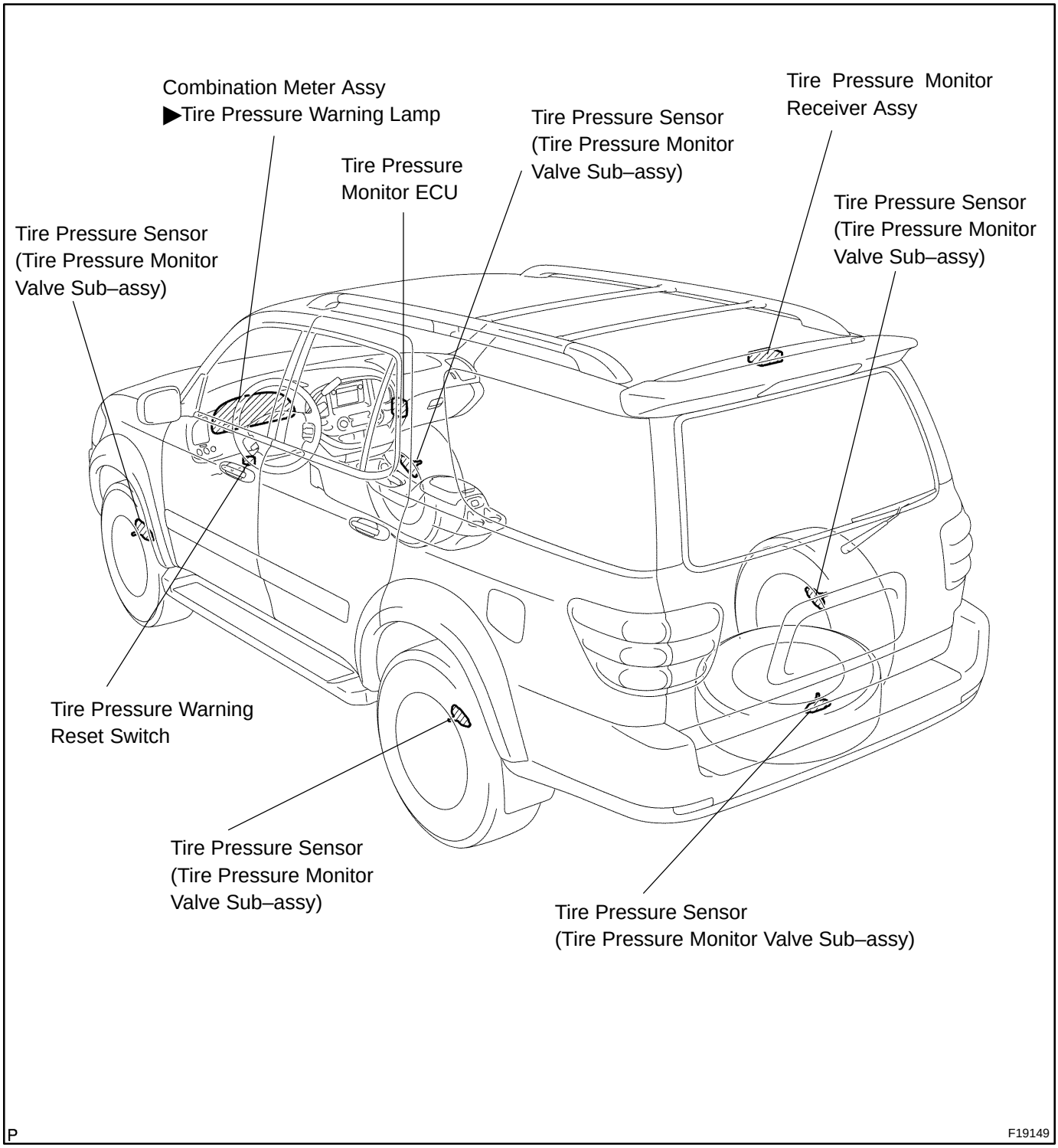
DIDJU–01

LOCATION



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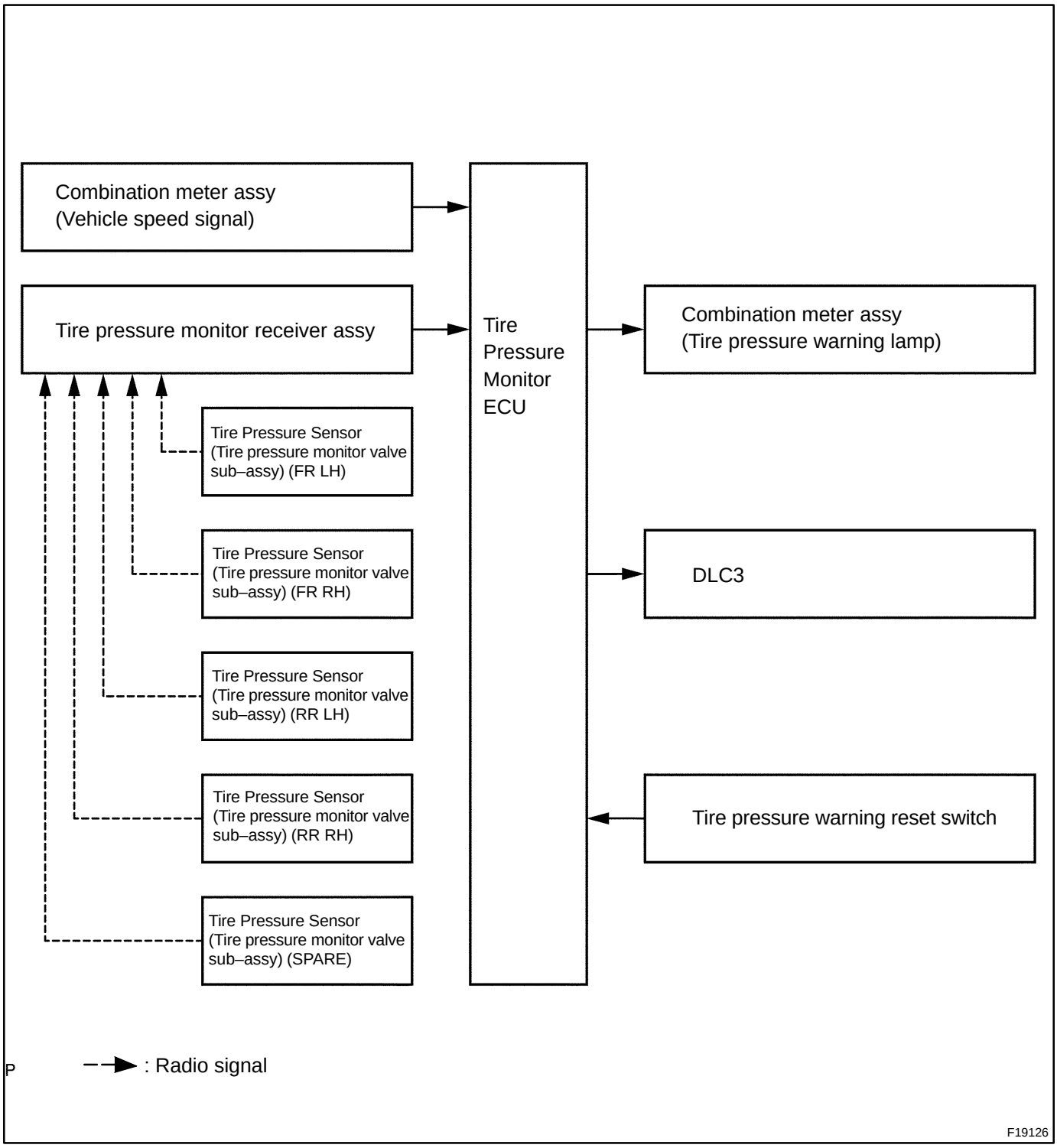
DIDJV–01

SYSTEM DIAGRAM



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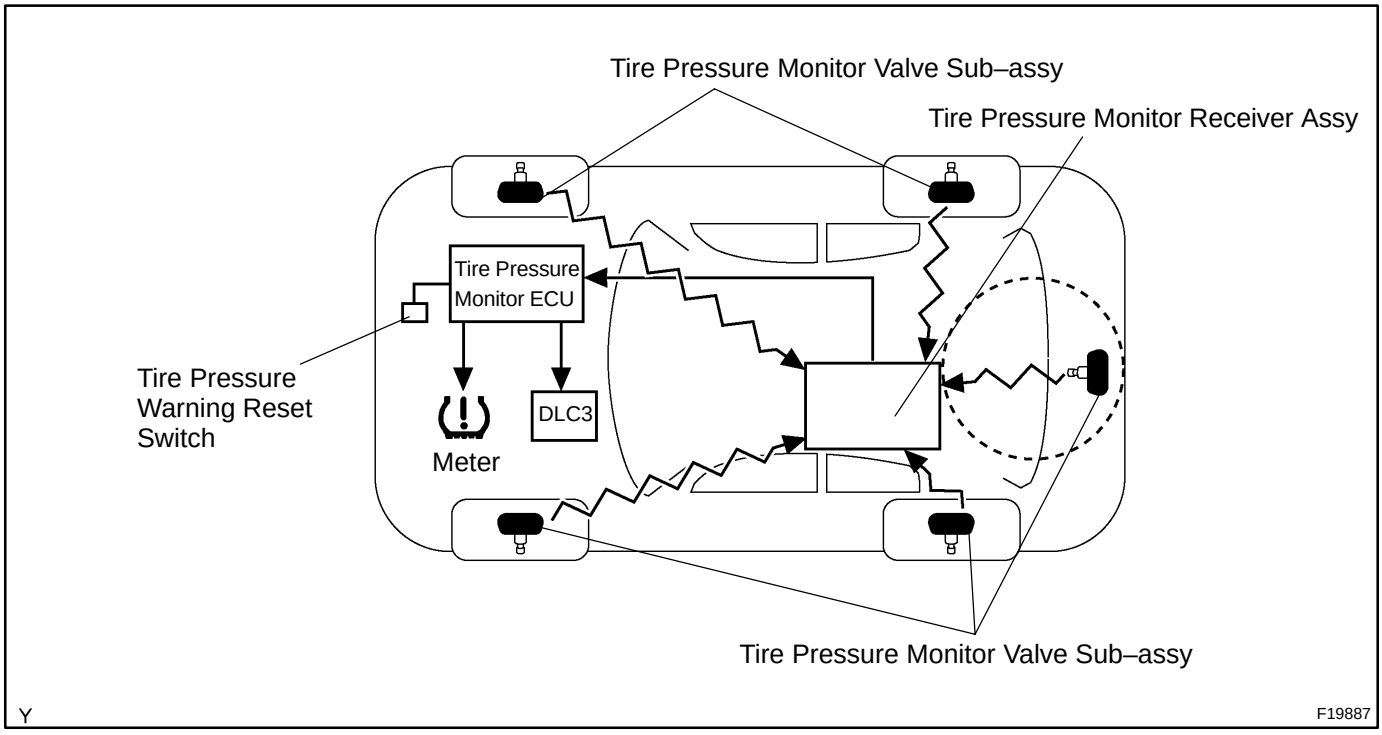
DIDJW–01

SYSTEM DESCRIPTION

1. DESCRIPTION OF SYSTEM

(a) A tire pressure monitor valve sub–assy equipped with a tire pressure sensor and a transmitter and is installed in a tire wheel assy. The sensor measures the tire pressure and the measured value and transmitter ID are transmitted to the tire pressure monitor receiver assy on the body as radio waves and then sent to the tire pressure monitor ECU from the tire pressure monitor receiver. If the transmitter ID has already been registered, the ECU compares the measured air pressure value with the standard value. When the value is less than the standard value registered in the tire pressure monitor ECU, the warning lamp on the combination meter comes on.

- ▶ To address the differences in the air pressure settings by the type of tires, or the differences in pressure between the front and rear tires, a tire pressure warning reset switch has been newly adopted.
- ▶ Along with the adoption of the tire pressure warning reset switch, the warning operation has been changed.
- ▶ TPWS transmitters with different bending angles as the tire pressure monitor valve sub–assy have been provided for steel wheels with center ornaments. (They are not interchangeable with aluminum wheels or steel wheels with full wheel caps.)



2. WHEN TIRE PRESSURE WARNING LAMP IS LIT

(a) When the warning lamp does not go off, or when it comes on during driving, check tire pressure. If the warning lamp is lit even though the tire pressure is correctly adjusted, the tire could be punctured.

(b) Under the following conditions, the system may not function properly.

- ▶ The areas, facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.
- ▶ A radio device of similar frequency is used in the vehicle.
- ▶ A lot of snow or ice is stuck to the vehicle, especially onto the wheels and around the wheel houses.
- ▶ The battery of the sensor has been depleted.
- ▶ The tires without tire pressure monitor valve sub–assy are used.
- ▶ Tire chains are used.

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▶ When the spare tire is not within the receivable range of the electric wave, a signal may not be received because spare tires are fixed. Accordingly, the system may not function properly. If there is a possibility that the TPWS system does not receive a signal from the spare tire, rotate the tire 90˚.

HINT:

▶ If any other wheels than the specified ones are used, the system may not function properly because the radio waves are differently transmitted from the tire pressure sensor.

▶ Depending on the tire type, the system may not function properly even though the specified wheels are used.

(c) The average use life of the grommet of the tire pressure monitor valve sub–assy is approximately 5 years, at which time it must be replaced.

(d) After removing and installing the ECU or a sensor, output a diagnosis code and check that it is a normal code.

3. FUNCTION OF COMPONENTS

Components	Function
Tire pressure monitor valve sub–assy	Combined as a single unit with a disc wheel air valve, it measures tire pressure and temperature and transmits an ID number for measurement value and identification. Built–in the battery.
Tire pressure monitor receiver assy	Receives and transmits a necessary signal from the transmitter to the tire pressure monitor ECU.
Tire pressure monitor ECU	Receives the signal from the receiver and identifies it as vehicle's own signal. If the measurement value is equal to or lower than the specified value, it transmits a signal so that the air pressure warning lamp on the combination meter comes on.
Tire pressure warning lamp	Located in the combination meter, it informs the driver of lowered tire air pressure and system failure.
Tire pressure warning reset switch	Enters the initialization mode for tire or wheel replacement, or tire rotation

4. TIRE PRESSURE WARNING RESET SWITCH

▶ By operating the tire pressure warning reset switch, the tire pressure monitor ECU can be set to issue a warning at an inflation pressure that corresponds to the type of tires. Therefore, the dealer must set the warning threshold to the proper value in order to comply with the local regulations.

▶ Operate the tire pressure warning reset switch only after the inflation pressures of all 5 tires (including the spare) have been adjusted on the vehicle.

▶ To initialize the system, press and hold the tire pressure warning reset switch for 3 seconds or longer with the ignition switch ON. After the system has been initialized, the warning lamp blinks 3 times (1 second ON, 1 second OFF).

▶ During initialization, the tire pressure monitor valve sub–assy measures the inflation pressure of the tires, and registers the signals that are transmitted into the tire pressure monitor ECU at a frequency of one per minute. The initialization process is completed when the signals from the 5 tires have been received.

▶ The initialization process is canceled if the ignition switch is turned OFF during initialization. To initialize again, the tire pressure warning reset switch must be pressed again. For this reason, once the tire pressure warning reset switch has been pressed, turning OFF the ignition switch is not recommended for a minimum of 20 minutes.

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DIDJX–01

HOW TO PROCEED WITH TROUBLESHOOTING

The hand–held tester can be used at steps 3, 7 and 9.

1	**Vehicle Brought to Work Shop**

NEXT

2	**Customer Problem Analysis (See page DI–804)**

NEXT

3	**DTC Check and Clear (See page DI–820)**

- **DTC is output: Go to step 4**
- **DTC is not output: Go to step 5**

4	**DTC Chart (See page DI–825)**

- **Go to step 7**

5	**Problem Symptom Confirmation**

- **Symptom does not occur: Symptom simulation (See page IN–24)**
- **Symptom occurs: Go to step 6**

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6	Problem Symptoms Table (See page DI–814)

Go to step 8

7	Circuit Inspection (See page DI–827 To DI–888)

NEXT

8	Repair

NEXT

9	Confirmation Test

NEXT

End

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DIDJY–01

CUSTOMER PROBLEM ANALYSIS CHECK

Tire Pressure Warning System Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date of First Occurrence	/ /
Frequency of Problem Occurrence	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ **In spite of abnormal low tire pressure, the warning lamp does not come on.**	
	☐ **The warning lamp was lit and the tire was filled up with air, but the warning lamp does not go off.**	
	Tire Pressure Warning Lamp Abnormal	☐ Remains ON ☐ Does not come on

Check Item	**Tire Pressure Warning Lamp**	☐ Normal ☐ Malfunction Code (Code)
	Tire	☐ Tire Pressure FR ( ) FL ( ) RR ( ) RL ( ) ☐ Tire Size FR ( ) FL ( ) RR ( ) RL ( ) ☐ Tire Type FR ( ) FL ( ) RR ( ) RL ( ) ☐ Tire Wear Condition FR ( ) FL ( ) RR ( ) RL ( ) ☐ History of changing tires or wheels When ( ) ☐ History of rotating tires When ( )

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DIDJZ–01

REGISTRATION

1. IN CASE OF TIRE PRESSURE MONITOR ECU REPLACEMENT

(a) Read ID stored in the old ECU using the hand–held tester.

2. IN CASE OF TIRE PRESSURE MONITOR VALVE SUB–ASSY AND/OR TIRE PRESSURE MONITOR ECU REPLACEMENT

(a) Read ID written on the tire pressure monitor valve.

3. REGISTER TRANSMITTER ID

NOTICE:

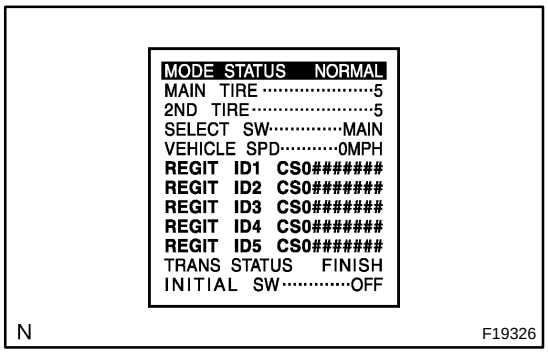
It is necessary to register the transmitter ID in the tire pressure monitor ECU when replacing the tire pressure monitor valve sub–assy and/or tire pressure monitor ECU.

(a) Set the tire pressure of all wheels to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

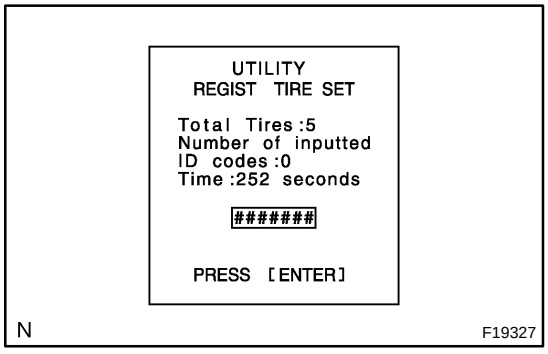
(b) Connect the hand–held tester to DLC3.

(c) Turn the ignition switch to the ON position.

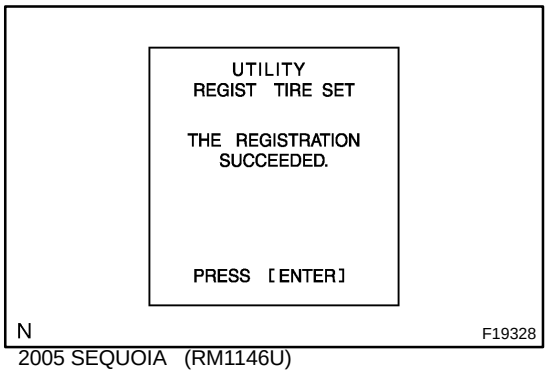


(d) Read and write down the ID (ID1 to ID5) by using the DATA LIST.

(e) Select the REGIST TIRE following the hand–held tester screen.
(UTILITY – REGIST TIRE)



(f) Input the ID (ID1 to ID5) using the hand–held tester and transmit it to the tire pressure monitor ECU.



(g) Set the ID transmission condition to ”SUCCEEDED”.

HINT:

If the operations of steps (d) to (f) do not complete within 5 min., the mode will return to normal operation mode.

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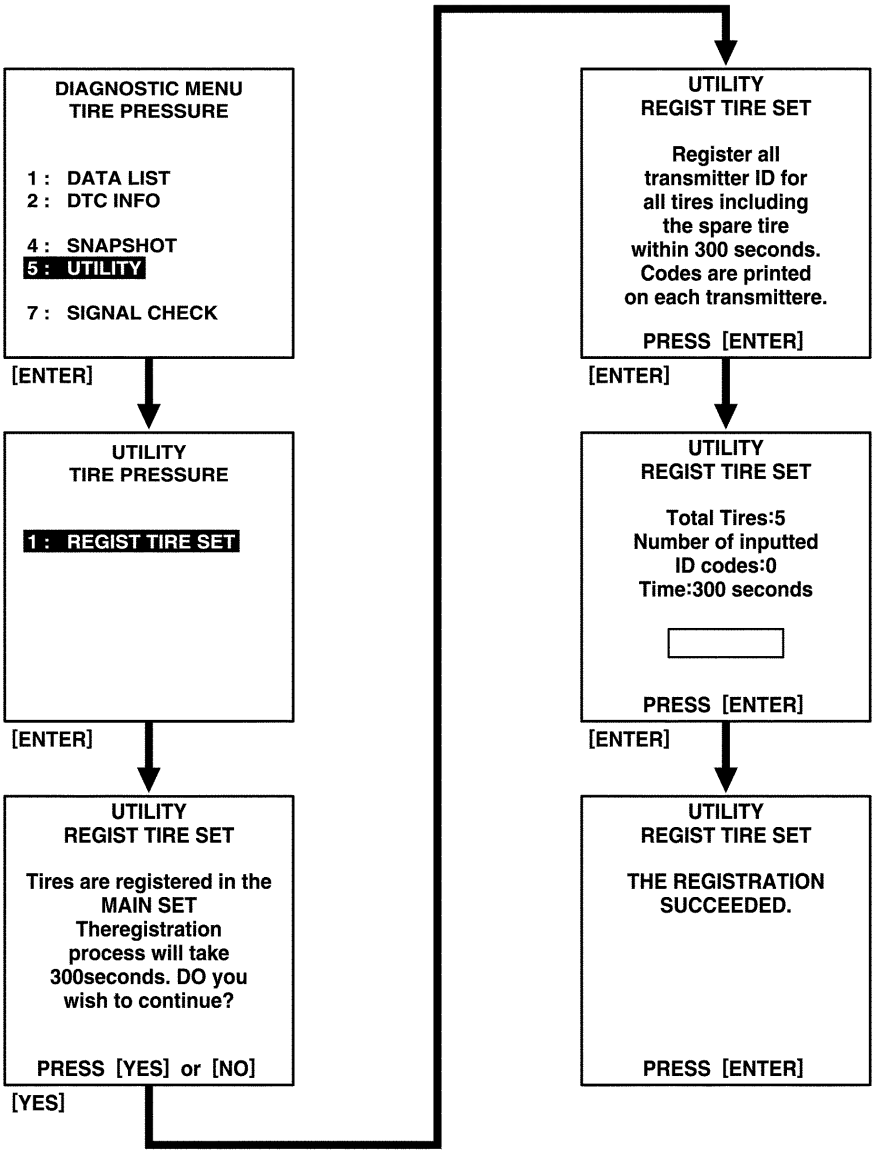
Registration Procedure



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4. CONFIRMATION OF TRANSMITTER ID REGISTRATION

(a) Set the tire pressure of all wheels to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

(b) Connect the hand–held tester to DLC3.

(c) Turn the ignition switch to the ON position.

(d) Select ”SIGNAL CHECK” mode on the hand–held tester (see page DI–810).

(e) Forcibly transmit the transmitter IDs for all wheels.

(1) When rapidly reducing the pressure, remove the valve core (above 20 kPa/15 sec.).

HINT:

- The transmitter ID can be transmitted by rapidly reducing the tire air pressure.
- When rapidly reducing the pressure, remove the valve core (above 20 kPa/15 secs.).

(2) Perform the steps mentioned above to all tires including the spare tire.

(f) Check that test mode DTCs C2181/81, C2182/82, C2183/83, C2184/84 and C2185/85 are all erased.

HINT:

- The transmitter ID registration is complete when the test mode DTCs are erased.
- If they haven’t been erased, reset the tire pressure to the specified value and rotate the tire 90 to 270 degrees. Then forcibly transmit the transmitter IDs of all wheels. If they are still output, register the transmitter IDs.

(g) Set the tire pressure of all wheels to the specified value.

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DIDK0–01

INITIALIZATION

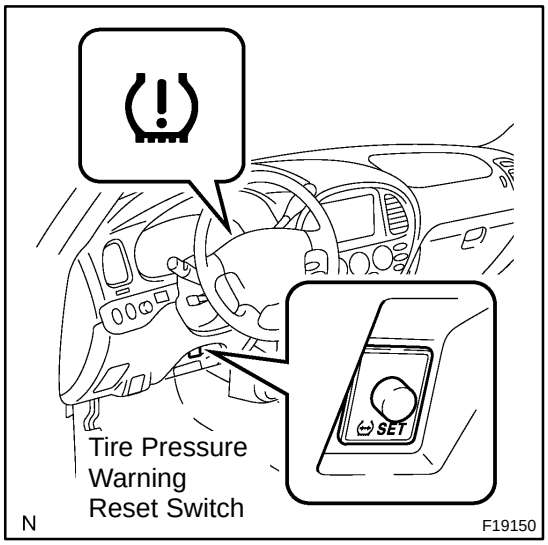
1. INITIALIZATION

NOTICE:

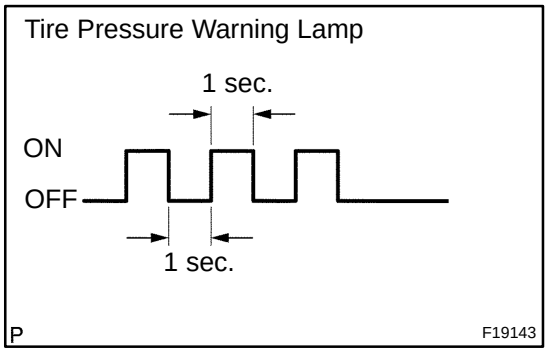
Initialization is necessary after replacing either the ECU, tires with different tire pressure or tire pressure monitor valve sub–assy, after rotating the tires, or when a new vehicle is delivered.

(a) Set the tire air pressure for all wheels, including the spare, to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)



(b) Keep the tire pressure warning reset switch pressed for 3 seconds or more with the ignition switch on.



(c) Check that the tire pressure warning lamp blinks 3 times (1 second ON, 1 second OFF).

HINT:

- Do not turn the ignition switch off during initialization (The initialization process takes about 20 minutes).
- Initialization will be complete if signals are received from all the wheels including the spare. Initialization will be canceled if the ignition switch is turned off during initialization.

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(d) Confirm that initialization is complete using the hand–held tester.
(e) Check that the pressure for each tire is displayed in INIT THRESHOLD 1 to 5.
(f) Initialization is complete.

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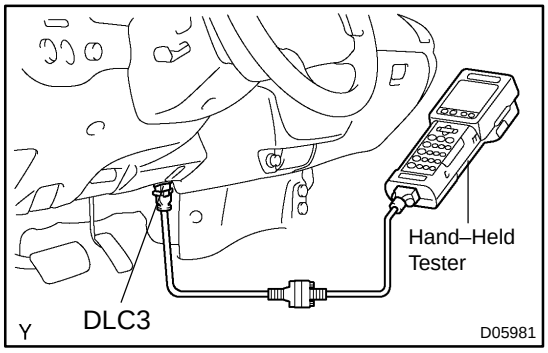
DIDKL–01

TEST MODE PROCEDURE

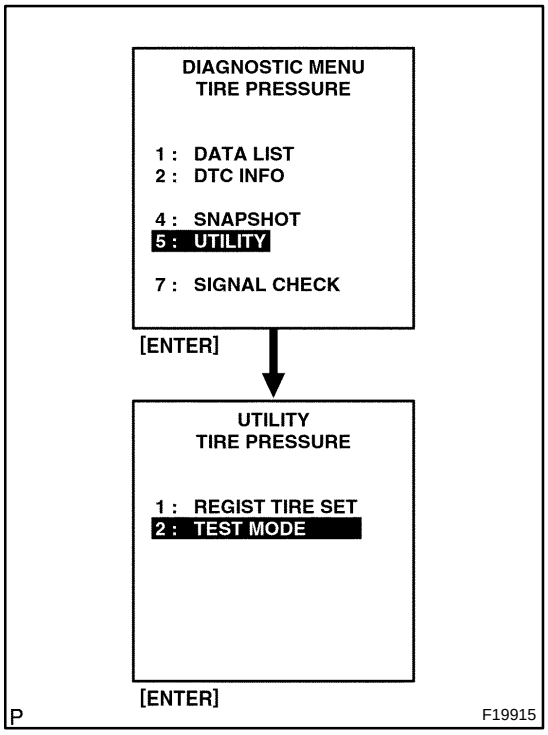
1. ENTER TEST MODE

HINT:

- ▶ Operation of the tire pressure warning reset switch can be checked in TEST MODE.
- ▶ During TEST MODE, the system is not initialized by pushing the tire pressure warning reset switch. The circuit of the tire pressure warning reset switch can be inspected during this mode.



(a) Make sure that the ignition switch is off.
(b) Connect the hand–held tester to DLC3.
(c) Turn the ignition switch to the ON position.



(d) Select the TEST MODE on hand–held tester.

(e) Perform tire pressure warning reset switch test.
(1) Push the tire pressure warning reset switch.
(2) Check the tire pressure warning indicator lamp.

Test Signal	Normal Condition
Tire Pressure Warning Reset Switch	▶Switch ON: TPWS indicator come on ▶Switch OFF: TPWS indicator blinking

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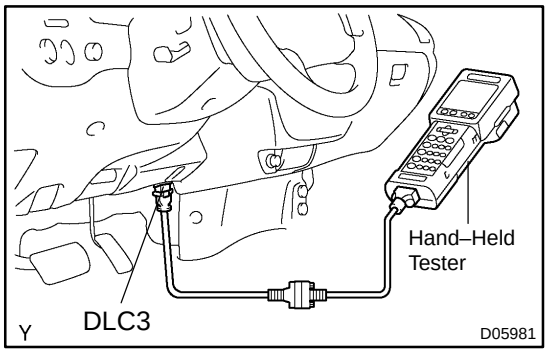
2. PERFORM SIGNAL CHECK

HINT:

- When entering signal check, the tire pressure monitor ECU sets all the signal check DTCs first.
  After completing signal check for each inspection item, the DTCs that are determined normal by the tire pressure monitor ECU will be erased.
  The DTCs for other inspection items may not be erased when only a certain signal is inspected.
- When signal check returns back to normal mode, all the signal check DTCs will be erased.



(a) Make sure that the ignition switch is off.
(b) Connect the hand–held tester to DLC3.
(c) Turn the ignition switch to the ON position.
(d) Select the SIGNAL CHECK on hand–held tester.

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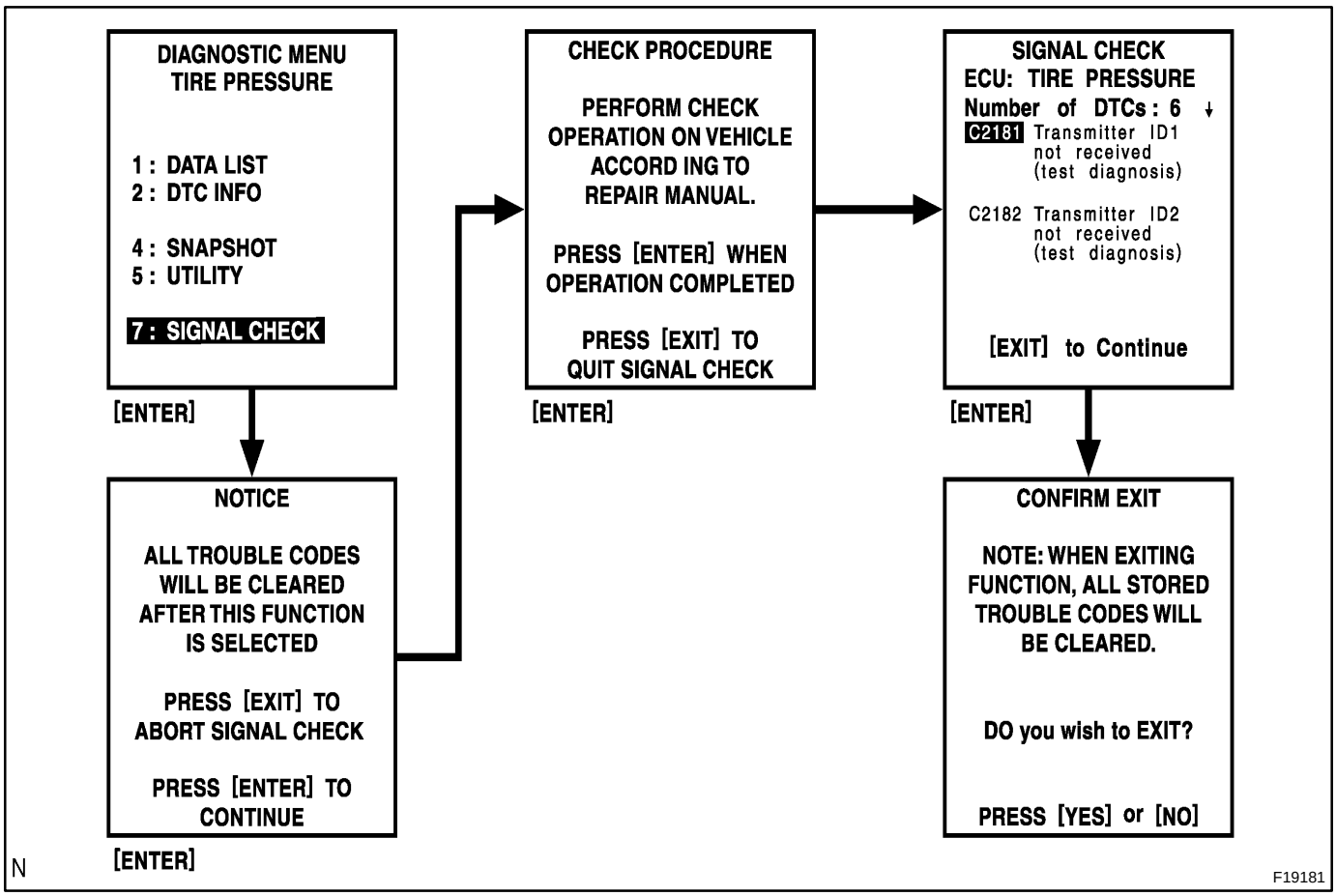

(e) Drive the vehicle at 12mph (20 km/h) or more for 10 seconds or more.

(f) Loosen the valve core and rapidly reducing the pressure (20 kPa above/15 sec.).

HINT:

The transmitter ID can be transmitted by rapidly reducing the tire air pressure.

(g) Check that the tire pressure warning system test mode DTCs are erased.

SIGNAL CHECK DTC	Test Signal	Signal Check DTC Clear Condition
C2181, C2185	Transmitter Data	Receive DATA from the transmitter which has a registered ID in TPWS ECU
C2191	Vehicle Speed Signal	Vehicle speed of 12 mph (20 km/h) or more is detected for 3 seconds or more

(h) Result

HINT:

After the signal check is complete, check for a DTC and signal check DTC to confirm the system status.

SIGNAL CHECK DTC is output	Repair the faulty part and enter SIGNAL CHECK again
SIGNAL CHECK DTCs are cleared	No problem

(i) End of SIGNAL CHECK

After completing test mode (SIGNAL CHECK), turn the ignition switch OFF and disconnect the tester.

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DTC of SIGNAL CHECK (TEST DIAGNOSIS) function:

If a malfunction code is displayed during the test mode DTC check, check the circuit listed for that code. For details of each code, refer to the ”See Page” under respective ”DTC No.” in the chart.

DTC No. (See Page)	Detection Item	Trouble Area
C2181/81 (DI–834)	Transmitter ID1 not received	▶Tire pressure monitor receiver assy ▶Each tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Wire harness
C2182/82 (DI–834)	Transmitter ID2 not received	▶Tire pressure monitor receiver assy ▶Each tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Wire harness
C2183/83 (DI–834)	Transmitter ID3 not received	▶Tire pressure monitor receiver assy ▶Each tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Wire harness
C2184/84 (DI–834)	Transmitter ID4 not received	▶Tire pressure monitor receiver assy ▶Each tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Wire harness
C2185/85 (DI–834)	Transmitter ID5 not received	▶Tire pressure monitor receiver assy ▶Each tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Wire harness
C2191/91 (DI–870)	Vehicle speed signal error	▶Vehicle speed sensor ▶Combination meter assy ▶Tire pressure monitor ECU ▶Wire harness

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DIDK1–01

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

Symptom	Suspected Area	See page
Tire pressure warning system does not operate.	1. Tire pressure monitor valve sub–assy 2. Tire pressure monitor receiver assy 3. Power source circuit 4. Tc terminal circuit 5. Combination meter assy 6. Tire pressure monitor ECU	– – DI–878 DI–888 BE–55 –
DTC check cannot be done.	1. Power source circuit 2. Tc terminal circuit 3. Tire pressure monitor ECU	DI–878 DI–888 –
Tire pressure warning lamp malfunctions (Does not light up).	1. Power source circuit 2. Tire pressure warning lamp circuit 3. Combination meter assy 4. Tire pressure monitor ECU	DI–878 DI–873 BE–55 –
Tire pressure warning lamp malfunctions (Remains ON).	1. Tire pressure check 2. Tire pressure monitor ECU connector poorly connected 3. Tire pressure warning lamp circuit 4. Combination meter assy 5. Tire pressure monitor ECU	SA–3 – DI–873 BE–55 –
Tire pressure warning lamp malfunctions (Blinking).	1. Check DTC 2. Tc terminal circuit 3. Test mode (SIGNAL CHECK) 4. Tire pressure monitor ECU	DI–820 DI–888 DI–810 –
Initialization cannot be done.	1. Test mode (SIGNAL CHECK) 2. Tire pressure warning reset switch 3. Tire pressure monitor ECU	DI–810 DI–875 –

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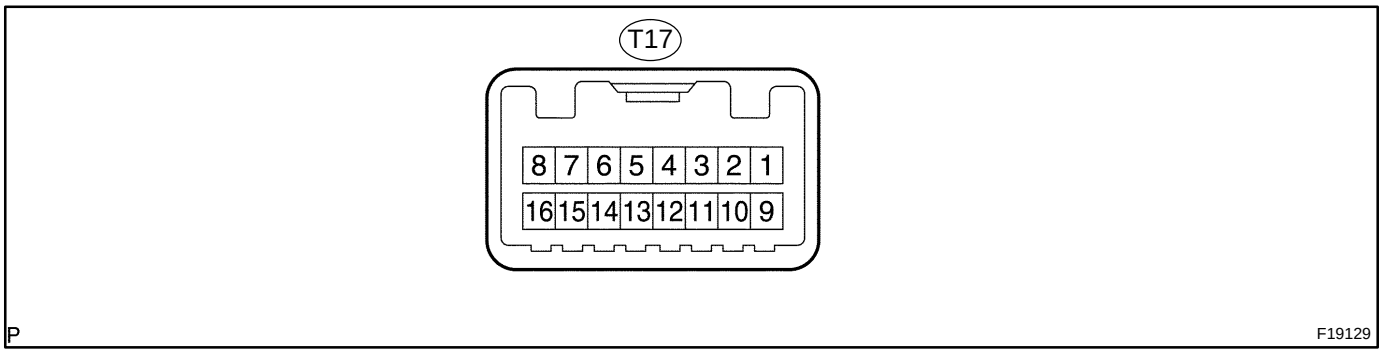
DIDK2–01

TERMINALS OF ECU

HINT:

Inspect the connectors from the back side while the connectors are connected.



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (T17–2) – GND (T17–11)	B–R – W–B	IG power source	IG switch ON	10 to 14 V
SPD (T17–3) – GND (T17–11)	G–O – W–B	Vehicle speed signal	Vehicle is running	Pulse generation
SIL (T17–4) – GND (T17–11)	G–R – W–B	Diagnosis tester communication line	IG switch ON, when communication is not performed with a tester	8 V or more
IND (T17–6) – GND (T17–11)	GR–L – W–B	Tire pressure warning lamp output signal	IG switch ON, tire pressure warning lamp ON	8 V or more
IND (T17–6) – GND (T17–11)	GR–L – W–B	Tire pressure warning lamp output signal	IG switch ON, tire pressure warning lamp OFF	Below 1.5 V
RDA (T17–7) – GND (T17–11)	V – W–B	Tire pressure monitor receiver input signal	IG switch ON, when the tire pressure monitor receiver is not connected	10 to 14 V
RF5V (T17–8) – GND (T17–11)	L – W–B	Tire pressure monitor receiver power source	IG switch ON	4.5 to 5.5 V
CAL SW (T17–10) – GND (T17–11)	GR – W–B	Tire pressure warning reset SW	IG switch ON Tire pressure warning reset SW OFF	10 to 14 V
CAL SW (T17–10) – GND (T17–11)	GR – W–B	Tire pressure warning reset SW	IG switch ON Tire pressure warning reset SW ON	Below 1.5 V
GND (T17–11) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω
TC (T17–12) – GND (T17–11)	P–B – W–B	Tc terminal	When terminal TC is not connected.	8 V or more
GND2 (T17–16) – GND (T17–11)	BR–R – W–B	Tire pressure monitor receiver ground	Always	Below 1 Ω

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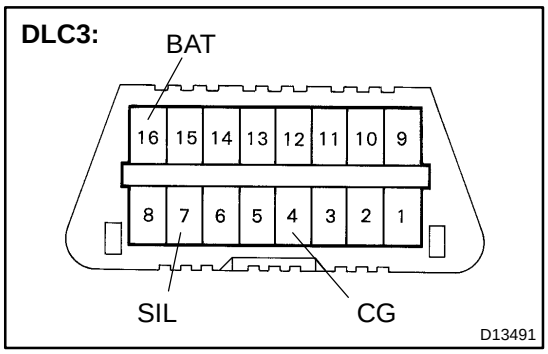
DIDK3–01



DIAGNOSIS SYSTEM

1. CHECK BATTERY VOLTAGE

Battery voltage: 11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.

2. CHECK DLC3

The vehicle's tire pressure monitor ECU uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

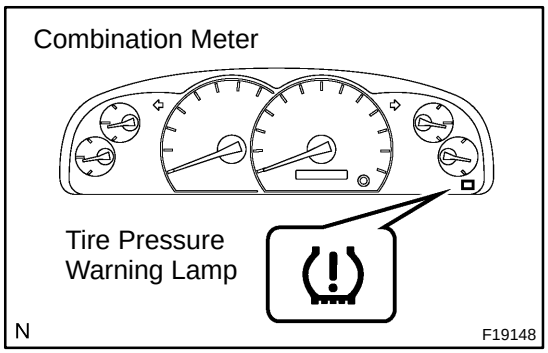
Verify the conditions listed in the table below:

Terminal No.	Disc.	Connection / Voltage or Resistance	Condition
7	SIL	Bus + Line / Pulse generation	During transmission
4	CG	Chassis Ground to Body Ground / 1 Ω or less	Always
16	BAT	Battery Positive to Body Ground / 10 to 14 V	Always

HINT:

If the hand–held tester display shows UNABLE TO CONNECT TO VEHICLE when the cable of the hand–held tester is connected to DLC3, the ignition switch is turned to the ON position and the tester is operated, there is a problem on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tester itself, so consult the Service Department listed in the tester's instruction manual.



3. DIAGNOSIS SYSTEM

(a) Warning lamp

(1) The tire pressure warning lamp blinks when there is any malfunction in the tire pressure warning system.

NOTICE:

When the malfunction has been corrected, the tire pressure warning lamp does not come on.

(b) DTCs (Normal mode)

(1) DTCs are memorized in the tire pressure monitor ECU and read by the blinks of the tire pressure warning lamp or using the hand–held tester (see page DI–820.

(c) Test mode

(1) By switching from normal mode into test mode (input signal check), you can inspect the tire pressure monitor receiver assy, each tire pressure monitor valve sub–assy and vehicle speed sensor (see page DI–810).

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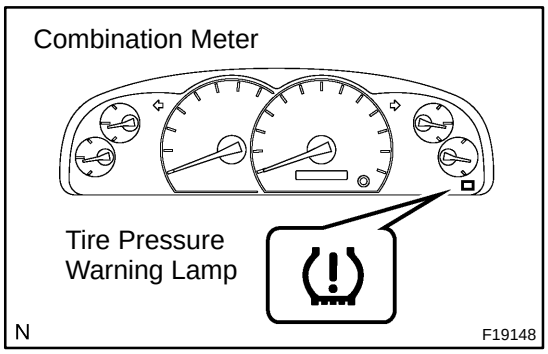

4. CHECK WARNING LAMP

(a) Turn the ignition switch to the ON position.

(b) Check that the tire pressure warning lamp comes on for 3 seconds.

If the warning check result is not normal, proceed to the trouble-shooting for the tire pressure warning lamp circuit.

Trouble Area	See page
Tire pressure warning lamp circuit	DI–873

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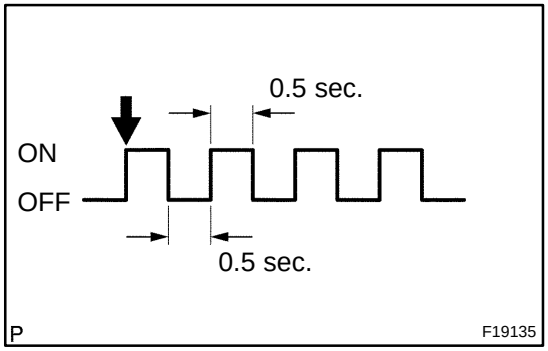
5. TIRE PRESSURE WARNING LAMP CHART

HINT:
The table below indicates the state of the tire pressure warning lamp after the ignition switch is turned ON.

	Immediately after turning the IG ON	Always					
	Comes on for 3 sec.	Goes off	Comes on	Blinks (*1)	Blinks (*2)	Blinks (*3)	Output DTC
Normal	◀	◀					
Low tire pressure	◀		◀				
System fail	◀			◀			
ECU connector poorly connected	◀		◀				
TC ground (There is no DTC)	◀				◀		
TC ground (There is DTC)	◀						◀
Test mode	◀					◀	



*1: Comes on and goes off repeatedly at 0.5 second intervals.

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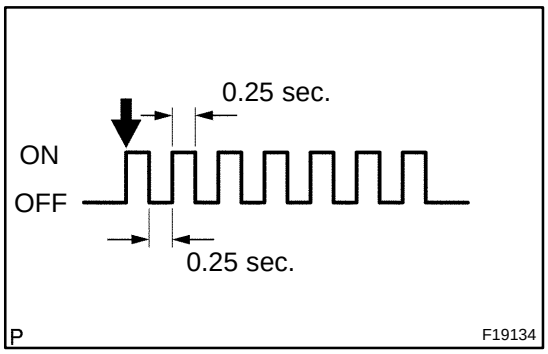
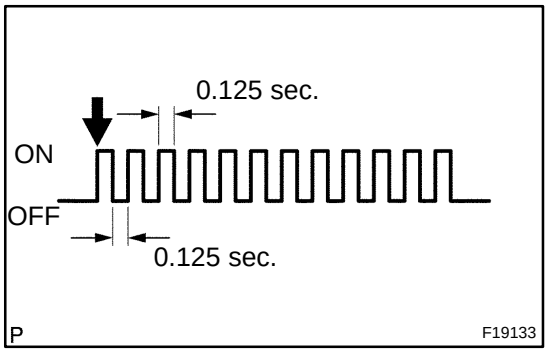


*2: Comes on and goes off repeatedly at 0.25 second intervals.



*3: Comes on and goes off repeatedly at 0.125 second intervals.

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DIDK4–01

DTC CHECK / CLEAR

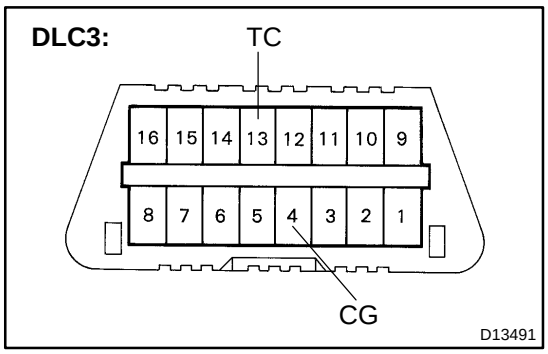
1. DTC CHECK (USING SST CHECK WIRE)

(a) Check DTCs.

(1) Using the SST, connect terminals TC and CG of DLC3.

SST 09843–18040

(2) Turn the ignition switch to the ON position.



(3) Read and record any DTCs from the tire pressure warning lamp on the combination meter. Refer to the illustration on the left for examples of a normal system code and codes 13 and 33.

HINT:

▶ If the tire pressure warning lamp does not blink any DTCs or the normal system code, inspect the tire pressure warning lamp circuit or TC terminal circuit.

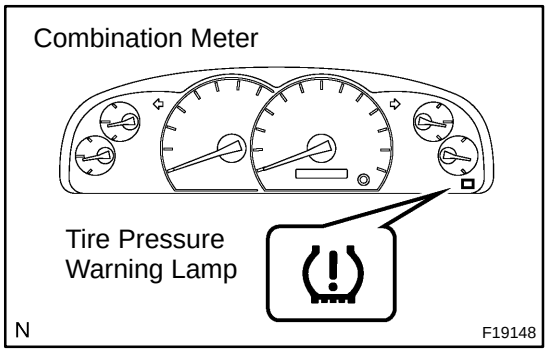
Trouble Area	See page
Tire pressure warning lamp circuit	DI–873
TC terminal circuit	DI–888

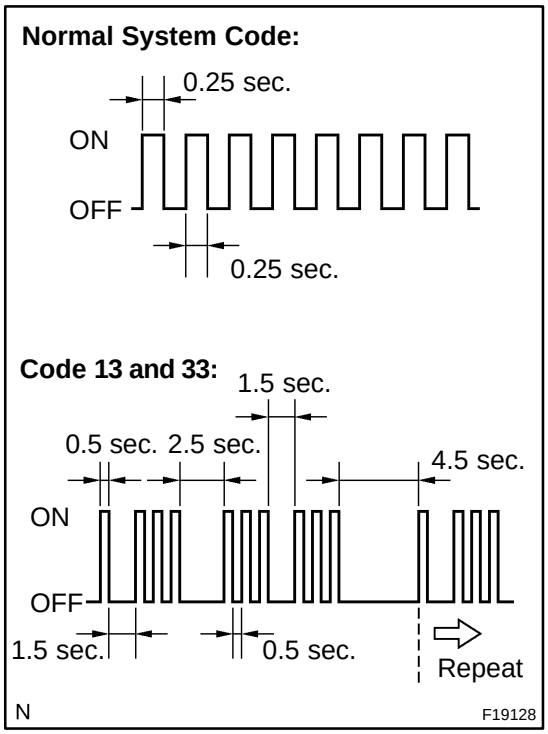
▶ If 2 or more malfunctions are indicated at the same time, the lowest numbered DTC is displayed first.

(4) Refer to the Diagnostic Trouble Code Chart (see page DI–825) for DTC information.

(5) After completing the check, turn the ignition switch off and remove the SST from DLC3.

SST 09843–18040





2. DTC CHECK (USING HAND–HELD TESTER)

(a) Check DTCs.

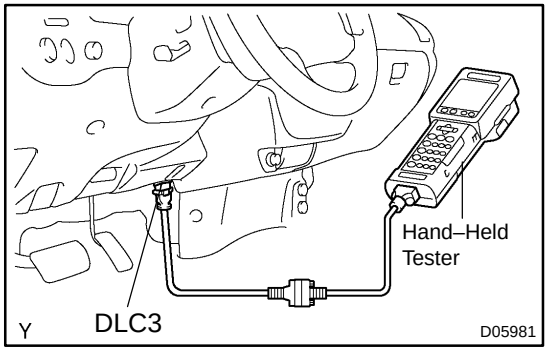
(1) Connect the hand–held tester to the DLC3.

(2) Turn the ignition switch to the ON position.

(3) Read the DTCs following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator's manual for further details.



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3. DTC CLEAR

HINT:

After repairing the malfunctions, clear the DTCs.

(a) Connect the hand–held tester to DLC3.

(b) Turn the ignition switch to the ON position.

(c) Erase the DTCs following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator's manual for further details.

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DIDK5–01

DATA LIST / ACTIVE TEST

1. DATA LIST

(a) Connect the hand–held tester to DLC3.

(b) Turn the ignition switch to the ON position.

(c) Following the display on the hand–held tester, read the ”DATA LIST”.

Item	Measurement item/ Range (Display)	Normal Condition	Diagnostic Note
MODE STATUS	Tire pressure warning system mode/NORMAL or REG 2nd or REG M or TEST	NORMAL: Normal mode TEST: Test mode	–
MAIN TIRE	Number of main tire ID to be registered/0 or 1 or 2 or 3 or 4 or 5	0 to 5 should be displayed	–
2ND TIRE	Number of 2ND tire ID to be registered/0 to 1 or 2 or 3 or 4 or 5	0 to 5 should be displayed	–
SELECT SW	Select switch/Main, 2nd	Main	–
INITIAL SW	Initialization switch/ON, OFF	ON: Switch on OFF: Switch off	–
VEHICLE SPEED	Vehicle speed reading/ min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	Speed indicated on the combination meter
REGIT ID1 CODE	Registered ID1 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID1 is displayed	–
REGIT ID2 CODE	Registered ID2 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID2 is displayed	–
REGIT ID3 CODE	Registered ID3 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID3 is displayed	–
REGIT ID4 CODE	Registered ID4 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID4 is displayed	–
REGIT ID5 CODE	Registered ID5 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID5 is displayed	–
TRANS STATUS	ID code transmission status/ FINISH or NOW	FINISH or NOW	–
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–
TIREPRESS5	ID5 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–

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Item	Measurement item/ Range (Display)	Normal Condition	Diagnostic Note
TIRE TEMP1	ID1 temperature in tire/ min.: –40°C (–40°F), max.: 215°C (419°F)	Actual tire temperature	–
TIRE TEMP2	ID2 temperature in tire/ min.: –40°C (–40°F), max.: 215°C (419°F)	Actual tire temperature	–
TIRE TEMP3	ID3 temperature in tire/ min.: –40°C (–40°F), max.: 215°C (419°F)	Actual tire temperature	–
TIRE TEMP4	ID4 temperature in tire/ min.: –40°C (–40°F), max.: 215°C (419°F)	Actual tire temperature	–
TIRE TEMP5	ID5 temperature in tire/ min.: –40°C (–40°F), max.: 215°C (419°F)	Actual tire temperature	–
BATT VOLT1	ID1 battery voltage/ OVER or LESS	OVER	–
BATT VOLT2	ID2 battery voltage/ OVER or LESS	OVER	–
BATT VOLT3	ID3 battery voltage/ OVER or LESS	OVER	–
BATT VOLT4	ID4 battery voltage/ OVER or LESS	OVER	–
BATT VOLT5	ID5 battery voltage/ OVER or LESS	OVER	–
SELECT SW INFO	Select switch setting information/ WITH or WITHOUT	WITH or WITHOUT	–
INITIAL SW INFO	Initialization switch setting information/WITH or WITHOUT	WITH or WITHOUT	–
INIT THRESHOLD1	ID1 initial threshold of low–pressure/ min.: 0 kpa (0 kgf·cm, 0 psi), max.: 637.5 kpa (6.48 kgf·cm, 92.2 psi)	Tire pressure after initialization	–
INIT THRESHOLD2	ID2 initial threshold of low–pressure/ min.: 0 kpa (0 kgf·cm, 0 psi), max.: 637.5 kpa (6.48 kgf·cm, 92.2 psi)	Tire pressure after initialization	–
INIT THRESHOLD3	ID3 initial threshold of low–pressure/ min.: 0 kpa (0 kgf·cm, 0 psi), max.: 637.5 kpa (6.48 kgf·cm, 92.2 psi)	Tire pressure after initialization	–
INIT THRESHOLD4	ID4 initial threshold of low–pressure/ min.: 0 kpa (0 kgf·cm, 0 psi), max.: 637.5 kpa (6.48 kgf·cm, 92.2 psi)	Tire pressure after initialization	–

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INIT THRESHOLD5	ID5 initial threshold of low–pressure/ min.: 0 kpa (0 kgf·cm, 0 psi), max.: 637.5 kpa (6.48 kgf·cm, 92.2 psi)	Tire pressure after initialization	–
# CODES	Number of DTC recorded/ min.: 0, max.: 255	Min.: 0, Max.: –	–

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DIDK6–01

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- If no abnormality is found when the parts are inspected, inspect the tire pressure monitor ECU.
- If a malfunction code is displayed during the DTC check, inspect the circuit listed for that code. For details of each code, refer to the ”See page” under respective ”DTC No.” in the DTC chart.

DTC chart of Tire Pressure Warning:

DTC No. (See Page)	Detection Item	Trouble Area
C2111/11 (DI–827)	Transmitter ID1 operation stop	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU
C2112/12 (DI–827)	Transmitter ID2 operation stop	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU
C2113/13 (DI–827)	Transmitter ID3 operation stop	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU
C2114/14 (DI–827)	Transmitter ID4 operation stop	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU
C2115/15 (DI–827)	Transmitter ID5 operation stop	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU
C2121/21 (DI–834)	Transmitter ID1 not received	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU ▶Wire harness
C2122/22 (DI–834)	Transmitter ID2 not received	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU ▶Wire harness
C2123/23 (DI–834)	Transmitter ID3 not received	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU ▶Wire harness
C2124/24 (DI–834)	Transmitter ID4 not received	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU ▶Wire harness
C2125/25 (DI–834)	Transmitter ID5 not received	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU ▶Wire harness
C2141/41 (DI–842)	Transmitter ID1 error	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2142/42 (DI–842)	Transmitter ID2 error	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2143/43 (DI–842)	Transmitter ID3 error	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2144/44 (DI–842)	Transmitter ID4 error	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2145/45 (DI–842)	Transmitter ID5 error	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy

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C2165/65 (DI–847)	Abnormal temperature inside ID1 tire	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2166/66 (DI–847)	Abnormal temperature inside ID2 tire	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2167/67 (DI–847)	Abnormal temperature inside ID3 tire	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2168/68 (DI–847)	Abnormal temperature inside ID4 tire	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2169/69 (DI–847)	Abnormal temperature inside ID5 tire	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy
C2171/71 (DI–852)	Transmitter ID not registered	Tire pressure monitor ECU
C2176/76 (DI–854)	Receiver error	▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU ▶Wire harness
C2177/77 (DI–860)	Initialization incomplete	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy ▶Wire harness
C2191/91 (DI–870)	Vehicle speed signal error	▶Vehicle speed sensor ▶Tire pressure monitor ECU ▶Combination meter ▶Wire harness

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DIDK7–01

CIRCUIT INSPECTION

DTC	C2111/11	Transmitter ID1 Operation Stop

DTC	C2112/12	Transmitter ID2 Operation Stop

DTC	C2113/13	Transmitter ID3 Operation Stop

DTC	C2114/14	Transmitter ID4 Operation Stop

DTC	C2115/15	Transmitter ID5 Operation Stop

CIRCUIT DESCRIPTION

The tire pressure monitor valve sub–assy stops transmitting signals when receiving specific signals. The ECU stores the DTCs when the tire pressure monitor valve sub–assy receives the signals, for some reason, and stops transmitting signals. As this is not a system malfunction, the DTCs are erased when signal transmission is resumed.

HINT:

The electric wave is stopped at assembly plant, because the strength of the electric wave emitting from the tire pressure sensing transmitter does not comply with the Japan Wireless Telegraphy Act.

DTC No.	DTC Detecting Condition	Trouble Area
C2111/11 C2112/12 C2113/13 C2114/14 C2115/15	When any signal similar to the stop signal is received for some reason, these DTCs will be output.	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU

HINT:

It is necessary to perform the procedure to identify the tire pressure monitor valve sub–assy that is malfunctioning because it cannot be identified by the output DTC.

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INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

HINT:

Set the tire pressure to the specified value.

1	**Forcibly transmit transmitter ID of all wheels.**

PREPARATION:

Remove the valve cores of the all wheels to rapidly reduce the pressure of all tires to 120 kPa (1.2 kgf/cm^2, 17 psi respectively).

HINT:

The transmitter ID can be transmitted forcibly by rapidly reducing tire air pressure.

NEXT

2	**Check DTC (See page DI–820).**

CHECK:

Check for a DTC.

OK:

DTC is not output.

OK → **Set tire pressure to normal value (Transmitter stop condition is completely reset).**

NG

3	**Set tire pressure to normal value.**

PREPARATION:

Set the tire pressure back to the specified normal value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

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4	**Forcibly transmit transmitter ID.**

PREPARATION:

(a) Forcibly transmit the transmitter ID by performing the following:
  (1) Set the tire pressure to the specified value.
  (2) Rotate the tire 90 to 270 degrees.
  (3) Rapidly reduce the pressure of all tires to 120 kPa (1.2 kgf/cm^2, 17 psi respectively).
  (4) Perform the steps mentioned above to all tires including the spare tire.

NEXT

5	**Check DTC (See page DI–820).**

CHECK:

Check for a DTC.

OK:

DTC is not output.

HINT:

A system error is probable if NG. If any DTC other than C2111/21, C2112/22, C2113/23, C2114/24 and C2115/25, is output, perform troubleshooting according to that DTC.

OK → **Set tire pressure to normal value (Transmitter stop condition is completely reset).**

NG

6	**Check DTC (See page DI–820).**

CHECK:

Check if DTCs C2111/21, C2112/22, C2113/23, C2114/24 and C2115/25 are all output.

No → **Go to step 12.**

Yes

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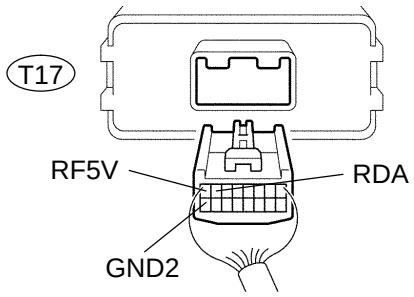
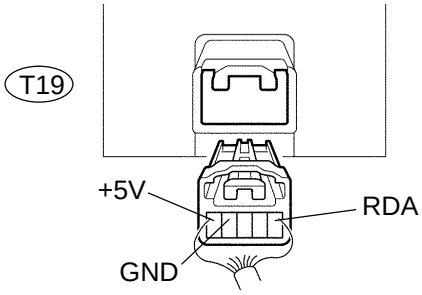
7	Check harness and connector (Tire pressure monitor receiver assy – Tire pressure monitor ECU).

Tire Pressure Monitor ECU:



Tire Pressure Monitor Receiver Assy:



PREPARATION:

Disconnect the tire pressure monitor receiver assy T19 connector and tire pressure monitor ECU T17 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

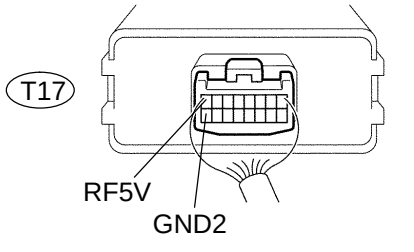
T17–7 (RDA) – T19–1 (RDA)	Below 1 Ω
T17–8 (RF5V) – T19–5 (+5V)	Below 1 Ω
T17–16 (GND2) – T19–4 (GND)	Below 1 Ω
T17–7 (RDA) – Body ground	10 kΩ or higher
T17–8 (RF5V) – Body ground	10 kΩ or higher
T17–16 (GND2) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

8	Inspect tire pressure monitor ECU.

Tire Pressure Monitor ECU:



PREPARATION:

(a) Connect the tire pressure monitor ECU T17 connector.

(b) Turn the ignition switch to the ON position.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
T17–8 (RF5V) – T17–16 (GND2)	Ignition Switch ON	4.5 to 5.5 V

NG → **Check power source circuit (See page DI–878).**

OK

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9	**Replace tire pressure monitor receiver assy (See page SA–13).**

NEXT

10	**Check DTC (See page DI–820).**

PREPARATION:
Clear the DTCs.
CHECK:
Check for a DTC.
OK:
DTC is not output.

OK → **End**

NG

11	**Replace tire pressure monitor ECU and check DTC**

PREPARATION:
(a) Replace the tire pressure monitor ECU (see page SA–20).
(b) Clear the DTCs.
CHECK:
Check for a DTC.
OK:
DTC is not output.

NG → **Replace tire pressure monitor valve sub–assy (See page SA–16).**

OK

End

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12	**Set tire pressure to normal value.**

PREPARATION:

Set the tire pressure of all wheels to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

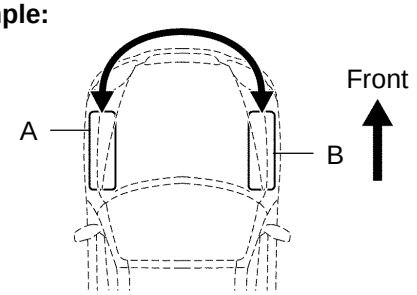
NEXT

13	**Identify transmitter corresponding to DTC (See page DI–881).**

NEXT

14	**Interchange tires.**

Example:



PREPARATION:

Interchange tire ”A” with a defective tire pressure monitor valve sub–assy with tire ”B” with a normal one.

HINT:

If tire ”A” (left front) is identified in step 13.

NEXT

15	**Set tire pressure to normal value.**

PREPARATION:

Set the tire pressure of all wheels to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

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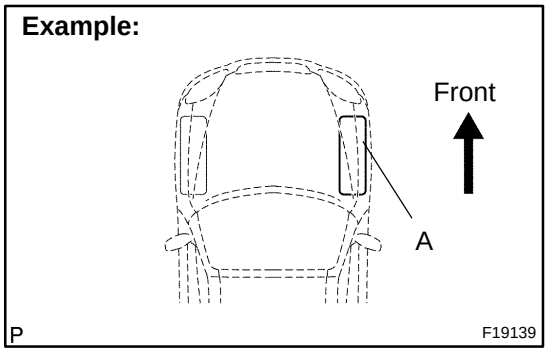
16	Forcibly transmit transmitter ID.

Example:



PREPARATION:

Remove the valve core of tire ”A”, rapidly reduce the tire pressure and forcibly transmit the transmitter ID of the tire pressure monitor valve sub–assy.

NEXT

17	Check DTC again (See page DI–820).

CHECK:

Check for a DTC.

OK:

DTC is not output.

HINT:

- If a DTC is output, replace the identified tire pressure monitor valve sub–assy.
- Before installing a new tire pressure monitor valve sub–assy, read and write down its transmitter ID.
- Register the transmitter ID after replacement and then set the tire pressure to the specified value (see page DI–805).

NG → **Replace tire pressure monitor valve sub–assy (See page SA–16).**

OK

Replace tire pressure monitor receiver assy (See page SA–13).

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DIDK8–01

DTC	C2121/21	Transmitter ID1 Not Received
DTC	C2122/22	Transmitter ID2 Not Received
DTC	C2123/23	Transmitter ID3 Not Received
DTC	C2124/24	Transmitter ID4 Not Received
DTC	C2125/25	Transmitter ID5 Not Received
DTC	C2181/81	Transmitter ID1 Not Received (Test Diagnosis)
DTC	C2182/82	Transmitter ID2 Not Received (Test Diagnosis)
DTC	C2183/83	Transmitter ID3 Not Received (Test Diagnosis)
DTC	C2184/84	Transmitter ID4 Not Received (Test Diagnosis)
DTC	C2185/85	Transmitter ID5 Not Received (Test Diagnosis)

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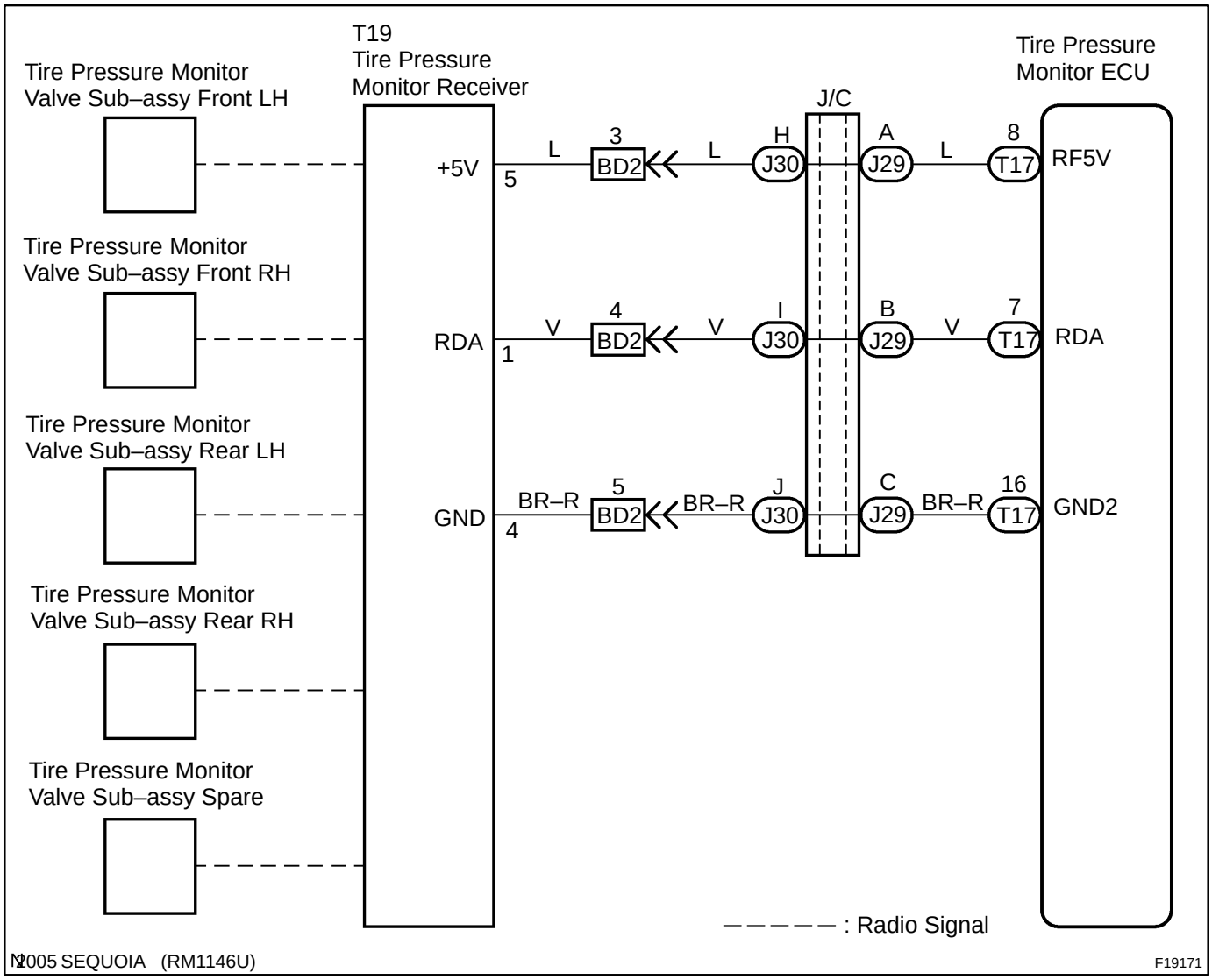
CIRCUIT DESCRIPTION

The tire pressure monitor valve sub–assy constantly sends radio waves to the tire pressure monitor receiver assy. If the battery for the tire pressure monitor valve sub–assy is depleted, or if the tire pressure monitor receiver assy is defective or comes off, the DTC will be output. DTCs C2121/21 to C2125/25 can only be deleted by the tester. DTCs C2181/81 to C2185/85 can be deleted when the transmitter sends a force transmission signal or the test mode ends. DTCs C2181/81 to C2185/85 are output only in the test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C2121/21 C2122/22 C2123/23 C2124/24 C2125/25	A DTC is detected when the ECU receives no signals for 51 minutes or more, the vehicle speed is 5 mph (8 km/h) or higher, and the ECU receives no signals for 12 minutes or more.	▶Tire pressure monitor receiver assy ▶Each tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Wire harness
C2181/81 C2182/82 C2183/83 C2184/84 C2185/85	Malfunction in the transmitting/receiving circuit	▶Tire pressure monitor receiver assy ▶Each tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Wire harness

HINT:
It is necessary to perform the procedure to identify the tire pressure monitor valve sub–assy that is malfunctioning because it cannot be identified by the output DTC.

WIRING DIAGRAM



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INSPECTION PROCEDURE

NOTICE:
It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).
HINT:
Set the tire pressure to the specified value.

1	**Check tire pressure warning lamp.**

PREPARATION:
Turn the ignition switch to the ON position.
CHECK:
Check the tire pressure warning lamp.
RESULT:

Does not blink	A
Comes on and goes off repeatedly at 0.5 second intervals	B

B → **Go to step 4.**

A

2	**Clear DTC (See page DI–820).**

NEXT

3	**Check DTC (See page DI–820).**

CHECK:
Check for a DTC.
OK:
DTC is not output.

NG → **Go to step 4.**

OK

Check problem symptoms table (See page DI–814).

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4	**Check DTC (See page DI–820).**

CHECK:

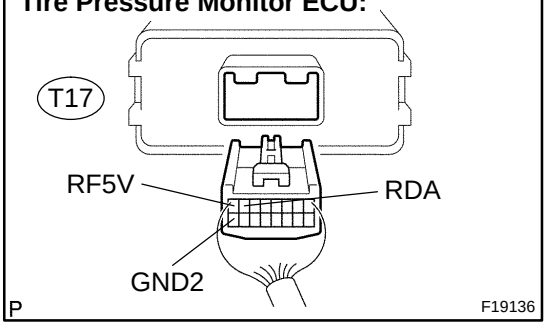
Check if DTCs C2121/21, C2122/22, C2123/23, C2124/24 and C2125/25 are all output.

No → **Go to step 10.**

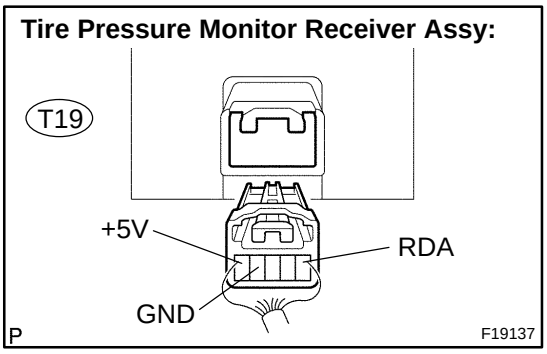
Yes

5	**Check harness and connector (Tire pressure monitor receiver assy – Tire pressure monitor ECU).**

Tire Pressure Monitor ECU:



Tire Pressure Monitor Receiver Assy:



PREPARATION:

Disconnect the tire pressure monitor receiver assy T19 connector and tire pressure monitor ECU T17 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
T17–7 (RDA) – T19–1 (RDA)	Below 1 Ω
T17–8 (RF5V) – T19–5 (+5V)	Below 1 Ω
T17–16 (GND2) – T19–4 (GND)	Below 1 Ω
T17–7 (RDA) – Body ground	10 kΩ or higher
T17–8 (RF5V) – Body ground	10 kΩ or higher
T17–16 (GND2) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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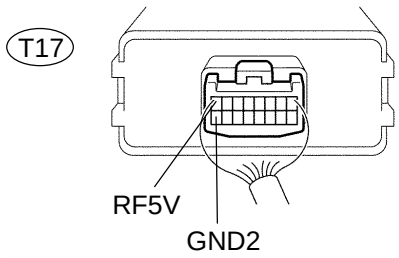
6	**Inspect tire pressure monitor ECU.**

Tire Pressure Monitor ECU:



PREPARATION:

(a) Connect the tire pressure monitor ECU T17 connector.

(b) Turn the ignition switch to the ON position.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
T17–8 (RF5V) – T17–16 (GND2)	Ignition Switch ON	4.5 to 5.5 V

NG → **Check power source circuit (See page DI–878).**

OK →

7	**Replace tire pressure monitor receiver assy (See page SA–13).**

HINT:

Perform the inspection using parts from a normal vehicle when possible.

NEXT →

8	**Check DTC (See page DI–820).**

PREPARATION:

Clear the DTCs.

CHECK:

Check for a DTC.

OK:

DTC is not output.

OK → **End**

NG →

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9	**Replace tire pressure monitor ECU and check DTC.**

PREPARATION:

(a) Replace the tire pressure monitor ECU (see page SA–20).

(b) Clear the DTCs.

CHECK:

Check for a DTC.

OK:

DTC is not output.

NG → **Replace tire pressure monitor valve sub–assy (See page SA–16).**

OK

End

10	**Set tire pressure to normal value.**

PREPARATION:

Set the tire pressure of all wheels to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

11	**Identify transmitter corresponding to DTC (See page DI–881).**

NEXT

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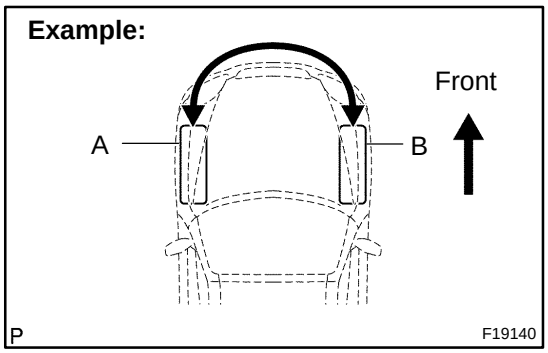
12	Interchange tires.



PREPARATION:
Interchange tire ”A” with a defective tire pressure monitor valve sub–assy with tire ”B” with a normal one.
HINT:
If tire ”A” (left front) is identified in step 11.

NEXT

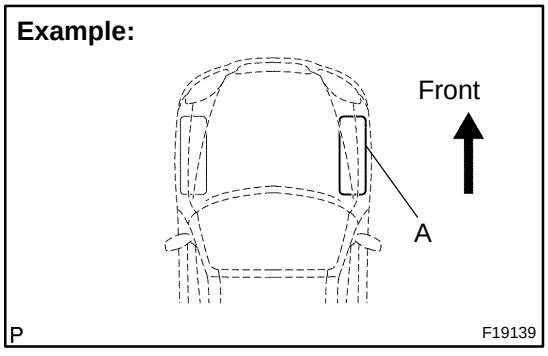
13	Set tire pressure to normal value.

PREPARATION:
Set the tire pressure of all wheels to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

14	Forcibly transmit transmitter ID.



PREPARATION:
Remove the valve core of tire ”A”, rapidly reduce the tire pressure and forcibly transmit the transmitter ID of the tire pressure monitor valve sub–assy.

NEXT

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15	**Check DTC again (See page DI–820).**

CHECK:

Check for a DTC.

OK:

DTC is not output.

HINT:

- If a DTC is output, replace the identified tire pressure monitor valve sub–assy.
- Before installing a new tire pressure monitor valve sub–assy, read and write down its transmitter ID.
- Register the transmitter ID after replacement and then set the tire pressure to the specified value (see page DI–805).

NG → **Replace tire pressure monitor valve sub–assy (See page SA–16).**

OK →

Replace tire pressure monitor receiver assy (See page SA–13).

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DIDK9–01

DTC	C2141/41	Transmitter ID1 Error

DTC	C2142/42	Transmitter ID2 Error

DTC	C2143/43	Transmitter ID3 Error

DTC	C2144/44	Transmitter ID4 Error

DTC	C2145/45	Transmitter ID5 Error

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C2141/41 C2142/42 C2143/43 C2144/44 C2145/45	If an ”ERROR” signal is received 3 times consecutively, the tire pressure monitor valve sub–assy will be judged as defective and these DTCs will be output. This will happen under the situations where the inflation pressure is out of the specified range 0 to 637.5 kPa (0 to 6.48 kgf/cm^2, 0 psi to 92.2 psi), the temperature inside the tire is out of the specified range –40 to 215°C (–40 to 419°F), or an error occurs in the tire pressure monitor valve sub–assy, etc.	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy

HINT:

It is necessary to perform the procedure to identify the tire pressure monitor valve sub–assy that is malfunctioning because it cannot be identified by the output DTC.

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INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

HINT:

Set the tire pressure to the specified value.

1	**Check tire pressure warning lamp.**

PREPARATION:

Turn the ignition switch to the ON position.

CHECK:

Check the tire pressure warning lamp.

RESULT:

Does not blink	A
Comes on and goes off repeatedly at 0.5 second intervals	B

B → **Go to step 5.**

A

2	**Identify transmitter corresponding to DTC (See page DI–881).**

NEXT

3	**Clear DTC (See page DI–820).**

NEXT

Dardoor.com

4	**Check DTC (See page DI–820).**

CHECK:
Check for a DTC.
OK:
DTC is not output.
HINT:
- If the result is OK, replace the tire pressure monitor valve sub–assy specified in STEP 2.
- Before installing a new tire pressure monitor valve sub–assy, read and write down its transmitter ID.
- Register the transmitter ID after replacement and then set the tire pressure to the specified value (see page DI–805).

NG → **Go to step 9.**

OK

Replace tire pressure monitor valve sub–assy (See page SA–16).

HINT:
Replace the identified tire pressure monitor valve sub–assy.

5	**Identify transmitter corresponding to recorded DTC (See page DI–881).**

NEXT

6	**Replace tire pressure monitor valve sub–assy (See page SA–16).**

PREPARATION:
Replace the identified tire pressure monitor valve sub–assy with a new one.
HINT:
Before installing a new tire pressure monitor valve sub–assy, read and write down its transmitter ID.

NEXT

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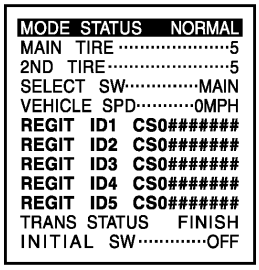
7	**Registration of transmitter ID (See page DI–805).**

DATA LIST:



N F19326

PREPARATION:

(a) Confirm the transmitter ID on the DATA LIST.
(b) Register the transmitter ID for all wheels.
(c) Set the tire pressure to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

8	**Check DTC (See page DI–820).**

CHECK:
Check for a DTC.
OK:
DTC is not output.

NG → **Go to step 9.**

OK

End

9	**Replace tire pressure monitor receiver assy (See page SA–13).**

HINT:
Perform the inspection using parts from a normal vehicle when possible.

NEXT

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10	**Check DTC (See page DI–820).**

PREPARATION:
Check for a DTC.
OK:
DTC is not output.

NG → **Replace tire pressure monitor ECU (See page SA–20).**

OK

End

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DIDKA–01

DTC	C2165/65	Abnormal Temperature Inside ID1 Tire

DTC	C2166/66	Abnormal Temperature Inside ID2 Tire

DTC	C2167/67	Abnormal Temperature Inside ID3 Tire

DTC	C2168/68	Abnormal Temperature Inside ID4 Tire

DTC	C2169/69	Abnormal Temperature Inside ID5 Tire

CIRCUIT DESCRIPTION

The tire pressure monitor valve sub–assy measures tire internal temperature as well as tire pressure, and transmits the information to the tire pressure monitor receiver along with the transmitter ID. If the measured temperature is out of the specified range, the tire pressure monitor ECU recognizes it as a malfunction, outputs DTCs, and blinks the tire pressure warning lamp.

DTC No.	DTC Detecting Condition	Trouble Area
C2165/65 C2166/66 C2167/67 C2168/68 C2169/69	Temperature inside the tire exceeds 119°C (246.2°F) more than once.	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy

HINT:

It is necessary to perform the procedure to identify the tire pressure monitor valve sub–assy that is malfunctioning because it cannot be identified by the output DTC.

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INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

HINT:

Set the tire pressure to the specified value.

1	**Check tire pressure warning lamp.**

PREPARATION:

Turn the ignition switch to the ON position.

CHECK:

Check the tire pressure warning lamp.

RESULT:

Does not blink	A
Comes on and goes off repeatedly at 0.5 second intervals	B

B → **Go to step 6.**

A

2	**Identify transmitter corresponding to DTC (See page DI–881).**

NEXT

3	**Adjust tire pressure to the specified value.**

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

4	**Clear DTC (See page DI–820).**

NEXT

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5	**Check DTC (See page DI–820).**

CHECK:

Check for a DTC.

OK:

DTC is not output.

HINT:

- If the result is OK, replace the tire pressure monitor valve sub–assy specified in STEP 2.
- Register the transmitter ID after replacement and then set the tire pressure to the specified value.

NG → **Go to step 11.**

OK

Replace tire pressure monitor valve sub–assy (See page SA–13).

6	**Identify transmitter corresponding to DTC (See page DI–881).**

NEXT

7	**Adjust tire pressure to the specified value.**

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

8	**Replace tire pressure monitor valve sub–assy (See page SA–16).**

PREPARATION:

Replace the identified tire pressure monitor valve sub–assy with a new one.

HINT:

Before installing a new tire pressure monitor valve sub–assy onto the wheel, read and write down its transmitter ID.

NEXT

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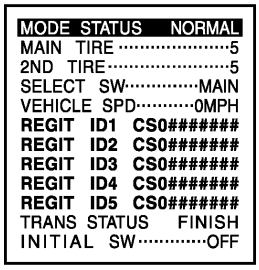
9	**Registration of transmitter ID (See page DI–805).**

DATA LIST:



N F19326

PREPARATION:

(a) Confirm the transmitter ID on the DATA LIST.
(b) Register the transmitter ID for all wheels.
(c) Set the tire pressure to the specified value.

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

10	**Check DTC (See page DI–820).**

CHECK:
Check for a DTC.
OK:
DTC is not output.

NG → **Go to step 11.**

OK

End

11	**Replace tire pressure monitor receiver assy (See page SA–13).**

HINT:
Perform the inspection using parts from a normal vehicle when possible.

NEXT

Dardoor.com

12	**Check DTC (See page DI–820).**

CHECK:

Check for a DTC.

OK:

DTC is not output.

NG → **Replace tire pressure monitor ECU (See page SA–20).**

OK

End

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DIDKB–01

DTC	C2171/71	Transmitter ID Not Registered

CIRCUIT DESCRIPTION

This DTC is output when an transmitter ID cannot be registered.

DTC No.	DTC Detecting Condition	Trouble Area
C2171/71	Transmitter ID code is not registered. (When an ID code is unregistered for 51 minutes or more.)	▶Tire pressure monitor ECU

INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

HINT:

Set the tire pressure to the specified value.

1	**Check tire pressure warning lamp.**

PREPARATION:

Turn the ignition switch to the ON position.

CHECK:

Check the tire pressure warning lamp.

RESULT:

Does not blink	A
Comes on and goes off repeatedly at 0.5 second intervals	B

B → **Registration of transmitter ID (See page DI–805).**

A

2	**Clear DTC (See page DI–820).**

NEXT

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3	**Check DTC (See page DI–820).**

CHECK:
Check for a DTC.
OK:
DTC C2171/71 is not output.

NG → **Replace tire pressure monitor ECU (See page SA–20).**

OK

4	**Confirm that ID registration is complete.**

PREPARATION:
Perform the ”CONFIRMATION OF TRANSMITTER ID REGISTRATION” procedure.
(Refer to step 4 of REGISTRATION on page DI–805).
CHECK:
Confirm that the transmitter ID is registered.

NEXT

End

Dardoor.com

DIDKC–01

DTC	C2176/76	Receiver error

CIRCUIT DESCRIPTION

This DTC is output when signals from the tire pressure monitor receiver stop.

DTC No.	DTC Detecting Condition	Trouble Area
C2176/76	DTC is stored when either of the following is detected: ▶Malfunction in tire pressure monitor ECU internal circuit. ▶Terminal RF5V is shorted to ground.	▶Tire pressure monitor receiver assy ▶Tire pressure monitor ECU ▶Wire harness

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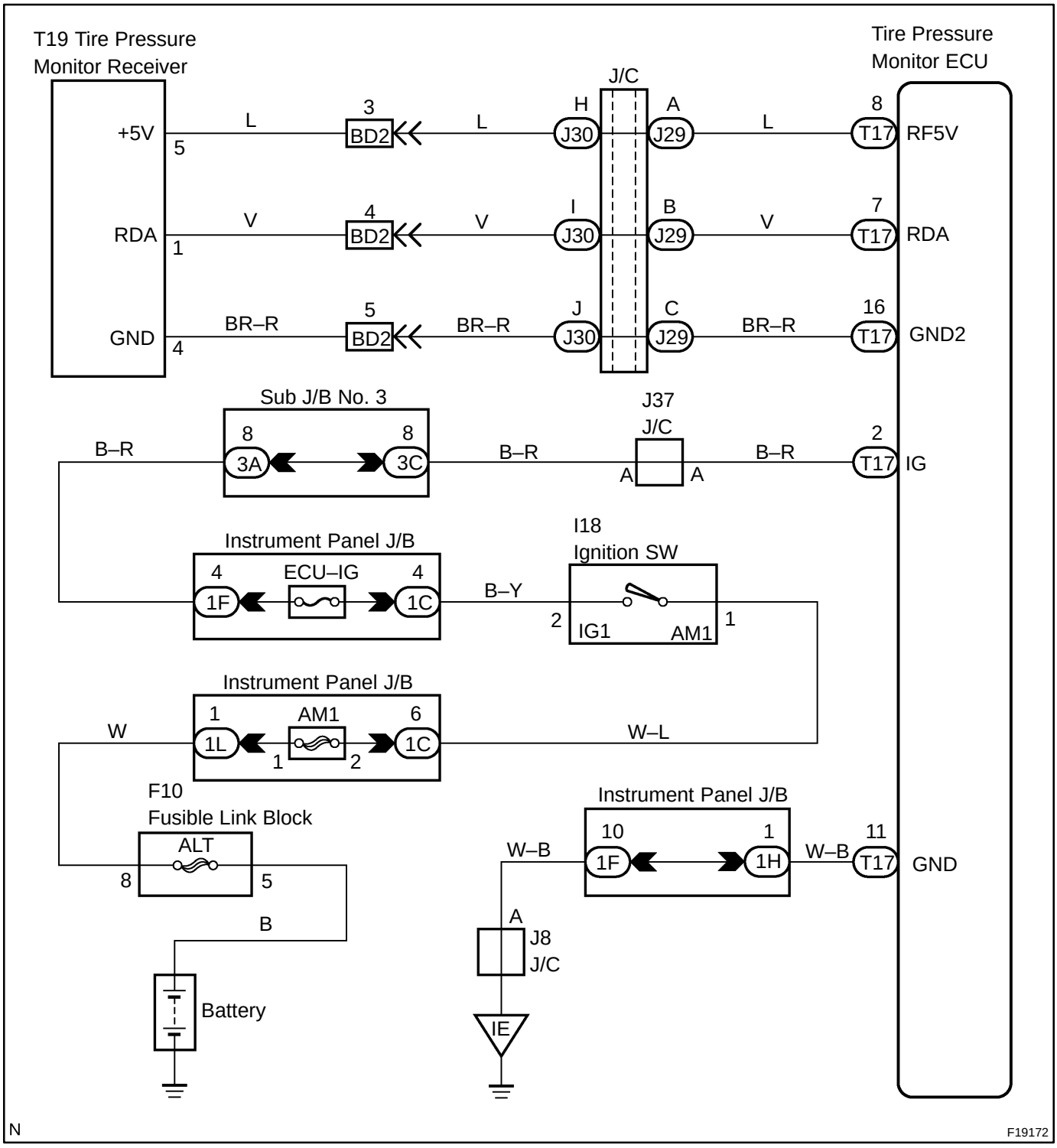
WIRING DIAGRAM



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INSPECTION PROCEDURE

NOTICE:

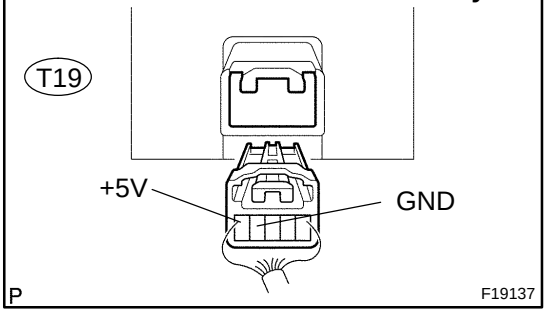
It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

HINT:

Set the tire pressure to the specified value.

1	**Inspect tire pressure monitor receiver assy.**

Tire Pressure Monitor Receiver Assy:



PREPARATION:

(a) Disconnect the tire pressure monitor receiver assy T19 connector.

(b) Turn the ignition switch to the ON position.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
T19–4 (GND) – T19–5 (+5V)	Ignition Switch ON	4.5 to 5.5 V

NG	**Go to step 3.**

OK

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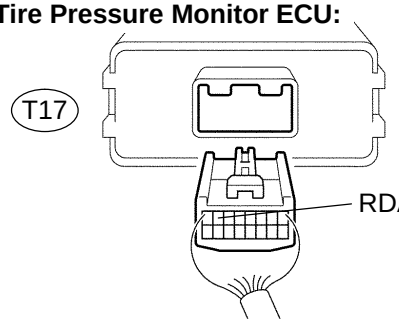
2	Check harness and connector (Tire pressure monitor receiver assy – Tire pressure monitor ECU).

Tire Pressure Monitor ECU:



PREPARATION:

Disconnect the tire pressure monitor receiver assy T19 connector and tire pressure monitor ECU T17 connector.

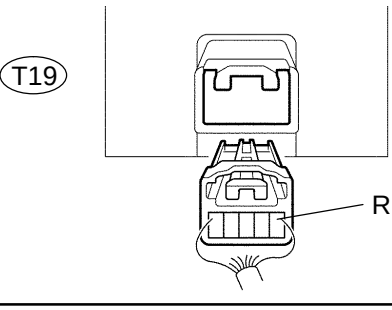
CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
T17–7 (RDA) – T19–1 (RDA)	Below 1 Ω

Tire Pressure Monitor Receiver Assy:



OK	Go to step 5.

NG

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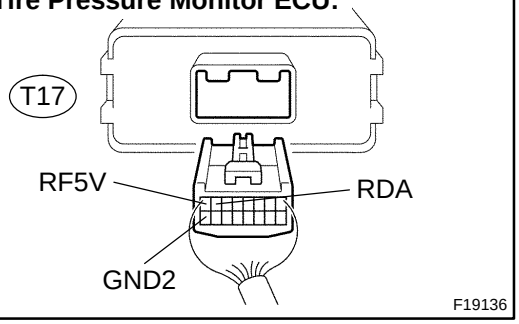
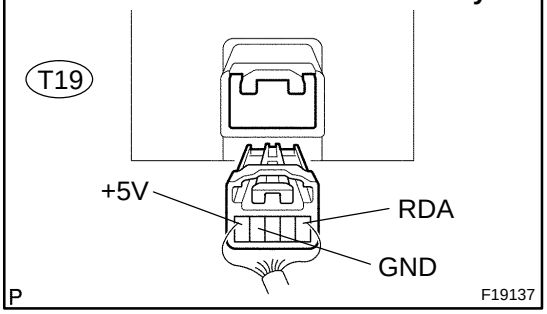
3	**Check harness and connector (Tire pressure monitor receiver assy – Tire pressure monitor ECU).**

Tire Pressure Monitor ECU:



Tire Pressure Monitor Receiver Assy:



PREPARATION:

Disconnect the tire pressure monitor receiver assy T19 connector and tire pressure monitor ECU T17 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
T17–7 (RDA) – T19–1 (RDA)	Below 1 Ω
T17–8 (RF5V) – T19–5 (+5V)	Below 1 Ω
T17–16 (GND2) – T19–4 (GND)	Below 1 Ω
T17–7 (RDA) – Body ground	10 kΩ or higher
T17–8 (RF5V) – Body ground	10 kΩ or higher
T17–16 (GND2) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

4	**Check power source circuit (See page DI–878).**

NG → **Repair or replace power source circuit.**

OK

5	**Replace tire pressure monitor receiver assy (See page SA–13).**

HINT:

Perform the inspection using parts from a normal vehicle when possible.

NEXT

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6	**Check DTC (See page DI–820).**

CHECK:

(a) Check for a DTC.

OK:

DTC is not output.

HINT:

- ▶ It is necessary to register an ID when replacing the tire pressure monitor ECU.
- ▶ Read ID on the DATA LIST before removing the tire pressure monitor ECU. Register the ID to the new tire pressure monitor ECU (see page DI–805).

NG → **Replace tire pressure monitor ECU (See page SA–20).**

OK →

End

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DIDKD–01

DTC	C2177/77	Initialization Incomplete

CIRCUIT DESCRIPTION

Initialization is necessary after replacing either ECU, tires with different tire pressure or tire pressure monitor valve sub–assy, after rotating the tires, or when a new vehicle is delivered.

DTC No.	DTC Detection Condition	Trouble Area
C2177/77	Initialization is not complete after vehicle speed of 5mph (8km/h) or more continues for 20 minutes or more (total).	▶Tire pressure monitor valve sub–assy ▶Tire pressure monitor ECU ▶Tire pressure monitor receiver assy ▶Wire harness

INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

HINT:

Set the tire pressure to the specified value.

1	Check tire pressure warning lamp.

PREPARATION:

Turn the ignition switch to the ON position.

CHECK:

Check the tire pressure warning lamp.

RESULT:

Does not blink	A
Comes on and goes off repeatedly at 0.5 second intervals	B

B → Go to step 7.

A

2	Clear DTC (See page DI–820).

NEXT

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3	**Check DTC (See page DI–820).**

CHECK:

Check for a DTC.

OK:

DTC C2177/77 is not output.

NG → **Go to step 4.**

OK

Perform initialization (See page DI–808).

4	**Check tire pressure warning lamp.**

PREPARATION:

Turn the ignition switch to the ON position.

CHECK:

Check the tire pressure warning lamp comes on for 3 seconds and goes off.

RESULT:

Does not come on	A
Comes on	B

B → **Go to step 2.**

A

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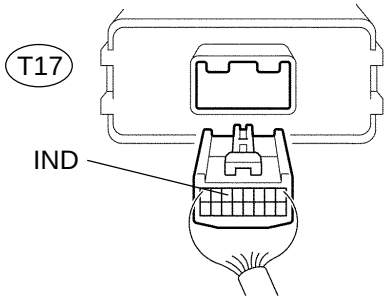
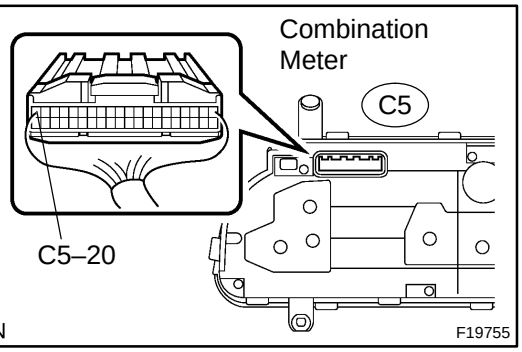
5	Check harness and connector (Tire pressure monitor ECU – Combination meter).

Tire Pressure Monitor ECU:





PREPARATION:

Disconnect the tire pressure monitor ECU T17 connector and C5 combination meter connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

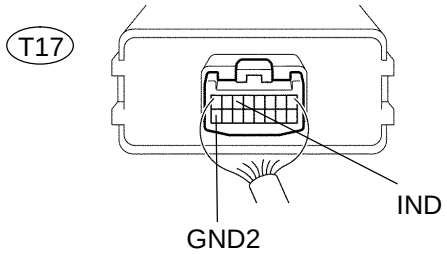
Tester Connection	Specified Condition
T17–6 (IND) – C5–20	Below 1 Ω
T17–6 (IND) – Body ground	10 kΩ or higher

NG → **Repair or replace harness and connector.**

OK

6	Inspect tire pressure monitor ECU.

Tire Pressure Monitor ECU:



PREPARATION:

Connect the tire pressure monitor ECU T17 connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
T17–6 (IND) – T17–16 (GND2)	Immediately after turning the ignition switch ON (within 3 seconds)	8 to 16V

NG → **Replace tire pressure monitor ECU (See page SA–20).**

OK

Repair or replace combination meter (See Page DI–1610).

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7	**Check tire pressure warning lamp.**

PREPARATION:

(a) Turn the ignition switch to the ON position.

(b) Enter TEST MODE (see page DI–810).

(c) Press the tire pressure warning reset switch for 1 second or more after switching to TEST MODE.

CHECK:

Does the tire pressure warning lamp come on while pressing the tire pressure warning reset switch?

RESULT:

Comes on	A
Does not come on	B

B → **Go to step 14.**

A

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8	**Check tire pressure warning lamp.**

HINT:
Check all tires, including the spare, one at a time in this order: FR, FL, RR RL, Spare.

PREPARATION:

(a) Turn the ignition switch to the ON position.
(b) Rapidly reduce the pressure of the tires to approximately 120 kPa (1.2 kgf/cm^2, 35 psi).
(c) Check that the tire pressure warning lamp comes on for 1 second while rapidly reducing the pressure or immediately after reducing the pressure.
(d) Note the check results.
(e) Set the tire pressure to the specified value.

CHECK:

Check that the tire pressure warning lamp comes on when each of the wheels is inspected.

RESULT:

Does not come on (All wheels)	A
Does not come on (Some wheels)	B
Comes on (All wheels)	C

B → **Replace tire pressure monitor receiver assy (See page SA–13).**

HINT:
Replace the tire pressure monitor valve sub–assy for which the tire pressure warning lamp did not come on during inspection.

C → **Perform initialization (See page DI–808).**

A

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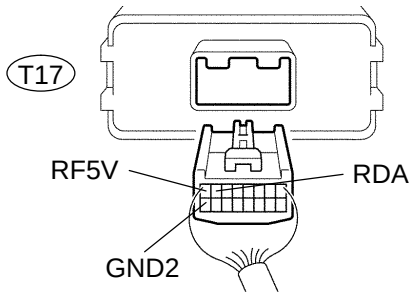
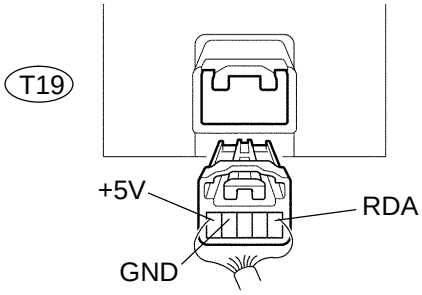
9	Check harness and connector (Tire pressure monitor receiver assy – Tire pressure monitor ECU).

Tire Pressure Monitor ECU:



Tire Pressure Monitor Receiver Assy:



PREPARATION:

Disconnect the tire pressure monitor receiver assy T19 connector and tire pressure monitor ECU T17 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

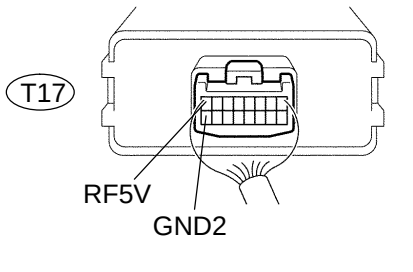
T17–7 (RDA) – T19–1 (RDA)	Below 1 Ω
T17–8 (RF5V) – T19–5 (+5V)	Below 1 Ω
T17–16 (GND2) – T19–4 (GND)	Below 1 Ω
T17–7 (RDA) – Body ground	10 kΩ or higher
T17–8 (RF5V) – Body ground	10 kΩ or higher
T17–16 (GND2) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

10	Inspect tire pressure monitor ECU.

Tire Pressure Monitor ECU:



PREPARATION:

Connect the tire pressure monitor ECU T17 connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
T17–8 (RF5V) – T17–16 (GND2)	Ignition Switch ON	4.5 to 5.5 V

NG → **Check power source circuit (See page DI–878).**

OK

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11	**Replace tire pressure monitor receiver assy (See page SA–13).**

NEXT

12	**Check DTC (See page DI–820).**

PREPARATION:
Clear the DTCs.
CHECK:
Check for a DTC.
OK:
DTC is not output.

OK → **End**

NG

13	**Replace tire pressure monitor ECU and check DTC.**

PREPARATION:
(a) Replace the tire pressure monitor ECU (see page SA–20).
(b) Clear the DTCs.
CHECK:
Check for a DTC.
OK:
DTC is not output.

NG → **Replace tire pressure monitor valve sub–assy (See page SA–16).**

OK

End

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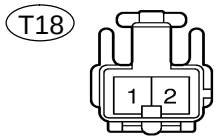
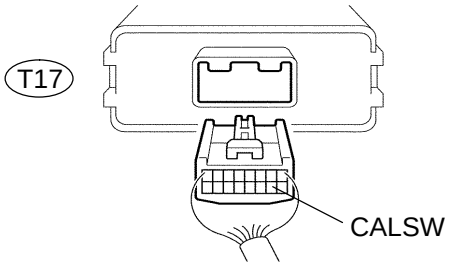
14	Check harness and connector (Tire pressure warning reset switch – Tire pressure monitor ECU).

Tire Pressure Warning Reset Switch (harness side connector)



Tire Pressure Monitor ECU:



F19884

PREPARATION:

Disconnect the tire pressure warning reset switch connector T18 and tire pressure monitor ECU connector T17.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

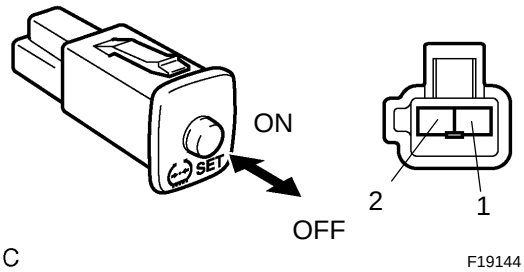
Tester Connection	Specified Condition
T17–10 (CALSW) – T18–1	Below 1 Ω
T17–10 (CALSW) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

15	Inspect tire pressure warning reset switch.

Tire Pressure Warning Reset Switch



C

F19144

PREPARATION:

Disconnect the tire pressure warning reset switch connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the tire pressure warning reset switch when the tire pressure warning switch is ON and OFF.

OK:

Switch Condition	Specified Condition
ON	Below 1 Ω
OFF	10 kΩ or higher

NG → **Replace tire pressure warning reset switch.**

OK

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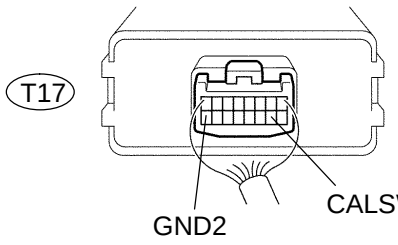
16	Inspect tire pressure monitor ECU.

Tire Pressure Monitor ECU:



PREPARATION:

Connect the tire pressure monitor ECU T17 connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
T17–10 (CALSW) – T17–16 (GND2)	IG Switch ON to OFF	8 to 16 V

NG → **Repair or replace harness or connector.**

OK

17	Check DTC (See page DI–820).

PREPARATION:

Clear the DTCs.

CHECK:

Check for a DTC.

OK:

DTC is not output.

OK → **End**

NG

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18	**Replace tire pressure monitor ECU and check DTC.**

PREPARATION:

(a) Replace the tire pressure monitor ECU (see page SA–20).

(b) Clear the DTCs.

CHECK:

Check for a DTC.

OK:

DTC is not output.

NG → **Replace tire pressure monitor valve sub–assy (See page SA–16).**

OK

End

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DIDKE–01

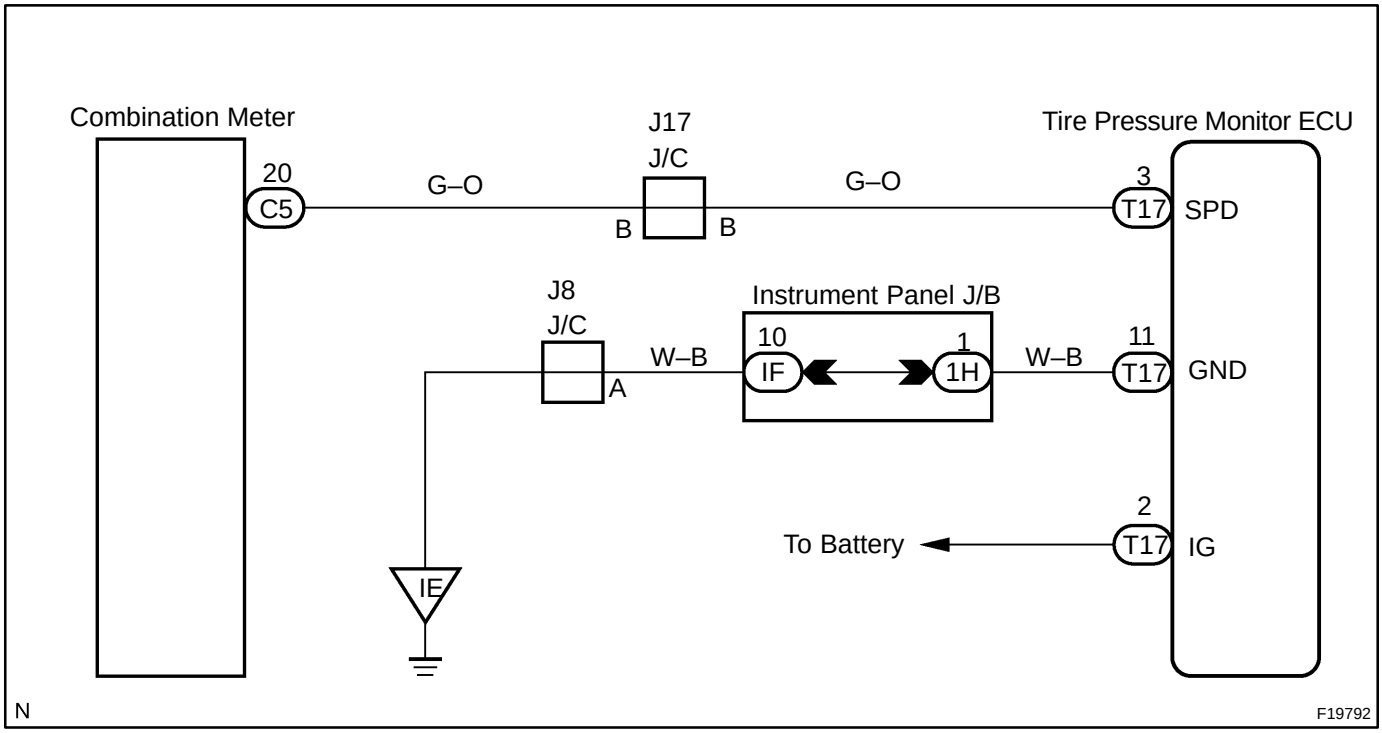
DTC	C2191/91	Vehicle Speed Signal Error

CIRCUIT DESCRIPTION

The tire pressure monitor ECU receives a speed signal from the combination meter. This DTC is stored upon entering test mode but erased when a vehicle speed signal of 12 mph (20 km/h) is detected for 3 seconds or more. The DTC is output only in test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C2191/91	Speed sensor circuit malfunction.	▶Vehicle speed sensor ▶Combination meter assy ▶Tire pressure monitor ECU ▶Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

HINT:

When not using the hand–held tester, go to step 2.

1	**Read value on hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position, and push the hand–held tester main switch ON.

(c) Select the item below in the DATA LIST, and read its value displayed on the hand–held tester.

TIRE PRESSURE:

Item	Normal Condition
VEHICLE SPEED	Actual vehicle speed

CHECK:

Check that the values indicated on the tester and the combination meter are the same.

OK:

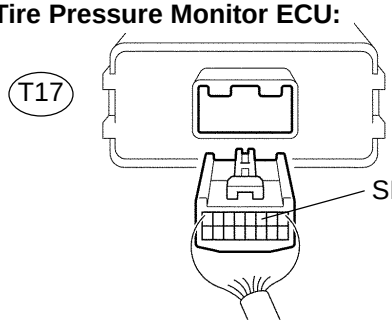
Indicates actual speed.

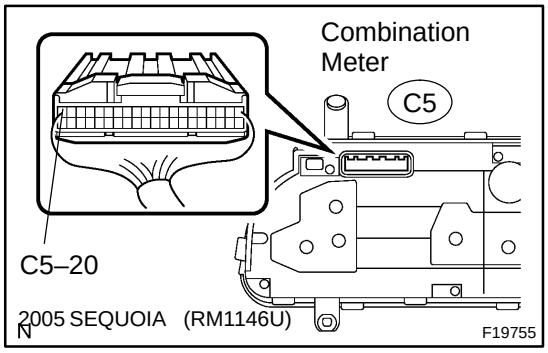
OK → **Replace tire pressure monitor ECU (See page SA–20).**

NG

2	**Check harness and connector (Tire pressure monitor ECU – Combination meter assy).**

Tire Pressure Monitor ECU:





PREPARATION:

Disconnect the combination meter assy C5 connector and tire pressure monitor ECU T17 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
T17–3 (SPD) – C5–20	Below 1 Ω
T17–3 (SPD) – Body ground	10 kΩ or higher

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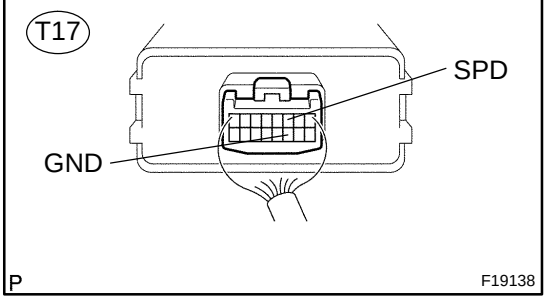
NG → **Repair or replace harness or connector.**

OK

3	**Inspect tire pressure monitor ECU.**

Tire Pressure Monitor ECU:



PREPARATION:

Remove the tire pressure monitor ECU with connectors still connected.

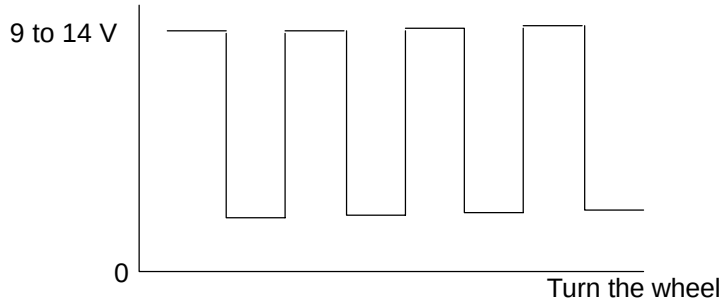
CHECK:

Check voltage.

(1) Shift the shift lever to neutral.
(2) Jack up one of the front wheels.
(3) Turn the ignition switch to the ON position.
(4) Measure the voltage between terminals SPD and GND of the tire pressure monitor ECU when the front wheel is turned slowly.

OK:

Voltage is generated intermittently.



HINT:

As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows.

NG → **Check combination meter assy (Speed signal circuit) (See page SA–20).**

OK

Replace tire pressure monitor ECU (See page SA–20).

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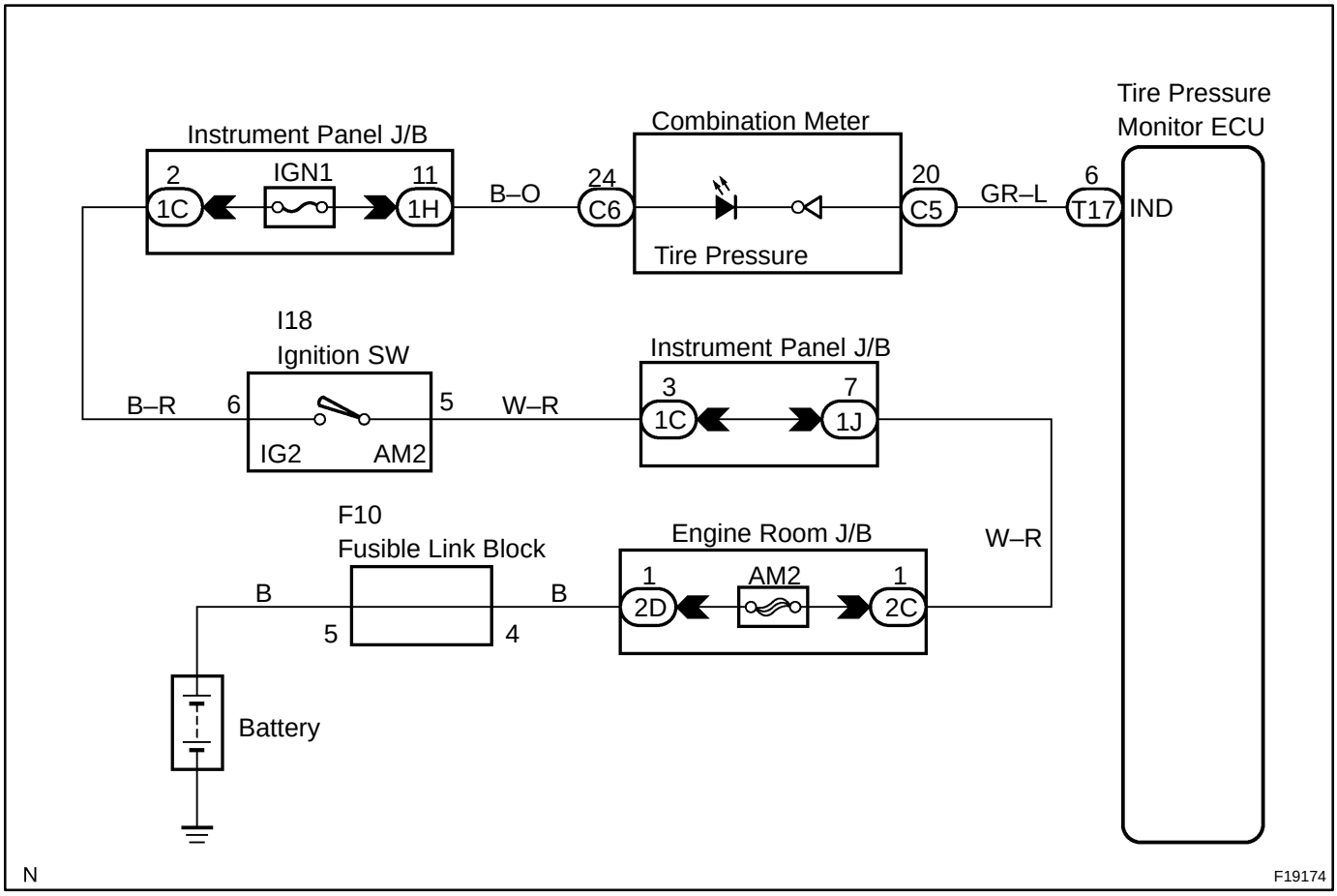
DIDKF–01

Tire Pressure Warning Lamp Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, the tire pressure warning lamp comes on and tire pressure monitor is cancelled at the same time. At this time, the ECU records a DTC in memory.
Connect terminals Tc and CG of the DLC3 to make the tire pressure warning lamp blink and output the DTC.

WIRING DIAGRAM



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INSPECTION PROCEDURE

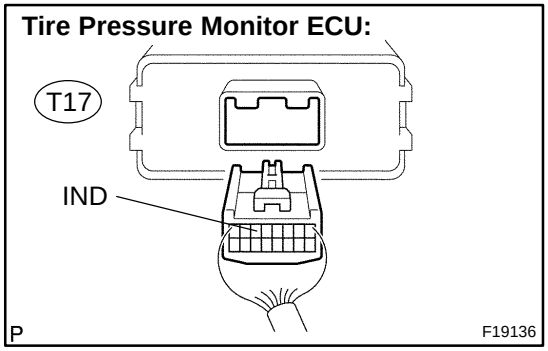
NOTICE:

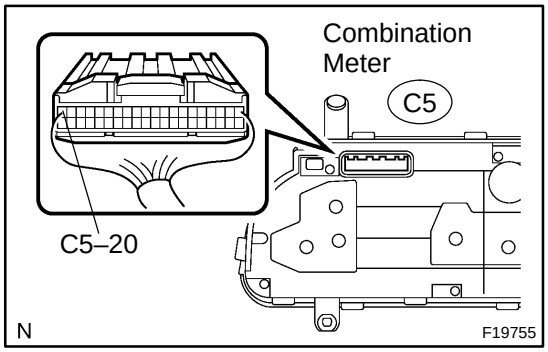
It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

HINT:

This procedure must be performed according to the PROBLEM SYMPTOMS TABLE.

1	**Check harness and connector (Tire pressure monitor ECU – Combination meter assy).**





PREPARATION:

Disconnect the tire pressure monitor ECU T17 connector and C5 combination meter.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
T17–6 (IND) – C5–20	Below 1 Ω
T17–6 (IND) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector (Combination meter to tire pressure monitor ECU).**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–814).

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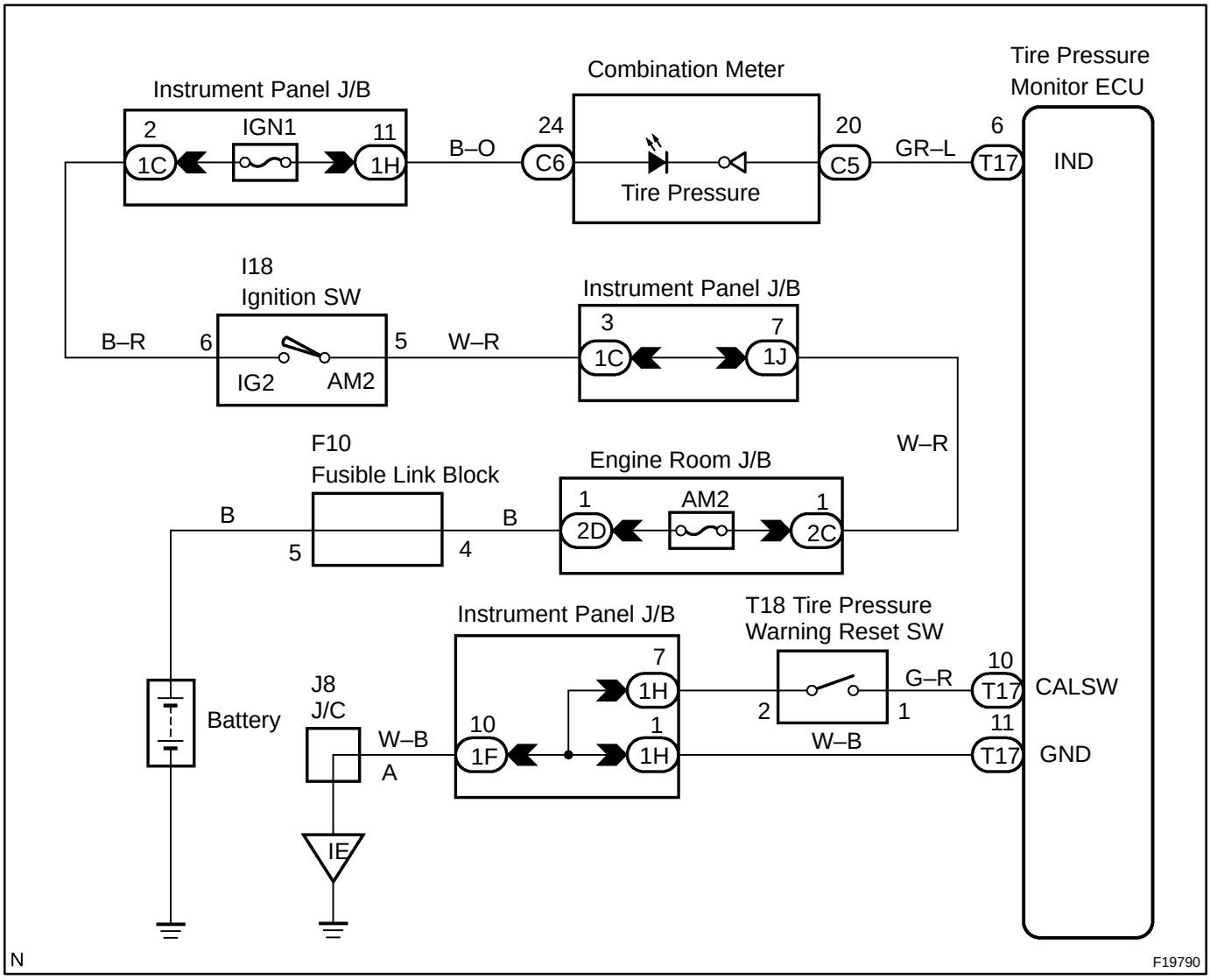
DIDKG–01

Tire Pressure Warning Reset Switch Circuit

CIRCUIT DESCRIPTION

Receiving the signal from the tire pressure warning reset switch, the tire pressure monitor ECU indicates the initialization of the pressure warning system.

WIRING DIAGRAM



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INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or tire pressure monitor ECU (see page DI–805).

1	**Check tire pressure warning reset switch function.**

CHECK:

Perform the tire pressure warning reset switch test in TEST MODE PROCEDURE (see page DI–810).

OK:

Reset switch ON: Tire pressure warning lamp comes on.
Reset switch OFF: Tire pressure warning lamp blinks.

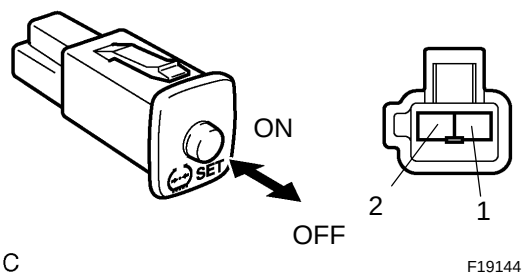
NG → **Go to step 2.**

OK

End.

2	**Inspect tire pressure warning reset switch.**

Tire Pressure Warning Reset Switch



PREPARATION:

Disconnect the tire pressure warning reset switch connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the tire pressure warning reset switch when the tire pressure warning switch is ON and OFF.

OK:

Switch Condition	Specified Condition
ON	Below 1 Ω
OFF	10 kΩ or higher

NG → **Replace tire pressure warning reset switch.**

OK

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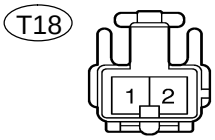
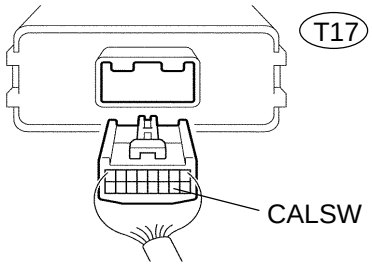
3	Check harness and connector (Tire pressure warning reset switch – Tire pressure monitor ECU)

Tire Pressure Warning Reset Switch (harness side connector)



Tire Pressure Monitor ECU:



F19884

PREPARATION:

Disconnect the tire pressure warning reset switch T18 connector and tire pressure monitor ECU T17 connector .

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
T17–10 (CALSW) – T18–1	Below 1 Ω
T17–10 (CALSW) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace tire pressure monitor ECU (See page SA–20).

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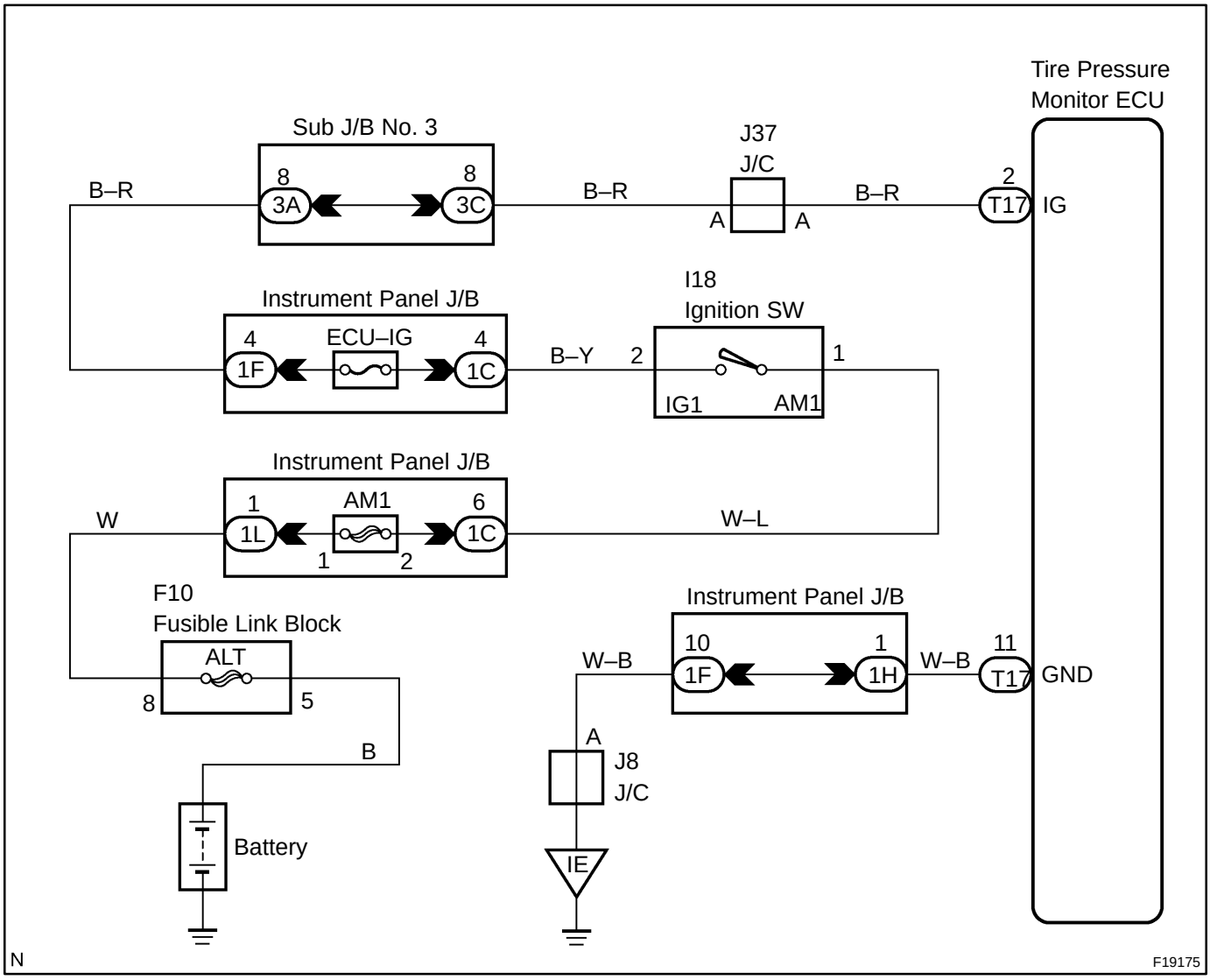
DIDKH–01

ECU Power Source Circuit

CIRCUIT DESCRIPTION

This is the power source for the tire pressure monitor ECU. It also supplies power to the tire pressure monitor receiver via the ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

1	**Inspect battery.**

CHECK:

Check the battery voltage.

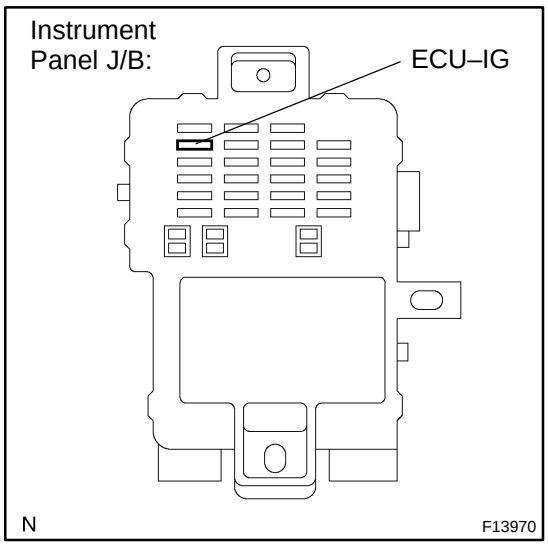
OK:

Voltage: 11 to 14 V

NG → **Check and repair charging system. (See page CH–1)**

OK

2	**Inspect fuse (ECU–IG).**



PREPARATION:

Remove the ECU–IG fuse from the instrument panel J/B.

CHECK:

Check continuity of the ECU–IG fuse.

OK:

Continuity

NG → **Check for a short in all harness and connector connected to fuse and replace fuse.**

OK

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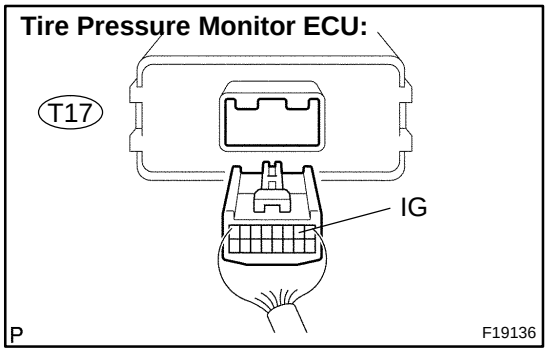
3	Inspect tire pressure monitor ECU (IG terminal voltage).

Tire Pressure Monitor ECU:



PREPARATION:

(a) Disconnect the tire pressure monitor ECU T17 connector.

(b) Turn the ignition switch to the ON position.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

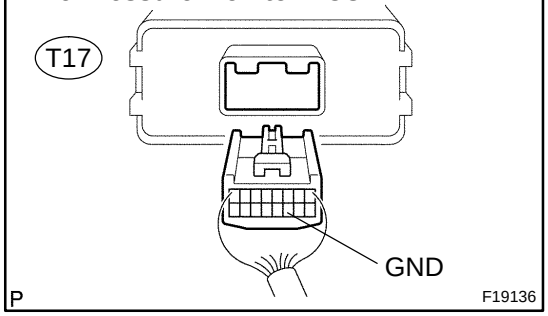
Tester Connection	Condition	Specified Condition
T17–2 (IG) – Body ground	Ignition Switch ON	10 to 14 V

NG → **Repair or replace harness or connector (IG circuit).**

OK ↓

4	Check harness and connector (Tire pressure monitor ECU – Body ground).

Tire Pressure Monitor ECU:



PREPARATION:

Disconnect the tire pressure monitor ECU T17 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
T17–11 (GND) – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector (GND circuit).**

OK ↓

Replace tire pressure monitor ECU (See page SA–20).

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DIDKI–01

Identify transmitter (Error in present)

HINT:

- ▶ Refer to IDENTIFY TRANSMITTER (ERROR IN PRESENT) if the DTC is output currently. Refer to IDENTIFY TRANSMITTER (ERROR IN PAST) if a previously output DTC is not output now. Even when DTCs C2165/65 to C2169/69 are output both as present and past codes, refer to IDENTIFY TRANSMITTER (ERROR IN PAST).
- ▶ DTCs relevant to the transmitters are corresponding to each transmitter ID. It is impossible to identify which tire is malfunctioning according to each transmitter ID. Therefore the following procedures must be followed to confirm the ID No. and tire location.

INSPECTION PROCEDURE

1	**Set the pressure of all tires to the specified value.**

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

2	**Rapidly reduce the pressure of front right wheel to 120 kPa (1.2 kgf/cm^2, 17 psi).**

NEXT

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3	**Using hand–held tester, check the tire pressure data of each wheel.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position, and push the hand–held tester main switch ON.
(c) Select the item below in the DATA LIST, and read its value displayed on the hand–held tester.

TIRE PRESSURE:

Item	Measurement item/ Range (Display)	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–
TIREPRESS5	ID5 tire inflation pressure/ min.: 0 kPa (0 kgf·cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf·cm^2, 92.2 psi)	Actual tire inflation pressure	–

CHECK:

Check the tire pressure data of each tire.

NEXT

4	**Is any of the tire pressure data 120 kPa (1.2 kgf/cm^2, 17 psi)?**

No → **The detected DTC is for the front right wheel transmitter.**

Yes

5	**Rapidly reduce the pressure of front left wheel to 120 kPa (1.2 kgf/cm^2, 17 psi).**

NEXT

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6	Using hand–held tester, check the tire pressure data of each wheel.

NEXT

7	Is there a wheel whose tire pressure newly becomes 120 kPa (1.2 kgf/cm^2, 17 psi)?

No → The detected DTC is for the front left wheel transmitter.

Yes

8	Rapidly reduce the pressure of rear right wheel to 120 kPa (1.2 kgf/cm^2, 17 psi).

NEXT

9	Using hand–held tester, check the tire pressure data of each wheel.

NEXT

10	Is there a wheel whose tire pressure newly becomes 120 kPa (1.2 kgf/cm^2, 17 psi)?

No → The detected DTC is for the rear right wheel transmitter.

Yes

11	Rapidly reduce the pressure of rear left wheel to 120 kPa (1.2 kgf/cm^2, 17 psi).

NEXT

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12	Using hand–held tester, check the tire pressure data of each wheel.

NEXT

13	Is there a wheel whose tire pressure newly becomes 120 kPa (1.2 kgf/cm^2, 17 psi)?

No → The detected DTC is for the rear left wheel transmitter.

Yes

The detected DTC is for the spare tire transmitter.

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DIDKJ–01

Identify transmitter (Error in past)

HINT:

- Refer to IDENTIFY TRANSMITTER (ERROR IN PRESENT) if the DTC is output currently. Refer to IDENTIFY TRANSMITTER (ERROR IN PAST) if a previously output DTC is not output now. Even when DTCs C2165/65 to C2169/69 are output both as present and past codes, refer to IDENTIFY TRANSMITTER (ERROR IN PAST).
- DTCs relevant to the transmitters are corresponding to each transmitter ID. It is impossible to identify which tire is malfunctioning according to each transmitter ID. Therefore the following procedures must be followed to confirm the ID No. and tire location.
- The following are the procedures to identify which wheel's transmitter ID1 is resulting from when assuming that either of the DTCs C2141/41 (Transmitter ID1 error) or C2165/65 (Abnormal temperature inside ID1 tire) is detected. Identify the corresponding transmitter using the same procedures when DTCs C2142/42 to C2145/45, C2166/66 to C2169/69 are detected.

IDENTIFICATION PROCEDURE

1	**Set the pressure of all tires to the specified value.**

Tire size	Front	Rear	Spare
P245 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)	240 kPa (2.4 kgf/cm^2, 35 psi)
P265 / 70 R 16	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)
P265 / 65 R 17	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

NEXT

2	**Rapidly reduce the pressure of front right wheel to 120 kPa (1.2 kgf/cm^2, 17 psi).**

NEXT

3	**Using hand–held tester, check the ID1 tire pressure data.**

NEXT

4	**Is ID1 tire pressure 120 kPa (1.2 kgf/cm^2, 17 psi)?**

Yes → **The ID1 is for the front right wheel transmitter.**

No

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5	Rapidly reduce the pressure of front left wheel to 120 kPa (1.2 kgf/cm^2, 17 psi).

NEXT

6	Using hand–held tester, check the ID1 tire pressure data.

NEXT

7	Is ID1 tire pressure 120 kPa (1.2 kgf/cm^2, 17 psi)?

Yes → The ID1 is for the front left wheel transmitter.

No

8	Rapidly reduce the pressure of rear right wheel to 120 kPa (1.2 kgf/cm^2, 17 psi).

NEXT

9	Using hand–held tester, check the ID1 tire pressure data.

NEXT

10	Is ID1 tire pressure 120 kPa (1.2 kgf/cm^2, 17 psi)?

Yes → The ID1 is for the rear right wheel transmitter.

No

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11	Rapidly reduce the pressure of rear left wheel to 120 kPa (1.2 kgf/cm^2, 17 psi).

NEXT

12	Using hand–held tester, check the ID1 tire pressure data.

NEXT

13	Is ID1 tire pressure 120 kPa (1.2 kgf/cm^2, 17 psi)?

Yes → The ID1 is for the rear left wheel transmitter.

No

The ID1 is for the spare tire transmitter.

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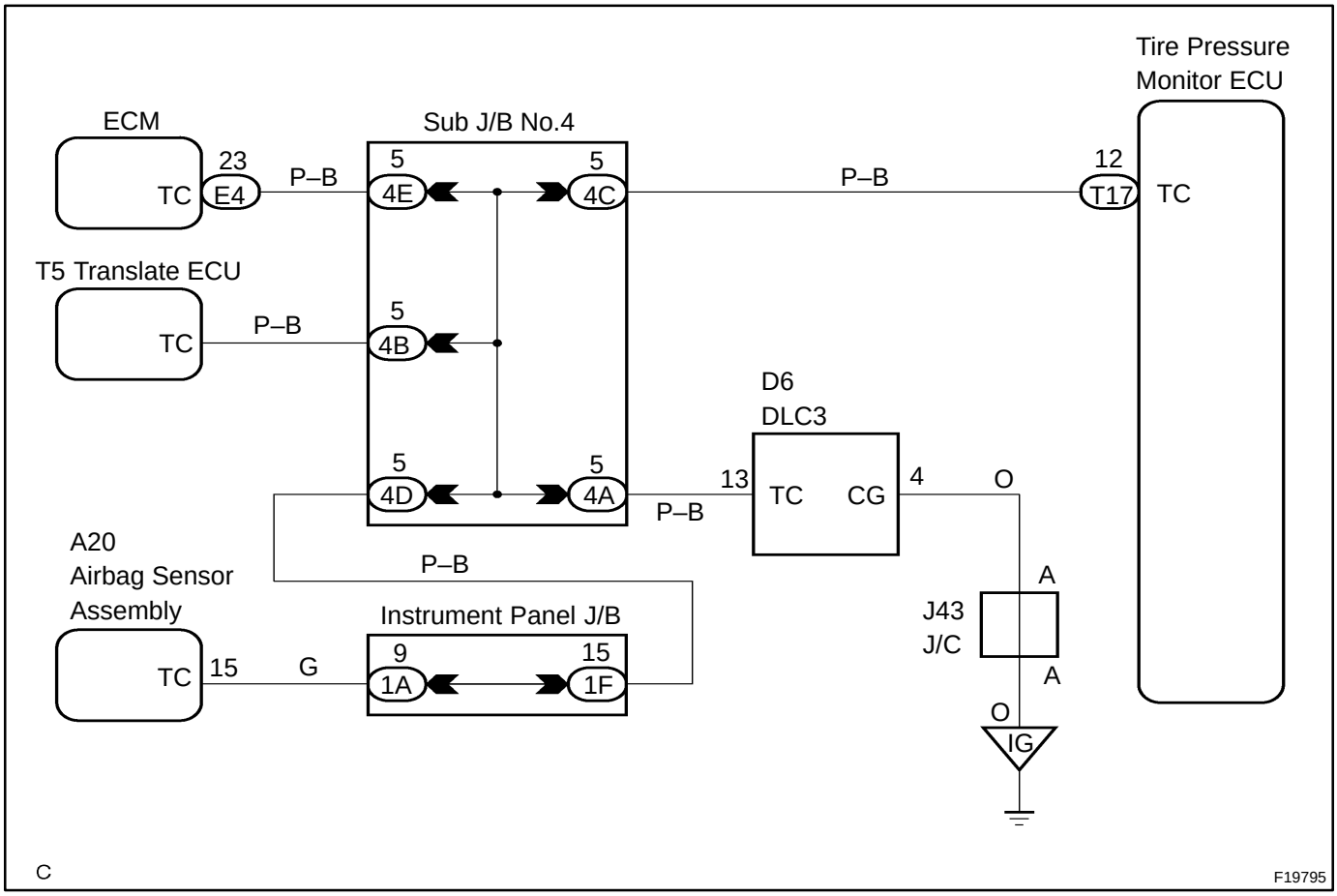
DIDKK–01

Tc and CG Terminal Circuit

CIRCUIT DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
The DTCs are indicated by blinking of the tire pressure warning lamp.

WIRING DIAGRAM



HINT:
When each warning lamp stays blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in each ECU is suspected.

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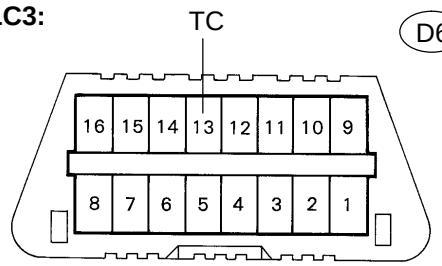
INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure monitor valve sub–assy and/or the tire pressure monitor ECU (see page DI–805).

1	**Check harness and connector (DLC3 – Tire pressure monitor ECU).**

DLC3:



PREPARATION:

Disconnect the tire pressure monitor ECU T17 connector.

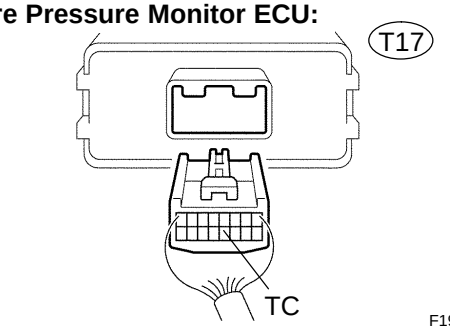
CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
D6–13 (TC) – T17–12 (TC)	Always	Below 1 Ω

Tire Pressure Monitor ECU:

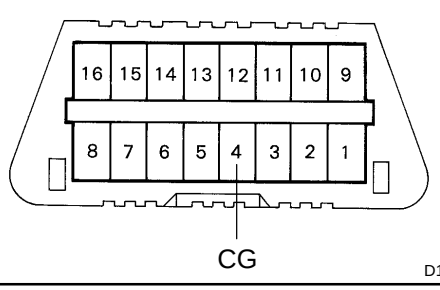


NG → **Repair or replace harness or connector.**

OK

2	**Check harness and connector (DLC3 – Body ground).**

DLC3:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
D6–4 (CG) – Body ground	Always	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

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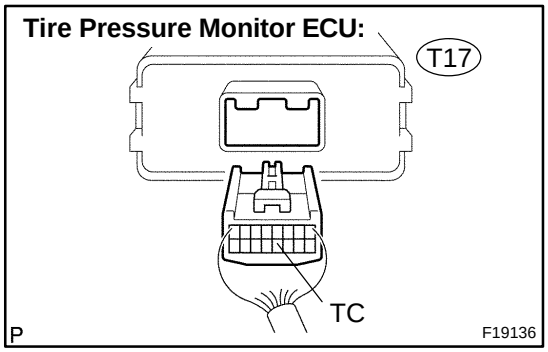
3	Check harness and connector (Tire pressure monitor ECU – Body ground).



PREPARATION:

Disconnect the tire pressure monitor ECU T17 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
T17–12 (TC) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector and each ECU.**

OK

Replace tire pressure monitor ECU (See page SA–20).

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ABS WITH EBD & BA & TRAC & VSC SYSTEM

DIDLU–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

- **When there is a malfunction in the contact point of the terminals or installation problems with parts, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.**
- **In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and freeze frame data output, and record it before disconnecting each connector or removing and installing parts.**
- **Since the ABS with EBD & BA & TRAC & VSC systems may be influenced by a malfunction in the other systems, be sure to check for DTCs in the other systems.**
- **Be sure to remove and install the ABS & VSC actuator and each sensor with the IG switch OFF unless specified in the inspection procedure.**
- **When removing and installing the ABS & VSC actuator and each sensor, be sure to check that the normal display is output in test mode inspection and in DTC output inspection after installing all the parts.**
- **After replacing the yaw rate sensor and/or the ABS & VSC actuator assembly, make sure to perform yaw rate and deceleration sensors' zero point calibration (See page DI–897).**
- **The CAN communication system is used for data communication between the skid control ECU (included in the actuator), the steering angle sensor, and the yaw rate sensor (the deceleration sensor is included). If there is trouble in the CAN communication line, the DTC of the communication line is output.**
- **If the DTC of the CAN communication line is output, repair the malfunction and troubleshoot the ABS with EBD & BA & TRAC & VSC systems.**
- **Since the CAN communication line has its own length and route, it can not be repaired temporarily with the bypass wire, etc.**

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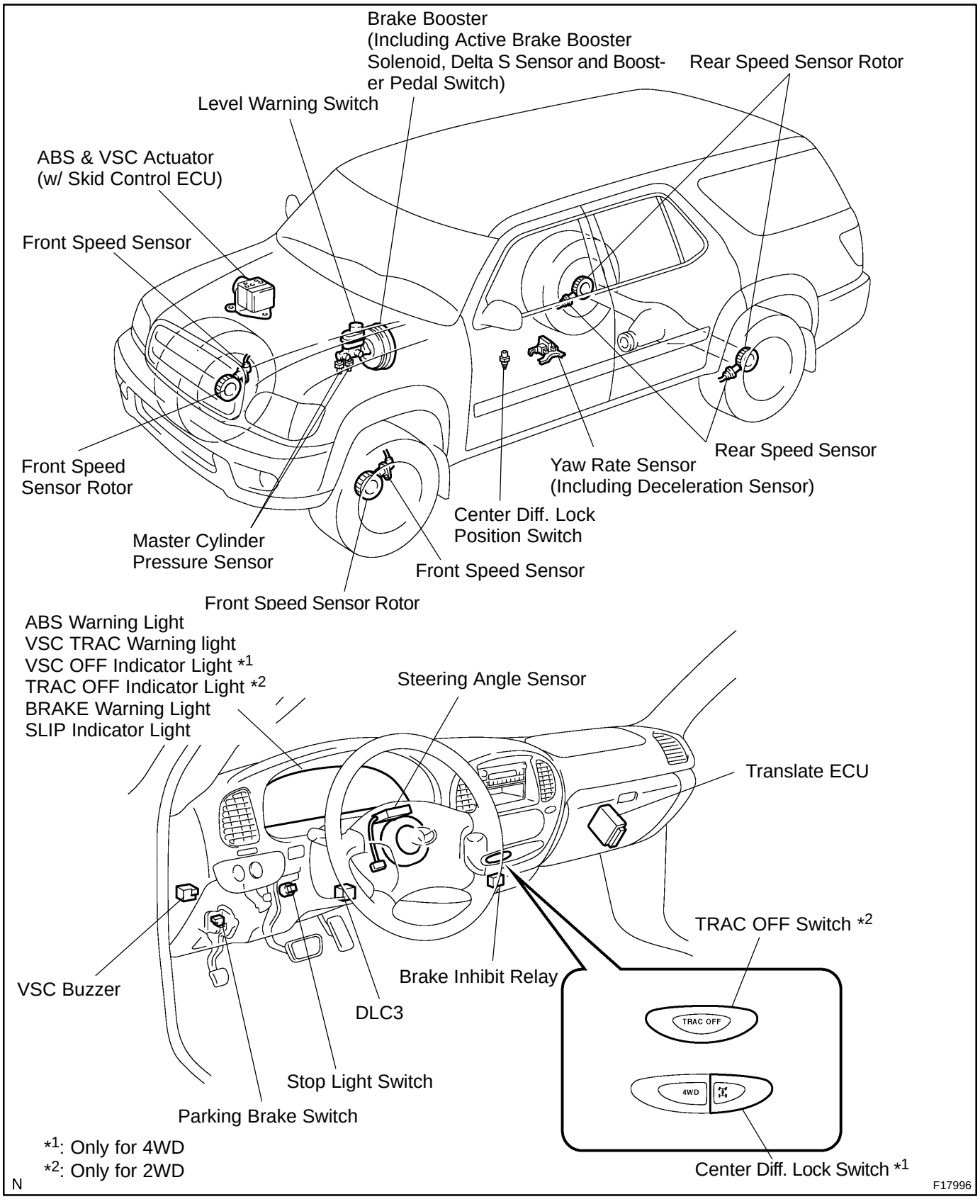
DIDLV–01

LOCATION



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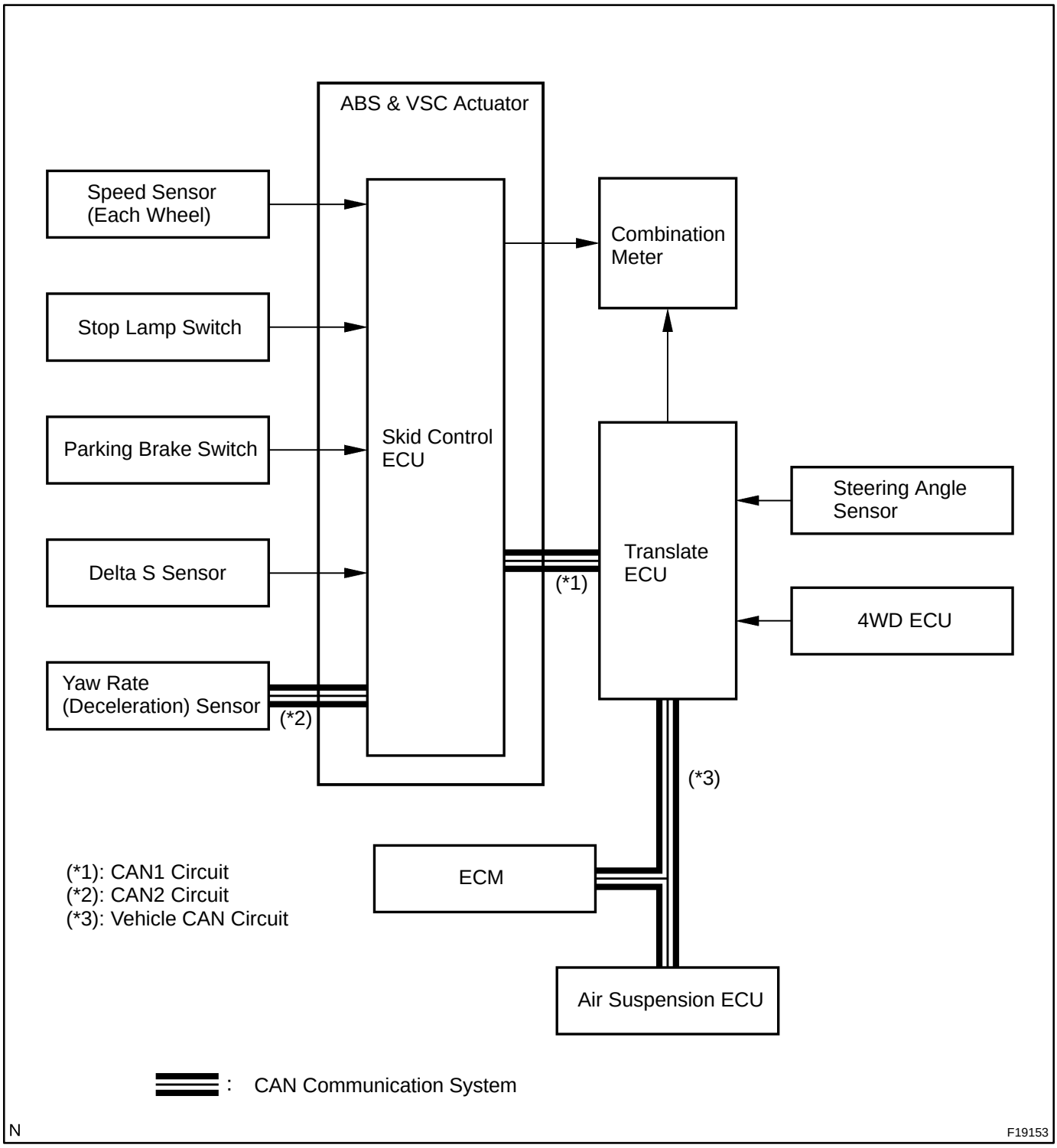
DIDLW–01

SYSTEM DIAGRAM



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DIDLX–01

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

- ▶ The yaw rate sensor and deceleration sensor are combined and in a single unit. This unit communicates with the skid control ECU through the CAN communication system.
- ▶ No changes have been made to the communication method between the VSC system and ECM. However, the communication method between the Translate ECU and ECM has been changed from serial to CAN communication.

(a) ABS
(Anti–lock Brake System)
The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

(b) EBD
(Electronic Brake force Distribution)
The EBD control utilizes ABS, realizing proper brake force distribution between front and rear wheels in accordance with driving conditions.
In addition, during braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.

(c) BA (Brake Assist)
The primary purpose of the brake assist system is to provide an auxiliary brake force to assist the driver who cannot generate a large enough brake force during emergency braking, thus helping to maximize the vehicle's braking performance.

(d) TRAC
(Traction Control)
The TRAC system helps prevent the drive wheels from slipping if the driver presses down on the accelerator pedal excessively when starting off or accelerating on a slippery surface.

(e) VSC
(Vehicle Stability Control)
The VSC system helps prevent the vehicle from slipping sideways as a result of strong front wheel skid or strong rear wheel skid during cornering.

2. ABS with EBD & BA & TRAC & VSC OPERATION

(a) The skid control ECU calculates vehicle stability tendency based on signals from the speed sensor, yaw rate (deceleration) sensor and steering angle sensor. In addition, it evaluates the results of the calculations to determine whether any control actions (control of the engine output torque by electronic throttle control and of the wheel brake pressure by the brake actuator) should be implemented.

(b) The SLIP indicator blinks and the VSC buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when TRAC is operating, and the operation being performed is displayed.

3. FAIL SAFE FUNCTION

(a) When a failure occurs in the ABS & BA & TRAC & VSC systems, the ABS and VSC warning lights come on and ABS & BA & TRAC & VSC operations are prohibited. In addition to this, when there is a failure that disables EBD operation, the brake warning light also comes on and EBD operation is prohibited.

(b) If some control is prohibited due to a malfunction during its operation, that control will be cut off gradually not to change the stability of the vehicle suddenly.

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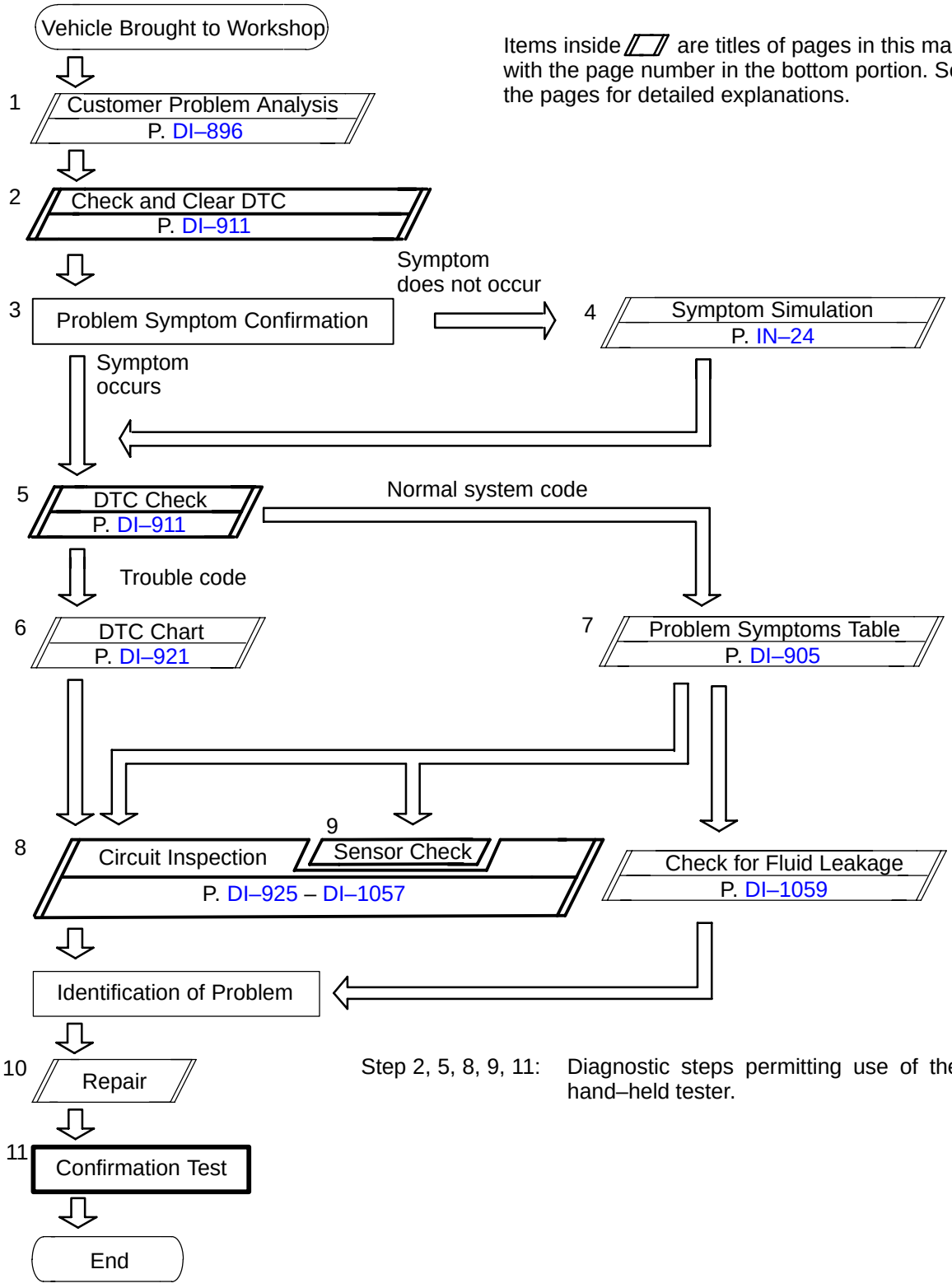
DI939–04

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the following procedures:



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 8, 9, 11: Diagnostic steps permitting use of the hand–held tester.

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DI93A–03

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & BA & TRAC & VSC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Date	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRAC does not operate. (Wheels spin when starting off rapidly.)	
	☐ VSC does not operate. (Wheels sideslip when turning sharply.)	
	☐ BA does not operate	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	TRAC OFF Indicator Light Abnormal*1	☐ Remains ON ☐ Does not Light Up
	VSC OFF Indicator Light Abnormal*2	☐ Remains ON ☐ Does not Light Up
	VSC TRAC Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	BRAKE Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

Check Item	**Malfunction Indicator Light**	☐ Normal ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal System Code ☐ Trouble Code (Code)
	2nd Time	☐ Normal System Code ☐ Trouble Code (Code)

*1: Only for 2WD
*2: Only for 4WD

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DIDLY–01

CALIBRATION

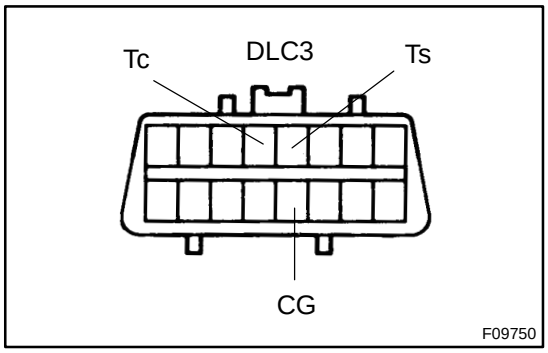
1. ZERO POINT CALIBRATION OF MASTER CYLINDER PRESSURE, YAW RATE AND DECELERATION SENSORS

HINT:

When having replaced the master cylinder pressure, yaw rate and deceleration sensors and/or the ECU, make sure to perform master cylinder pressure, yaw rate and deceleration sensors' zero point calibration.

NOTICE:

- **While obtaining the zero point, do not vibrate the vehicle by tilting, moving or shaking it and keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to do this on a level surface (within an inclination of 1 degree).**



(a) Perform master cylinder pressure, yaw rate and deceleration sensors zero point calibration.
  (1) Using SST, connect terminals Ts and CG of the DLC3.
  SST 09843–18040
  (2) Shift the shift lever to the P position.
  (3) Turn the ignition switch to the ON position.
  (4) Keep the vehicle in a stationary condition on a level surface for 4 sec. or more.
  (5) Keep your foot off the brake pedal.
  Do not leave 4WD vehicles in the L4 position.
  (6) Press the center diff. lock (TRAC OFF) switch 3 times within 3 seconds.
  (7) Check that the VSC buzzer sounds for 3 seconds.

HINT:

- If the VSC buzzer does not sound, do the zero point calibration again and/or check the VSC buzzer circuit (See page DI–1052).
- If the VSC buzzer does not sound, check for yaw rate and deceleration sensor failure (See page DI–911).

  (8) Turn the ignition switch OFF.
  (9) Disconnect terminals Ts and CG of the DLC3.

(b) Perform steering angle sensor zero point calibration.
  This calibration is carried out automatically by following procedures below:
  (1) Make sure the system is not in sensor check mode.
  (2) Calibrate the steering angle sensor by driving the vehicle in a straight line at more than 7 MPH (12 km/h) for 5 seconds.

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(3) Stop the vehicle. Use the hand–held tester to check that the steering angle value on the DATA LIST increases when the steering wheel is turned left, and decreases when turned right.

(4) Turn the ignition switch OFF.

HINT:

- If the steering angle reads 1,150 degrees when the steering wheel is in any position, the sensor has not been calibrated.
- Carry out the calibration procedure again.
- DTC C1362/36 will be output from the skid control ECU if the skid control ECU is replaced with a new one and/or sensor calibration is not performed.
- DTC C1362/36 will be deleted when sensor calibration is complete.

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DIDLZ–01

TEST MODE PROCEDURE

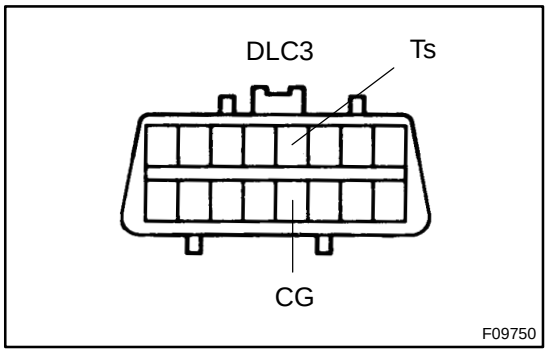
1. When not using the hand–held tester:
SENSOR CHECK (TEST MODE)

NOTICE:

When having replaced the master cylinder pressure, yaw rate and deceleration sensors and/or the ECU, perform zero point calibration of the master cylinder pressure, yaw rate and deceleration sensors (See page DI–897).

HINT:

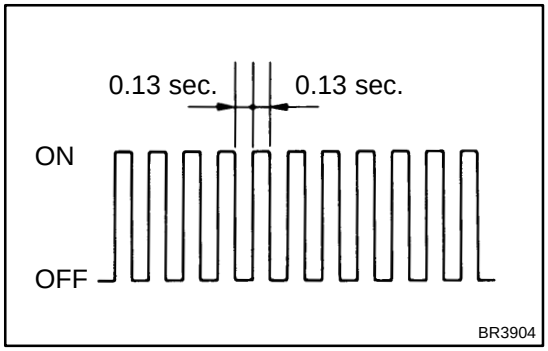
If the ignition switch is turned from the ON to the ACC or LOCK position in test mode, test mode DTCs will be erased.



(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Check that the shift lever is in the P position, and turn the steering wheel to the neutral position.
(3) Using SST, connect terminals Ts and CG of the DLC3.

SST 09843–18040

(4) Start the engine.



(5) Check that the ABS and VSC TRAC warning lights blink.

HINT:

If the ABS and VSC TRAC warning lights do not blink, inspect the ABS warning light circuit, VSC TRAC warning light circuit and Ts terminal circuit.

(6) Keep the vehicle in a stationary condition on a level surface for 4 sec. or more.

ABS warning light circuit	DI–1021 or DI–1025
VSC TRAC warning light circuit	DI–1027 or DI–1031
Ts terminal circuit	DI–1057

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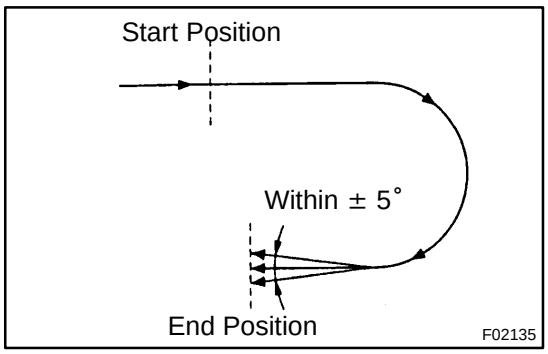

(b) Check the yaw rate and deceleration sensor.
Shift the shift lever to the D position and drive the vehicle at a vehicle speed of approx. 3 mph (5 km/h), turn the steering wheel either to the left or right for 90° or more, and turn the vehicle through 180 degrees. Check that the VSC buzzer sounds for 3 seconds upon start off.
Stop the vehicle and shift the shift lever to the P position, and check that the VSC buzzer sounds again for 3 seconds.

HINT:

- If the VSC buzzer sounds twice, the sensor check has been completed normally.
- If the VSC buzzer does not sound, check the VSC buzzer circuit (See page DI–1052), then do the sensor check again.
- Drive the vehicle through 180°. At the end of the turn, the direction of the vehicle should be within 180° ± 5° of its start position.
- Do not spin the wheels.
- If the buzzer sounds after start off, then the deceleration sensor check has passed its check. If the buzzer sounds at the completion of a curve, then the yaw rate sensor check has passed its check. The buzzer sound should be heard twice during the sensor checks.

(c) Check the master cylinder pressure sensor.
(1) Turn the ignition switch to the ON position.
(2) Keep the vehicle in a stationary condition on a level surface for 2 sec. or more.
(3) Keeping the vehicle in a stationary condition and not pressing on the brake pedal for 1 sec. or more, depress the brake pedal with 147 N (15 kgf, 33 lbf) or more for 2 sec. or more.

NOTICE:
If zero point calibration has never been performed on a new ECU, master cylinder pressure sensor check cannot be completed correctly. Perform zero point calibration first (See page DI–897).

HINT:
At this time, the buzzer sounds for 3 seconds.

(d) Check the speed sensor.
Drive the vehicle straight forward.
When driving the vehicle at the speed of 28 mph (45 km/h) or higher for several seconds, check that the ABS warning light goes off.

HINT:
There is a possibility that the sensor check is not completed if the vehicle has its wheels spun or its steering wheel turned during this check.

(e) Stop the vehicle.

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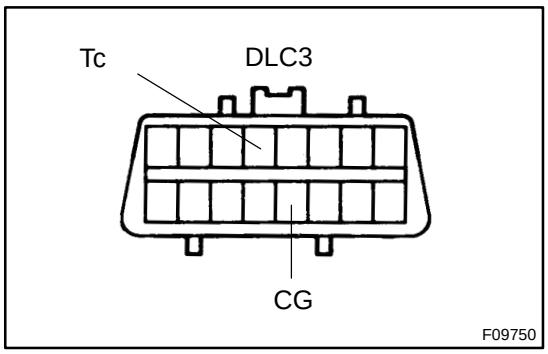


(f) Read the DTC.

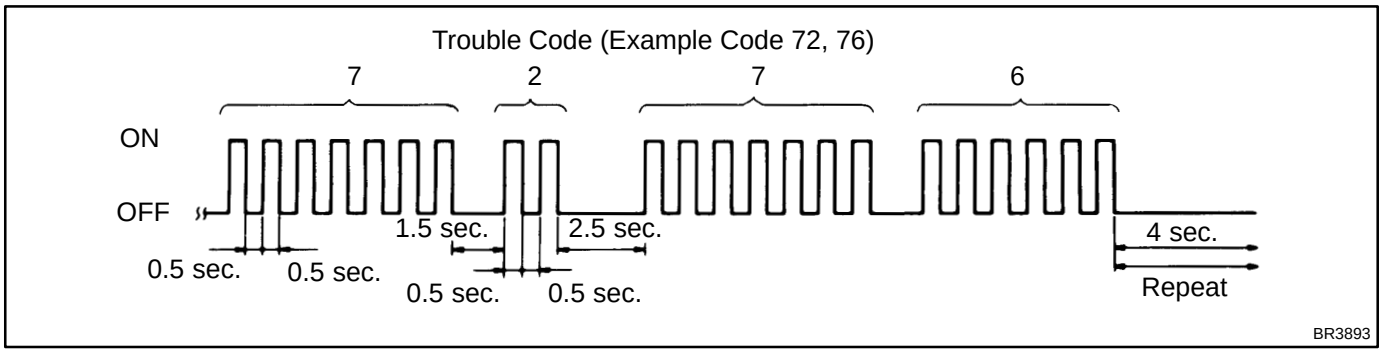
(1) Using SST, connect terminals Tc and CG of the DLC3.

SST 09843–18040

(2) Read the number of blinks of the warning light.

HINT:

- See the list of DTC (step 3).
- If all sensors are normal, a normal system code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the codes will be displayed in ascending order.



(3) After doing the check, disconnect terminals Ts and CG, Tc and CG of the DLC3, and turn the ignition switch OFF.

SST 09843–18040

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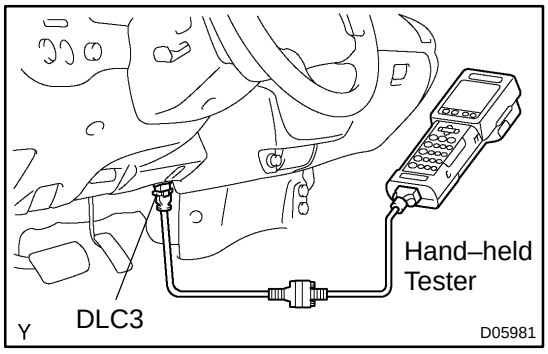
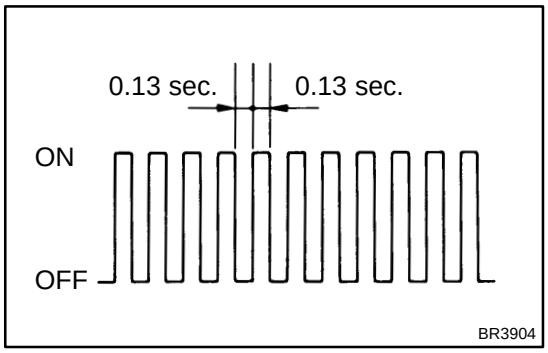
2. When using the hand–held tester:
SENSOR CHECK (TEST MODE)

NOTICE:

When having replaced the master cylinder pressure, yaw rate and deceleration sensors and/or ECU, perform zero point calibration of the master cylinder pressure, yaw rate and deceleration sensors (See page DI–897). Make sure that this operation is done before performing the following.



(a) Procedures for test mode:
(1) Connect the hand–held tester to the DLC3.
(2) Check that the shift lever is in the P position, and turn the steering wheel to the neutral position.
(3) Start the engine.
(4) Select the SIGNAL CHECK on the hand–held tester.

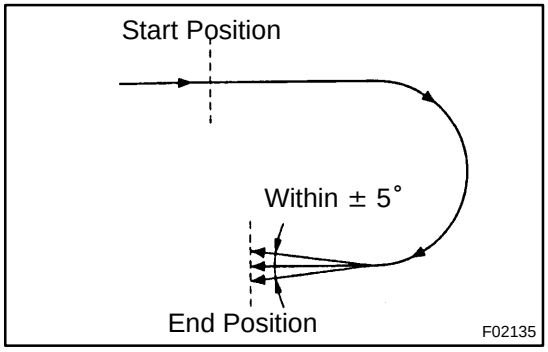


(5) Check that the ABS warning light and VSC TRAC warning light blink.

HINT:
If the ABS and VSC TRAC warning lights do not blink, inspect the ABS warning light circuit, VSC TRAC warning light circuit and Ts terminal circuit.

(6) Keep the vehicle in a stationary condition on a level surface for 4 sec. or more.

ABS warning light circuit	DI–1021 or DI–1025
VSC TRAC warning light circuit	DI–1027 or DI–1031
Ts terminal circuit	DI–1057



(b) Check the yaw rate and deceleration sensor.
Shift the shift lever to the D position and drive the vehicle at a vehicle speed of approx. 3 mph (5 km/h), turn the steering wheel either to the left or right for 90° or more, and turn the vehicle through 180 degrees. Check that the VSC buzzer sounds for 3 seconds upon start off.
Stop the vehicle and shift the shift lever to the P position, check that the VSC buzzer sounds again for 3 seconds.

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HINT:

- If the VSC buzzer sounds twice, the sensor check has been completed normally.
- If the VSC buzzer does not sound, check the VSC buzzer circuit (see page DI–1052), then do the sensor check again.
- Drive the vehicle through 180˚. At the end of the turn its check, the direction of the vehicle should be within 180˚ ± 5˚ of its start position.
- Do not spin the wheels.
- If the buzzer sounds after start off, then the deceleration sensor check has passed its check. If the buzzer sounds at the completion of a turn its check, then the yaw rate sensor check has passed. The buzzer sound should be heard during the sensor checks.

(c) Check the master cylinder pressure sensor.

(1) Turn the ignition switch to the ON position.

(2) Keep the vehicle in a stationary condition on a level surface for 2 sec. or more.

(3) Keeping the vehicle in a stationary condition and not pressing on the brake pedal for 1 sec. or more, depress the brake pedal with 147 N (15 kgf, 33 lbf) or more for 2 sec. or more on a new ECU.

NOTICE:

If zero point calibration has never been performed on a new ECU, master cylinder pressure sensor check cannot be completed correctly. Perform zero point calibration first (See page DI–897).

HINT:

At this time, the buzzer sounds for 3 seconds.

(d) Check the speed sensor.

Drive the vehicle straight forward.

When driving the vehicle at the speed of 28 mph (45 km/h) or higher for several seconds, check that the ABS warning light goes off.

HINT:

There is a case that the sensor check is not completed if the vehicle has its wheels spun or its steering wheel turned during this check.

(e) Stop the vehicle.

(f) Read the DTC by following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator's manual for further details.

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3. DTC of ABS sensor check function:

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage of right front speed sensor	▶Right front speed sensor ▶Sensor installation ▶Sensor rotor
C1272 / 72	Low output voltage of left front speed sensor	▶Left front speed sensor ▶Sensor installation ▶Sensor rotor
C1273 / 73	Low output voltage of right rear speed sensor	▶Right rear speed sensor ▶Sensor installation ▶Sensor rotor
C1274 / 74	Low output voltage of left rear speed sensor	▶Left rear speed sensor ▶Sensor installation ▶Sensor rotor
C1275 / 75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276 / 76	Abnormal change in output voltage of left front speed sensor	Left front speed sensor rotor
C1277 / 77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor
C1278 / 78	Abnormal change in output voltage of left rear speed sensor	Left rear speed sensor rotor
C1279 / 79	Deceleration sensor is faulty	▶Deceleration sensor ▶Sensor installation
C1281 / 81	Master cylinder pressure sensor output signal is faulty	Master cylinder pressure sensor

HINT:

Read the number of blinks of the ABS warning light.

DTC of VSC sensor check function:

Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	▶Yaw rate sensor ▶Yaw rate sensor circuit

HINT:

Read the number of blinks of the VSC TRAC warning light.

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DI93F–04

PROBLEM SYMPTOMS TABLE

If a normal code is indicated during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

- **When replacing the skid control ECU, sensor, etc., turn the ignition switch OFF.**
- **When replacing the master cylinder pressure, yaw rate and deceleration sensors and/or the ECU, make sure to perform master cylinder pressure, yaw rate, and deceleration sensors' zero point calibration (See page DI–897).**

Symptom	Suspected Area	See page
ABS does not operate	When the following 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC reconfirming that the normal code is output. 2. IG power source circuit 3. Speed sensor circuit 4. Check the hydraulic circuit for leakage.	 DI–911 DI–957 DI–925 DI–1059
ABS does not operate efficiently	When the following 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC reconfirming that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the hydraulic circuit for leakage.	 DI–911 DI–925 DI–963 DI–1059
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	DI–1021 or DI–1025
BRAKE warning light abnormal	1. BRAKE warning light circuit 2. Skid control ECU 3. Translate ECU	DI–1033 or DI–1038
DTC check cannot be done	When the following 1. to 3. are all normal and the problem is still occurring, replace the skid control ECU. 1. ABS warning light circuit 2. Tc terminal circuit 3. VSC TRAC warning light circuit	 DI–1021 or DI–1025 DI–1055 DI–1027 DI–1031
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI–1057
TRAC does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage 4. Speed sensor circuit	 DI–911 DI–957 DI–1059 DI–925
TRAC does not operate efficiently	Only when 1. to 3. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. Check the hydraulic circuit for leakage 3. Speed sensor circuit	 DI–911 DI–1059 DI–925

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VSC does not operate	Only when 1. to 9. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. Perform zero point calibration 3. IG power source circuit 4. Check the hydraulic circuit for leakage 5. Speed sensor circuit 6. Deceleration sensor circuit 7. Yaw rate sensor circuit 8. Steering angle sensor circuit 9. Master cylinder pressure sensor circuit	 DI–911 DI–897 DI–957 DI–1059 DI–925 DI–951 DI–954 DI–946 DI–983
VSC does not operate efficiently	Only when 1. to 8. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. Perform zero point calibration 3. Check the hydraulic circuit for leakage 4. Speed sensor circuit 5. Deceleration sensor circuit 6. Yaw rate sensor circuit 7. Steering angle sensor circuit 8. Master cylinder pressure sensor circuit	 DI–911 DI–897 DI–1059 DI–925 DI–951 DI–954 DI–946 DI–983
VSC TRAC warning light abnormal	1. VSC TRAC warning light circuit 2. Skid control ECU	DI–1027 or DI–1031
SLIP indicator light abnormal	1. SLIP indicator light circuit 2. Skid control ECU	DI–1041 or DI–1045
VSC OFF (TRAC OFF) indicator abnormal	1. VSC OFF (TRAC OFF) indicator light circuit 2. VSC OFF (TRAC OFF) switch circuit 3. Skid control ECU	DI–1048

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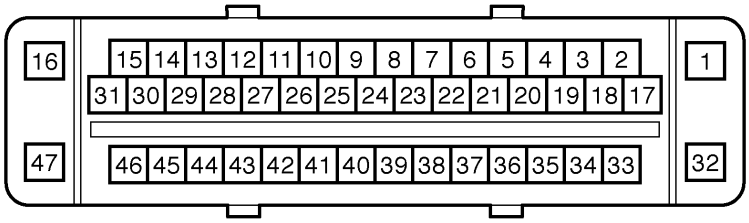
DIDM0–01

TERMINALS OF ECU

1. Skid Control ECU:



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F16974

Symbols (Terminal No.)	Terminal Description
GND (1)	Skid control ECU ground
CANL (2)	Vehicle CAN communication line
VCP (3)	Pedal stroke sensor (Delta S Sensor) line
CANH (6)	Vehicle CAN communication line
E3 (8)	Pedal stroke sensor (Delta S Sensor) ground
VYS (11)	Yaw rate sensor power source
IG1 (13)	IG1 power supply
PIM (14)	Pedal stroke sensor (Delta S Sensor) line
D/G (15)	Diagnosis tester communication line
+BM (16)	Motor relay power supply
BST (17)	Brake booster line
PSNC (18)	Brake booster line
SS1 (19)	Yaw rate sensor signal line
STS (20)	Brake booster line
PSNO (21)	Brake booster line
BZ (22)	Buzzer output
SS2 (23)	Yaw rate sensor signal line
GYAW (24)	Yaw rate sensor ground
PMC2 (25)	M/C pressure sensor 2 signal
VCM2 (26)	M/C pressure sensor 2 power supply
E2 (27)	M/C pressure sensor 2 ground
PMC (28)	M/C pressure sensor 1 signal
E1 (29)	M/C pressure sensor 1 ground
VCM (30)	M/C pressure sensor 1 power supply
BSTP (31)	Brake booster line
GND2 (32)	Skid control ECU ground
FL+ (33)	FL wheel speed signal line
FL– (34)	FL wheel speed signal line
WA (35)	ABS warning light output
RR– (36)	RR wheel speed signal line
RR+ (37)	RR wheel speed signal line
BSW (38)	Brake inhibit signal line
STP (39)	Stop light switch signal input

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Symbols (Terminal No.)	Terminal Description
TS (40)	Sensor check input
+BO (41)	Steering angle sensor line
RL+ (42)	RL wheel speed signal line
RL– (43)	RL wheel speed signal line
VSCW (44)	VSC OFF indicator output
FR– (45)	FR wheel speed signal line
FR+ (46)	FR wheel speed signal line
+BS (47)	Solenoid relay power supply

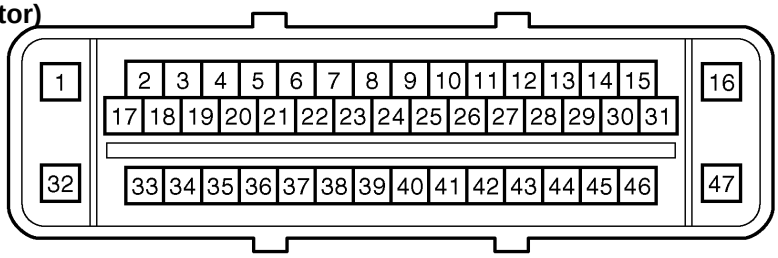
2. Terminal Inspection

Disconnect the connector and measure the voltage on the wire harness side.

HINT:

Voltage can not be measured with the connector connected to the skid control ECU as the connector is water resistance.

Skid Control ECU
(harness side connector)



N F19198

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+BM (16) – GND1, 2 (1, 32)	B–R – W–B	Motor relay power supply	IG switch ON	10 to 14 V
GYAW (24) – GND1, 2 (1, 32)	G – W–B	Yaw rate sensor ground	Always	Below 1 Ω
E3 (8) – GND1, 2 (1, 32)	L – W–B	M/C pressure sensor 3 ground	Always	Below 1 Ω
E2 (27) – GND1, 2 (1, 32)	W – W–B	M/C pressure sensor 2 ground	Always	Below 1 Ω
E1 (29) – GND1, 2 (1, 32)	W – W–B	M/C pressure sensor 1 ground	Always	Below 1 Ω
STP (39) – GND1, 2 (1, 32)	G–Y – W–B	Stop light switch signal input	Brake pedal depressed	8 to 14 V
STP (39) – GND1, 2 (1, 32)	G–Y – W–B	Stop light switch signal input	Brake pedal released	Below 1.5 V
+BS (47) – GND1, 2 (1, 32)	B–R – W–B	Solenoid relay power supply	IG switch ON	10 to 14 V

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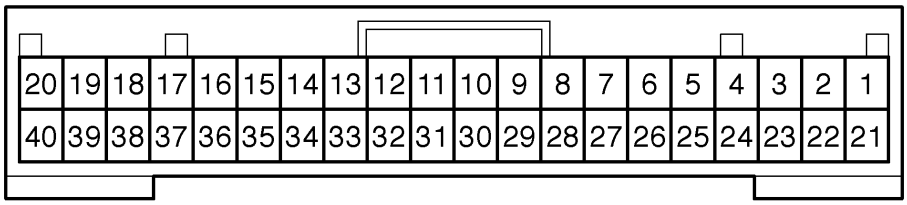
Translate ECU:



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG1 (1) – GND (40)	B–R – O	Translate ECU power supply	IG SW ON	10 to 14 V
PKB2 (4) – GND (40)	LG–R – O	PKB signal line	IG SW ON, PKB SW ON	Below 2.0 V
PKB2 (4) – GND (40)	LG–R – O	PKB signal line	IG SW ON, PKB SW OFF	10 to 14 V
VSC+ (7) – VSC– (11)	L – W	CAN communication line	IG switch ON	Pulse generation
ENG+ (14) – ENG– (16)	R – W	ECM communication	IG SW ON	Pulse generation
SS1+ (18) – SS1– (19)	O – Y	Steering angle sensor line	IG SW ON	Pulse generation
TRIG (20) – GND (40)	W–L – O	Steering angle sensor signal	IG SW ON	4.5 to 5.5 V
LVL2 (24) – GND (40)	Y–L – O	Brake fluid level signal	Brake fluid level SW ON	Below 1.5 V
CSW (26)* – GND (40)	L–W – O	Center diff. lock SW signal	IG SW ON, VSC OFF SW ON	Below 1.5 V
CSW (26)* – GND (40)	L–W – O	Center diff. lock SW signal	IG SW ON, VSC OFF SW OFF	8 to 14 V
TS (27) – GND (40)	R–L – O	Sensor check input	IG switch ON	10 to 14 V
TC (28) – GND (40)	P–B – O	Diagnosis tester communication line	IG switch ON	10 to 14 V
CD (29)* – GND (40)	BR–Y – O	Center diff. lock lamp signal	IG SW ON, center diff. lock indicator ON	Below 1.5 V
CD (29)* – GND (40)	BR–Y – O	Center diff. lock lamp signal	IG SW ON, center diff. lock indicator OFF	8 to 14 V
EXI2 (31)* – GND (40)	Y–G – O	Center diff. lock signal	IG SW ON, center diff. lock SW ON	Below 1.5 V
EXI2 (31)* – GND (40)	Y–G – O	Center diff. lock signal	IG SW ON, center diff. lock SW OFF	8 to 14 V
IND (37) – GND (40)	W–R – O	SLIP indicator signal	IG SW ON, SLIP indicator ON	Below 2.0 V
IND (37) – GND (40)	W–R – O	SLIP indicator signal	IG SW ON, SLIP indicator OFF	10 to 14 V
WT (38) – GND (40)	R–G – O	VSC OFF or TRAC OFF warning light circuit	IG SW ON, VSC OFF or TRAC OFF warning light ON	Below 2.0 V
WT (38) – GND (40)	R–G – O	VSC OFF or TRAC OFF warning light circuit	IG SW ON, VSC OFF or TRAC OFF warning light OFF	10 to 14 V
BRL (39) – GND (40)	R–B – O	BRAKE warning light circuit	IG SW ON, BRAKE warning light ON	Below 2.0 V
BRL (39) – GND (40)	R–B – O	BRAKE warning light circuit	IG SW ON, BRAKE warning light OFF	10 to 14 V

*: Only for 4WD

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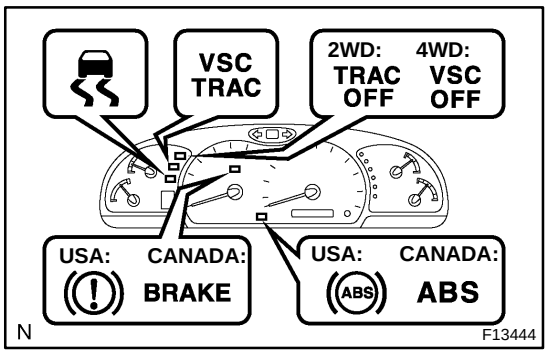
DIDM1–01



DIAGNOSIS SYSTEM

1. CHECK WARNING LIGHT

(a) Release the parking brake pedal.

(b) When the ignition switch is turned ON, check that the ABS warning light, VSC TRAC warning light, VSC OFF (TRAC OFF) indicator light, BRAKE warning light and SLIP indicator light come on for approx. 3 seconds.

HINT:

- When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, VSC TRAC warning light circuit, VSC OFF (TRAC OFF) indicator light circuit, BRAKE warning light circuit or SLIP indicator light circuit.

Trouble Area	See page
ABS warning light circuit	DI–1021 or DI–1025
VSC TRAC warning light circuit	DI–1027 or DI–1031
VSC OFF (TRAC OFF) indicator light circuit	DI–1048
BRAKE warning light circuit	DI–1033 or DI–1038
SLIP indicator light circuit	DI–1041 or DI–1045

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST between TC and CG terminals of the DLC3 and observing the blinking of the ABS and VSC warning lights, or by connecting a hand–held tester.
- This system has a sensor signal check function (TEST MODE) (See page DI–899).
  The DTC can be read by connecting the SST between terminals TS and CG of the DLC3 and observing the blinking of the ABS and VSC TRAC warning lights, or by connecting a hand–held tester.

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DIDM2–01

DTC CHECK / CLEAR

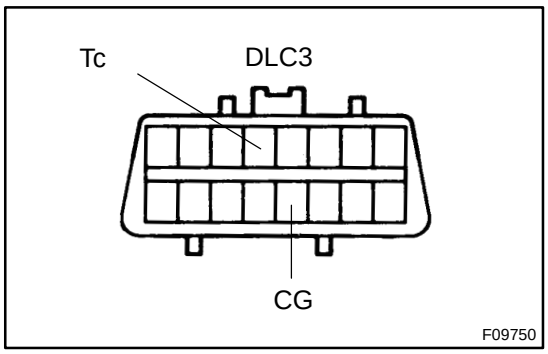
USING SST (CHECK WIRE):

1. CHECK DTC

(a) Using SST, connect terminals Tc and CG of the DLC3.
SST 09843–18040

(b) Turn the ignition switch to the ON position.

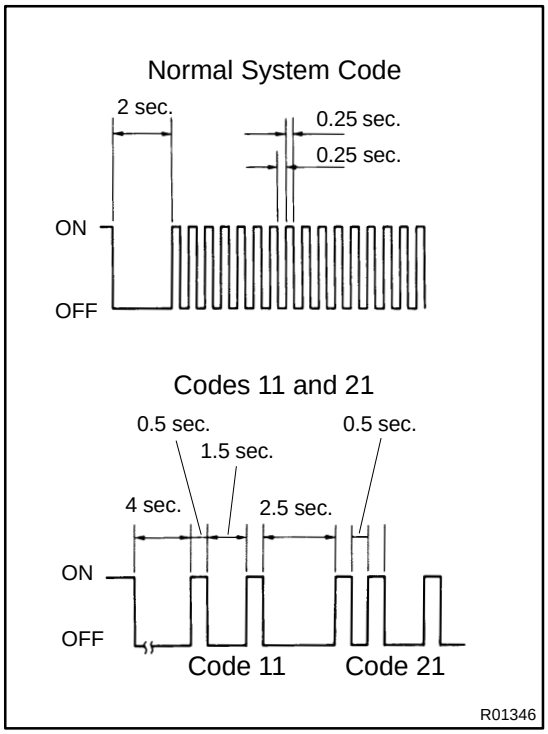
(c) Read the DTC from the ABS and VSC TRAC warning lights on the combination meter.



HINT:

▶ If no code appears, inspect the diagnostic circuit, ABS warning light circuit or VSC TRAC warning light circuit.

Trouble Area	See page
Tc terminal circuit	DI–1055
ABS warning light circuit	DI–1021 or DI–1025
VSC TRAC warning light circuit	DI–1027 or DI–1031



▶ As examples, the blinking patterns for normal system code and codes 11 and 21 are shown on the left.

(1) Codes are explained in the code table on page DI–921.

(2) After completing the check, disconnect terminals Tc and CG of the DLC3, and turn off the display.

If 2 or more trouble codes are identified at the same time, the DTCs will be displayed in ascending order.

2. CHECK TRANSLATE DTC

HINT:

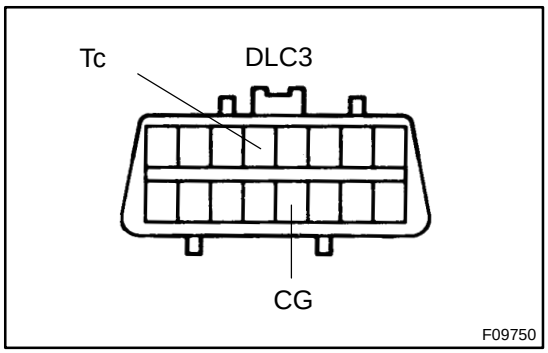
Once the ignition switch is turned off, all DTCs in the translate ECU are cleared.

(a) Release the parking brake pedal.

(b) Check the brake fluid level.

(c) Using SST, connect terminals Tc and CG of the DLC3.
SST 09843–18040

(d) Read the DTC of the BRAKE warning light.



NOTICE:

When reading DTCs, be sure to be seated in the driver's seat and depressing the brake pedal.

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HINT:

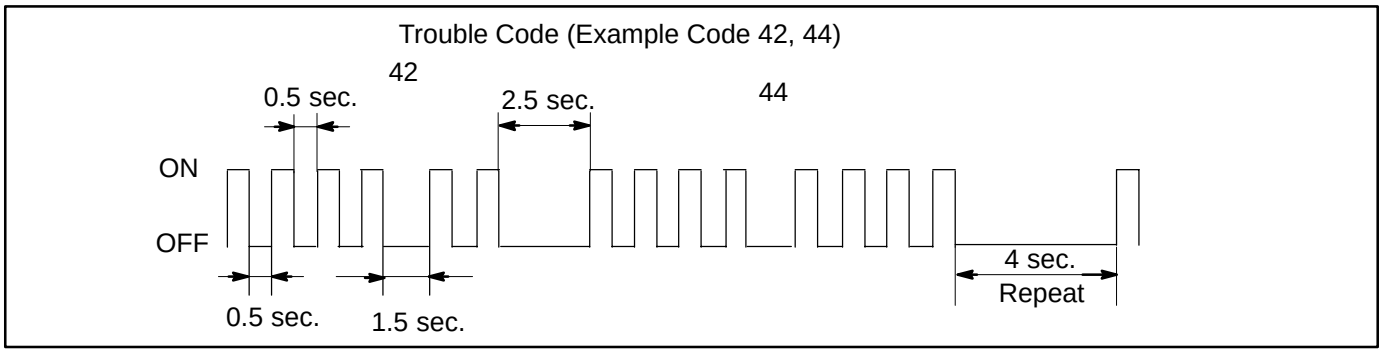
▶ If no code appears, inspect the diagnostic circuit, and BRAKE warning light circuit.

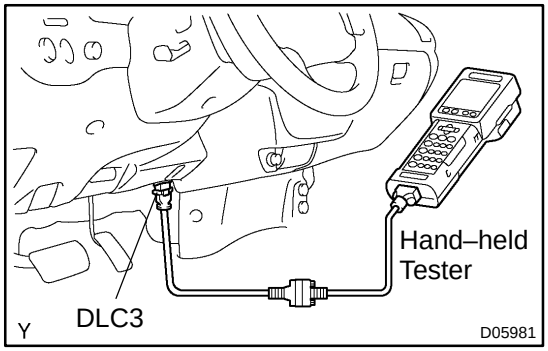
Trouble Area	See page
Tc terminal circuit	DI–1055
BRAKE warning light circuit	DI–1033 or DI–1038

▶ When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

▶ If all sensors are normal, a normal system code is output. (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated.)

▶ If 2 or more trouble codes are identified at the same time, the codes will be displayed in ascending order.





USING HAND–HELD TESTER:

3. CHECK DTC

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Read the DTC by following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator's manual for further details.

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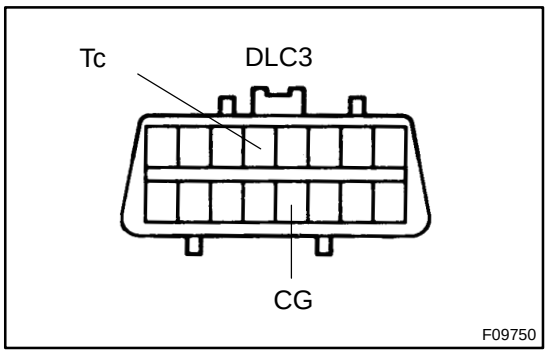
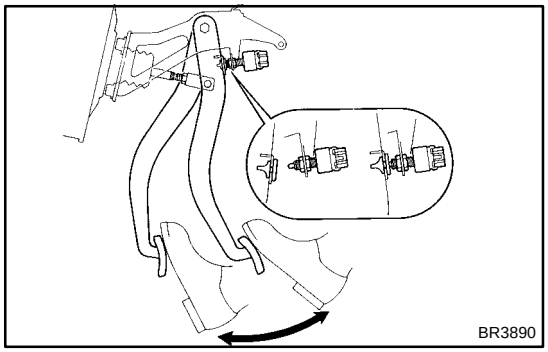


USING SST (CHECK WIRE):

4. CLEAR DTC

(a) Using SST, connect terminals Tc and CG of the DLC3.
SST 09843–18040

(b) Turn the ignition switch to the ON position.



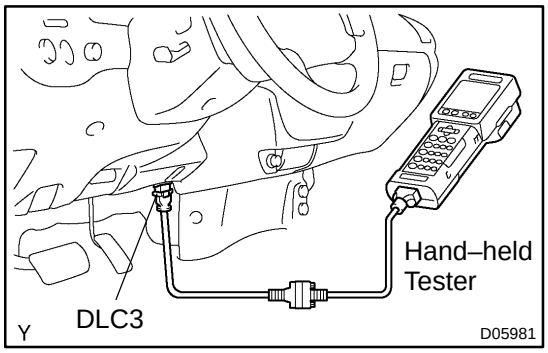
(c) Clear the DTC stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.

(d) Check that the warning light indicates the normal code.

(e) Remove the SST from the terminals of the DLC3.
SST 09843–18040

HINT:

Cancellation cannot be done by removing the battery cable or ECU–IG fuse.



USING HAND–HELD TESTER:

5. CLEAR DTC

(a) Hook up the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Operate the hand–held tester to erase the codes.

HINT:

(d) Please refer to the hand–held tester operator's manual for further details.

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DIDM3–01

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

- ▶ Whenever a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) state as freeze frame data.
- ▶ The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to the ON position since the last time the ABS was activated. However, if the vehicle was stopped or at low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will not count the number since then.
- ▶ Freeze frame data at the time the ABS operates:
  The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored when the ABS operated is erased.
- ▶ Freeze frame data at the time a DTC is detected:
  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) From the display on the tester, select the ”FREEZE FRAME DATA”.

Hand–held Tester Display	Measurement Item	Reference Value
VEHICLE SPD	Wheel speed sensor reading	min.: 0 km/h max.: 326 km/h
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Number of operations of ignition switch ON after memorizing freeze frame data	0 to 31
MAS CYL PRESS	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.9 V Brake pedal depressed: 0.8 to 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor change	–30 to 255 MPa/s
SYSTEM	System status	ABS activated: ABS VSC/TRC activated: VSC/TRC BA activated: BA Fail safe mode activated: FAIL SF No system activated: NO SYS
YAW RATE	Yaw rate angle sensor reading	–128 to 127
STEERING ANG	Steering sensor reading	Left turn: Increase Right turn: Drop
THROTTLE	Throttle position sensor reading	Release accelerator pedal: Approx. 0 deg. Depress accelerator pedal: Approx. 125 deg.
G (RIGHT & LEFT)	Right and left G	–1.869 to 1.869
G (BACK & FORTH)	Back and forth G	–1.869 to 1.869
VSC / TRC OFF SW	VSC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	FAIL P,N R D 4 3 2 L
TROUBLE CODE	Freeze DTC	min.: 0 max.: 255

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# CODES	Number of trouble codes	min.: 0 max.: 255
PEDAL STROKE	Pedal stroke sensor reading	min.: 0 V max.: 5.1 V
STROKE GRADE	Pedal stroke sensor change	min.: –2560 max.: 2550
SPD GRADE	Speed sensor grade	min.: –1.869 max.: 1.869

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DIDM4–01

FAIL–SAFE CHART

1. FAIL SAFE OPERATION

If there is a problem with sensor signals or actuator systems, the skid control ECU prohibits power supply to the ABS & VSC actuator and informs the ECM of VSC system failure.

The ABS & VSC actuator turns off each solenoid and the ECM shuts off VSC control (traction control signal) from the skid control ECU accordingly, which turns out to be as if the ABS, VSC and TRAC systems were not installed.

The ABS, VSC, and TRAC control will be prohibited, but EBD control continues as much as possible. If EBD control is impossible, the brake warning light comes on to warn the driver (See page DI–910).

Malfunction	Symptom
ABS system	ABS, BA, TRAC, and VSC control prohibited
BA system	ABS, BA, TRAC, and VSC control prohibited
EBD system	ABS & EBD control prohibited
TRAC system	TRAC and VSC control prohibited
VSC system	TRAC and VSC control prohibited

HINT:

- ▶ A malfunction in either the ABS or BA system will result in an identical operation, with ABS, BA, TRAC, and VSC system control prohibited.
- ▶ If control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.

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DIDM5–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

With the hand–held tester connected to the DLC3 and the ignition switch in the ON position, the ABS, TRAC and VSC data list can be displayed. Follow the prompts on the tester screen to access the DATA LIST.

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	ON : Motor relay ON OFF : Motor relay OFF	–
SOL RELAY	Solenoid relay / ON or OFF	ON : Solenoid relay ON OFF : Solenoid relay OFF	–
VSC / TRC OFF SW	TRAC control switch / ON or OFF	ON : TRAC control switch ON OFF : TRAC control switch OFF	–
AIR BLD SUPPORT	Air bleed support / ON or OFF	ON : Support ON OFF : Support OFF	–
STOP LIGHT SW	Stop lamp switch / ON or OFF	ON : Brake pedal depressed OFF : Brake pedal released	–
PKB SW	Parking brake switch / ON or OFF	ON : Parking brake applied OFF : Parking brake released	–
ABS OPERT FR	ABS operation (FR) / BEFORE or OPERATE	BEFORE : No ABS operation (FR) OPERATE : During ABS operation (FR)	–
ABS OPERT FL	ABS operation (FL) / BEFORE or OPERATE	BEFORE : No ABS operation (FL) OPERATE : During ABS operation (FL)	–
ABS OPERT RR	ABS operation (RR) / BEFORE or OPERATE	BEFORE : No ABS operation (RR) OPERATE : During ABS operation (RR)	–
ABS OPERT RL	ABS operation (RL) / BEFORE or OPERATE	BEFORE : No ABS operation (RL) OPERATE : During ABS operation (RL)	–
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD FL	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD RR	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD RL	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Similar speed as indicated on speedometer

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DECELERAT SEN	Deceleration sensor 1 reading / min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G at still condition	Reading changes when vehicle is bounced
DECELERAT SEN2	Deceleration sensor 2 reading / min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G at still condition	Reading changes when vehicle is bounced
IG VOLTAGE	ECU power supply voltage / TOO LOW / NORMAL / TOO HIGH	TOO LOW : 9.5 V or less NORMAL : 9.5 to 14.0 V TOO HIGH : 14.0 V or more	–
SFRR	ABS solenoid (SFRR) / ON or OFF	ON : Operated OFF : Not operated	–
SFRH	ABS solenoid (SFRH) / ON or OFF	ON : Operated OFF : Not operated	–
SFLR	ABS solenoid (SFLR) / ON or OFF	ON : Operated OFF : Not operated	–
SFLH	ABS solenoid (SFLH) / ON or OFF	ON : Operated OFF : Not operated	–
SRRR (SRR)	ABS solenoid (SRRR (SRR)) / ON or OFF	ON : Operated OFF : Not operated	–
SRRH (SRH)	ABS solenoid (SRRH (SRH)) / ON or OFF	ON : Operated OFF : Not operated	–
SRLR	ABS solenoid (SRLR) / ON or OFF	ON : Operated OFF : Not operated	–
SRLH	ABS solenoid (SRLH) / ON or OFF	ON : Operated OFF : Not operated	–
SRMR (SMCR, STR)	SRMR (SMCR, STR) / ON or OFF	ON : Operated OFF : Not operated	–
SRMF (SMCF SA3)	SRMF (SMCF, SA3) / ON or OFF	ON : Operated OFF : Not operated	–
SRCR (SA2)	SRCR (SA2) / ON or OFF	ON : Operated OFF : Not operated	–
SRCF (SA1)	SRCF (SA1) / ON or OFF	ON : Operated OFF : Not operated	–
YAW RATE	Yaw rate sensor/ Min.: –128 deg/s, Max.: 127 deg/s	Min.: –128 deg/s Max.: 128 deg/s	–
YAW ZERO VALUE	Memorized zero value/ Min.: –128 deg/s, Max.: 127 deg/s	Min.: –128 deg/s Max.: 128 deg/s	–
STEERING ANG	Steering sensor/ Min.: –1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	–
MAS CYL PRS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed
MAS CYL PRS 2	Master cylinder pressure sensor 2 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.9 V	Reading increases when brake pedal is depressed
PEDAL STROKE	Pedal Stroke Sensor min.: 0, max.: 5.1	Approximately 2.0 V without the brake pedal depressed	–

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2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, actuator, etc. to operate without removing any parts. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) According to the display on the tester, perform the ACTIVE TEST.

HINT:

The Ignition switch must be turned to the ON position to proceed to the ACTIVE TEST using the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMR (SMCR, STR)	Turns TRAC solenoid (SRMR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMF (SMCF, SA3)	Turns TRAC solenoid (SRMF) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCR (SA2)	Turns TRAC solenoid (SRCR) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCF (SA1)	Turns TRAC solenoid (SRCF) ON / OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation of motor (clicking sound) can be heard
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter

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VSC WARN LIGHT	Turns VSC warning light ON / OFF	Observe combination meter
VSC / TRC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard
SFRR & SFRH	Turns ABS solenoid SFRR & SFRH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFLR & SFLH	Turns ABS solenoid SFLR & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRH & SRR	Turns ABS solenoid SRH & SRR ON / OFF	Operation of solenoid (clicking sound) can be heard
SRLR & SRLH	Turns ABS solenoid SRLR & SRLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SFRH & SFLH	Turns ABS solenoid SFRH & SFLH ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCF & SRCR	Turns ABS solenoid SRCF & SRCR ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMF & SRMR	Turns ABS solenoid SRMF & SRMR ON / OFF	Operation of solenoid (clicking sound) can be heard

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DI93C–06

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

- **When removing parts, turn the ignition switch OFF.**
- **When replacing the master cylinder, yaw rate and deceleration sensors and/or the ECU, make sure to perform master cylinder, yaw rate and deceleration sensors' zero point calibration (See page DI–897).**

HINT:

- Using SST 09843–18040, connect terminals Tc and CG.
- If no abnormality is found when inspecting parts, inspect the ECU.
- If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC chart of ABS system:

DTC No. (See Page)	Detection Item	Trouble Area
C0200/31*1 (DI–925)	Right front wheel speed sensor signal malfunction	▶Right front, left front, right rear and left rear speed sensor ▶Each speed sensor circuit ▶Speed sensor rotor ▶Skid control ECU
C0205/32*1 (DI–925)	Left front wheel speed sensor signal malfunction	
C0210/33*1 (DI–925)	Right rear wheel speed sensor signal malfunction	
C0215/34*1 (DI–925)	Left rear wheel speed sensor signal malfunction	
C0226/21 (DI–932)	Malfunction in ABS & VSC solenoid valves	▶ABS & VSC actuator ▶ABS & VSC solenoid circuit
C0278/11 (DI–934)	Open or short circuit in ABS & VSC relay circuit	▶ABS & VSC solenoid relay ▶ABS & VSC solenoid relay circuit ▶ABS & VSC motor relay ▶ABS & VSC motor relay circuit
C1241/41 (DI–957)	Low battery positive voltage or abnormally high battery positive voltage	▶Battery ▶Charging system ▶Power source circuit (+BM, +BS) ▶Skid control ECU
C1244/44 (DI–951)	Open or short circuit in deceleration sensor circuit	▶Yaw rate (deceleration) sensor ▶Yaw rate (deceleration) sensor circuit
C1247/47 (DI–960)	Malfunction in delta S sensor	▶Delta S sensor ▶Delta S sensor circuit ▶Skid control ECU ▶Brake booster
C1249/49 (DI–963)	Open circuit in stop light switch circuit	▶Stop light switch ▶Stop light switch circuit ▶Skid control ECU
C1251/51*1 (DI–966)	Pump motor is locked Open circuit in pump motor circuit	▶ABS & VSC actuator
C1337/37 (DI–975)	Some tires are different in size from the other tires	▶Tire size
Always ON (DI–1016)	Malfunction in skid control ECU	▶Battery ▶Charging system ▶Power source circuit ▶ABS warning light circuit ▶Skid control ECU

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*1: As long as the following operations are not performed, the ABS warning light will not go OFF only by repairing the trouble area.
(1) Drive the vehicle at 12 mph (20 km/h) for 30 seconds or more and check that the ABS warning light goes off.
(2) Clear the DTC (See page DI–911).
HINT:
There is a possibility that the hand–held tester cannot be used when the ABS warning light is always ON.

DTC chart of VSC system:

DTC No. (See Page)	Detection Item	Trouble Area
C1201/51 (DI–936)	Engine control system malfunction	▶Engine control system
C1202/52 (DI–937)	Brake fluid level warning switch circuit	▶Brake fluid level ▶Brake fluid level warning switch ▶Brake fluid level warning switch circuit ▶Skid control ECU ▶CAN1 communication system ▶Translate ECU
C1203/53 *1 (DI–942)	Malfunction in CAN1 communication	▶Skid control ECU ▶CAN1 communication system ▶ECM ▶Translate ECU
C1207/37 (DI–522)	Reverse gear signal failure	ECT
C1223/43 (DI–945)	Malfunction in ABS control system	ABS control system
C1231/31 (DI–946)	Malfunction in steering angle sensor	▶Steering angle sensor ▶Steering angle sensor communication circuit ▶Skid control ECU ▶Translate ECU ▶CAN communication system
C1232/32 (DI–951)	Malfunction in deceleration sensor	▶Yaw rate (deceleration) sensor ▶Yaw rate (deceleration) sensor circuit
C1234/34 (DI–954)	Malfunction in yaw rate sensor	▶Yaw rate (deceleration) sensor ▶Yaw rate (deceleration) sensor circuit
C1310/11 (DI–969)	Open or short circuit in active brake booster solenoid circuit	▶Brake booster ▶Active brake booster solenoid circuit
C1311/12 (DI–971)	Open or short circuit in brake inhibit relay circuit	▶Brake inhibit relay ▶Brake inhibit relay circuit
1335/35 (DI–946)	Malfunction in steering angle sensor communication circuit	▶Steering angle sensor ▶Steering angle sensor communication circuit ▶Skid control ECU ▶Translate ECU ▶CAN1 communication system
C1340/47*2 (DI–977)	Center diff. lock circuit malfunction	▶Center diff. lock position switch ▶Center diff. lock position switch circuit ▶Center diff. lock indicator light circuit ▶Translate ECU
C1360/61 (DI–983)	Malfunction in master cylinder pressure sensor	▶Master cylinder pressure sensor ▶Master cylinder pressure sensor circuit

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C1361/62 (DI–986)	Abnormal battery voltage of VSC sensor	▶Battery ▶Charging system ▶Power source circuit ▶Yaw rate (deceleration) sensor ▶Skid control ECU ▶Master cylinder pressure sensor
C1362/36 (DI–990)	Malfunction in sensor offset value (VSC sensor system)	Skid control ECU (Perform zero point calibration)
C1363/63 (DI–991)	Malfunction in booster pedal force switch	▶Booster pedal force switch (Active brake booster) ▶Booster pedal force switch (Active brake booster) circuit
U0100/65 (DI–1075)	Malfunction in vehicle CAN communication system	▶Vehicle CAN communication system

HINT:

There is a possibility that the hand–held tester cannot be used when the VSC TRAC warning light is always ON.

*1: Check DTC chart C1203/53 first, then troubleshoot according to the DTC chart of translate ECU if necessary.

*2: 4WD

DTC chart of translate ECU (When DTC ”C1201/51, C1202/52, C1203/53 or U0100/65” of VSC system is output):

DTC No. (See Page)	Detection Item	Trouble Area
Normal code* (DI–1013)	Malfunction in ECM control system or suspension control ECU	▶ECM circuit ▶ECM ▶Brake fluid level ▶Brake fluid level warning switch circuit ▶Steering angle sensor ▶Translate ECU ▶Skid control ECU ▶Vehicle CAN ▶VSC+, VSC– circuit (CAN1 communication system)
51 (DI–995)	Malfunction in ECM control system	▶ECM
53 (DI–998)	Malfunction in CAN1 communication	▶VSC+, VSC– circuit (CAN1 communication system) ▶Skid control ECU ▶Translate ECU
58 (DI–1002)	Malfunction of brake fluid level switch	▶Brake fluid level warning switch circuit ▶Brake fluid level warning switch ▶Brake fluid reservoir level ▶Translate ECU
65 (DI–1005)	Malfunction 1 of vehicle CAN	▶ENG+, ENG– circuit (CAN communication system) ▶ECM ▶Translate ECU ▶Suspension control ECU
94 (DI–1009)	Malfunction 2 of vehicle CAN	▶ENG+, ENG– circuit (CAN communication system) ▶ECM ▶Translate ECU ▶Suspension control ECU
Non–code (DI–1015)	Malfunction in translate ECU	▶Brake warning light circuit ▶Tc terminal circuit ▶Translate ECU

*: Translate ECU is normal.

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If the brake warning light turns on, check that the parking brake pedal is released, the brake fluid level is normal, and no malfunction is identified in the fluid level warning switch system.
If there is a problem with VSC, the brake warning light comes on. The possible causes of a problem are as follows:

- 2 or more wheel speed sensor failures
- Low/high voltage
- Valve failure

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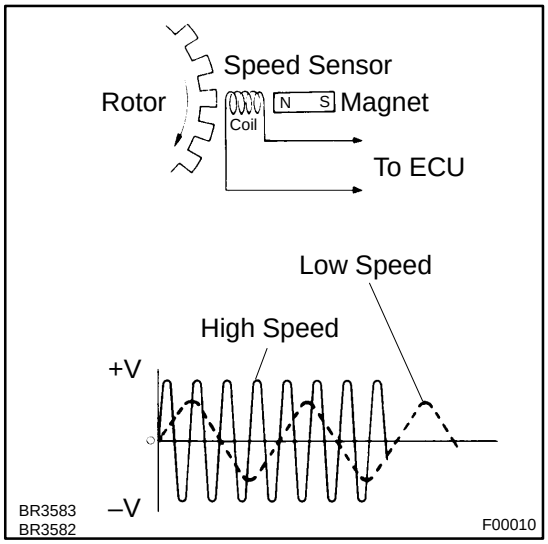
DI93G–05

CIRCUIT INSPECTION

DTC	C0200 / 31 – C0215 / 34	Speed Sensor Circuit

CIRCUIT DESCRIPTION



The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS control system. The front and rear rotors have 48 serrations each.

When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	When any of the following is detected: 1. During driving, speed sensor signals are not input for a fixed time. 2. Momentary interruption in speed sensor signals occurs many times during driving. 3. Abnormal signal occurs in pulse signal from speed sensor during driving. 4. Speed sensor signal circuit continues to be open for a fixed time.	▶Right front, left front, right rear and left rear speed sensor ▶Each speed sensor circuit ▶Sensor rotor ▶Skid control ECU

HINT:

DTC No. C0200 / 31 is for the right front speed sensor.
DTC No. C0205 / 32 is for the left front speed sensor.
DTC No. C0210 / 33 is for the right rear speed sensor.
DTC No. C0215 / 34 is for the left rear speed sensor.

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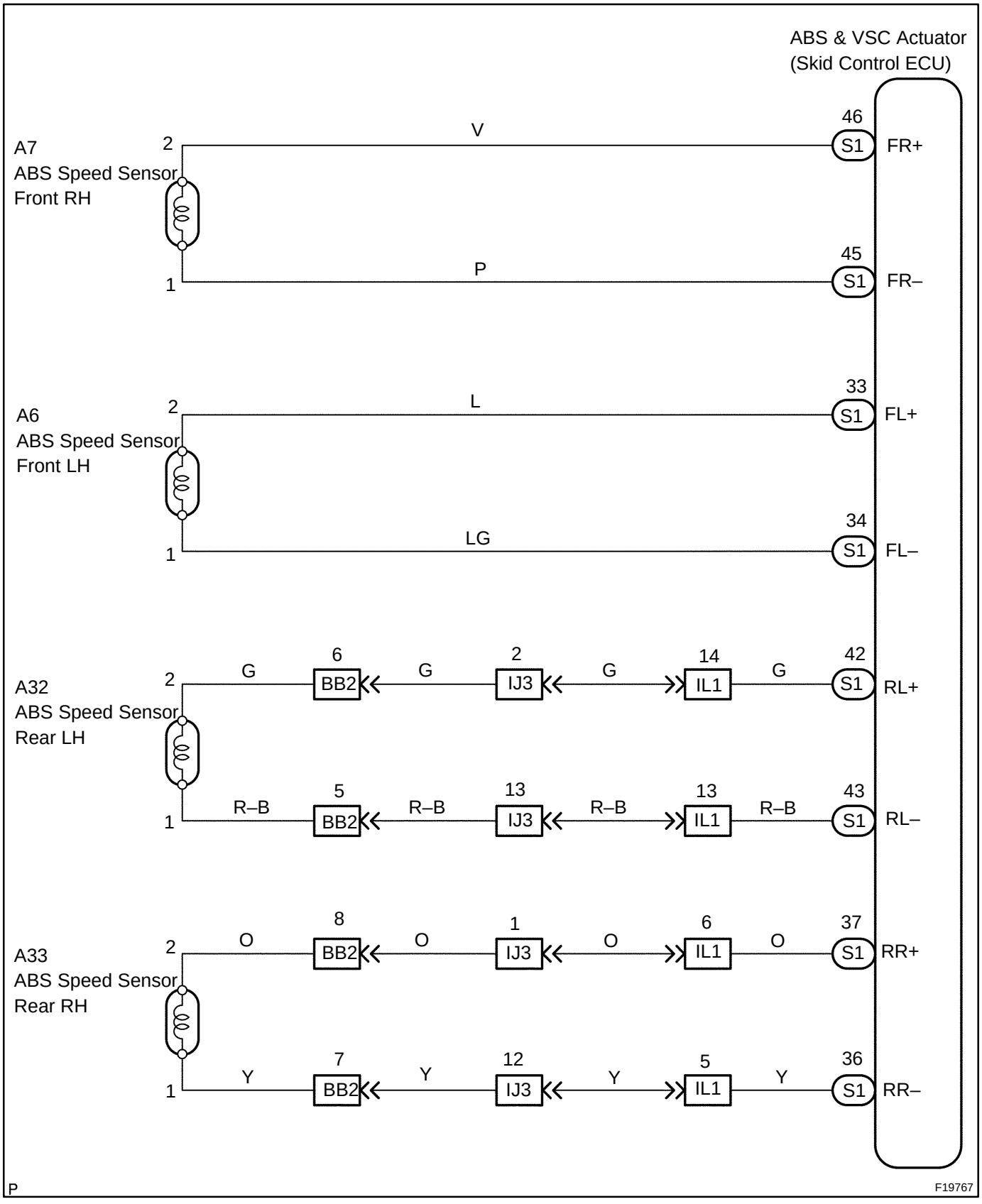
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check output value of speed sensor.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.

(c) Select DATA LIST mode on the hand–held tester.

CHECK:

Check that there is no difference between the speed value output from the speed sensor displayed by the hand–held tester and the speed value displayed by the speedometer when driving the vehicle.

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WHEEL SPD FR	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD FL	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD RR	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
WHEEL SPD RL	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer

OK:

There is almost no difference from the displayed speed value.

HINT:

There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

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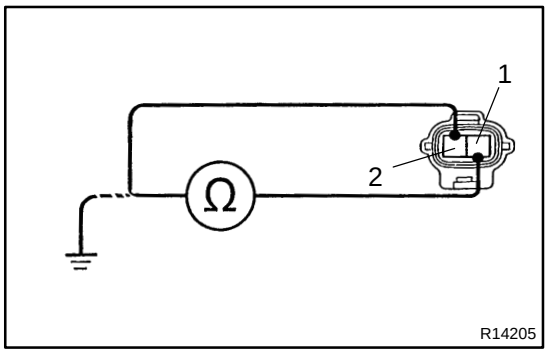
2	Check speed sensor.



Front:

PREPARATION:

(a) Make sure that there is no looseness at the connector lock part and connecting part of the connector.

(b) Disconnect the speed sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector.

OK:

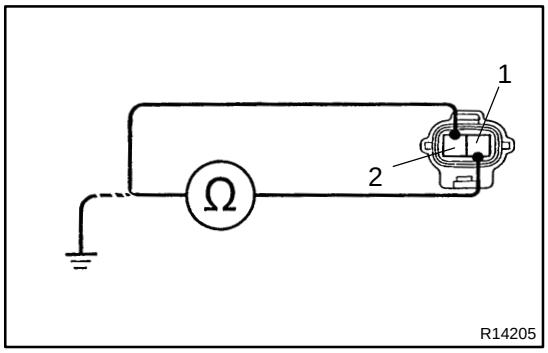
Resistance: 0.92 to 1.22 kΩ

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Make sure that there is no looseness at the connector lock part and connecting part of the connector.

(b) Disconnect the speed sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 1.8 to 2.2 kΩ

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor (See page BR–56 or BR–59).**

NOTICE:

Check the speed sensor signal after replacement (See page DI–899).

OK

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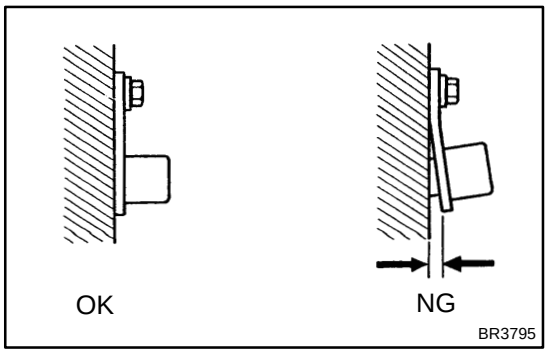
3	**Check for open and short circuit in harness and connector between each speed sensor and skid control ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

4	**Check sensor installation.**



CHECK:
Check the speed sensor installation.
OK:

The installation bolt is tightened properly and there is no clearance between the sensor and the front steering knuckle or the rear axle carrier.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

NG → **Replace speed sensor (See page BR–56 or BR–59).**

NOTICE:
Check the speed sensor signal after replacement (See page DI–899).

OK

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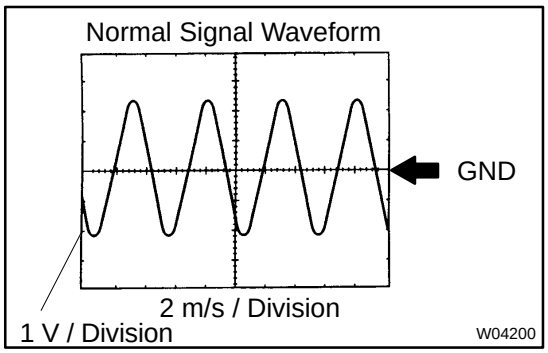
5	Check speed sensor and sensor rotor serrations.



INSPECTION USING OSCILLOSCOPE

PREPARATION:

Connect the oscilloscope to the terminal FR+ – FR–, FL+ – FL–, RR+ – RR– and RL+ – RL– of the skid control ECU.

CHECK:

Drive the vehicle at about 12 mph (20 km/h), and check the signal waveform.

OK:

A waveform as shown in the figure should be output.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

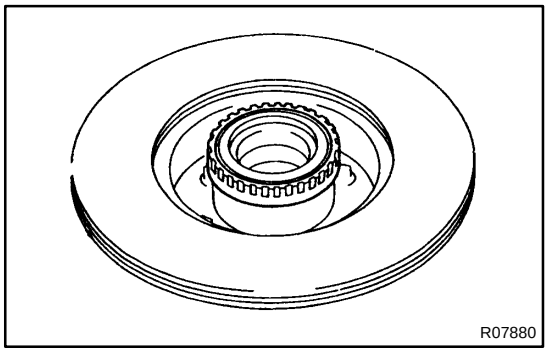
OK	Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

NG

6	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove the disc (See page SA–22).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the front speed sensor (See page BR–56).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

Remove any foreign matter if identified.

Check the output waveform again after reassembly.

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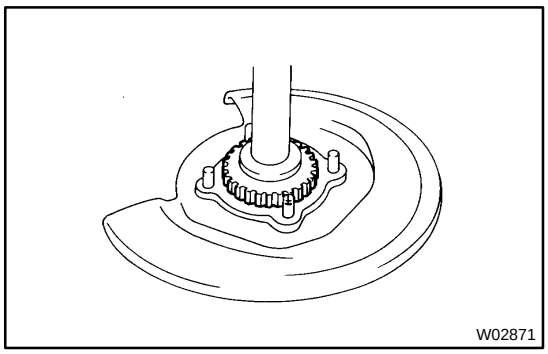

Rear:

PREPARATION:

Remove the axle shaft (See page SA–95).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR–59).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

NG → **Replace speed sensor or rotor.**

NOTICE:

Check the speed sensor signal after replacement (See page DI–899).

HINT:

Remove any foreign matter if identified.

Check the output waveform again after reassembly.

OK

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DI93H–03

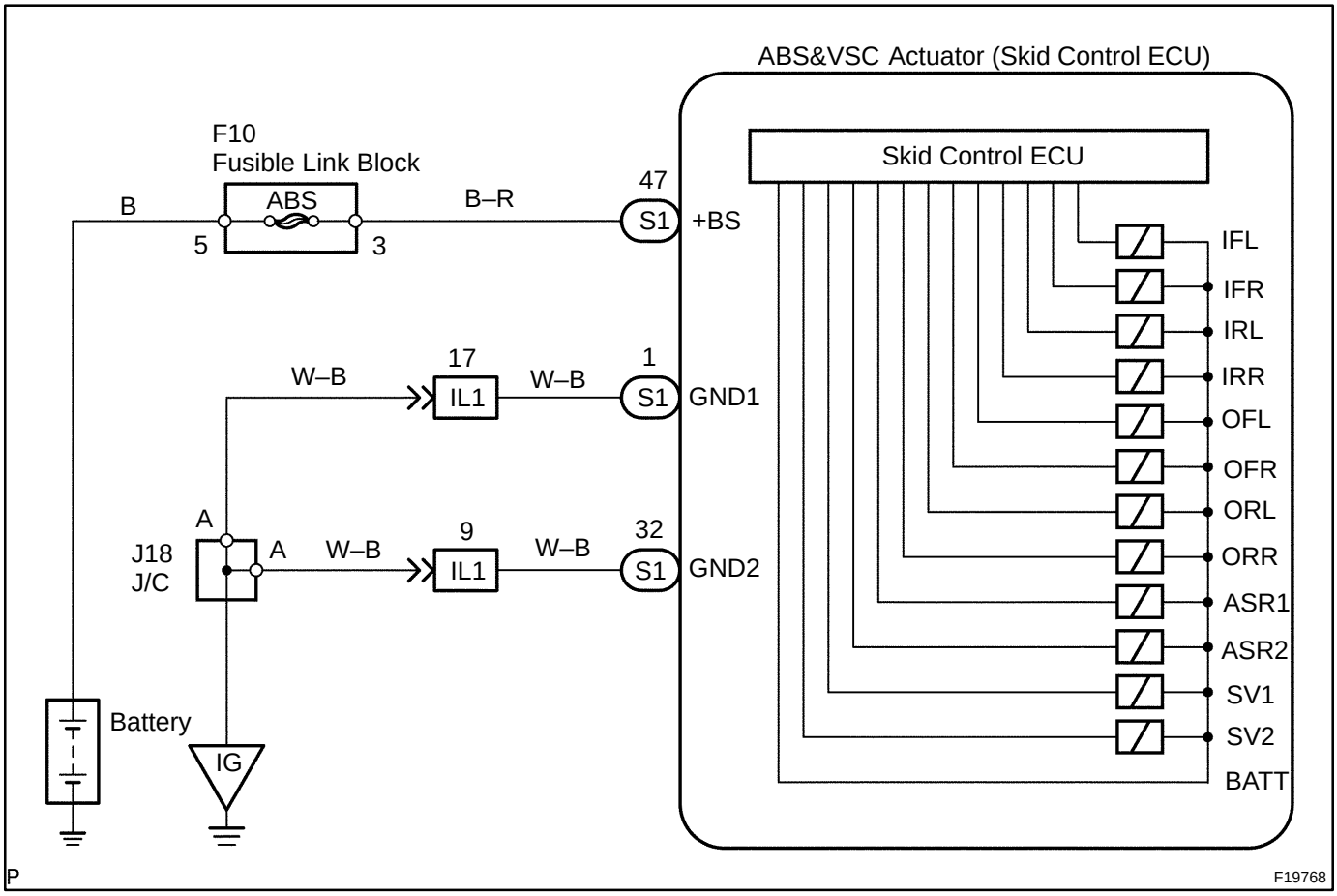
DTC	C0226 / 21	ABS & VSC Solenoid Circuit

CIRCUIT DESCRIPTION

This solenoid turns on when signals are received from the ECU and controls the pressure acting on the wheel cylinders to control braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Solenoid valve signal does not match the check result.	▶ABS & VSC actuator ▶ABS & VSC solenoid circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check DTC once more (See page DI–911).**

PREPARATION:

(a) Clear the DTC.

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **No problem.**

A

Replace skid control ECU with actuator (See page BR–51).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DI93I–03

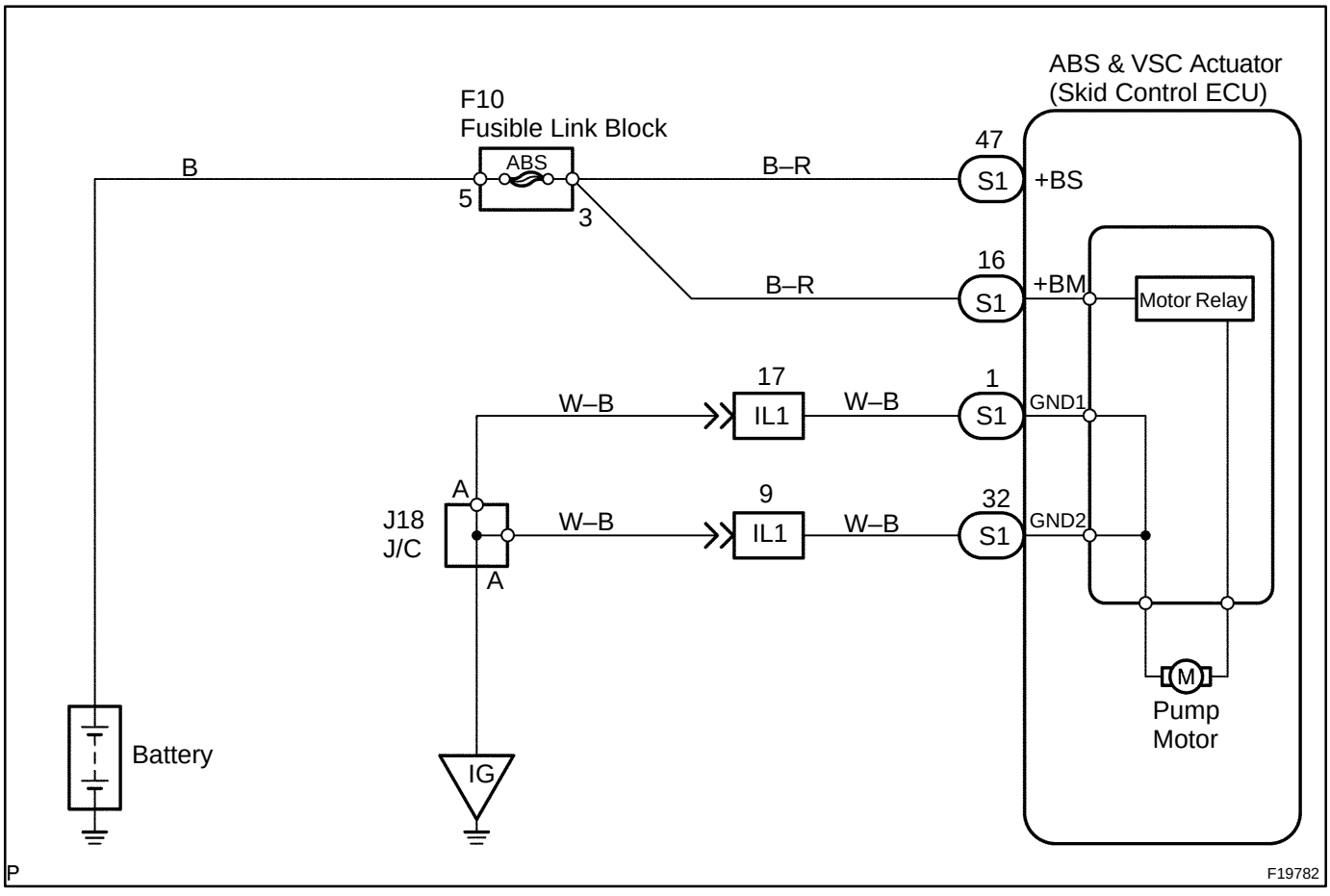
DTC	C0278 / 11	ABS & VSC Relay Circuit

CIRCUIT DESCRIPTION

This relay supplies power to each ABS & VSC solenoid. If the initial check is OK, then the relay turns on after the ignition switch is turned ON.

DTC No.	DTC Detecting Condition	Trouble Area
C0278 / 11	Relay circuit continues to be open for a fixed time when solenoid relay is ON after ignition switch is turned ON.	▶ABS & VSC solenoid relay ▶ABS & VSC solenoid relay circuit ▶ABS & VSC motor relay ▶ABS & VSC motor relay circuit

WIRING DIAGRAM



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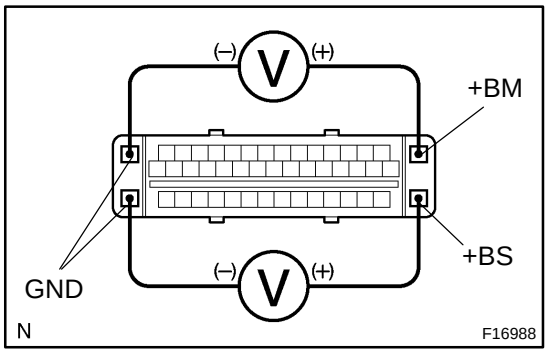
INSPECTION PROCEDURE

1	**Check voltage between terminals +BS, +BM and GND of the skid control ECU connector.**



PREPARATION:
Disconnect the skid control ECU connector.
CHECK:
Measure the voltage between terminals +BS, +BM and GND of the skid control ECU harness side connector.
OK:
Voltage: 10 to 14 V

NG → **Check and replace ABS fuses.**
Check and repair harness or connector.

OK

If the same code is still indicated after the DTC is deleted, check the condition of each connection.
If the connections are normal, the skid control ECU may be defective.

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DIDM6–01

DTC	C1201 / 51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If trouble occurs in the engine control system, the ECM transmits the abnormality to the skid control ECU via translate ECU. The skid control ECU sets this DTC and the skid control ECU prohibits TRAC and VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201 / 51	Conditions 1. and 2. continue for 5 sec.: 1. Engine speed: 500 rpm or more. 2. A trouble signal of the engine control system is input.	▶Engine control system

INSPECTION PROCEDURE

1	Check engine control system.

CHECK:

Check engine control system (See page DI–43).

RESULT:

DTC is not output	A
DTC is output	B

B → **Check and repair engine control system (See page DI–9).**

A → **Replace ECM (See page SF–80).**

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DIDM7–01

DTC	C1202 / 52	Brake Fluid Warning Switch Circuit

CIRCUIT DESCRIPTION

The brake fluid level warning switch sends the appropriate signal to the skid control ECU when the brake fluid level drops.

A brake fluid level signal is transmitted from the translate ECU to the skid control ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1202 / 52	When any of the following conditions are detected: 1. Low fluid level condition in the brake master cylinder reservoir tank continues for 30 sec. or more when vehicle stops, or for 60 sec. or more when driving. 2. With ECU terminal IG1 voltage is 9.5 V to 17.2 V and open circuit for the brake fluid level warning switch circuit continues for 2 sec. or more.	▶Brake fluid level ▶Brake fluid level warning switch ▶Brake fluid level warning switch circuit ▶Skid control ECU ▶CAN1 communication system ▶Translate ECU

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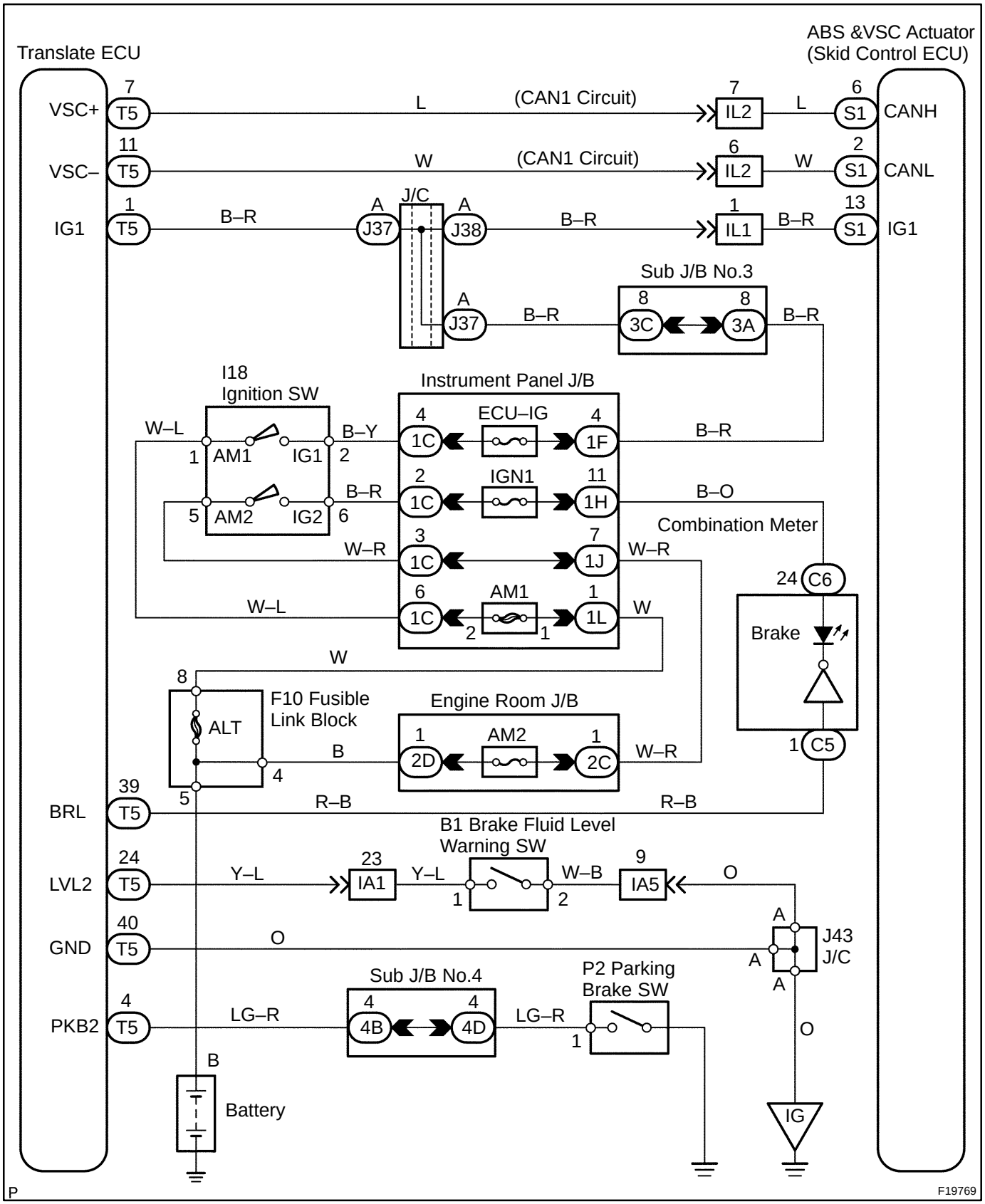
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check brake fluid level.**

CHECK:

Check the amount of fluid in the brake reservoir.

NG → **Check and repair brake fluid leakage and add fluid.**

OK

2	**Check DTC of translate ECU (translate DTC 58).**

CHECK:

Check DTC of the translate ECU (See page DI–911).

RESULT:

DTC 58 is not output	A
DTC 58 is output	B

B → **Go to step 4.**

A

3	**Check for open and short circuit in harness and connector between skid control ECU and translate ECU (CAN1 circuit).**

NG → **Repair or replace harness or connector (CAN1 circuit).**

OK

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

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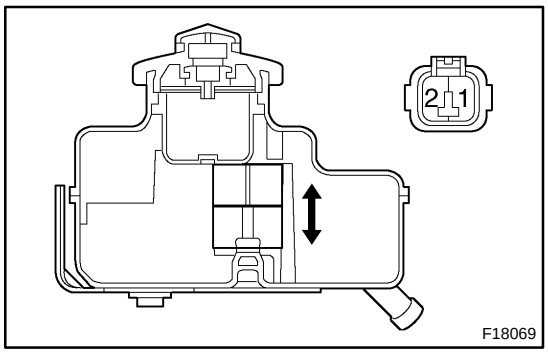
4	**Check brake fluid level warning switch.**



PREPARATION:

Disconnect the brake fluid level warning switch connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Switch Condition	Specified Condition
(B2–1) – (B2–2)	Float UP	10 kΩ or more (No continuity)
(B2–1) – (B2–2)	Float DOWN	1 Ω or less (Continuity)

NG → **Replace brake reservoir tank.**

OK

5	**Check for open and short circuit in harness and connector between brake fluid level warning switch and translate ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

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6	**Replace the translate ECU and check if trouble occurs again.**

PREPARATION:

(a) Clear the DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC C1202/52 is output	A
DTC C1202/52 is not output	B

B → **END**

A →

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

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DI93J–04

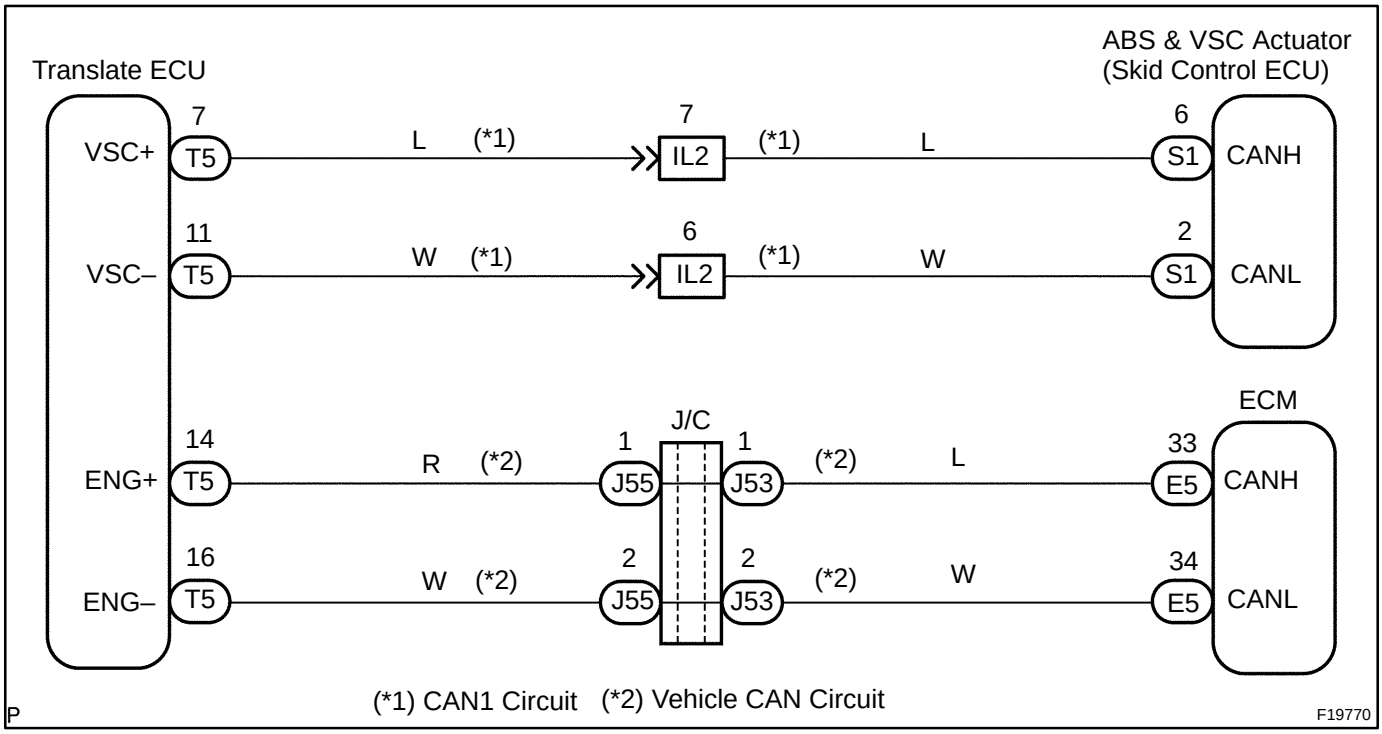
DTC	C1203 / 53	Malfunction in CAN1 Communication

CIRCUIT DESCRIPTION

This circuit is used to send TRAC & VSC control information from the skid control ECU to the ECM (CAN communication system) and engine control information from the ECM to the skid control ECU (CAN communication system).
The skid control ECU and ECM are connected to each other via the translate ECU using the CAN communication system.

DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	Data cannot be transmitted and/or received to/from ECM from translate ECU for a fixed time.	▶Skid control ECU ▶CAN1 communication system ▶ECM ▶Translate ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check engine control system.**

CHECK:

Check engine control system (See page DI–43).

RESULT:

DTC is not output	A
DTC is output	B

B → **Repair engine control system according to the output code (See page DI–58).**

A

2	**Check DTC of translate ECU.**

CHECK:

Check DTC of the translate ECU (See page DI–911).

RESULT:

DTC is output (53, 65, 94)	A
DTC is not output	B

B → **Go to step 4.**

A

3	**Check for open and short circuit in harness and connector between skid control ECU and translate ECU (CAN1 circuit).**

NG → **Repair or replace harness or connector (CAN1 circuit).**

OK

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4	**Replace the translate ECU and check if trouble occurs again.**

PREPARATION:

(a) Clear the DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **END**

A →

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

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DI93K–03

DTC	C1223 / 43	Malfunction in ABS Control System

CIRCUIT DESCRIPTION

HINT:

This DTC is output when the VSC system detects a malfunction in the ABS system.

DTC No.	DTC Detecting Condition	Trouble Area
C1223 / 43	ABS control system is abnormal.	ABS control system

INSPECTION PROCEDURE

1	**Check DTC (See page DI–911).**

PREPARATION:

(a) Clear the DTC.

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **No problem.**

A

Repair circuit indicated by output code (See page DI–921).

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DI93L–04

DTC	C1231 / 31, C1335 / 35	Steering Angle Sensor Circuit

CIRCUIT DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU via the CAN communication system. When there is a malfunction in the communication system, the DTCs will be detected by the diagnosis function.

DTC No.	DTC Detecting Condition	Trouble Area
C1231 / 31	Data is not transmitted to the steering angle sensor for a fixed time invalid steering angle sensor data.	▶Translate ECU ▶Steering angle sensor ▶Steering angle sensor communication circuit ▶Skid control ECU ▶CAN communication system
C1335 / 35	When the +BS terminal voltage is 9.5 V or more, data transmission from the steering angle sensor is impossible for 1 sec. or more.	▶Translate ECU ▶Steering angle sensor ▶Steering angle sensor to translate ECU circuit ▶Skid control ECU ▶CAN1 communication system

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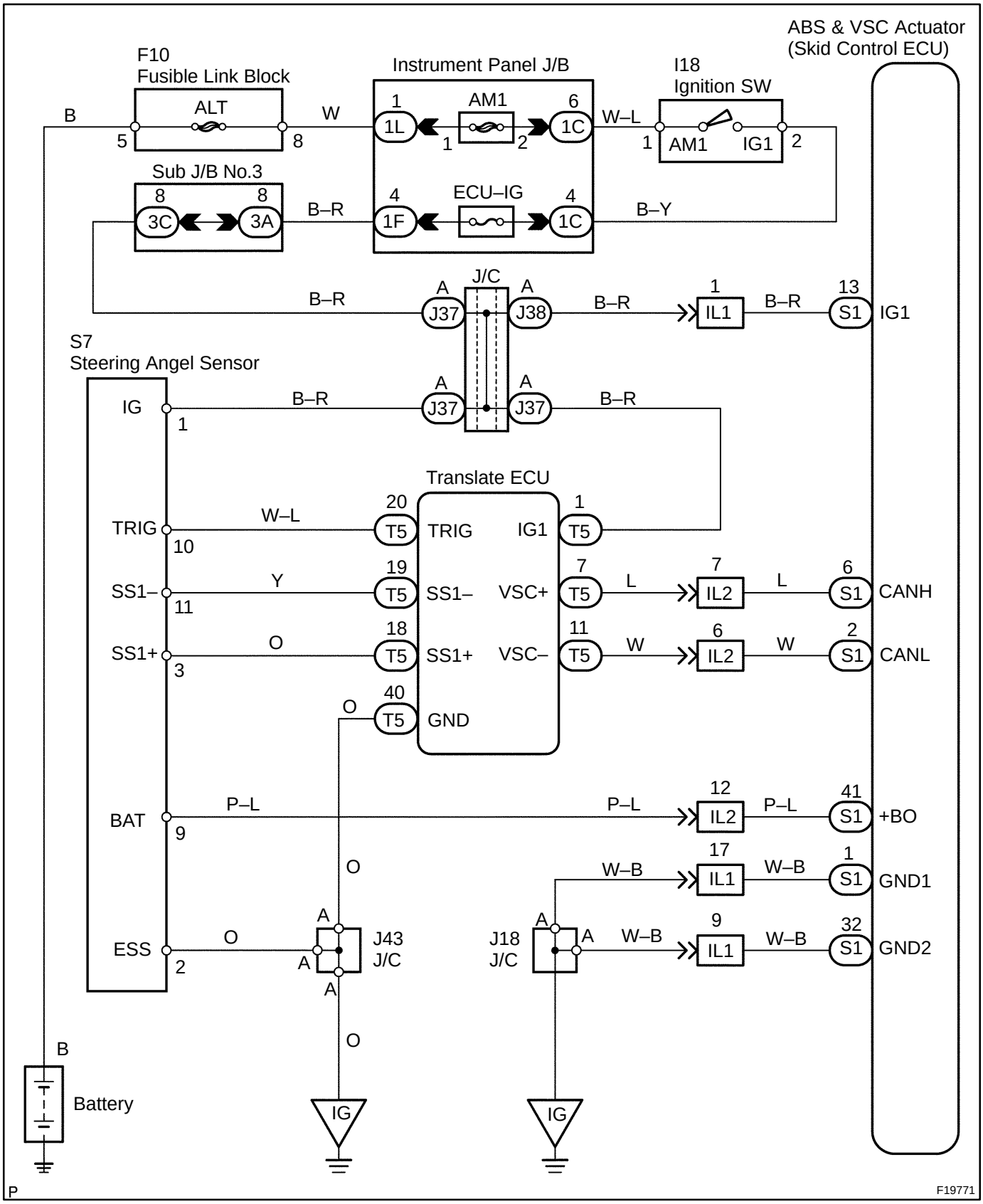
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check output value of the steering angle sensor.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.
(c) Check that the steering wheel is centered.
(d) Select DATA LIST mode on the hand–held tester.

CHECK:

Check that the steering wheel turning angle value of the steering angle sensor displayed on the hand–held tester changes when turning the steering wheel.

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
STEERING ANG	Steering sensor/ Min.: –1152 deg, Max.: 1150.875 deg	Left turn: Increase Right turn: Decrease	–

OK:

Turn the steering wheel to the left: Value increases
Turn the steering wheel to the right: Value decreases

HINT:

If the steering sensor zero point calibration is not performed, its value will be fixed to 1,150 deg.
Check after driving the vehicle straight ahead at a speed of 6.5 mph (10.5 km/h) or more.

OK → **Go to step 7.**

NG

2	**Check the installation condition of the steering angle sensor.**

CHECK:

Check steering angle sensor installation condition.

OK:

Steering angle sensor installed correctly.

NG → **Repair or replace steering angle sensor.**

NOTICE:

If the steering angle sensor has been replaced, drive the vehicle straight ahead at a speed of 6.5 mph (10.5 km/h) or more to calibrate the steering angle sensor.

OK

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3	**Check for open and short circuit in harness and connector between steering angle sensor and translate ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

4	**Check for open and short circuit in harness and connector between skid control ECU and translate ECU (CAN1 circuit).**

NG → **Repair or replace harness or connector (CAN1 circuit).**

OK

5	**Is DTC still output?**

Check DTC on page DI–911.

NO → **No problem.**

YES

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6	**Replace the skid control ECU and check if trouble occurs again.**

PREPARATION:
(a) Clear the DTC.
(b) Turn the ignition switch OFF.
CHECK:
Check if the same DTC still remains in the memory.
RESULT:

DTC is output	A
DTC is not output	B

B → **END.**

A →

Replace steering angle sensor.

NOTICE:
- **When replacing the skid control ECU, perform the zero point calibration (See page DI–897).**
- **If the steering angle sensor has been replaced, drive the vehicle straight ahead at a speed of 6.5 mph (10.5 km/h) or more to calibrate the steering angle sensor.**

7	**Check DTC once more (See page DI–911).**

PREPARATION:
(a) Clear the DTC.
(b) Turn the ignition switch OFF.
CHECK:
Check if the same DTC still remains in the memory.
RESULT:

DTC is output	A
DTC is not output	B

B → **END.**

A →

Replace skid control ECU with actuator (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DIDM8–01

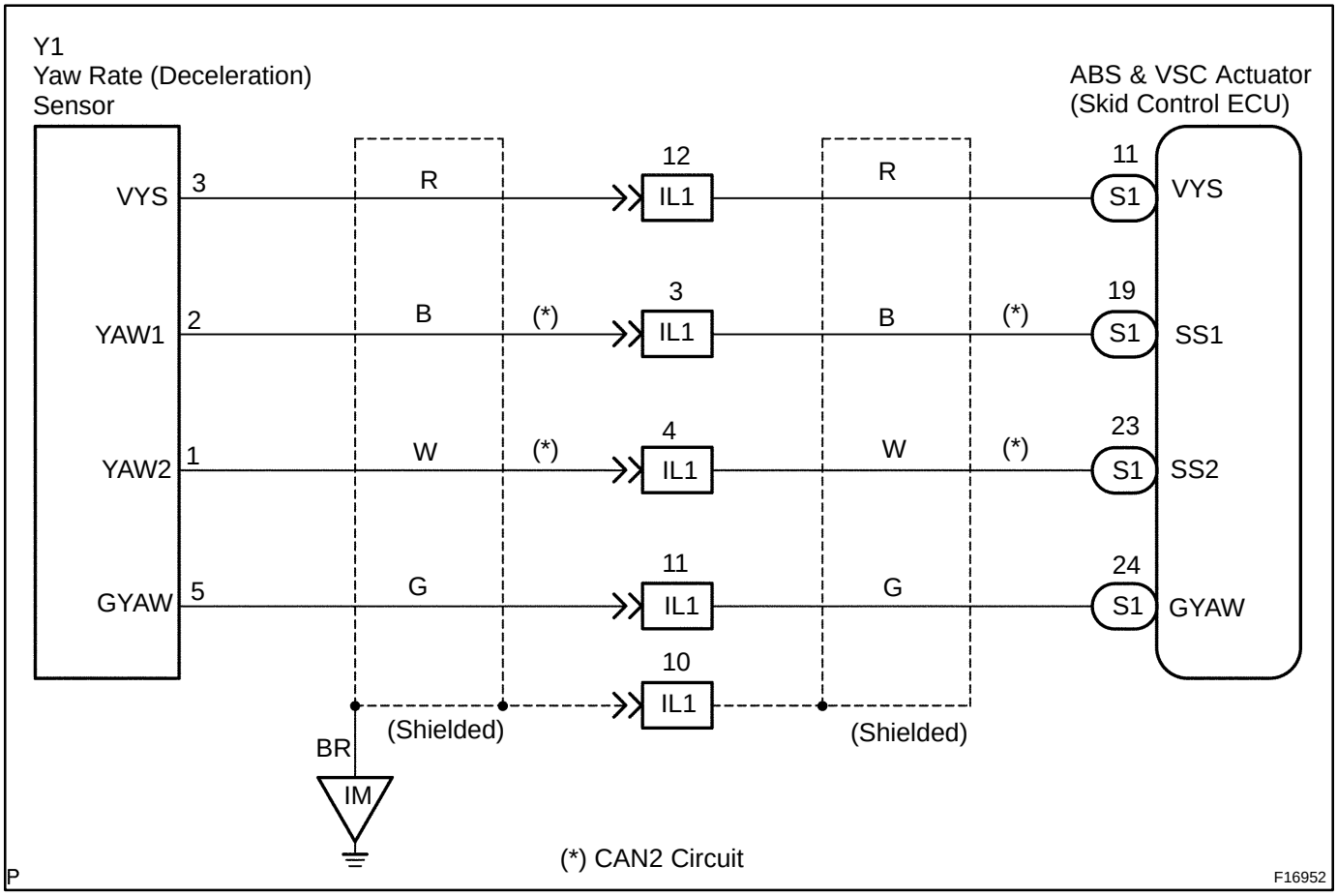
DTC	C1232 / 32, C1244 / 44	Deceleration Sensor Circuit

CIRCUIT DESCRIPTION

The skid control ECU receives signals from the yaw rate sensor (deceleration sensor) via the CAN2 communication system.
The yaw rate sensor has a built–in deceleration sensor.
This sensor detects deceleration on the vehicle. The sensor signal is used in ABS & BA & TRAC & VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1232 / 32	When the lateral deceleration output becomes 4.8 V or more or 0.2 V or less per 0.5 second.	▶Yaw rate (Deceleration) sensor ▶Yaw rate (Deceleration) sensor circuit
C1244 / 44	When any of the following conditions are detected: 1. When the supplied voltage to the yaw rate & deceleration sensor becomes 18 V or more or 6.5 V or less. 2. When the longitudinal deceleration output becomes 4.8 V or more or 0.2 V or less per 0.5 second.	▶Yaw rate (Deceleration) sensor ▶Yaw rate (Deceleration) sensor circuit

WIRING DIAGRAM



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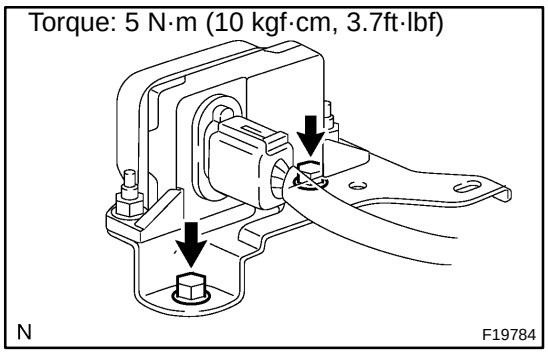
INSPECTION PROCEDURE

1	Check the yaw rate (deceleration) sensor installation.



CHECK:

Check the yaw rate (deceleration) sensor installation.

OK:

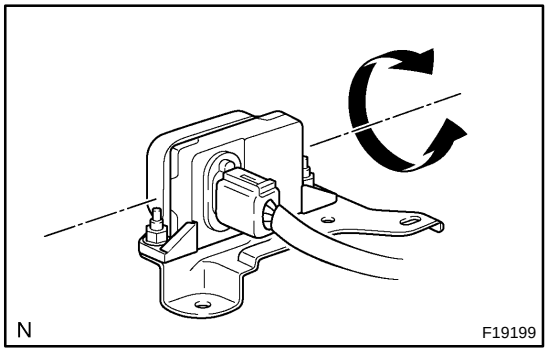
The sensor should be tightened to the specified torque.

The sensor should not be tilted.

NG → **Install yaw rate (deceleration) sensor correctly.**

OK

2	Check output value of the yaw rate sensor.



PREPARATION:

(a) Remove the 2 bolts and the yaw rate (deceleration) sensor assembly with the connector still connected.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.
(d) Select DATA LIST mode on the hand–held tester.

CHECK:

Check that the decelerate value of the deceleration sensor displayed on the hand–held tester changes: Place the deceleration sensor vertically to the ground and turn the sensor to the frontward and rearward.

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
DECELERAT SENS	Deceleration sensor 1 reading / min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G while stationary	Reading changes when vehicle is bounced
DECELERAT SENS2	Deceleration sensor 2 reading / min.: –1.869 G, max.: 1.869 G	Approximately 0 ± 0.13 G while stationary	Reading changes when vehicle is bounced

OK:

Decelerate value changes.

NG → **Replace yaw rate (deceleration) sensor.**

NOTICE:

When replacing the yaw rate (deceleration) sensor, perform the zero point calibration (See page DI–897).

OK

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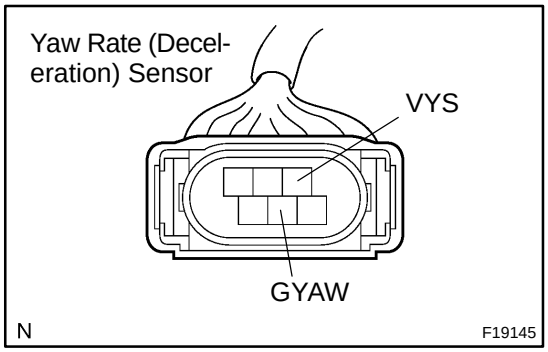
3	Check voltage between terminals VYS and GYAW of the yaw rate (deceleration) sensor.



PREPARATION:
Disconnect the yaw rate (deceleration) sensor connecter.
CHECK:
(a) Turn the ignition switch to the ON position.
(b) Measure the voltage between terminals VYS and GYAW of the yaw rate (deceleration) sensor harness side connector.
OK:
Voltage: 10 to 14 V

OK	Check and replace yaw rate (deceleration) sensor.

NOTICE:
When replacing the yaw rate sensor, perform the zero point calibration (See page DI–897).

NG

4	Check for open and short circuit in harness and connector between yaw rate sensor and skid control ECU (See page IN–35).

NG	Repair or replace harness or connector.

OK

Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DIDM9–01

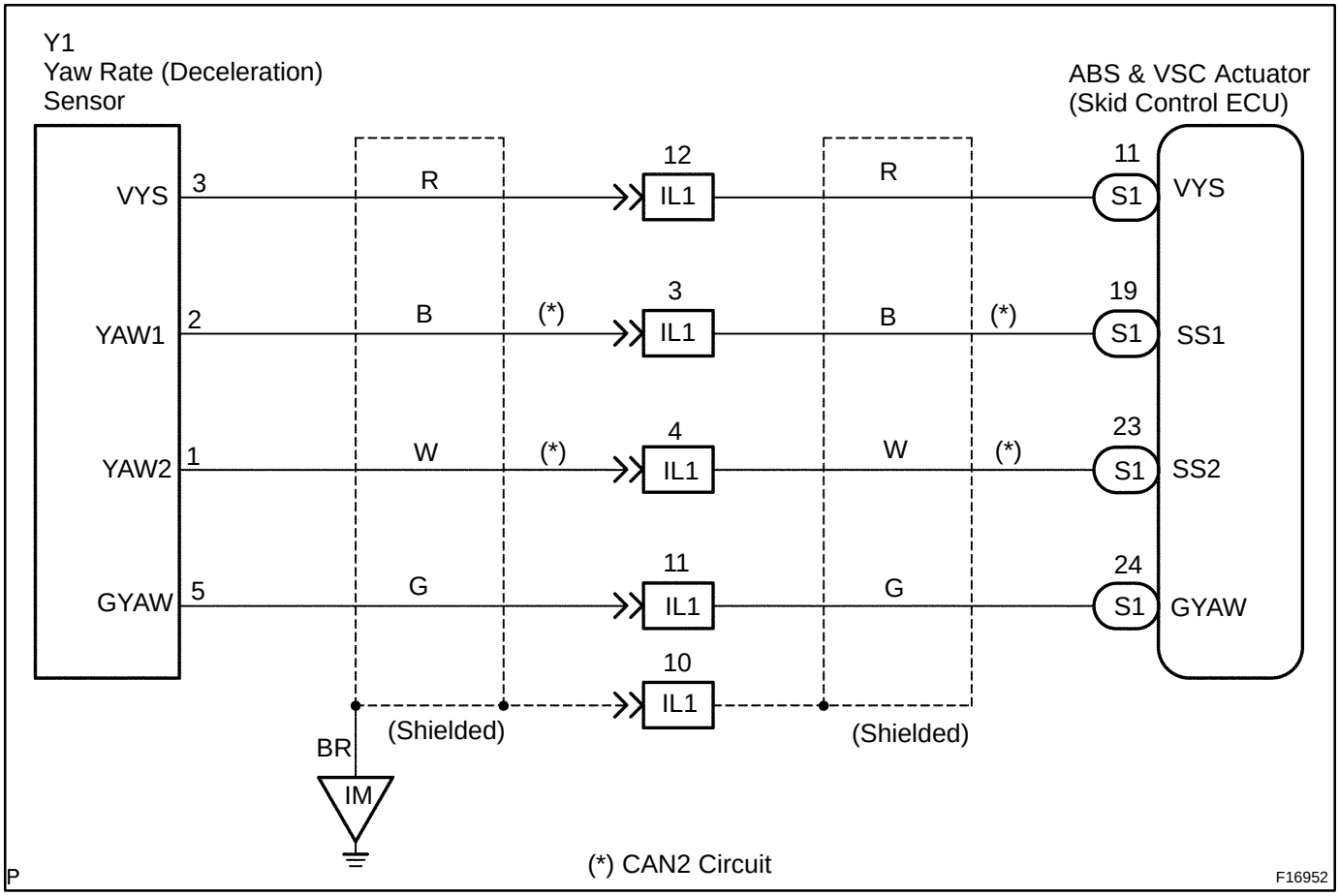
DTC	C1234 / 34	Malfunction in Yaw Rate Sensor

CIRCUIT DESCRIPTION

Yaw rate sensor detects the vehicle's sideslip and sends signals to the skid control ECU.

DTC No.	DTC Detecting Condition	Trouble Area
C1234 / 34	When any of the following conditions are detected: 1. Power output of 4.65 V or more or 0.25 or less continues for 0.1 sec. or more. 2. Difference between the actual output value of the yaw rate sensor and the output value calculated from the other sensor's continues to be large.	▶Yaw rate (deceleration) sensor ▶Yaw rate (deceleration) sensor circuit

WIRING DIAGRAM



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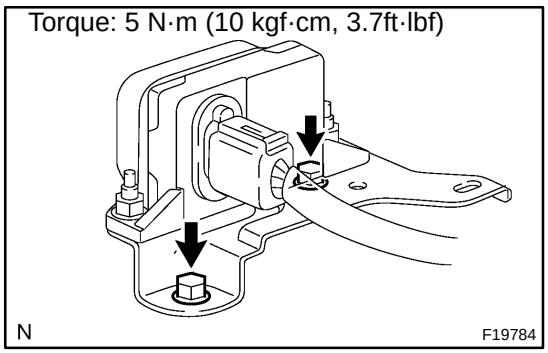
INSPECTION PROCEDURE

1	Check the yaw rate sensor installation.



CHECK:

Check the yaw rate sensor installation.

OK:

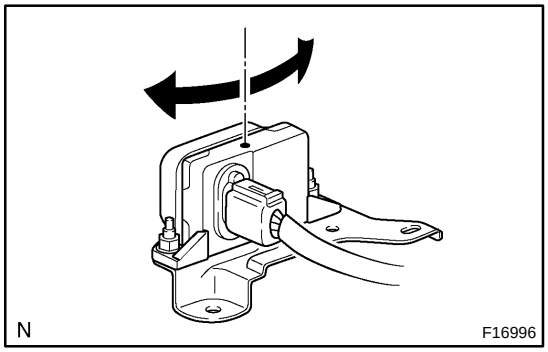
The sensor should be tightened to the specified torque.

The sensor should not be tilted.

NG → **Install yaw rate sensor correctly.**

OK

2	Check output value of the yaw rate sensor.



PREPARATION:

(a) Remove the 2 bolts and the yaw rate sensor assembly with the connector still connected.

(b) Connect the hand–held tester to the DLC3.

(c) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.

(d) Select the DATA LIST mode on the hand–held tester.

CHECK:

Check that the yaw rate value of the yaw rate sensor displayed on the hand–held tester changes: Place the yaw rate sensor vertically to the ground and turn the sensor to the right and left.

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
YAW RATE	Yaw rate sensor/ Min.: –128 deg/s, Max.: 127 deg/s	Min.: –128 deg/s Max.: 128 deg/s	–

OK:

Yaw rate value changes.

NG → **Replace yaw rate sensor.**

NOTICE:

When replacing the yaw rate sensor, perform the zero point calibration (See page DI–897).

OK

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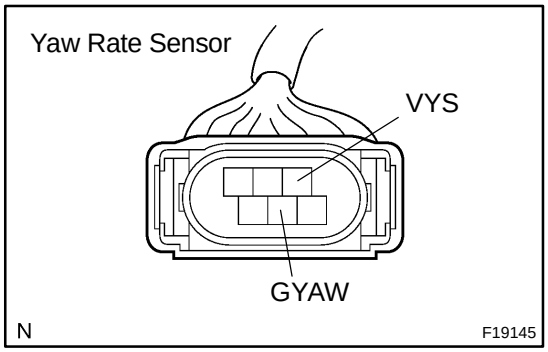
3	**Check voltage between terminal VYS and GYAW of the yaw rate sensor.**



PREPARATION:
Disconnect the yaw rate sensor connecter.
CHECK:
(a) Turn the ignition switch to the ON position.
(b) Measure the voltage between terminal VYS and GYAW of the yaw rate sensor harness side connector.
OK:
Voltage: 10 to 14 V

OK	**Check and replace yaw rate sensor.**

NOTICE:
When replacing the yaw rate sensor, perform the zero point calibration (See page DI–897).

NG

4	**Check for open and short circuit in harness and connector between yaw rate sensor and skid control ECU (See page IN–35).**

NG	**Repair or replace harness or connector.**

OK

Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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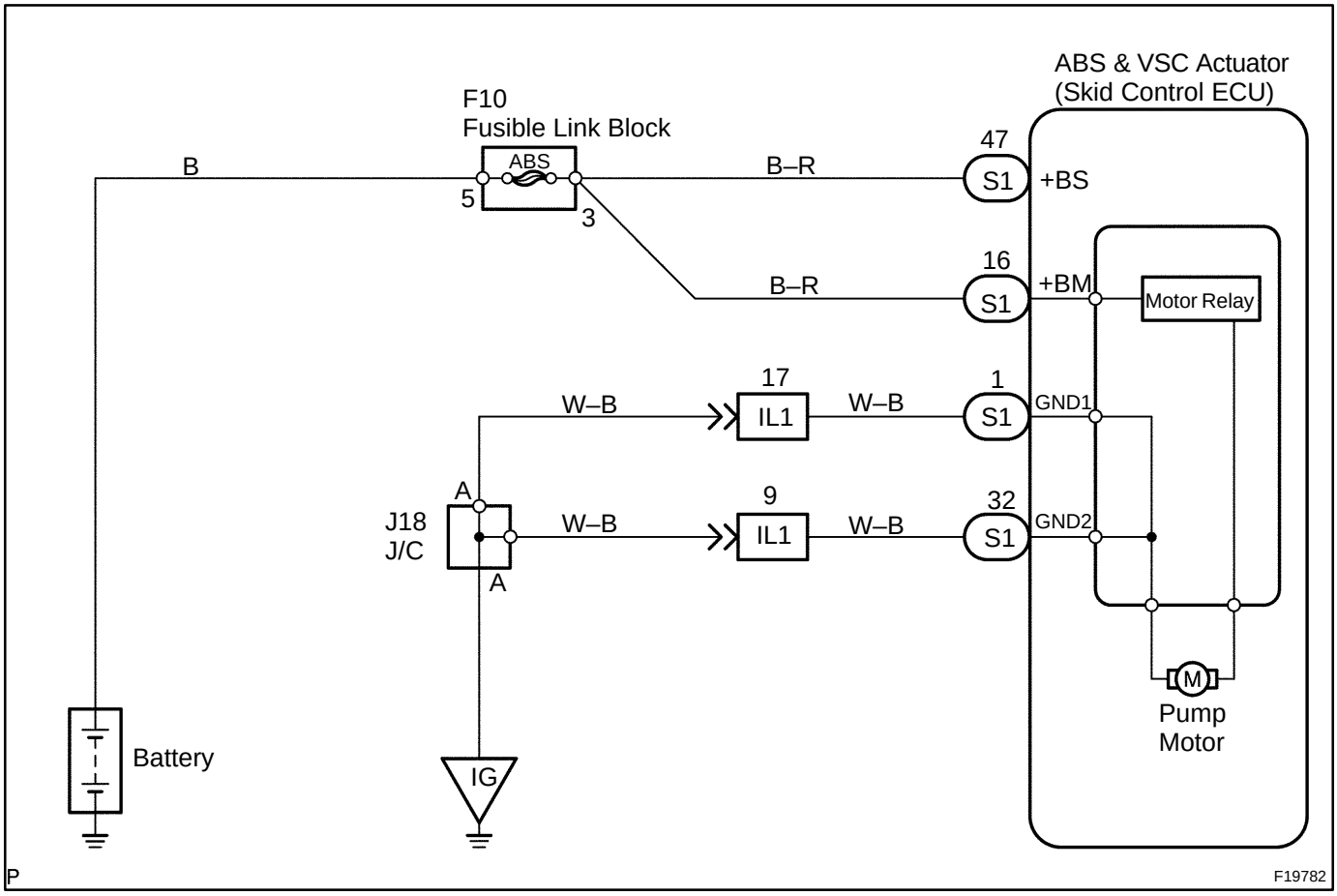
DTC	C1241 / 41	Power Source Circuit

CIRCUIT DESCRIPTION

If there is a problem with the skid control ECU power supply circuit, the skid control ECU outputs DTC and prohibits operation under the fail safe function.

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	When any of the following conditions are detected: 1. ECU terminal +BM/+BS voltage is too low for a fixed time during driving. 2. ECU terminal +BM/+BS voltage is too high for a fixed time while ignition switch is ON.	▶Battery ▶Charging system ▶Power source circuit (+BM, +BS) ▶Skid control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check ABS fuse.**

PREPARATION:

Remove the ABS fuse from the fusible link block.

CHECK:

Check continuity of the ABS fuse.

OK:

Continuity

NG → **Check for short circuit in all the harnesses and components connected to ABS fuse (See attached wiring diagram).**

OK

2	**Check battery positive voltage.**

OK:

Voltage: 10 to 14 V

NG → **Check and repair the charging system (See page CH–1).**

OK

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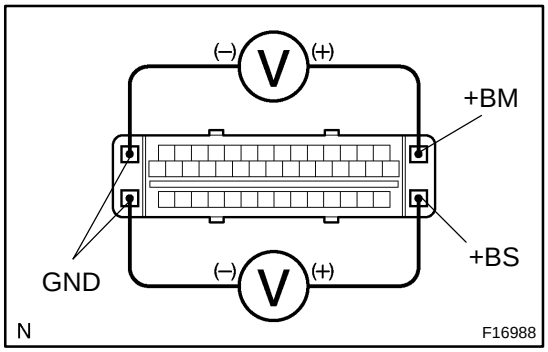
3	Check voltage of the +BM/+BS power source.



PREPARATION:
Disconnect the skid control ECU connector.
CHECK:
Measure the voltage between terminal +BM/+BS and GND of the skid control ECU harness side connector.
OK:

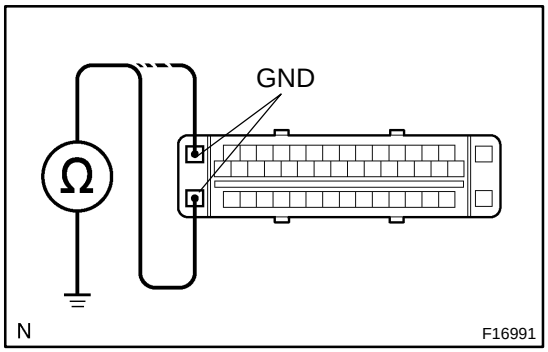
Voltage: 10 to 14 V

OK	Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

NG

4	Check continuity between terminal GND of the skid control ECU connector and body ground (See page IN–35).



PREPARATION:
Disconnect the skid control ECU connector.
CHECK:
Measure the resistance between terminal GND of the skid control ECU harness side connector and body ground.
OK:

Resistance: 1 Ω or less

NG	Repair or replace harness or connector.

OK

Check for open circuit in harness and connector between skid control ECU and battery (See page IN–35).

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DIDMB–01

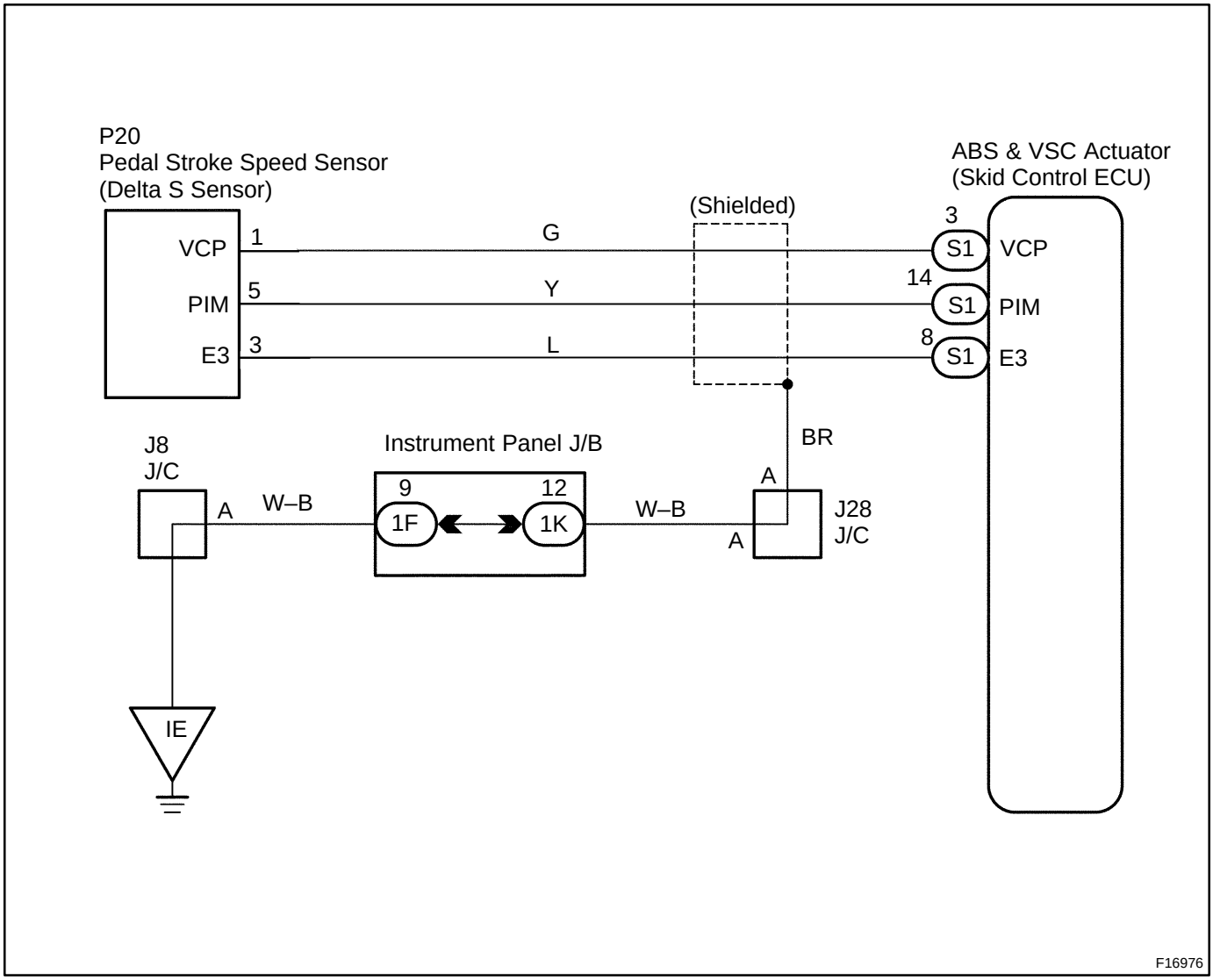
DTC	C1247 / 47	Malfunction in Delta S Sensor

CIRCUIT DESCRIPTION

Detects a problem with booster negative pressure and enters assist control.

DTC No.	DTC Detecting Condition	Trouble Area
C1247 / 47	When any of the following conditions are detected: 1. When the output becomes 4.7 V or more or 0.2 V or less per 100 msec. 2. When the output does not return to 2.5 V even when 500 msec. or more elapse, in spite of no change in brake operation.	▶Brake booster ▶Delta S sensor (Pedal stroke speed sensor) ▶Delta S sensor (Pedal stroke speed sensor) circuit ▶Skid control ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in the case of using the hand–held tester and start from step 2 in the case of not using the hand–held tester.

1	**Check output value of the delta S sensor (pedal stroke speed sensor) using the hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Run the engine until the engine speed reaches 3,000 rpm, and return it back to idle.

HINT:

Rev up the engine to ensure sufficient vacuum.

(d) Select DATA LIST mode on the hand–held .

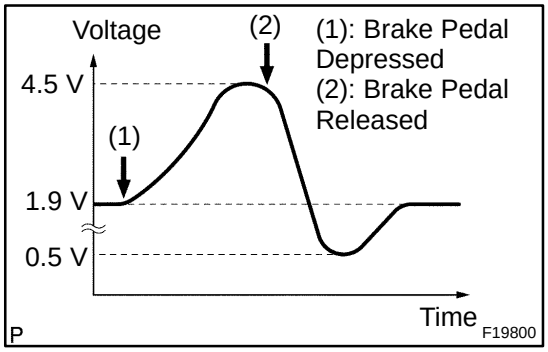
Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
PEDAL STROKE	Pedal stroke sensor/ min.: 0 V, max.: 5.1 V	Approximately 2.0 V without the brake pedal depressed.	–

HINT:

- The result appears on the tester after some delay because a time lag occurs in measurement with a hand–held tester.
- If a signal from the delta S sensor is sent between sampling, the result does not appear on the tester. So be sure to perform the measurement 2 or 3 times.

CHECK:

Check that the brake pedal acceleration value of the delta S sensor displayed on the hand–held tester changes, alternatively increasing the brake pedal stroke.



OK:

The value changes as shown in the illustration on the left. (The value will return to approximately 2.0 V after the brake pedal is released.)

HINT:

The maximum voltage depends on pedal stroke speed but should not exceed 4.5 V or fall below 0.2 V.

OK → **Replace skid control ECU (See page BR–52).**

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

NG

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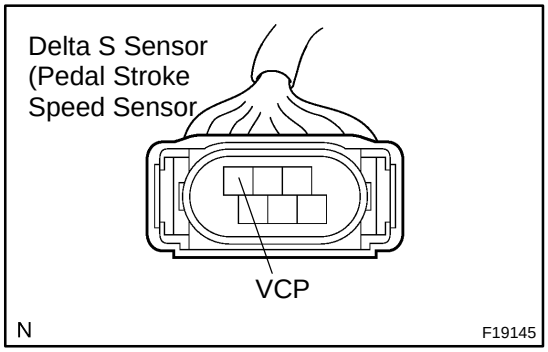
2	**Check for open or short circuit in harness and connector between delta S sensor (pedal stroke speed sensor) and skid control ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

3	**Inspect the delta S sensor (pedal stroke speed sensor) terminal voltage (VCP terminal)**



PREPARATION:

Disconnect the delta S sensor (pedal stroke speed sensor) connector.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage between VCP terminal and body ground.

OK:

Voltage: 5 V

NG → **Replace skid control ECU (See page BR–52).**

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

OK

Replace brake booster (See page BR–22).

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DTC	C1249 / 49	Open Circuit in Stop Light Switch Circuit

CIRCUIT DESCRIPTION

The skid control ECU inputs the stop light switch signal and detects the status of the brake operation. The skid control ECU has an open detection circuit. If an open in the stop lamp switch input line or GND side stop lamp circuit is detected when the stop lamp switch is off, this DTC is output.

DTC No.	DTC Detecting Condition	Trouble Area
C1249 / 49	ECU terminal STP voltage is low when both ignition switch and stop light switch are ON.	▶Stop light switch ▶Stop light switch circuit ▶Skid control ECU

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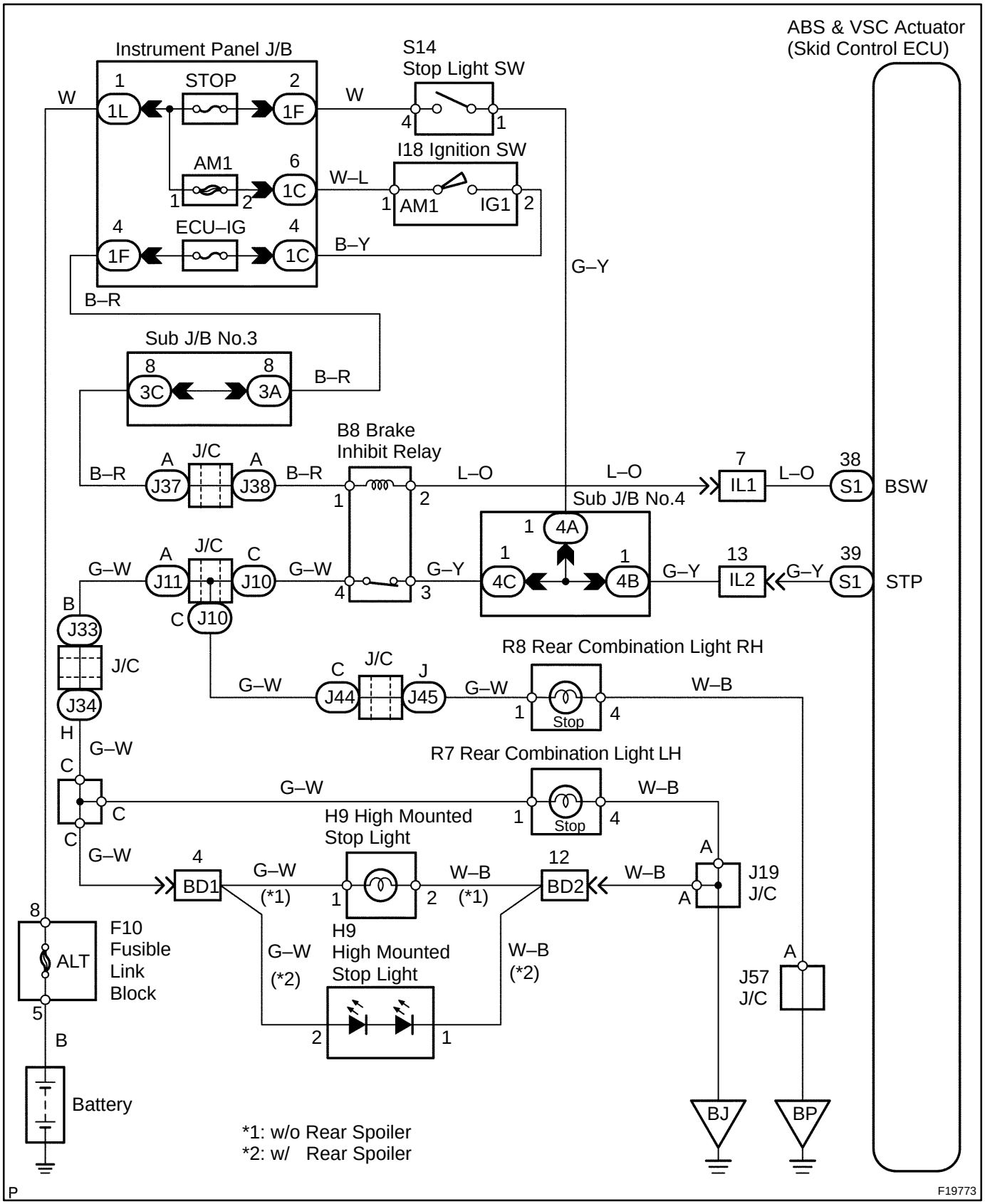
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check operation of the stop light switch.**

CHECK:

Check that the stop light comes on when the brake pedal is depressed and turns off when the brake pedal is released.

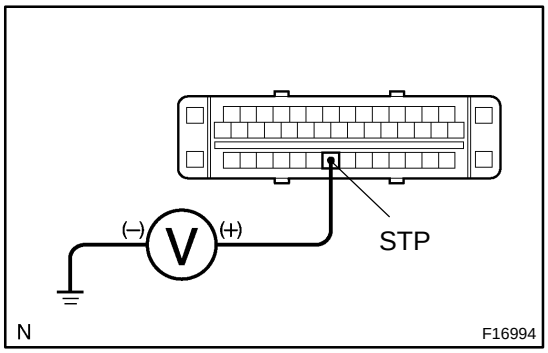
OK:

Stop light switch operation is normal.

NG → **Repair stop light circuit (See page BE–46).**

OK

2	**Check voltage between terminal STP of the skid control ECU and body ground.**



PREPARATION:

Disconnect the skid control ECU connector.

CHECK:

Measure the voltage between terminal STP of the skid control ECU harness side connector and body ground during depressing the brake pedal.

OK:

Voltage: 8 to 14 V

OK → **Replace skid control ECU (See page BR–52).**

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

NG

Check for open circuit in harness and connector between skid control ECU and stop light switch (See page IN–35).

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DIDMC–01

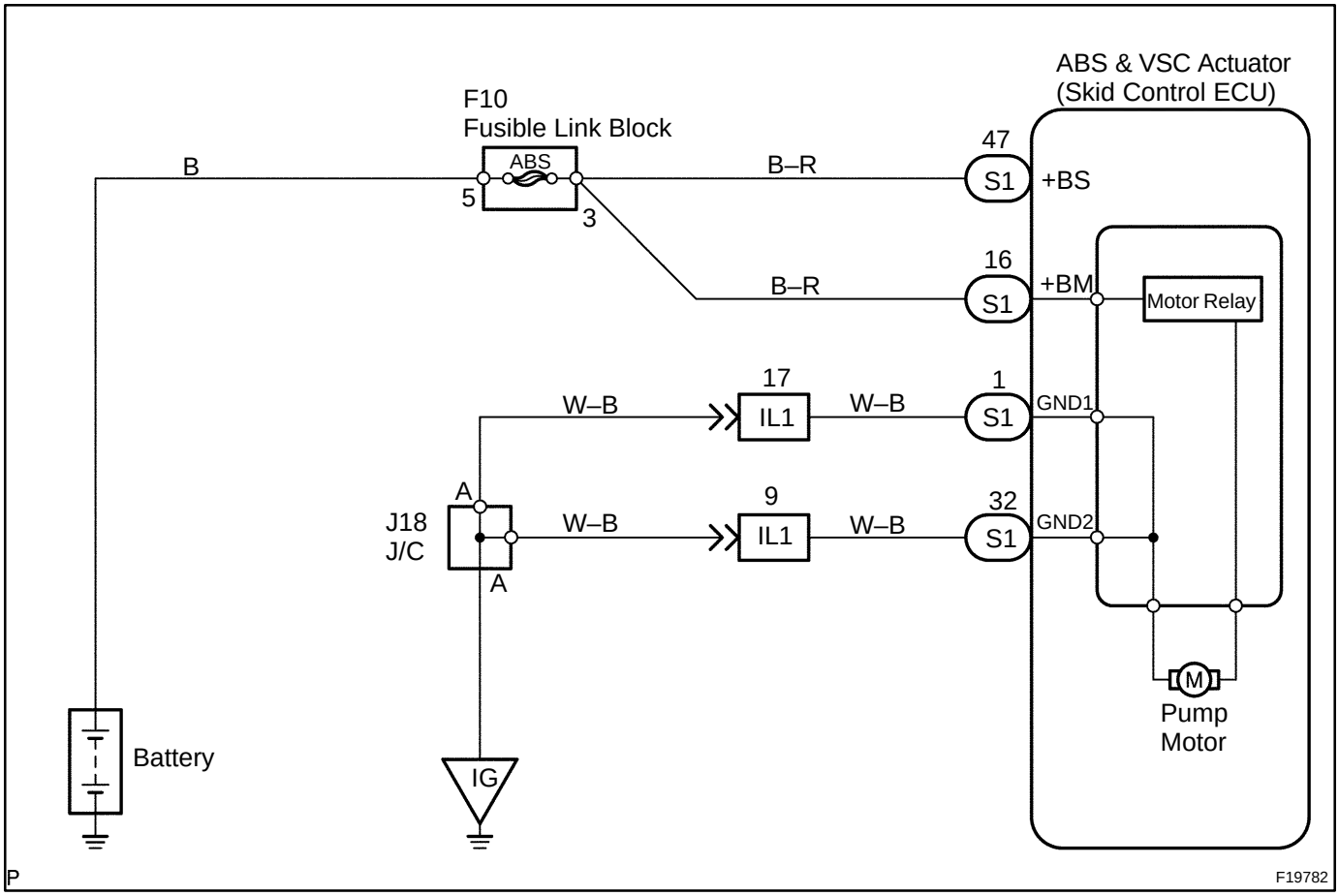
DTC	C1251 / 51	Pump Motor is Locked/ Open Circuit in Pump Motor Circuit

CIRCUIT DESCRIPTION

ABS pump motor is located inside the brake actuator.
The motor is used for BA, TRAC and VSC operation.

DTC No.	DTC Detecting Condition	Trouble Area
C1251 / 51	Pump motor does not operate during the initial check.	ABS & VSC actuator

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check pump motor operation.**

PREPARATION:

(a) Select the item ”ABS MOTOR RELAY” in the ACTIVE TEST and operate the ABS motor relay on the hand–held tester.

(b) Check the operation sound of the ABS pump motor when operating it with the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS MOT RELAY	Turns ABS motor relay ON / OFF	Operation of motor (clicking sound) can be heard

CHECK:

The operation sound of the pump motor should be heard.

OK:

Operation sound can be heard.

NG → **Go to step 2.**

OK ↓

Check and replace ABS & VSC actuator with skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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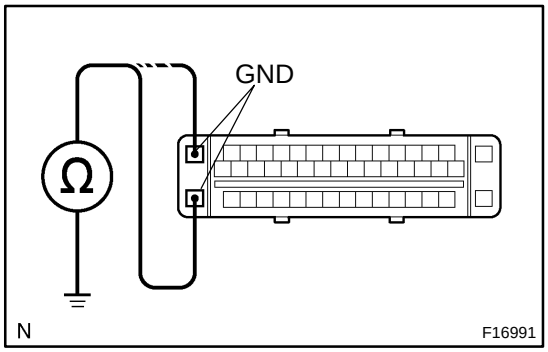
2	**Check continuity between terminal GND of the skid control ECU connector and body ground.**



PREPARATION:
Disconnect the skid control ECU connector.
CHECK:
Measure the resistance between terminal GND of the skid control ECU harness side connector and body ground.
OK:
Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & VSC actuator with skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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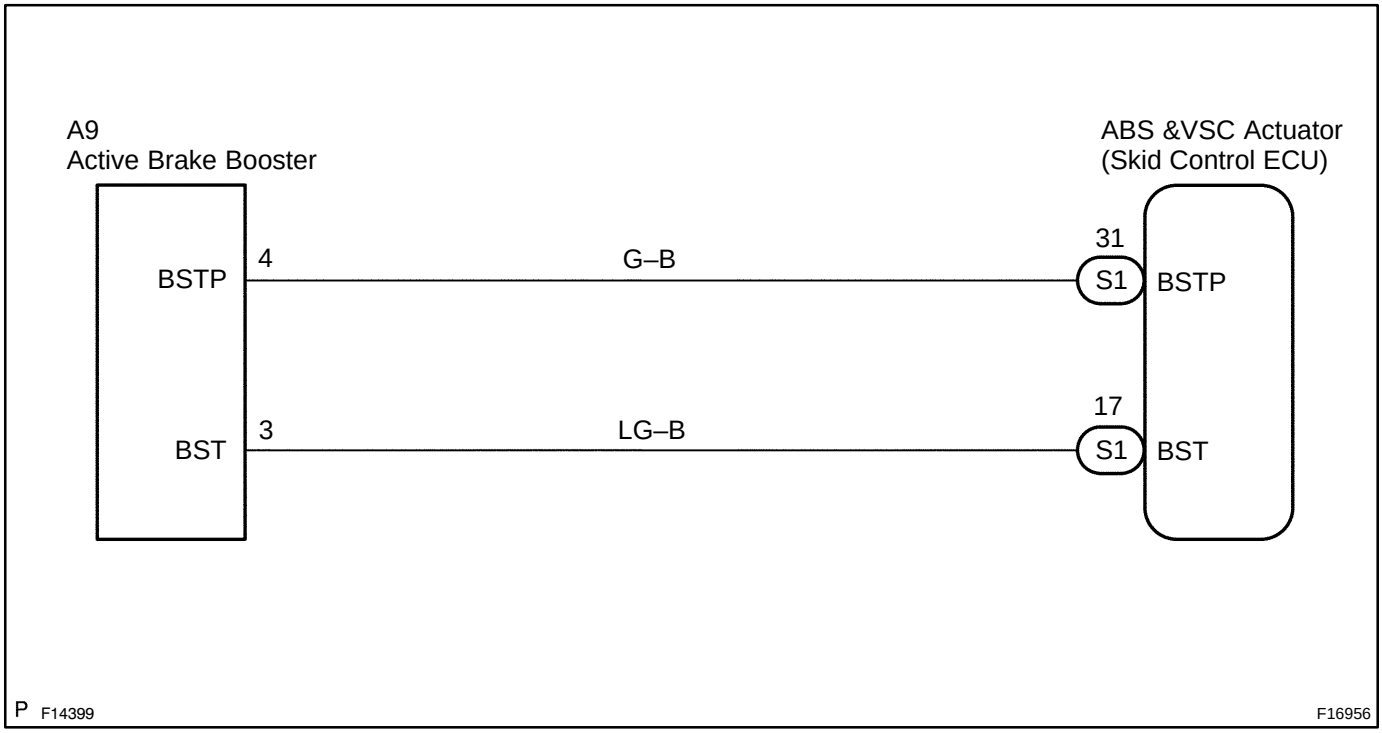
DTC	C1310 / 11	Open or Short Circuit in Active Brake Booster Solenoid Circuit

CIRCUIT DESCRIPTION

Operates when booster's negative pressure is insufficient and allows for a stable braking control.

DTC No.	DTC Detecting Condition	Trouble Area
C1310 / 11	Open or short in active brake booster solenoid circuit.	▶Brake booster ▶Active brake booster solenoid circuit

WIRING DIAGRAM



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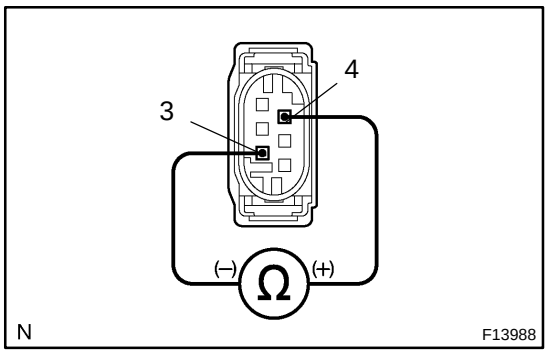
INSPECTION PROCEDURE

1	**Check active brake booster solenoid.**



PREPARATION:
Disconnect the connector from the brake booster.
CHECK:
Check resistance between terminals 3 and 4 of the brake booster.
OK:
Resistance: 1.1 to 1.7 Ω

NG → **Replace brake booster.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and brake booster (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DTC	C1311 / 12	Open or Short Circuit in Brake Inhibit Relay Circuit

CIRCUIT DESCRIPTION

Built in the stop lamp circuit and prohibits the stop lamp from turning on under VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1311 / 12	Open or short circuit is detected.	▶Brake inhibit relay ▶Brake inhibit relay circuit

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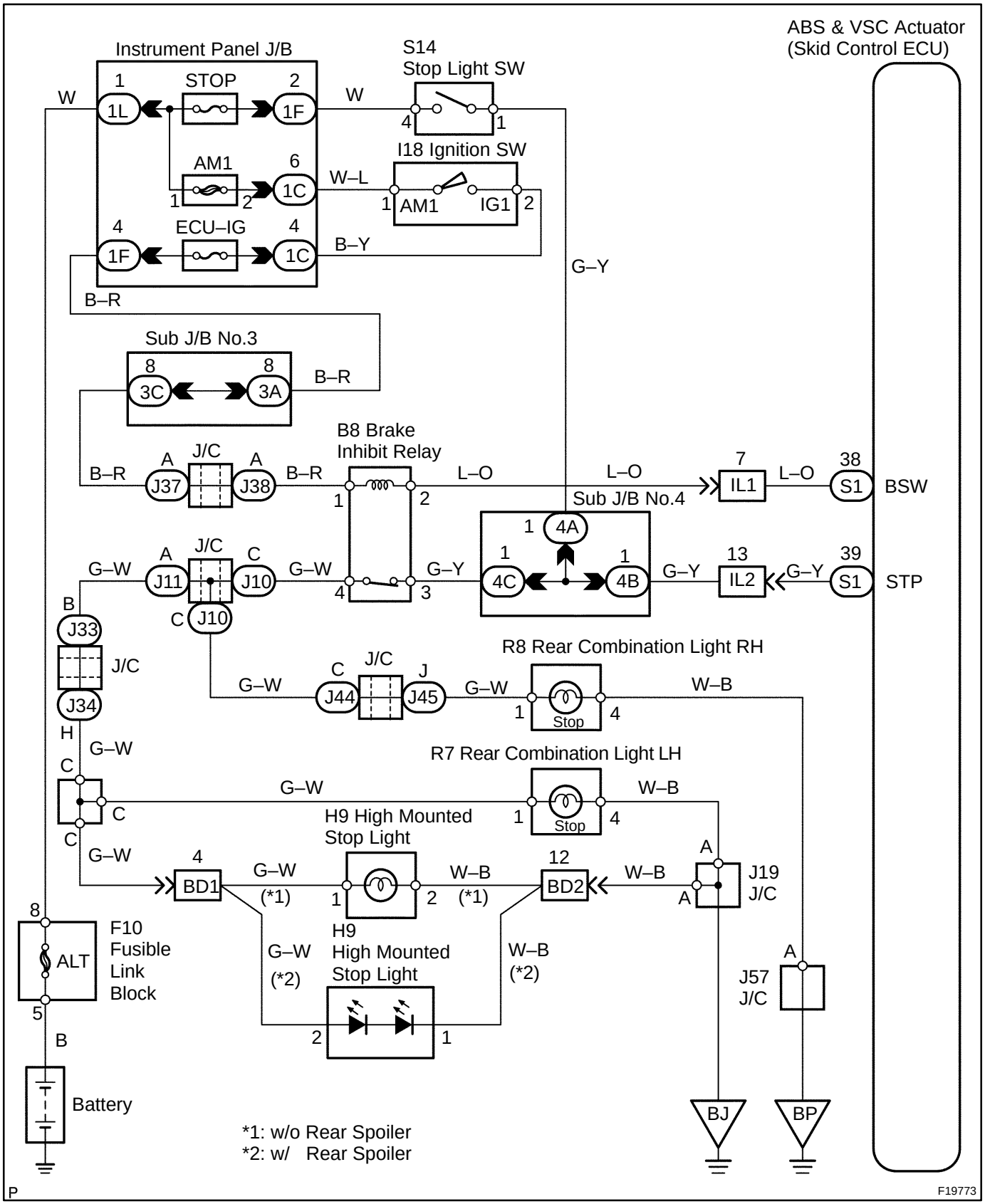
WIRING DIAGRAM



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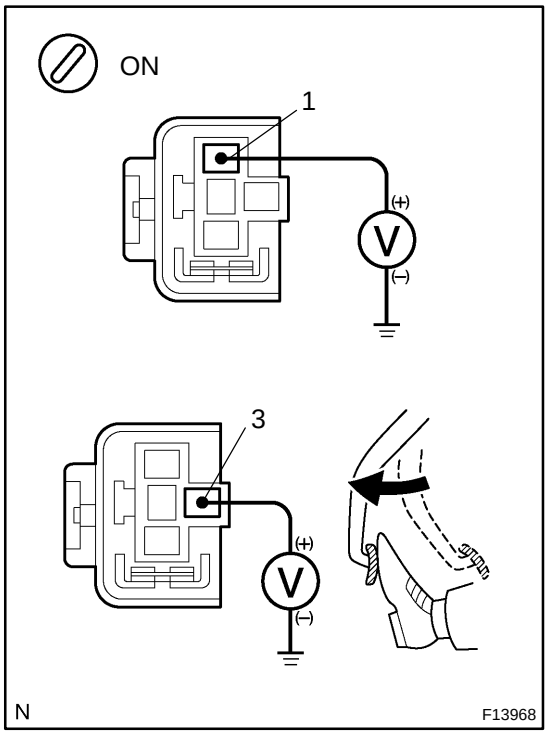
INSPECTION PROCEDURE

1	**Check voltage between terminals 1 and 3 of the brake inhibit relay and body ground.**



PREPARATION:

Remove the brake inhibit relay from the connector.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage between terminal 1 of the brake inhibit relay harness side connector and body ground.

OK:

Voltage: 10 to 14 V

CHECK:

Measure the voltage between terminal 3 of the brake inhibit relay harness side connector and body ground when the brake pedal is depressed.

OK:

Voltage: 8 to 14 V

NG → **Check and repair harness or connector.**

OK

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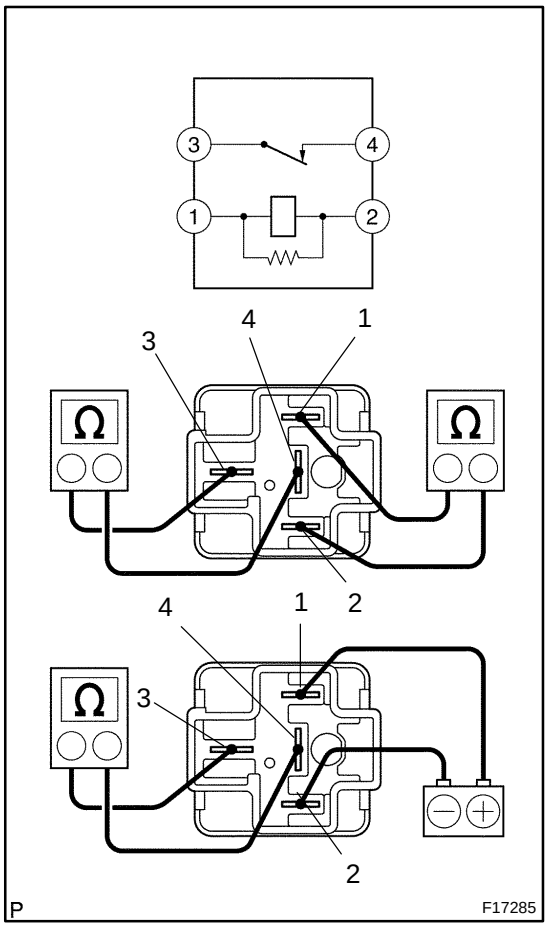
2	Check brake inhibit relay.



CHECK:

Check continuity between the following terminals of the brake inhibit relay.

OK:

Terminals 1 and 2	Continuity (Reference value 62 Ω)
Terminals 3 and 4	Continuity

CHECK:

(a) Apply battery positive voltage between terminals 1 and 2.

(b) Check continuity between terminals.

Terminals 3 and 4	Open

NG → **Replace brake inhibit relay.**

OK

3	Check for open and short circuit in harness and connector between brake inhibit relay and skid control ECU (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

If the same code is still indicated after the DTC is deleted, check the condition of each connection. If the connections are normal, the skid control ECU may be defective.

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DI93T–03

DTC	C1337 / 37	Some Tire Are Different in Size From the Other Tires

CIRCUIT DESCRIPTION

Skid control ECU measure the speed of each wheel by receiving signals from speed sensor. These signals are used for recognizing all 4 wheels are operating properly. Therefore, all wheel signals must be equal.

DTC No.	DTC Detecting Condition	Trouble Area
C1337 / 37	1 or 2 tires of different size are used for driving.	Tire size

INSPECTION PROCEDURE

1	**Check tire size.**

CHECK:

Check tire size and condition of all 4 wheels.

NG → **Replace tires so that all 4 tires are the same in size.**

OK

2	**Check speed sensor (See page DI–925).**

NG → **Replace speed sensor.**

OK

3	**Check speed sensor rotor (See page DI–925).**

NG → **Replace speed sensor rotor.**

OK

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4	**Check harness and connector between speed sensor and skid control ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DTC	C1340 / 47	Center DIFF. Lock Circuit Malfunction

CIRCUIT DESCRIPTION

This circuit sends the signal to the ECU by detecting that the transfer center differential is in the ”LOCK” position.

DTC No.	DTC Detecting Condition	Trouble Area
C1340 / 47	Center diff. lock position switch signal does not change	▶Center diff. lock position switch ▶Center diff. lock position switch circuit ▶Center diff. lock Indicator light circuit ▶Translate ECU

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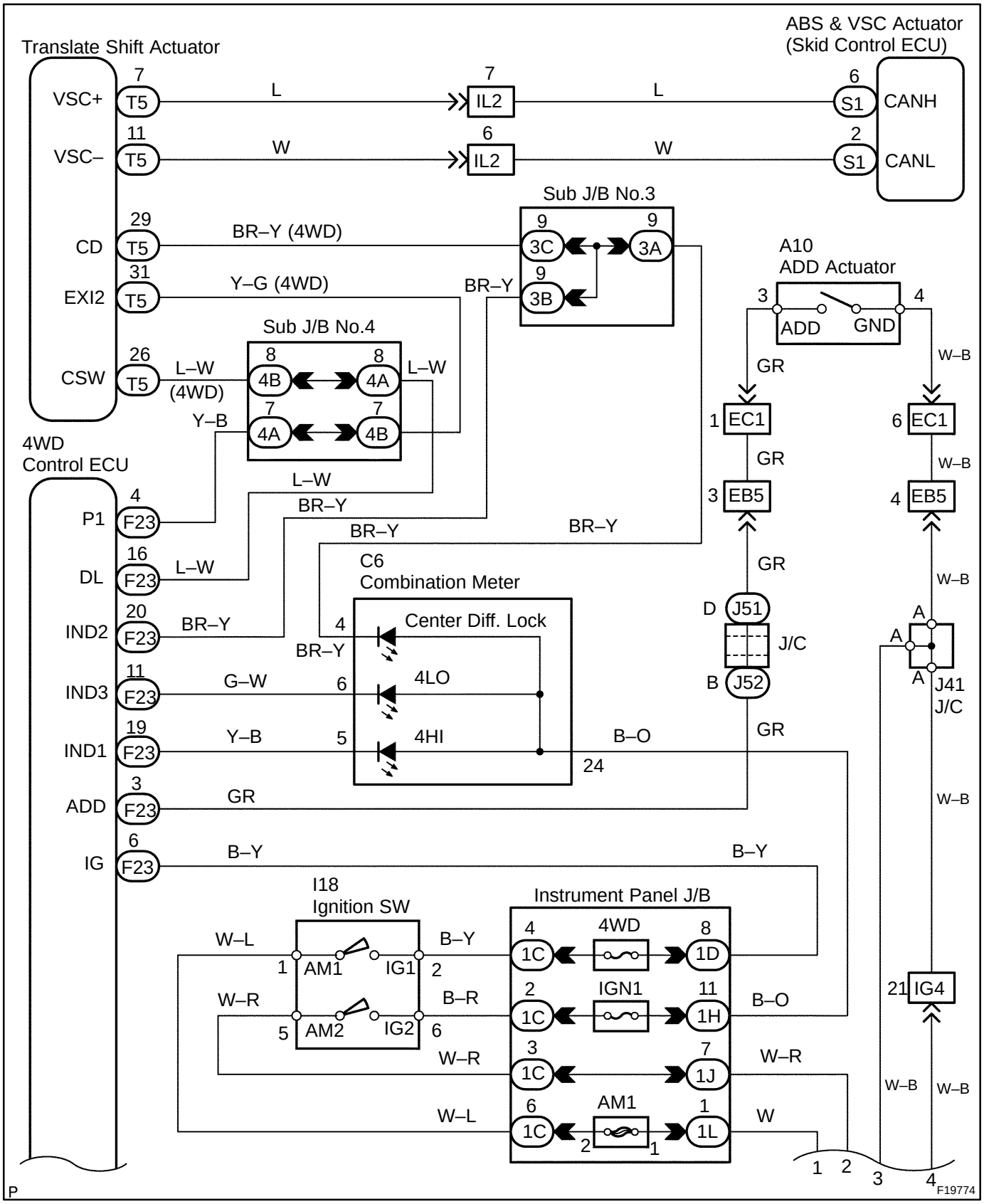
WIRING DIAGRAM



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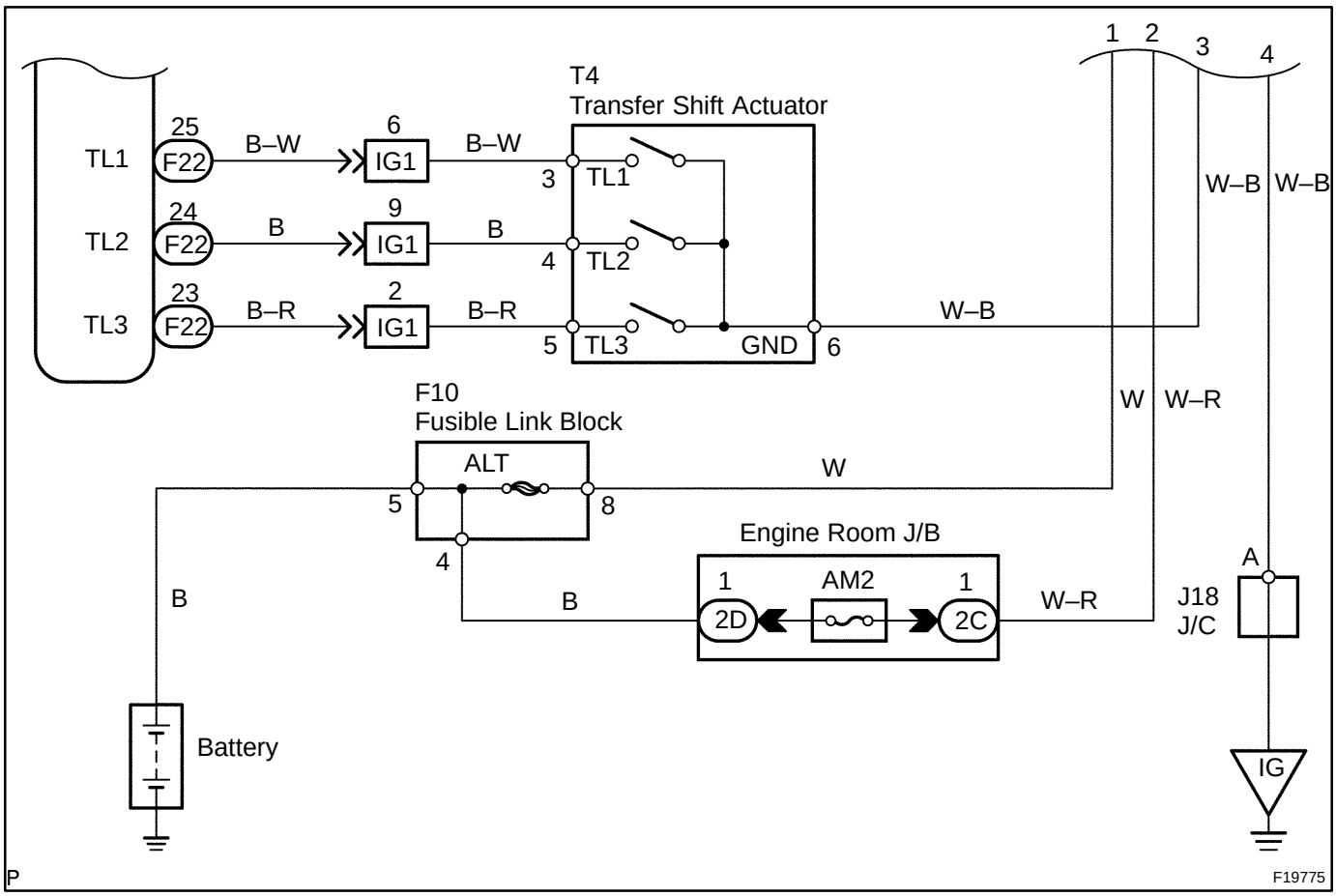
1 2 3 4
T4
Transfer Shift Actuator
TL1
25
F22
B–W
6
IG1
B–W
3
TL1
TL2
24
F22
B
9
IG1
B
4
TL2
TL3
23
F22
B–R
2
IG1
B–R
5
TL3
GND
6
W–B
W–B
W–B
F10
Fusible Link Block
ALT
5
8
4
W
W
W–R
Engine Room J/B
1
AM2
1
2D
2C
B
B
W–R
A
J18
J/C
Battery
IG
P
F19775

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INSPECTION PROCEDURE

1	**Check center differential lock operation (See page TR–39).**

OK:

Center differential lock operation is norm.

NG → **Repair or replace one–touch 2–4 selector system.**

OK ↓

2	**Check operation of the center differential lock indicator light.**

PREPARATION:

(a) Turn the ignition switch to the ON position.

(b) Set the transfer to the L4 position.

CHECK:

Check that pressing the center differential lock switch locks the differential and turns the lock indicator on.

OK:

Indicator light: ON/OFF or OFF/ON

HINT:

When the center differential cannot be shifted to LOCK smoothly, the center differential lock indicator light will blink.

NG → **Repair or replace center differential lock indicator light circuit.**

OK ↓

3	**Check that the 4WD ECU connectors are securely connected to the 4WD ECU.**

NO → **Connect the connector to the 4WD ECU.**

YES ↓

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4	**Check for open and short circuit in harnesses and connectors between terminals CD of the translate ECU and IND of the 4WD control ECU, EXI2 of the translate ECU and detection SW (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

5	**Replace the translate ECU and check if the trouble occurs again.**

PREPARATION:

(a) Clear the DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **END**

A

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6	**Replace skid control ECU and check if the trouble occurs again (See page BR–52 and DI–911).**

PREPARATION:

(a) Clear the DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **END**

A

Check and replace 4WD control ECU.

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DI93V–05

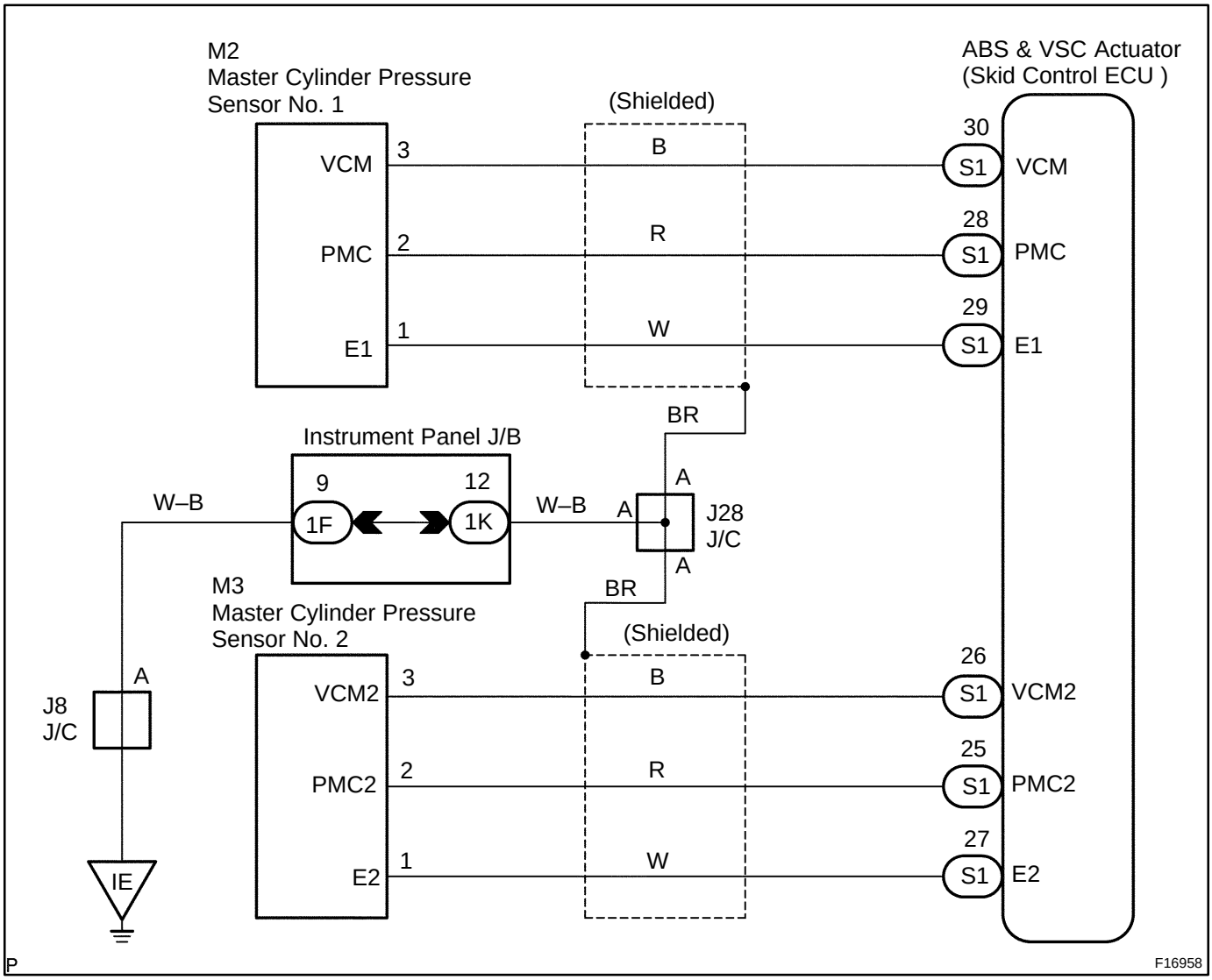
DTC	C1360 / 61	Malfunction in Master Cylinder Pressure Sensor

CIRCUIT DESCRIPTION

The master cylinder pressure sensors are connected to the skid control ECU.
Attached to the master cylinder: one reads front master cylinder pressure and the other reads rear master cylinder pressure.

DTC No.	DTC Detecting Condition	Trouble Area
C1360 / 61	When any of the following conditions are detected: 1. Noise to ECU terminal PMC occurs. 2. While ECU terminal STP is OFF, ECU terminal PMC voltage is out of standard range. 3. When ECU terminal IG1 voltage is proper, ECU terminal VCM voltage is out of range. 4. When ECU terminal VCM voltage is proper, ECU terminal PMC voltage is out of range.	▶Master cylinder pressure sensor ▶Master cylinder pressure sensor circuit

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Is pedal lowered or spongy?**

YES → **Bleed air from the system (See page BR–4).**

NO

2	**Check output value of the master cylinder pressure sensor No. 1 and No. 2.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position, and push the hand–held tester main switch ON.
(c) Select DATA LIST mode on the hand–held tester.

CHECK:

Check that the brake fluid pressure value of the master cylinder pressure sensor displayed on the hand–held tester changes when depressing the brake pedal.

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
MAS CYL PRS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed
MAS CYL PRS 2	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released : 0.3 to 0.9 V	Reading increases when brake pedal is depressed

OK:

Brake fluid pressure value changes.

OK → **Go to step 4.**

NG

3	**Check for open and short circuit in harness and connector between master cylinder pressure sensor and skid control ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

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4	**Replace master cylinder pressure sensor and check DTC once more.**

PREPARATION:

(a) Replace the master cylinder pressure sensor (See page BR–16).

(b) Clear the DTC (See page DI–911).

(c) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC is stored in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **END**

A →

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DTC	C1361 / 62	Abnormal Battery Voltage of VSC Sensor

CIRCUIT DESCRIPTION

Supplies power to the VSC sensors (yaw rate and master cylinder pressure sensors) through terminal IG1.

DTC No.	DTC Detecting Condition	Trouble Area
C1361/62	Voltage from VSC sensor system to ECU is abnormal.	▶Battery ▶Charging system ▶Power source circuit ▶Skid control ECU ▶Yaw rate (deceleration) sensor ▶Master cylinder pressure sensor

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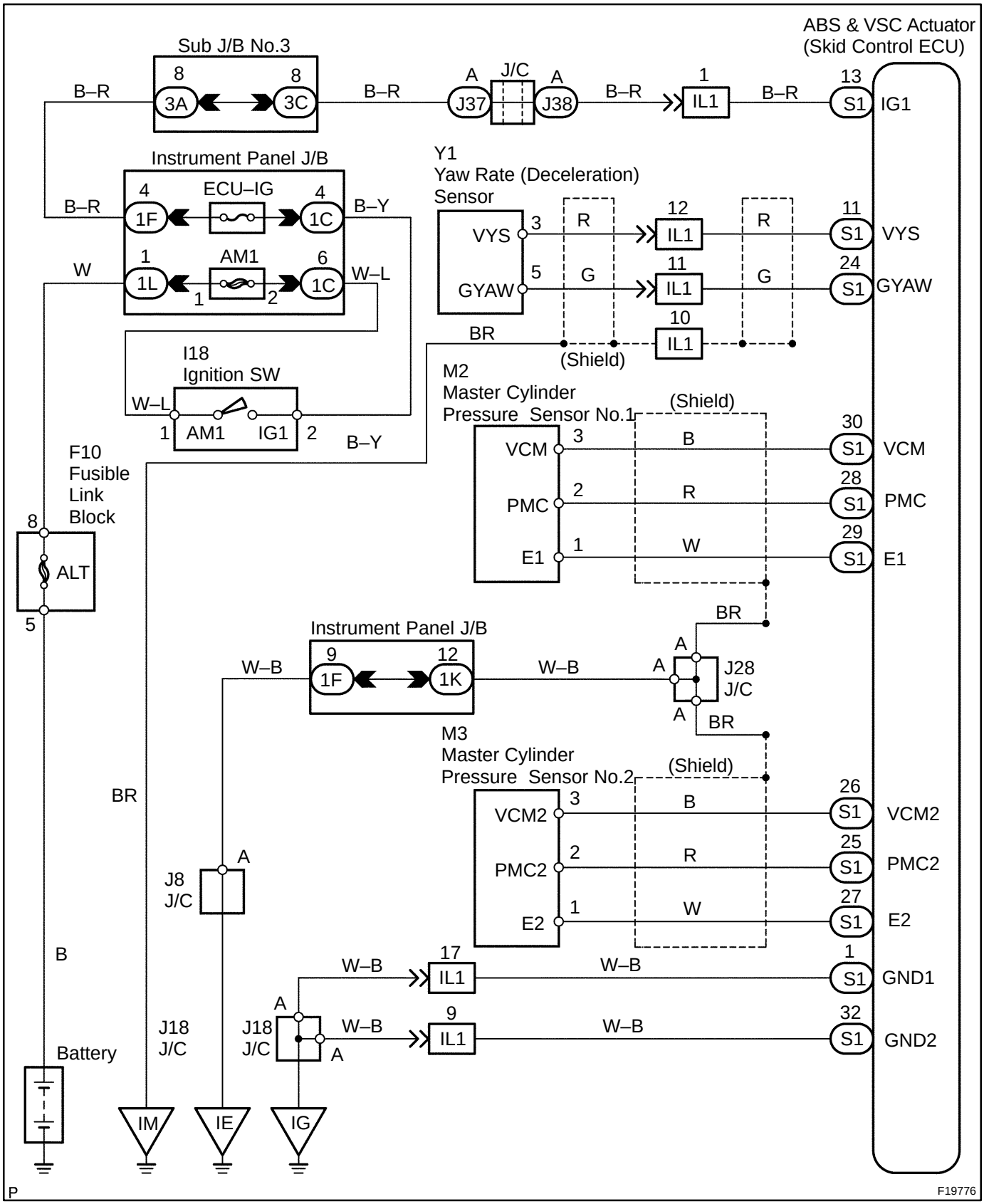
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check battery positive voltage.**

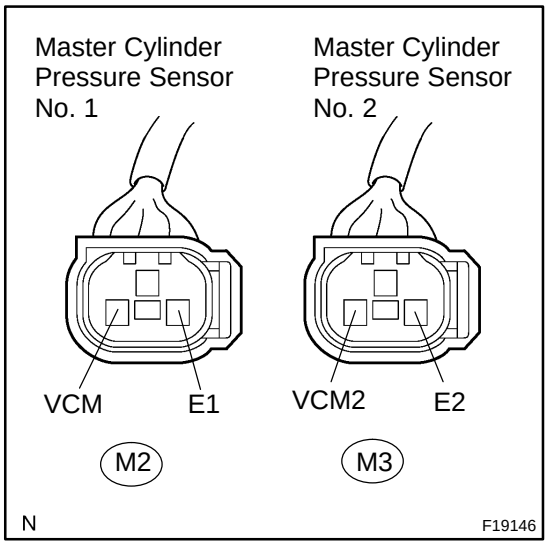
OK:

Voltage: 10 to 14 V

NG → **Check and repair the charging system (See page CH–1).**

OK

2	**Check master cylinder pressure sensor No. 1 and No. 2.**



PREPARATION:

Disconnect the master cylinder pressure sensor connectors No. 1 and No. 2.

CHECK:

(1) Turn the ignition switch to the ON position.

(2) Measure the voltage between terminal VCM and E1, VCM2 and E2 of the harness side connector.

OK:

Voltage: 4.5 to 5.5 V

NG → **Go to step 4.**

OK

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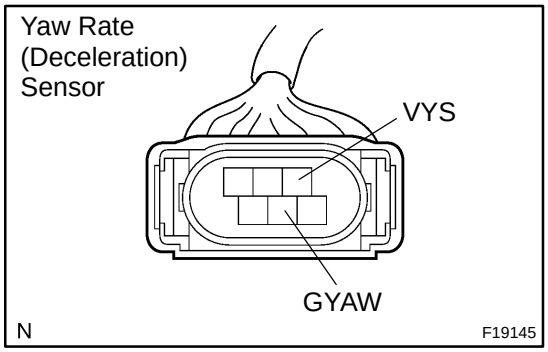
3	**Check yaw rate (deceleration) sensor.**



PREPARATION:

Disconnect the yaw rate (deceleration) sensor connector.

CHECK:

(1) Turn the ignition switch to the ON position.

(2) Measure the voltage between terminal GYAW and VYS of the harness side connector.

OK:

Voltage: 10 to 14 V

NG → **Go to step 4.**

OK

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

4	**Check for open and short circuit in harness and connector between master cylinder pressure sensor No. 1, master cylinder pressure sensor No. 2, yaw rate (deceleration) sensor and skid control ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

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DTC	C1362 / 36	Malfunction in Sensor Offset Value (VSC Sensor System)

CIRCUIT DESCRIPTION

DTC is output when zero point calibration is not done for the VSC sensors (yaw rate and master cylinder pressure sensors).
DTC is cleared when zero point calibration is done.

DTC No.	DTC Detecting Condition	Trouble Area
C1362 / 36	Zero point calibration of the VSC sensor system is not properly set.	Skid control ECU (Perform zero point calibration)

INSPECTION PROCEDURE

1	**Perform zero point calibration of the yaw rate (deceleration) sensor and master cylinder pressure sensor (See page DI–897).**

NEXT

2	**Check DTC**

PREPARATION:

(a) Clear the DTC (See page DI–911).
(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **END**

A

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

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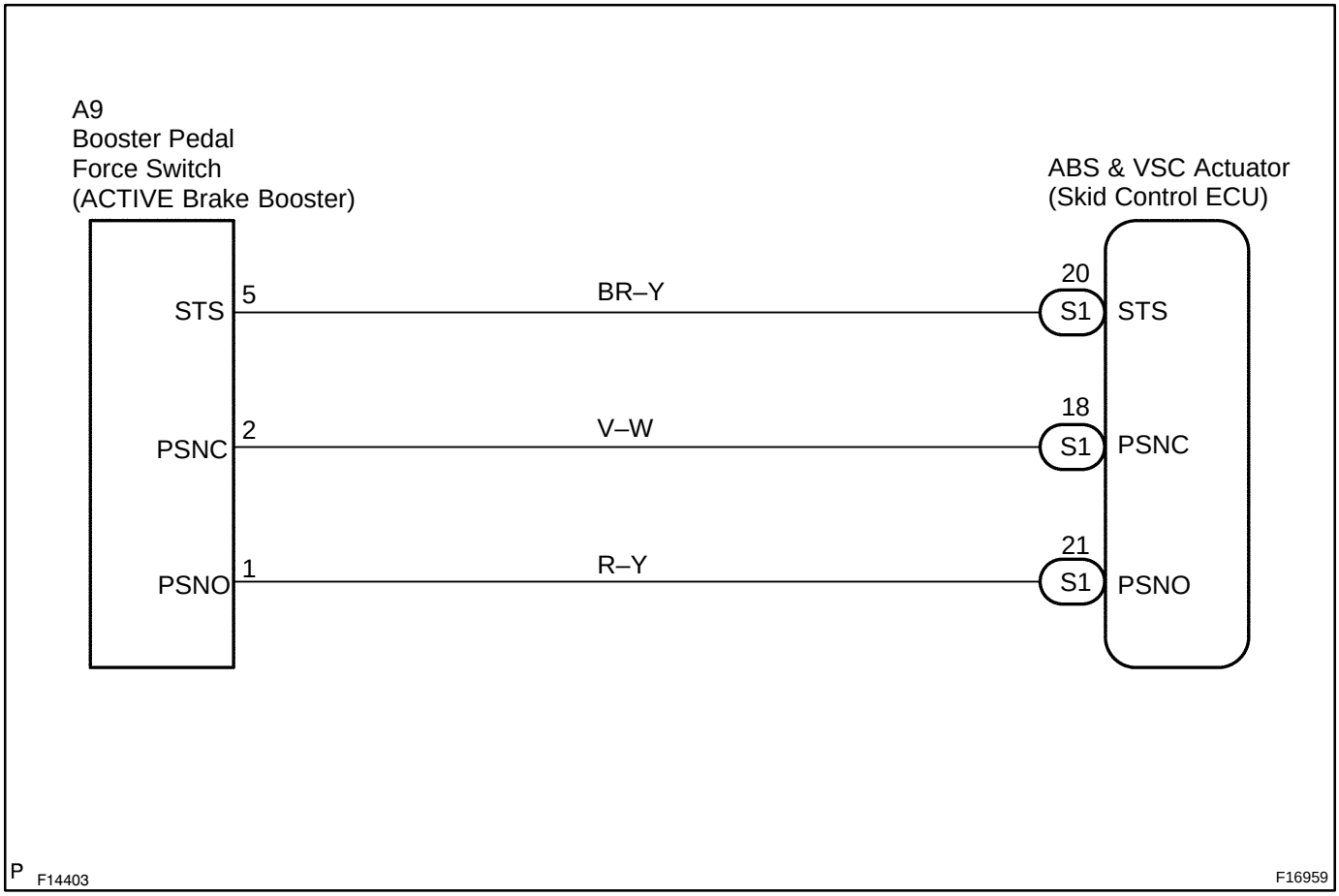
DTC	C1363 / 63	Malfunction in Booster Pedal Force Switch

CIRCUIT DESCRIPTION

Detects if the brake pedal is depressed.

DTC No.	DTC Detecting Condition	Trouble Area
C1363 / 63	Signal transmitted from booster pedal force switch to ECU is abnormal.	▶Booster pedal force switch (Active brake booster) ▶Booster pedal force switch (Active brake booster) circuit

WIRING DIAGRAM



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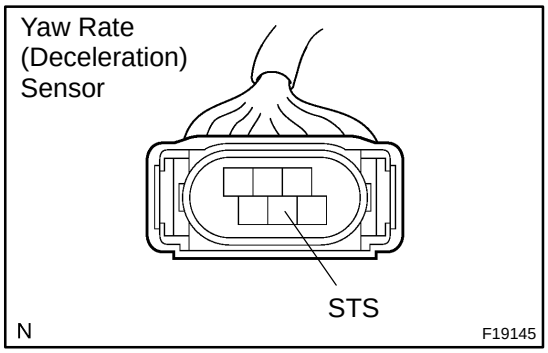
INSPECTION PROCEDURE

1	**Check voltage between terminal STS of brake pedal force switch and body ground.**



PREPARATION:

Disconnect the brake pedal force switch connector.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage between STS of brake pedal force switch harness side connector and body ground.

OK:

Voltage: About 6 V

NG	**Go to step 3.**

OK

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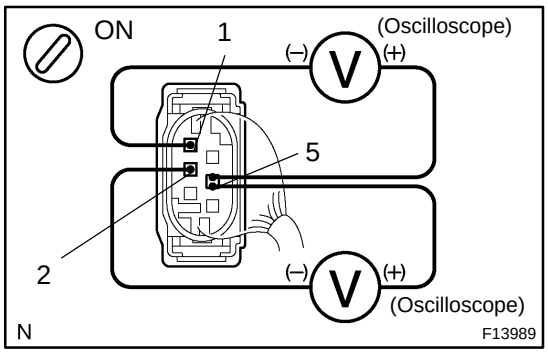
2	Check booster pedal force switch.



When using the oscilloscope:

PREPARATION:

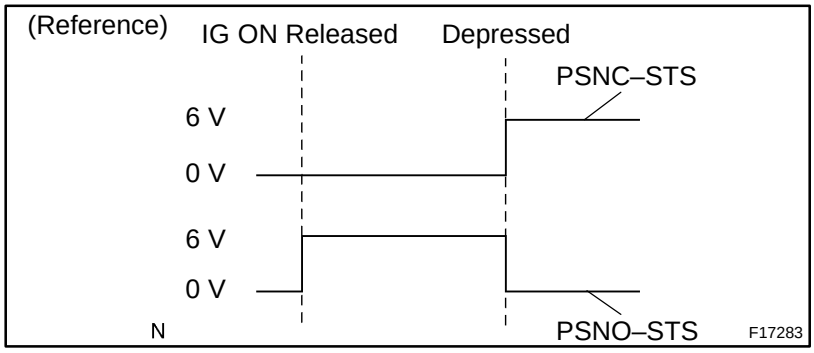
(a) Connect the oscilloscope between terminals PSNO(1) and STS(5), PSNC(2) and STS(5) of the brake booster with connector being connected.

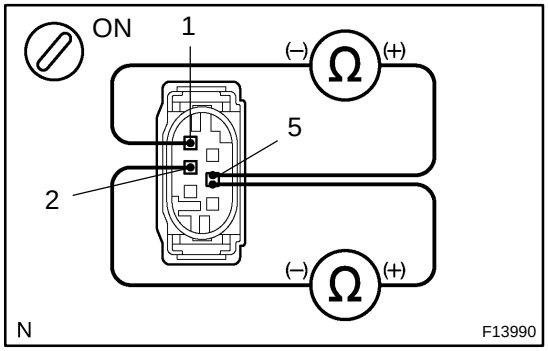
(b) Turn the ignition switch to the ON position.

CHECK:

Check the signal waveform while the brake pedal is depressed and released.

OK:





When not using the oscilloscope:

PREPARATION:

(a) Disconnect the connector from the brake booster.

(b) Turn the ignition switch to the ON position.

CHECK:

Check continuity between the terminals while depressing and releasing the brake pedal.

OK:

Tester Connection	Condition	Specified Condition
Terminals 2 – 5	Released	Continuity
Terminals 1 – 5	Depressed	Continuity

NG → **Replace brake booster (See page BR–22).**

OK

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3	Check for open and short circuit in harness and connector between booster pedal force switch and skid control ECU (See page IN–35).

NG → Repair or replace harness or connector.

OK →

Replace skid control ECU
(See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DIDMG–01

DTC	51	Malfunction in ECM Control System

CIRCUIT DESCRIPTION

The circuit is used to send TRAC & VSC control information from the skid control ECU to the ECM, and engine control information from the ECM to the skid control ECU via the vehicle CAN and CAN1 communication system.

This DTC is output when the engine control system failure signal is received from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
51	Translate ECU receives the engine control system failure signal from ECM for 5 sec. or more.	▶ECM

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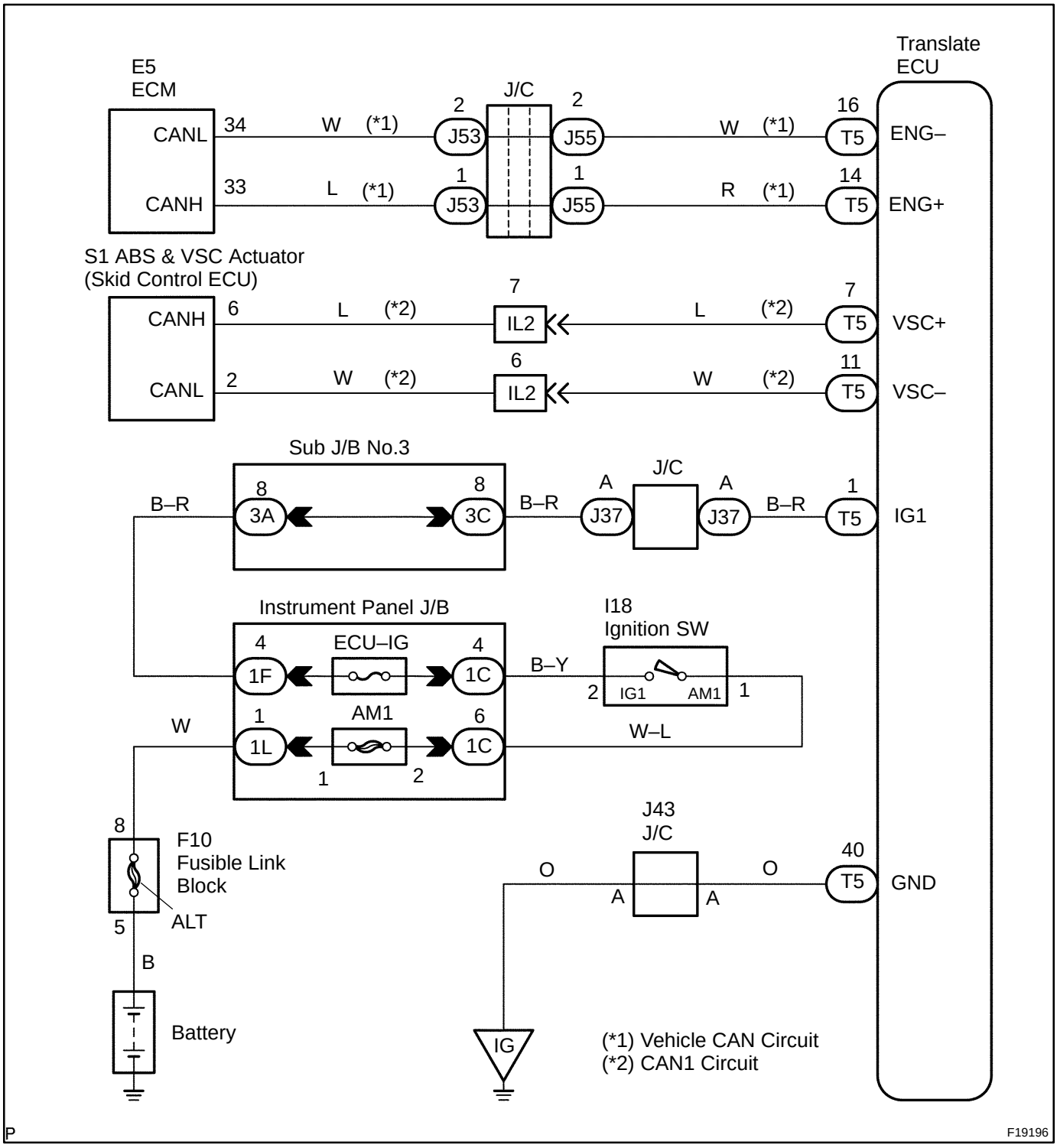
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check the DTC of the VSC (See page DI–911).**

CHECK:

Check skid control ECU DTC.

RESULT:

DTC is not output	A
DTC (C1203 / 53) is output	B

B → **Repair circuit indicated by output code (See page DI–921).**

A

2	**Check for open and short circuit in harness and connector between skid control ECU and translate ECU (CAN1 circuit).**

NG → **Repair or replace harness or connector (CAN1 circuit).**

OK

Replace translate ECU.

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DIDMH–01

DTC	53	Malfunction in CAN1 Communication

CIRCUIT DESCRIPTION

The circuit is used to send TRAC&VSC control information from the skid control ECU to the ECM, and engine control information from the ECM to the skid control ECU via the CAN communication system.
This DTC is output when communication between the translate ECU and the skid control ECU is cut off.

DTC No.	DTC Detecting Condition	Trouble Area
53	IG1 voltage is 8.5 V or more, and the condition that data from skid control ECU cannot be received continues for 5 sec. or more.	▶VSC+, VSC– circuit (CAN1 communication system) ▶Skid control ECU ▶Translate ECU

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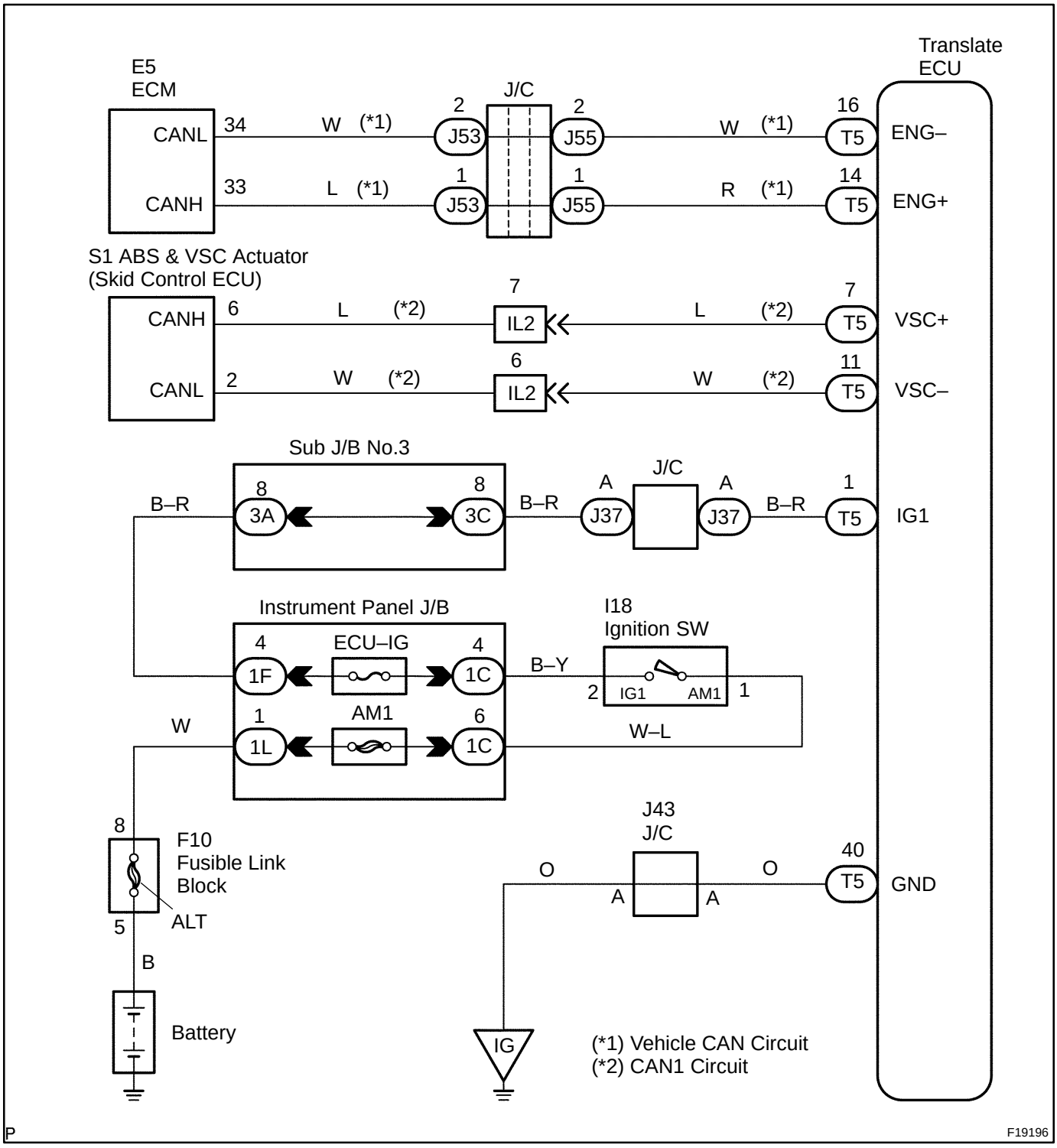
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check the DTC of the VSC (See page DI–911).**

CHECK:

Check skid control ECU DTC.

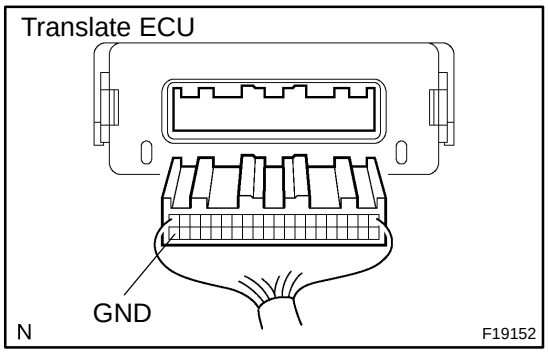
RESULT:

DTC is not output	A
DTC (C1203/53) is output	B

B → **Repair circuit indicated by the output code (See page DI–921).**

A

2	**Check for open circuit in harness and connector between GND terminal of the translate ECU and body ground.**



PREPARATION:

Disconnect the translate ECU connector.

CHECK:

Measure the resistance between the GND terminal and body ground.

OK:

Continuity

NG → **Repair or replace harness or connector (Translate ECU GND circuit).**

OK

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3	**Replace the translate ECU and check if the trouble occurs again.**

PREPARATION:

(a) Clear the translate DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC is stored in the memory.

PREPARATION:

DTC 53 is not output	A
DTC 53 is output	B

B → **Replace skid control ECU (See page BR–52).**

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

A →

END

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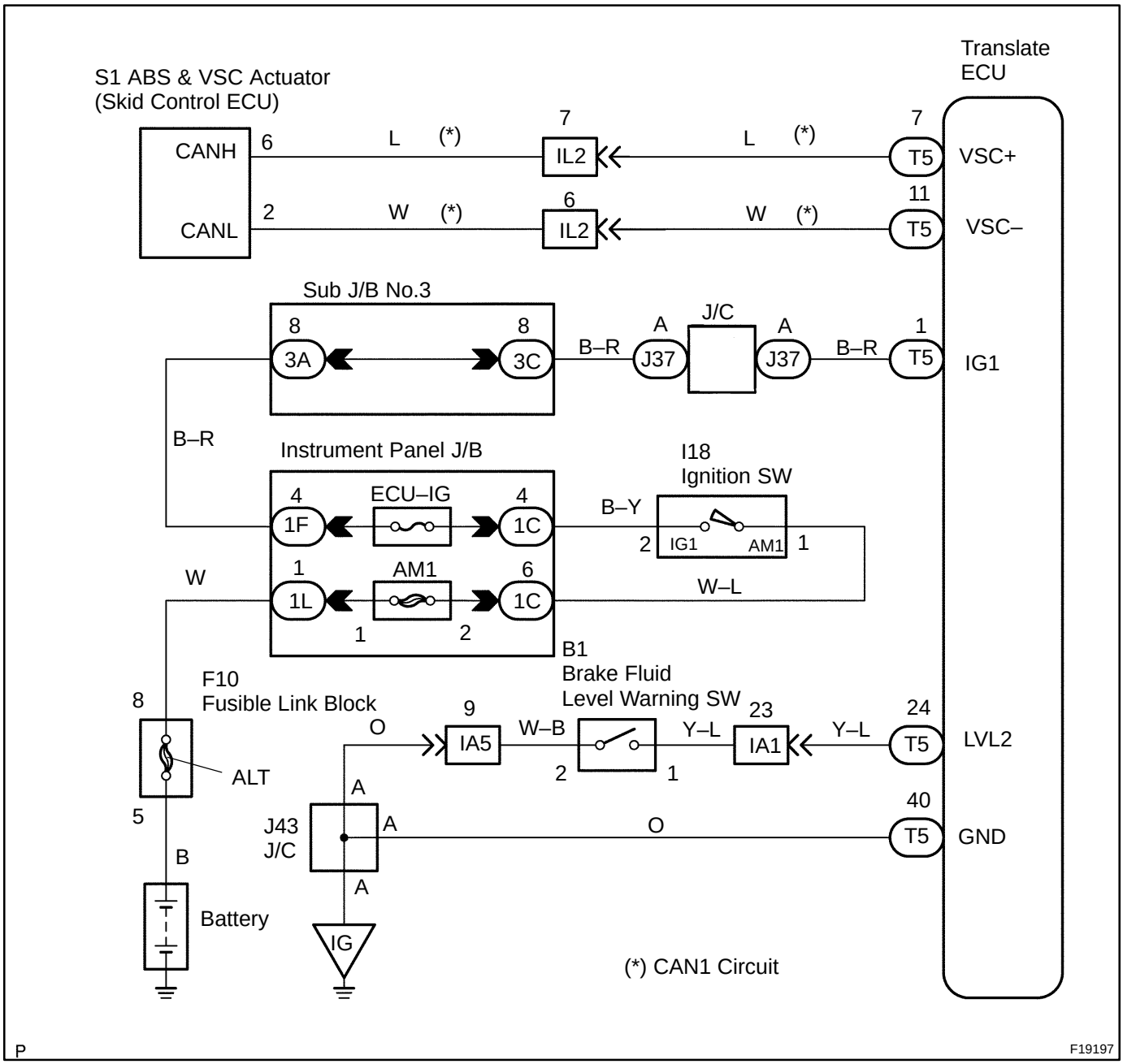
DTC	58	Malfunction of Brake Fluid Level Warning Switch

CIRCUIT DESCRIPTION

The brake fluid level warning switch sends the appropriate signal to the translate ECU.
This signal indicates a drop in brake fluid level.

DTC No.	DTC Detecting Condition	Trouble Area
58	▶Brake fluid level warning switch connector is disconnected for 1 sec. or more. ▶Brake fluid level warning switch is ON for 30 sec. or more.	▶Brake fluid level warning switch circuit ▶Brake fluid level warning switch ▶Brake fluid reservoir level ▶Translate ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check the DTC of the VSC (See page DI–911).**

CHECK:

Check skid control ECU DTC.

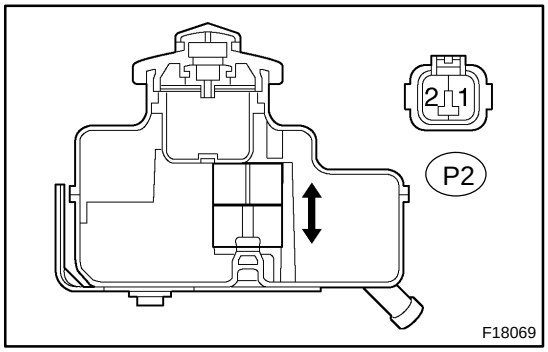
RESULT:

DTC is not output	A
DTC (C1202 / 52) is output	B

B → **Repair circuit indicated by the output code (See page DI–921).**

A

2	**Check brake fluid level warning switch.**



PREPARATION:

Disconnect the brake fluid level warning switch connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Switch Condition	Specified Condition
(B2–1) – (B2–2)	Float UP	10 kΩ or more (No continuity)
(B2–1) – (B2–2)	Float DOWN	1 Ω or less (Continuity)

NG → **Replace brake fluid level warning switch.**

OK

3	**Check for open and short circuit in harness and connector between brake fluid level warning switch and translate ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

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4	**Replace the translate ECU and check if the trouble occurs again.**

PREPARATION:

(a) Clear the translate DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC is stored in the memory.

PREPARATION:

DTC 58 is not output	A
DTC 58 is output	B

B → **Replace skid control ECU (See page BR–52).**

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

A

END

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DIDMJ–01

DTC	65	Malfunction 1 of Vehicle CAN

CIRCUIT DESCRIPTION

The circuit is used to send TRAC&VSC control information from the skid control ECU to the ECM, and engine control information from the ECM to the skid control ECU via the CAN communication system.
This DTC is output when communication between the translate ECU and the skid control ECU is cut off.

DTC No.	DTC Detecting Condition	Trouble Area
65	Any of the following 1. through 3. is detected when IG1 voltage is 8.5 V or more and vehicle speed exceeds by 9 mph (15 km/h) or more. 1. Condition that signal cannot be received from ECM at least once within 5 sec. occurs 10 times or more within 60 seconds. 2. Signal cannot be received continuously for 2 sec. or more. 3. Condition that signal cannot be sent to ECM at least once within 5 sec. occurs 10 times or more within 60 seconds.	▶ENG+, ENG– circuit (CAN communication system) ▶ECM ▶Translate ECU ▶Suspension control ECU

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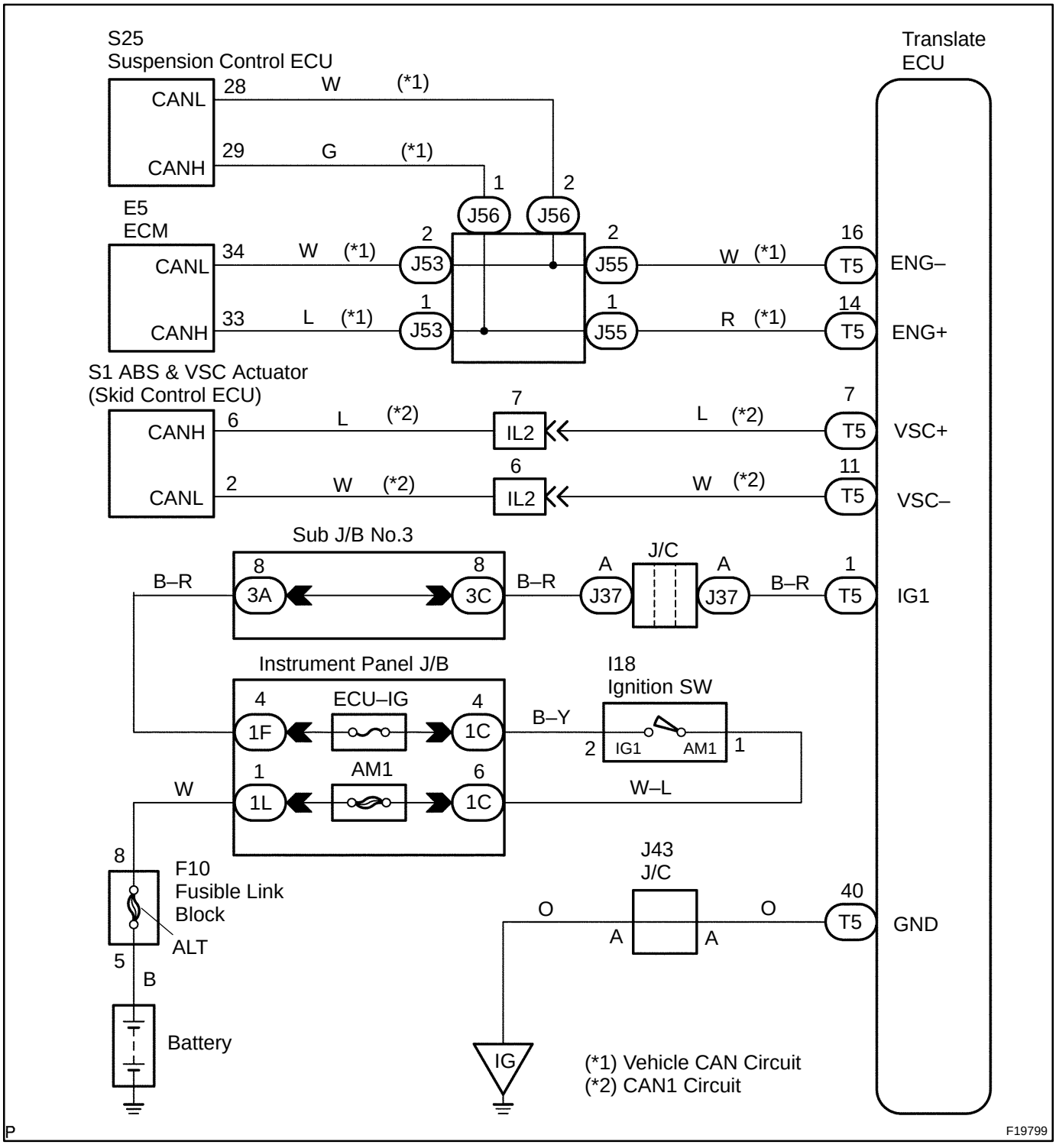
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check DTC of the VSC (See page DI–911).**

CHECK:

Check skid control ECU DTC.

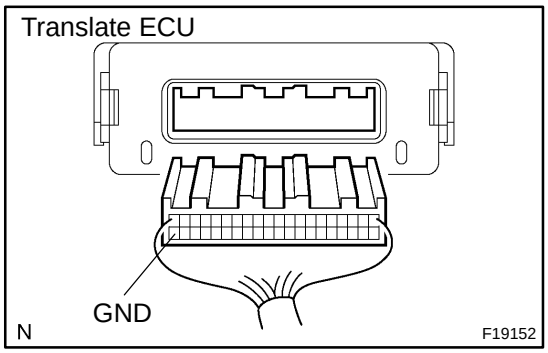
RESULT:

DTC is not output	A
DTC is output	B

B → **Repair circuit indicated by the output code (See page DI–921).**

A

2	**Check for open circuit in harness and connector between GND terminal of the translate ECU and body ground (See page IN–35).**



PREPARATION:

Disconnect the translate ECU connector.

CHECK:

Measure the resistance between the GND terminal and body ground.

OK:

Continuity

NG → **Repair or replace harness or connector (Translate ECU GND circuit.**

OK

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3	**Replace the translate ECU and check if the trouble occurs again.**

PREPARATION:

(a) Clear the translate DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC is stored in the memory.

PREPARATION:

DTC 65 is not output	A
DTC 65 is output	B

B → **Check and replace suspension control ECU, ECM or CAN communication system.**

A → **END**

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DIDMK–01

DTC	94	Malfunction 2 of Vehicle CAN

CIRCUIT DESCRIPTION

The circuit is used to send TRAC&VSC control information from the skid control ECU to the ECM, and engine control information from the ECM to the skid control ECU via CAN communication system.
This DTC is output when the ECM and translate ECU cannot communicate with each other.

DTC No.	DTC Detecting Condition	Trouble Area
94	When each of the following 1 or 2 is detected at IG1 voltage of 8.5 V or more. 1. Communication error because of noise. 2. Data sending error after writing to output device for 5 sec. or more.	▶ENG+, ENG– circuit (CAN communication system) ▶ECM ▶Translate ECU ▶Suspension control ECU

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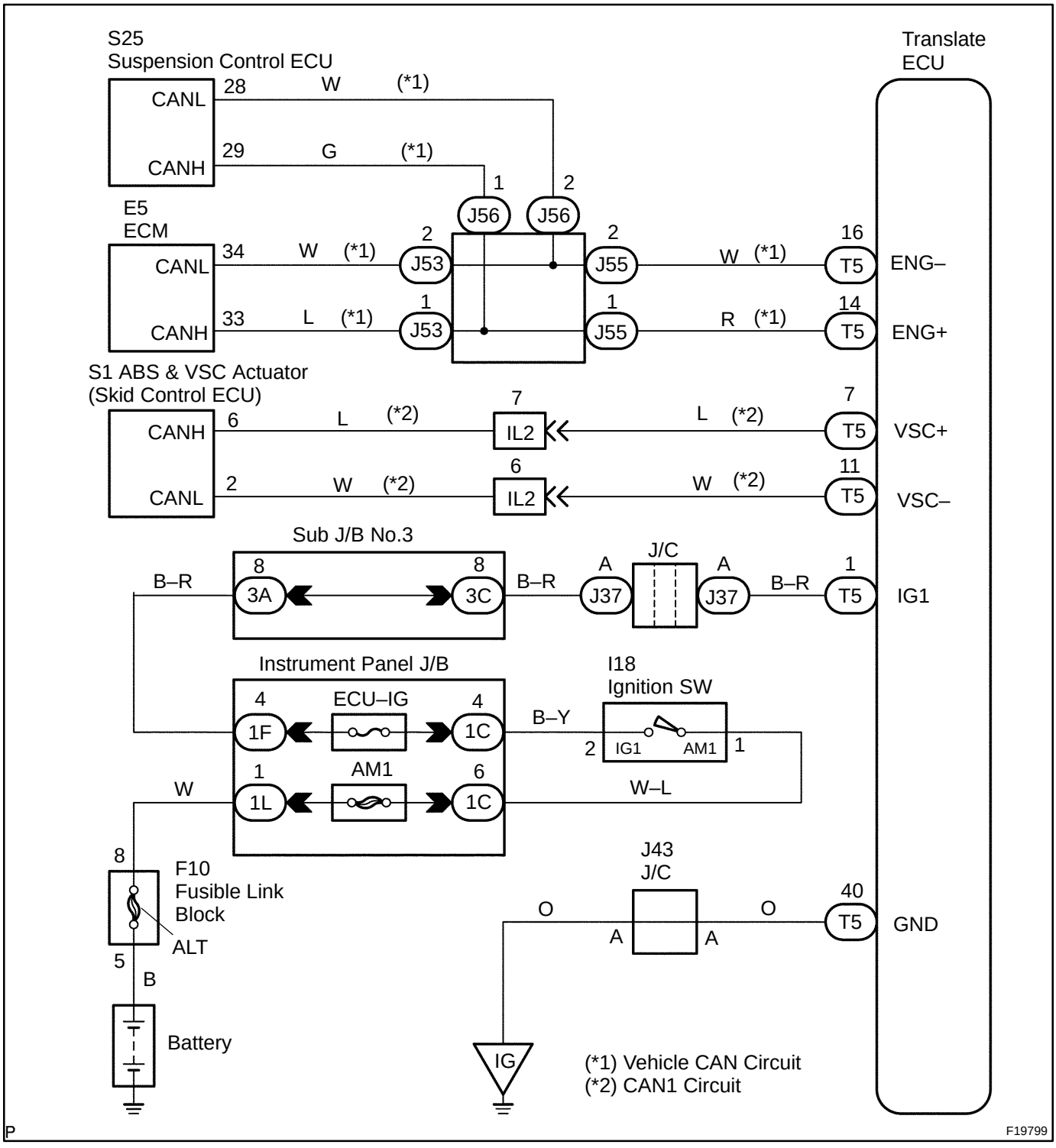
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check DTC of the VSC (See page DI–911)**

CHECK:

Check skid control ECU DTC.

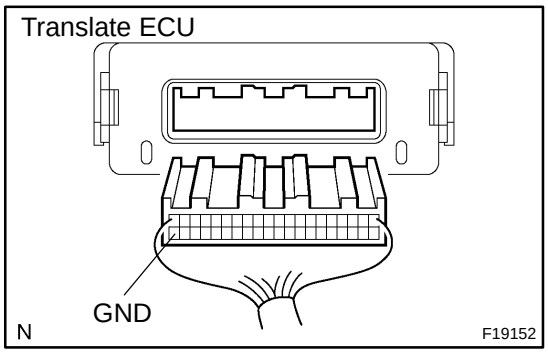
RESULT:

DTC is not output	A
DTC is output	B

B → **Repair circuit indicated by the output code (See page DI–921).**

A

2	**Check for open circuit in harness and connector between GND terminal of the translate ECU and body ground (See page IN–35).**



PREPARATION:

Disconnect the translate ECU connector.

CHECK:

Measure the resistance between the GND terminal and body ground.

OK:

Continuity

NG → **Repair or replace harness or connector (Translate ECU GND circuit).**

OK

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3	**Replace the translate ECU and check if the trouble occurs again.**

PREPARATION:

(a) Clear the translate DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC is stored in the memory.

PREPARATION:

DTC 94 is not output	A
DTC 94 is output	B

B → **Check and repair suspension control ECU, ECM or CAN communication system.**

A → **END**

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DTC	Normal Code	Malfunction in Translate ECU

CIRCUIT DESCRIPTION

If any trouble occurs in the engine control system, the skid control ECU prohibits ABS & VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
Normal Code	Conditions 1., 2. or 3. continue for 5 sec. or more: 1. Engine malfunction signal is sent from ECM. 2. Shift malfunction signal is sent from ECM. 3. The shift position is other than P and N, and P range input voltage is 8 V or more.	▶ECM circuit ▶ECM ▶Brake fluid level ▶Brake fluid level warning switch circuit ▶Steering angle sensor ▶Translate ECU ▶Skid control ECU ▶Vehicle CAN ▶VSC+, VSC– circuit (CAN1 communication system)

INSPECTION PROCEDURE

1	Is DTC output for ECM?

Check DTC on page DI–43.

YES → **Repair engine control system according to the output code (See page DI–58).**

NO

2	Check the DTC of the ABS and VSC (See page DI–911).

CHECK:

Check skid control ECU DTC.

RESULT:

Only DTC ”C1203/53” of the VSC system is output	A
Except DTC ”C1203/53” of the VSC system are output	B

B → **Repair ABS and VSC control system according to the code output (See page DI–921).**

A

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3	**Replace the translate ECU and check if the trouble occurs again.**

PREPARATION:

(a) Clear the DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC is stored in the memory.

PREPARATION:

DTC is not output	A
DTC is output	B

B → **Replace skid control ECU (See page BR–52).**

NOTICE:

When replacing the skid control ECU, perform zero point calibration (See page DI–897).

A

END

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DI942–03

DTC	Non – Code	Translate ECU malfunction

CIRCUIT DESCRIPTION

Translate ECU DTCs can be read by blinks of the brake warning light (see page DI–911).

DTC No.	DTC Detecting Condition	Trouble Area
Non – code*	Translate ECU internal malfunction is detected.	▶Brake warning light circuit ▶Tc terminal circuit ▶Translate ECU

*: Neither the normal system code nor a trouble code is output.

INSPECTION PROCEDURE

1	**Check the BRAKE warning light circuit (See page DI–1033).**

OK:

BRAKE warning light circuit is normal.

NG → **Repair or replace the BRAKE warning light circuit.**

OK

2	**Check the Tc terminal circuit (See page DI–1055).**

OK:

Tc terminal circuit is normal.

NG → **Repair or replace the Tc terminal circuit.**

OK

Check and replace the translate ECU.

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DI943–03

DTC	Always ON*	Malfunction in Skid Control ECU

*: ABS warning light

When reading DTCs by SST (CHECK WIRE), if the ABS warning light remains ON, troubleshoot by following the inspection flow.

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	When any of the following conditions are detected: 1. Malfunction in ECU internal circuit is identified. 2. ECU power source voltage is too high.	▶Battery ▶Charging system ▶Power source circuit ▶ABS warning light circuit ▶Skid control ECU

HINT:

There is a possibility that the hand–held tester cannot be used when the ECU is abnormal.

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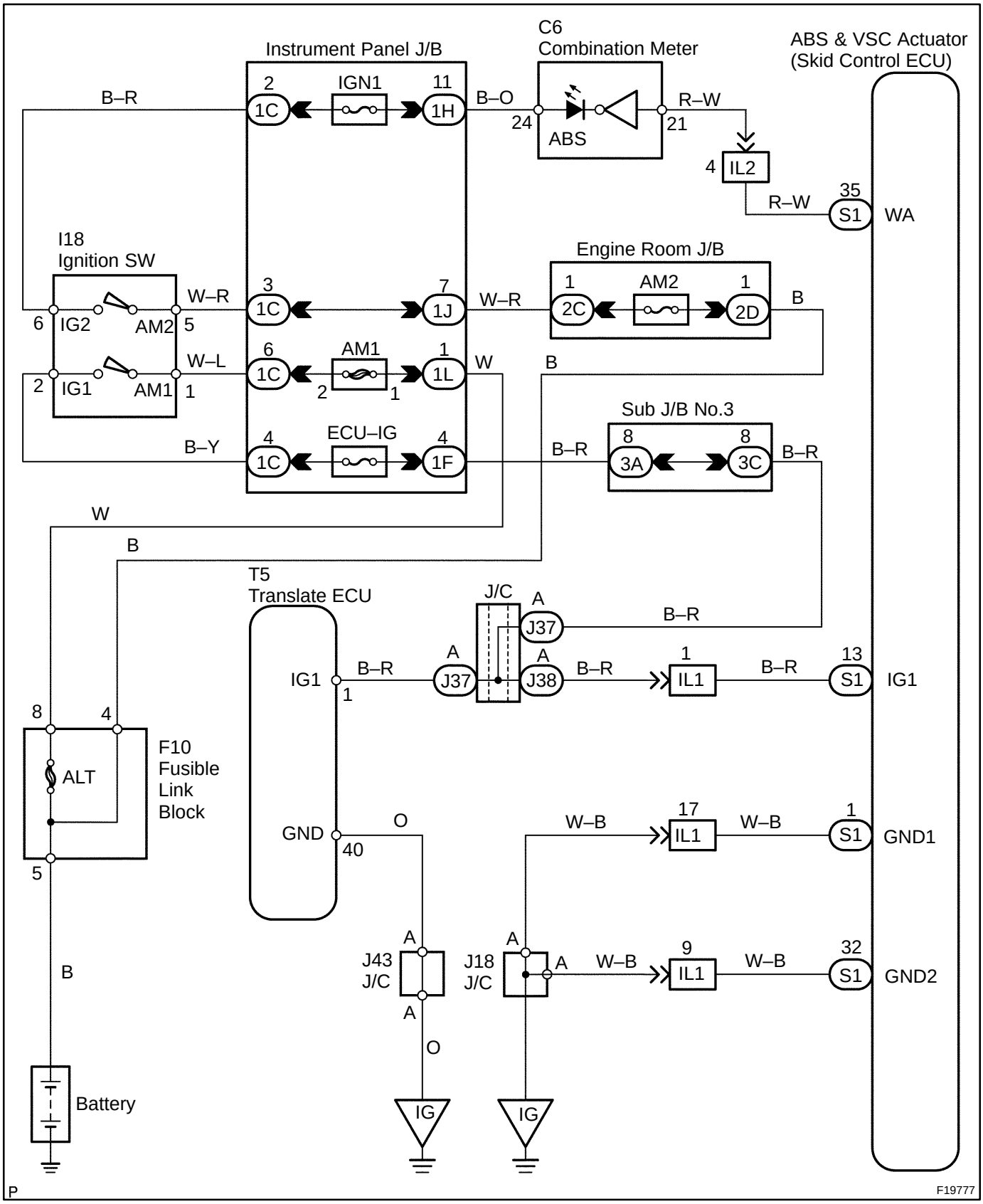
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Is DTC output?**

Check DTC on page DI–911.

YES → **Repair circuit indicated by the output code (See page DI–921).**

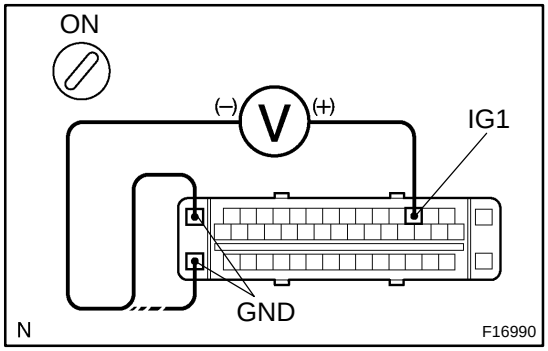
NO

2	**Check that the skid control ECU connector is securely connected to the skid control ECU (See page IN–35).**

NG → **Connect the connector to the skid control ECU.**

OK

3	**Check voltage between terminals IG1 and GND of the skid control ECU connector.**



PREPARATION:
Disconnect the skid control ECU connector.
CHECK:
(a) Turn the ignition switch to the ON position.
(b) Measure the voltage between terminals IG1 and GND of the skid control ECU harness side connector.
OK:
Voltage: 10 to 14 V

NG → **Check for open and short circuit in harness and connector between ECU–IG fuse and skid control ECU (See page IN–35).**

OK

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4	**Check battery positive voltage.**

CHECK:

Check the battery positive voltage.

OK:

Voltage: 10 to 14 V

NG → **Check and repair the charging system (See page CH–1).**

OK

5	**Check the Tc terminal circuit (See page DI–1055).**

OK:

Tc terminal circuit is normal

NG → **Repair or replace the Tc terminal circuit.**

OK

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6	**Check operation of the ABS warning light.**

When using the hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.
(c) Select ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter by the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WARN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter

OK:

ABS warning light operates.

When not using the hand–held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the skid control ECU.
(c) Turn the ignition switch to the ON position.

CHECK:

Check the ABS warning light comes on.

OK:

ABS warning light comes on.

OK → **Replace skid control ECU (See page BR–52).**

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

NG

7	**Check ABS warning light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair combination meter assembly (See page DI–1610).**

OK

Check for short circuit in harness and connector between ABS warning light and skid control ECU (See page IN–35).

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DI944–04

ABS Warning Light Circuit (Remains ON)

CIRCUIT DESCRIPTION

If the ECU detects trouble, it turns on the ABS warning light and prohibits ABS control. At this time, the ECU records a DTC in memory.
Connect terminals Tc and CG of the DLC3 to make the ABS warning light blink and indicate the DTC.

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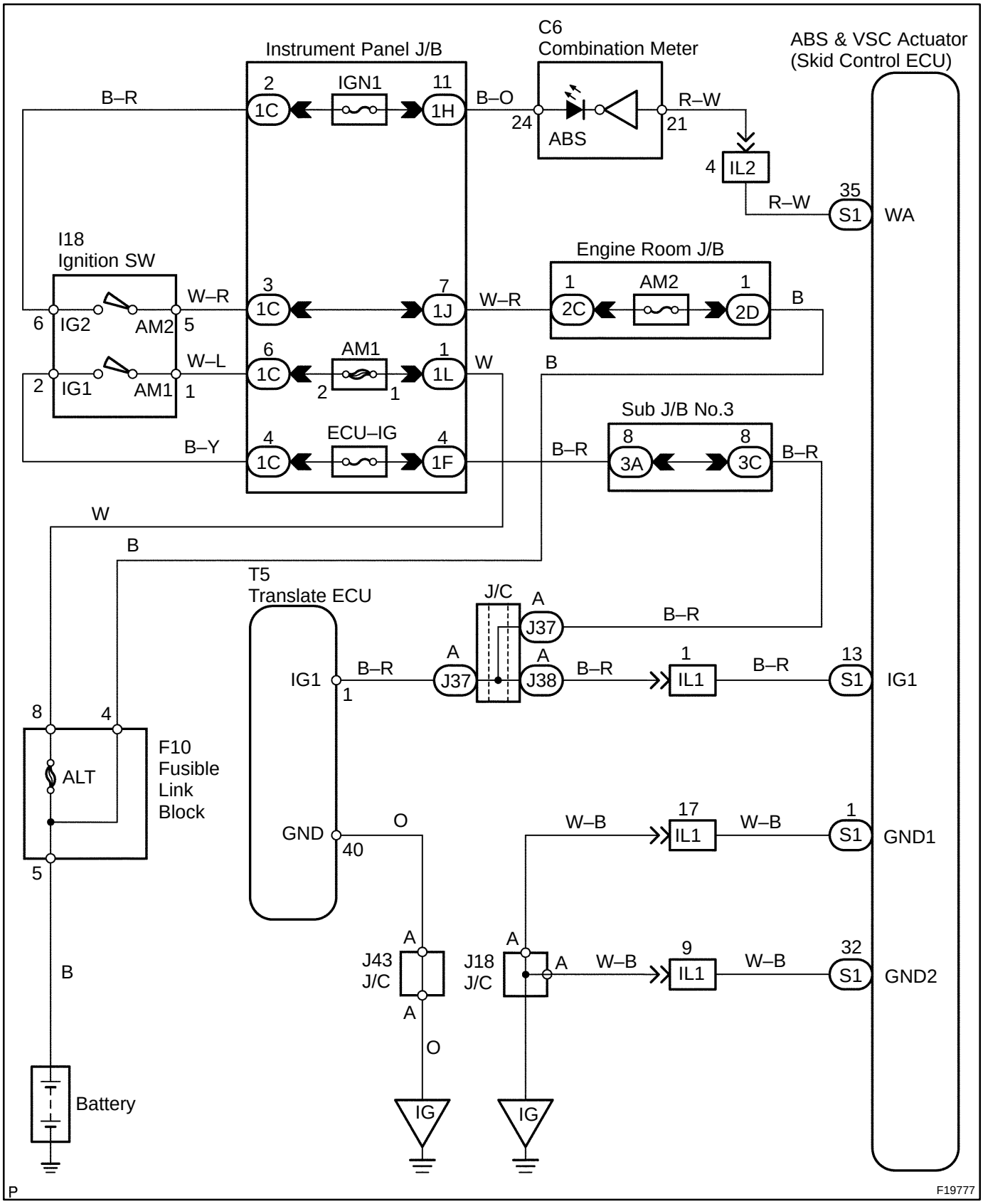
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check operation of the ABS warning light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition/Test Details	Diagnostic Note
ABS WARN LIGHT	Turn ABS warning light ON/OFF	Observe combination meter

OK:

ABS warning light operates.

NG → **Go to step 4**

OK

2	**Is DTC output?**

Check DTC on page DI–911.

YES → **Repair circuit indicated by the output code (See page DI–921).**

NO

3	**Check that the skid control ECU connector is securely connected to the skid control ECU (See page IN–35).**

NG → **Connect the connector to the skid control ECU.**

OK

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4	**Check harness and connector between skid control ECU and combination meter (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

5	**Check ABS warning light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair combination meter assembly (See page DI–1610).**

OK

Check and replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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ABS Warning Light Circuit (Does not light up)

CIRCUIT DESCRIPTION

See page DI–1021.

WIRING DIAGRAM

See page DI–1021.

INSPECTION PROCEDURE

1	**Check operation of the ABS warning light.**

When using the hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition/Test Details	Diagnostic Note
ABS WARN LIGHT	Turn ABS warning light ON/OFF	Observe combination meter

OK:

ABS warning light operates.

When not using the hand–held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the skid control ECU.
(c) Turn the ignition switch to the ON position.

CHECK:

Check the ABS warning light comes on.

OK:

ABS warning light comes on.

NG → **Go to step 2.**

OK

Check and replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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2	**Check harness and connector between skid control ECU and combination meter (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

3	**Check ABS warning light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair combination meter assembly (See page DI–1610).**

OK

Check and replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DI945–03

VSC TRAC Warning Light Circuit (Remains ON)

CIRCUIT DESCRIPTION

If the ECU stores a DTC to shut down VSC & TRAC operation, the VSC TRAC warning light on the combination meter come on.

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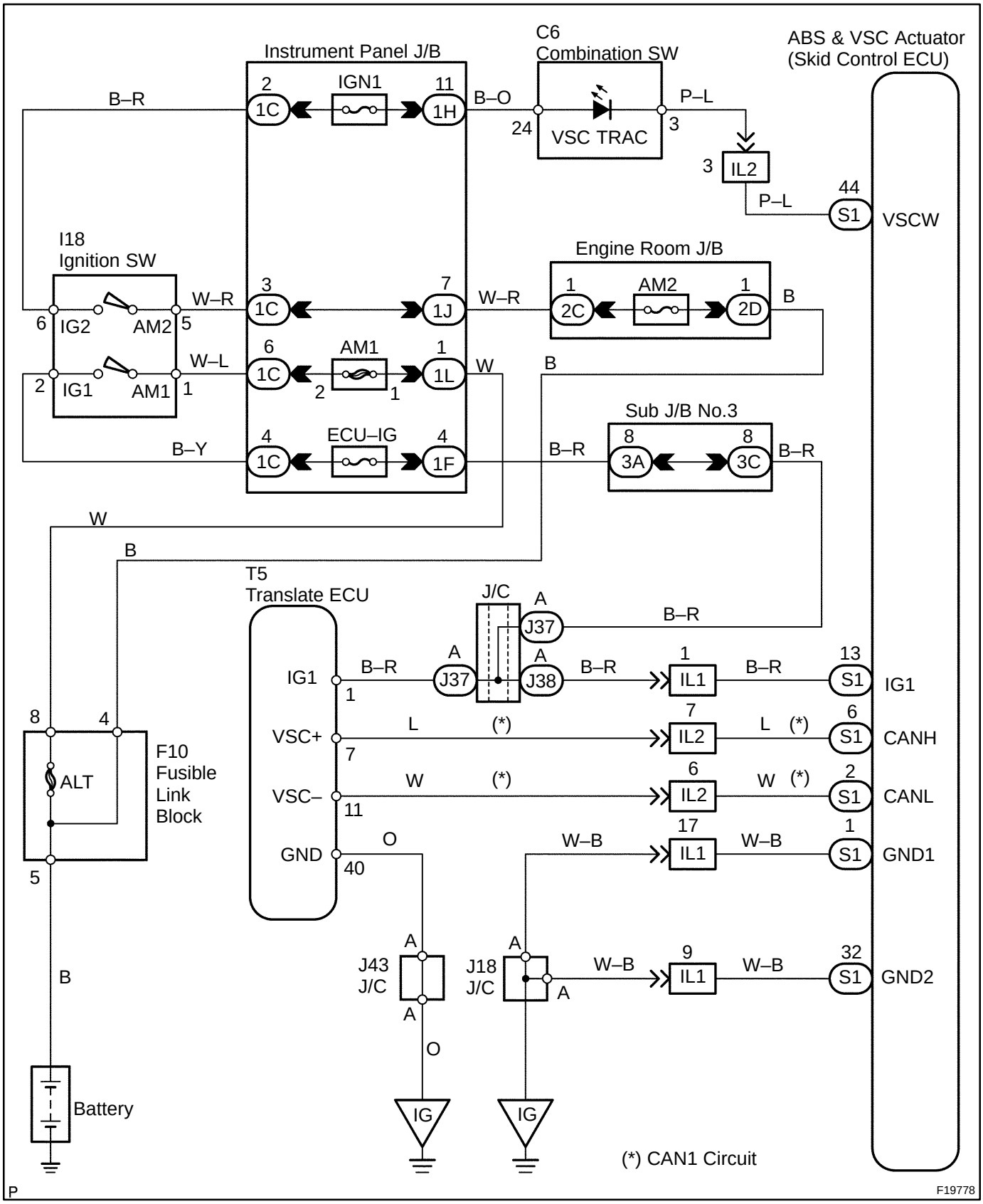
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check operation of the VSC warning light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.
(c) Select ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the VSC TRAC warning light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / TRC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter

OK:

VSC TRAC warning light operates.

OK → **Go to step 5.**

NG

2	**Is DTC output?**

Check DTC on page DI–911.

YES → **Repair circuit indicated by the output code (See page DI–921).**

NO

3	**Check for open and short circuit in harness and connector between skid control ECU and VSC TRAC warning light (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

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4	**Check VSC TRAC warning light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair combination meter assembly (See page DI–1610).**

OK

Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

5	**Is DTC output?**

Check DTC on page DI–911.

YES → **Repair circuit indicated by the output code (See page DI–921).**

NO

Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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VSC TRAC Warning Light Circuit (Does not light up)

CIRCUIT DESCRIPTION

See page DI–1027.

WIRING DIAGRAM

See page DI–1027.

INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check operation of the VSC warning light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.

(c) Select ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the VSC TRAC warning light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / TRC OFF IND	Turns VSC / TRAC OFF indicator ON / OFF	Observe combination meter

OK:

VSC TRAC warning light operates.

NG → **Go to step 2.**

OK →

Replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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2	**Check for open and short circuit in harness and connector between skid control ECU and VSC TRAC warning light (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

3	**Check VSC TRAC warning light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair combination meter assembly (See page DI–1610).**

OK

Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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BRAKE Warning Light Circuit (Remains ON)

CIRCUIT DESCRIPTION

The BRAKE warning light comes on when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.
The skid control ECU is connected to the translate ECU via the CAN1 communication system.

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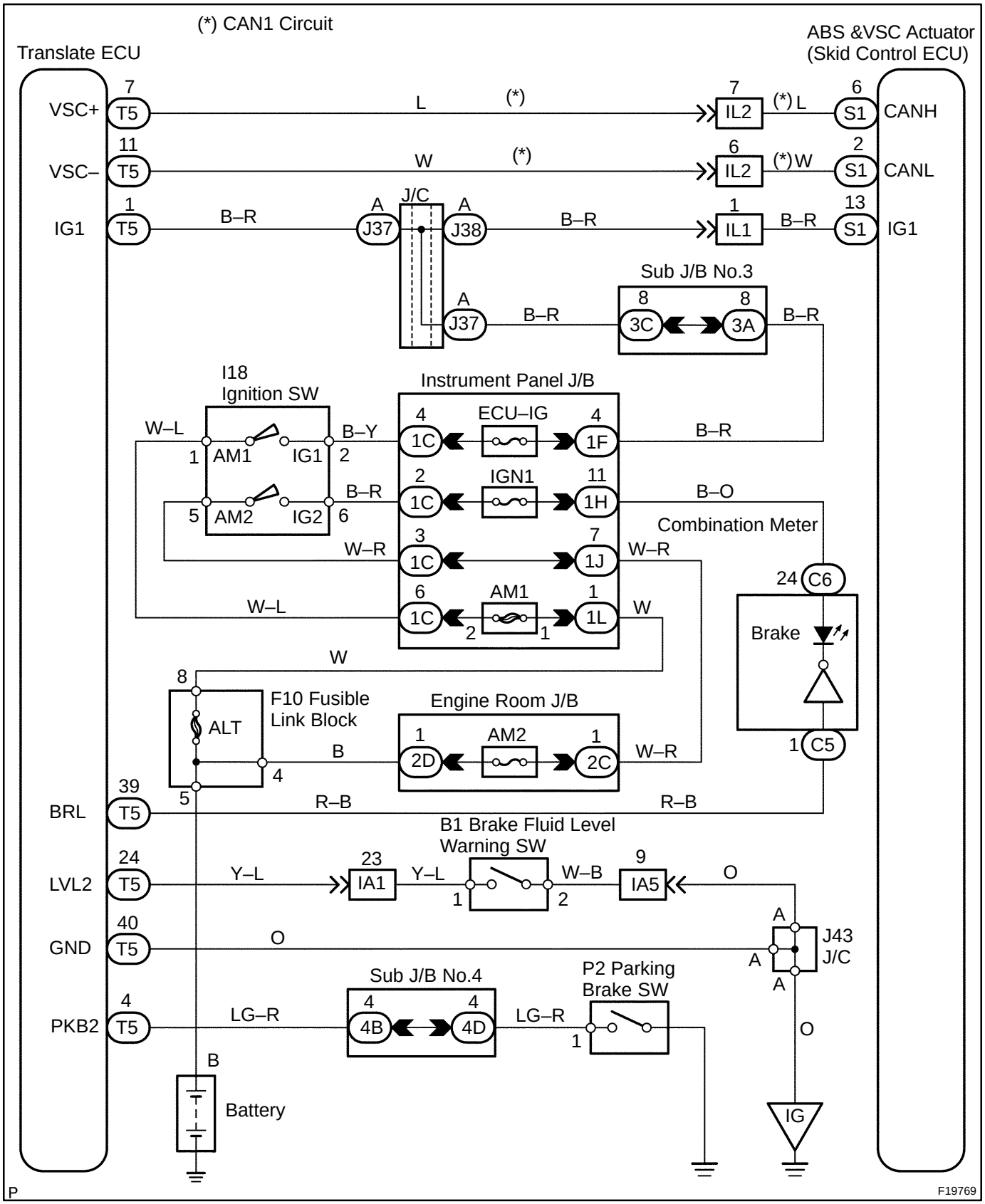
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check operation of the BRAKE warning light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held.

CHECK:

Check that ”ON” and ”OFF” of the BRAKE warning light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition/Test Details	Diagnostic Note
BRAKE WARN LIGHT	Turn BRAKE warning light ON/OFF	Observe combination meter

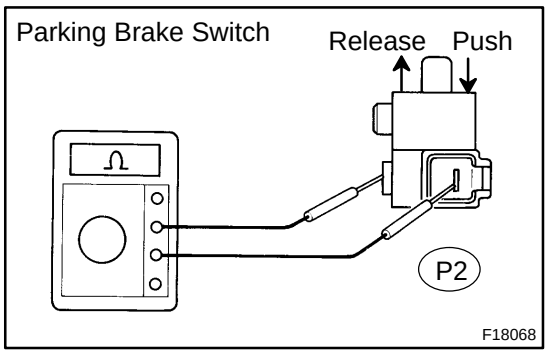
OK:

BRAKE warning light operates.

NG → **Go to step 6.**

OK

2	**Check parking brake switch assembly.**



PREPARATION:

Disconnect the parking brake switch connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Switch Condition	Specified Condition
P2–1 – Ground part	Released	1 Ω or less
P2–1 – Ground part	Pushed in	10 kΩ or more

NG → **Replace parking brake switch.**

OK

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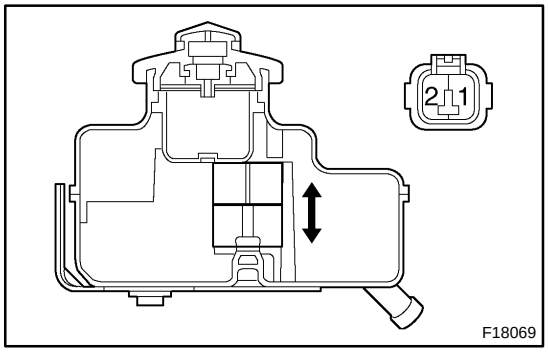
3	**Check harness and connector between translate ECU and parking brake switch (See page BE–2).**

NG → **Repair or replace parking brake switch circuit.**

OK

4	**Check brake fluid level warning switch.**



PREPARATION:
Disconnect the brake fluid level warning switch connector.
CHECK:
Measure the resistance according to the value(s) in the table below.
OK:

Tester Connection	Switch Condition	Specified Condition
(B2–1) – (B2–2)	Float UP	10 kΩ or more (No continuity)
(B2–1) – (B2–2)	Float DOWN	1 Ω or less (Continuity)

NG → **Replace brake fluid level warning switch.**

OK

5	**Check for open and short circuit in harness and connector between brake fluid level warning switch and translate ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

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6	**Check harness and connector between translate ECU and skid control ECU (CAN1 circuit).**

NG → **Repair or replace parking brake switch circuit (CAN1 circuit).**

OK

7	**Is DTC output?**

Check DTC (ABS, VSC, translate ECU and CAN communication system) on page DI–911.

YES → **Repair circuit indicated by the output code (See page DI–921).**

NO

8	**Check BRAKE warning light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair or replace combination meter (See page DI–1610).**

OK

Check and replace translate ECU.

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BRAKE Warning Light Circuit (Does not light up)

CIRCUIT DESCRIPTION

See page DI–1033.

WIRING DIAGRAM

See page DI–1033.

INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check operation of the BRAKE warning light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position and hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand–held.

CHECK:

Check that ”ON” and ”OFF” of the BRAKE warning light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition/Test Details	Diagnostic Note
BRAKE WARN LIGHT	Turn BRAKE warning light ON/OFF	Observe combination meter

OK:

BRAKE warning light operates.

NG → **Go to step 3.**

OK

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2	**Replace the translate ECU and check whether or not the trouble occurs again.**

PREPARATION:

(a) Clear the DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **END.**

A →

Check and replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

3	**Check harness and connector between translate ECU and skid control ECU (CAN1 circuit).**

NG → **Repair or replace parking brake switch circuit (CAN1 circuit).**

OK →

4	**Check harness and connector between translate ECU and combination meter (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK →

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5	**Check BRAKE warning light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair combination meter assembly (See page DI–1610).**

OK

Check and replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DI947–04

SLIP Indicator Light Circuit (Remains ON)

CIRCUIT DESCRIPTION

The SLIP indicator light blinks during VSC & TRAC operation.
The skid control ECU is connected to the translate ECU via the CAN communication system.

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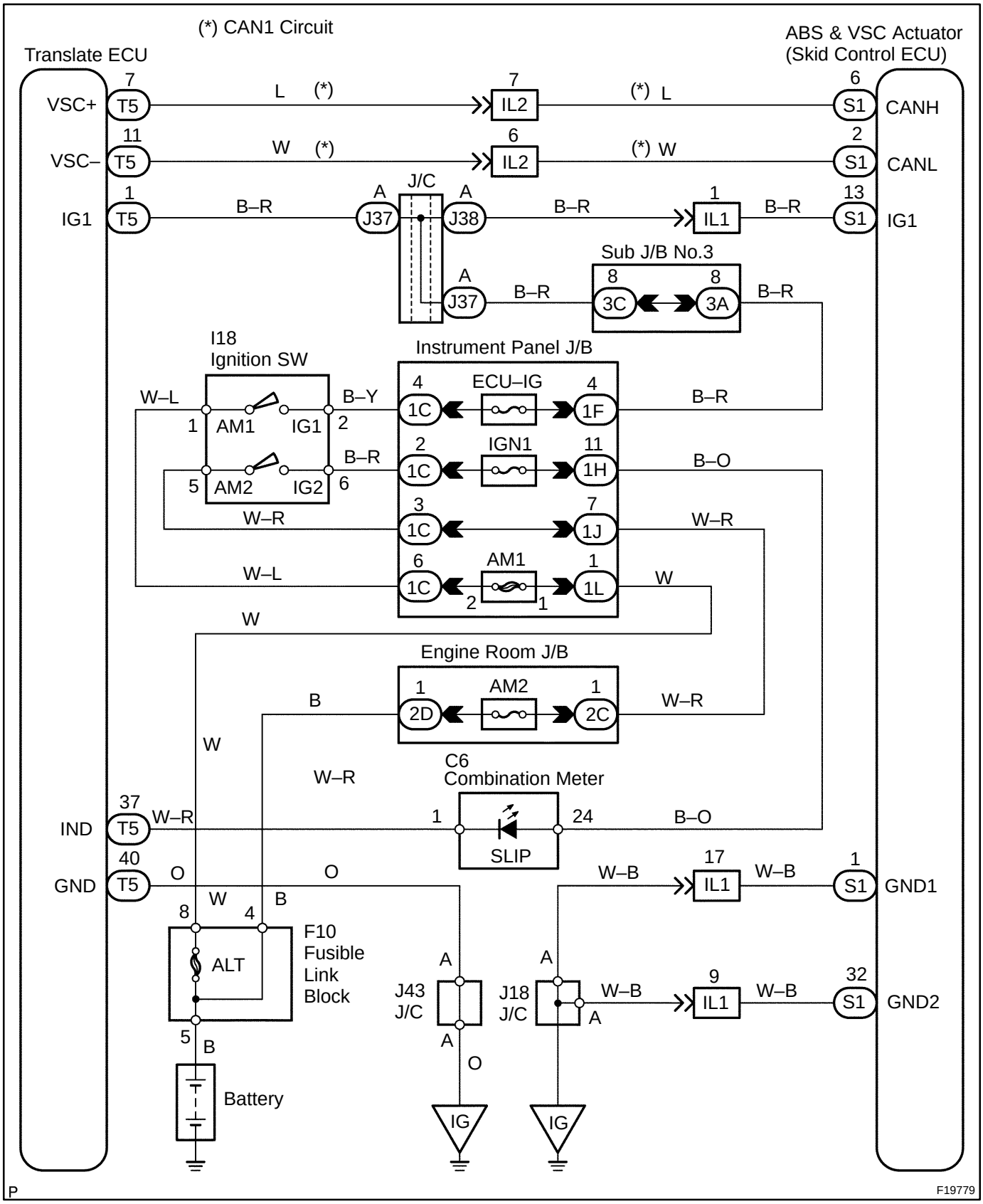
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check operation of the SLIP indicator light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.
(c) Select ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the SLIP indicator light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter

OK:

SLIP indicator operates.

NG → **Go to step 5.**

OK

2	**Check harness and connector between skid control ECU and translate ECU.**

NG → **Repair or replace harness or connector.**

OK

3	**Check that the SLIP indicator light is ON for 3 seconds immediately after ignition switch is turned ON.**

OK:

SLIP indicator light is ON for 3 seconds immediately after ignition switch is turned ON.

OK → **No problem.**

NG

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4	**Check SLIP indicator light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair or replace combination meter (See page DI–1610).**

OK

5	**Is DTC output?**

Check DTC (Translate ECU and CAN communication system) on page DI–911.

NG → **Repair circuit indicated by output code (See page DI–921).**

OK

6	**Check for open and short circuit in harness and connector between translate ECU and SLIP indicator light (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Check and replace translate ECU.

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SLIP Indicator Light Circuit (Does not light up)

CIRCUIT DESCRIPTION

See page DI–1041.

WIRING DIAGRAM

See page DI–1041.

INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 3 when not using the hand–held tester.

1	**Check operation of the SLIP indicator light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.

(c) Select ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the SLIP indicator light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter

OK:

SLIP indicator operates.

NG → **Go to step 3.**

OK

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2	**Replace the translate ECU and check if the trouble occurs again.**

PREPARATION:

(a) Clear the DTC (See page DI–911).

(b) Turn the ignition switch OFF.

CHECK:

Turn the ignition switch to the ON position, and check if the same DTC still remains in the memory.

RESULT:

DTC is output	A
DTC is not output	B

B → **END.**

A →

Check and replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

3	**Check harness and connector between translate ECU and skid control ECU (CAN1 circuit).**

NG → **Repair or replace parking brake switch circuit (CAN1 circuit).**

OK →

4	**Check harness and connector between translate ECU and combination meter (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK →

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5	**Check SLIP indicator light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair combination meter assembly (See page DI–1610).**

OK

Check and replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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DI948–04

VSC OFF *1 (TRAC OFF)*2 Indicator Light, Center Diff. Lock *1 (TRAC OFF)*2 Switch Circuit

*1: Only for 4WD
*2: Only for 2WD

CIRCUIT DESCRIPTION

This is the VSC (TRAC) control main switch. When the center diff. lock (TRAC OFF) switch is pushed on, VSC (TRAC) indicator goes off and the VSC OFF (TRAC OFF) indicator comes on. Turn the ignition switch OFF, and check that the VSC (TRAC) indicator comes on when turning the ignition switch to the ON position again.
Pressing the center diff. lock switch in 2WD mode does not deactivate VSC control. *1

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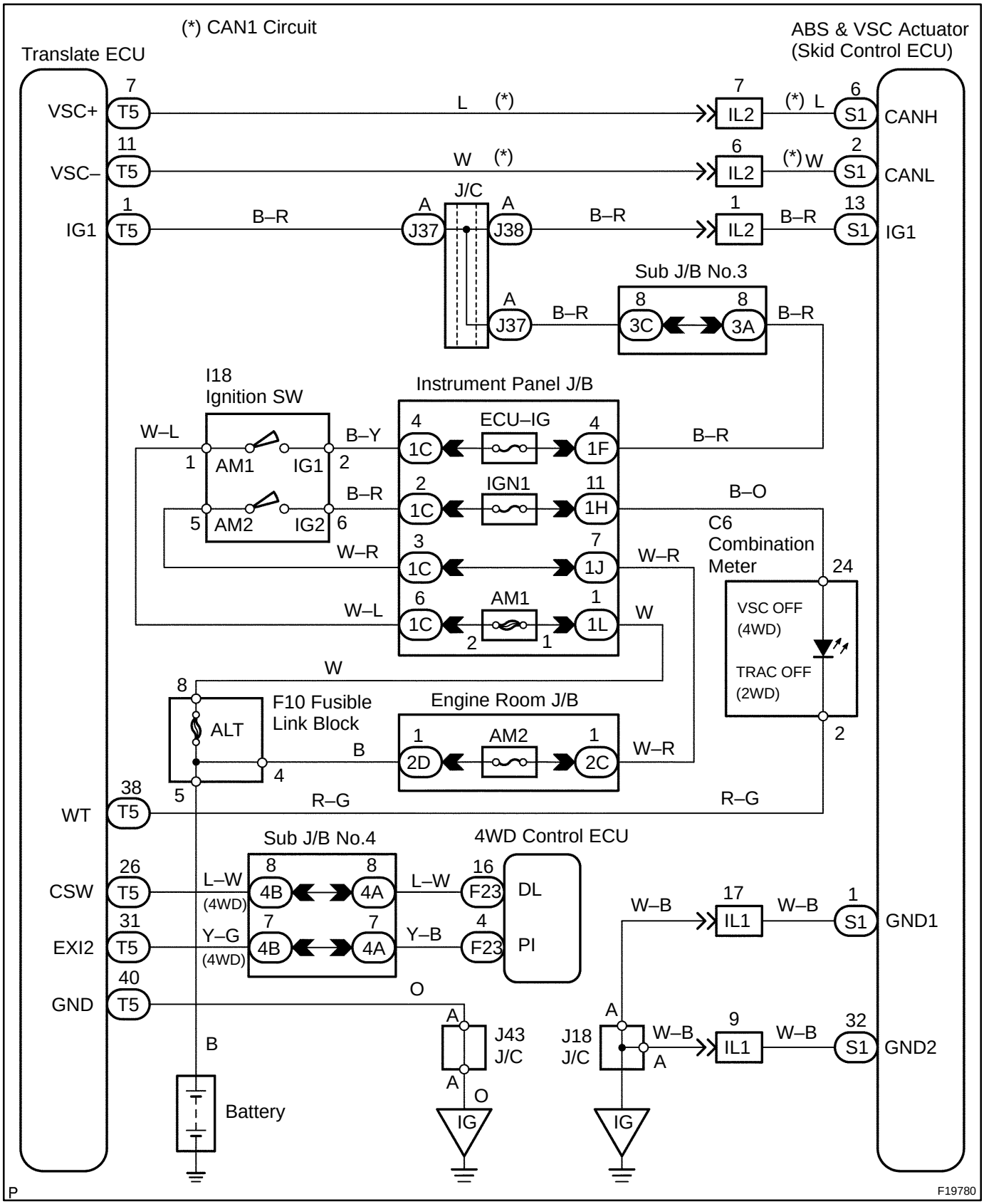
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check operation of the VSC OFF (TRAC OFF) indicator light.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.
(c) Select ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the VSC OFF (TRAC OFF) indicator light can be shown on the combination meter with the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC OFF (TRAC OFF)	Turns VSC OFF (TRAC OFF) indicator ON / OFF	Observe combination meter

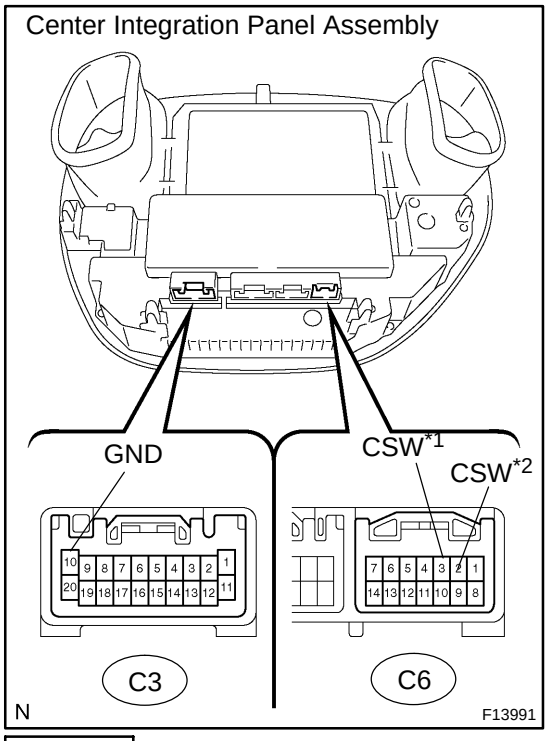
OK:

VSC OFF (TRAC OFF) indicator light comes on.

NG → **Go to step 4.**

OK

2	**Check center diff. lock (TRAC OFF) switch.**



PREPARATION:

Remove center integration panel assembly (See page BO–85).

CHECK:

Measure the resistance between terminals CSW and GND of the center diff. lock *1 (TRAC OFF *2) switch when the center diff. lock *1 (TRAC OFF *2) switch is ON and OFF.

*1 : Only for 4WD
*2 : Only for 2WD

OK:

Center diff. lock (TRAC OFF) switch	Resistance
Press continuously	Continuity
Release	1MΩ or higher

NG → **Replace center diff. lock (TRAC OFF) switch.**

OK

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3	**Check for open and short circuit in harness and connector between terminal CSW of the translate ECU and center diff. lock (TRAC OFF) switch and body ground (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

4	**Check VSC OFF (TRAC OFF) indicator light.**

See combination meter troubleshooting on page DI–1614.

NG → **Repair or replace combination meter (See page DI–1610).**

OK

5	**Check for open and short circuit in harness and connector between terminal WT of the translate ECU and VSC OFF (TRAC OFF) indicator light (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Check and replace translate ECU

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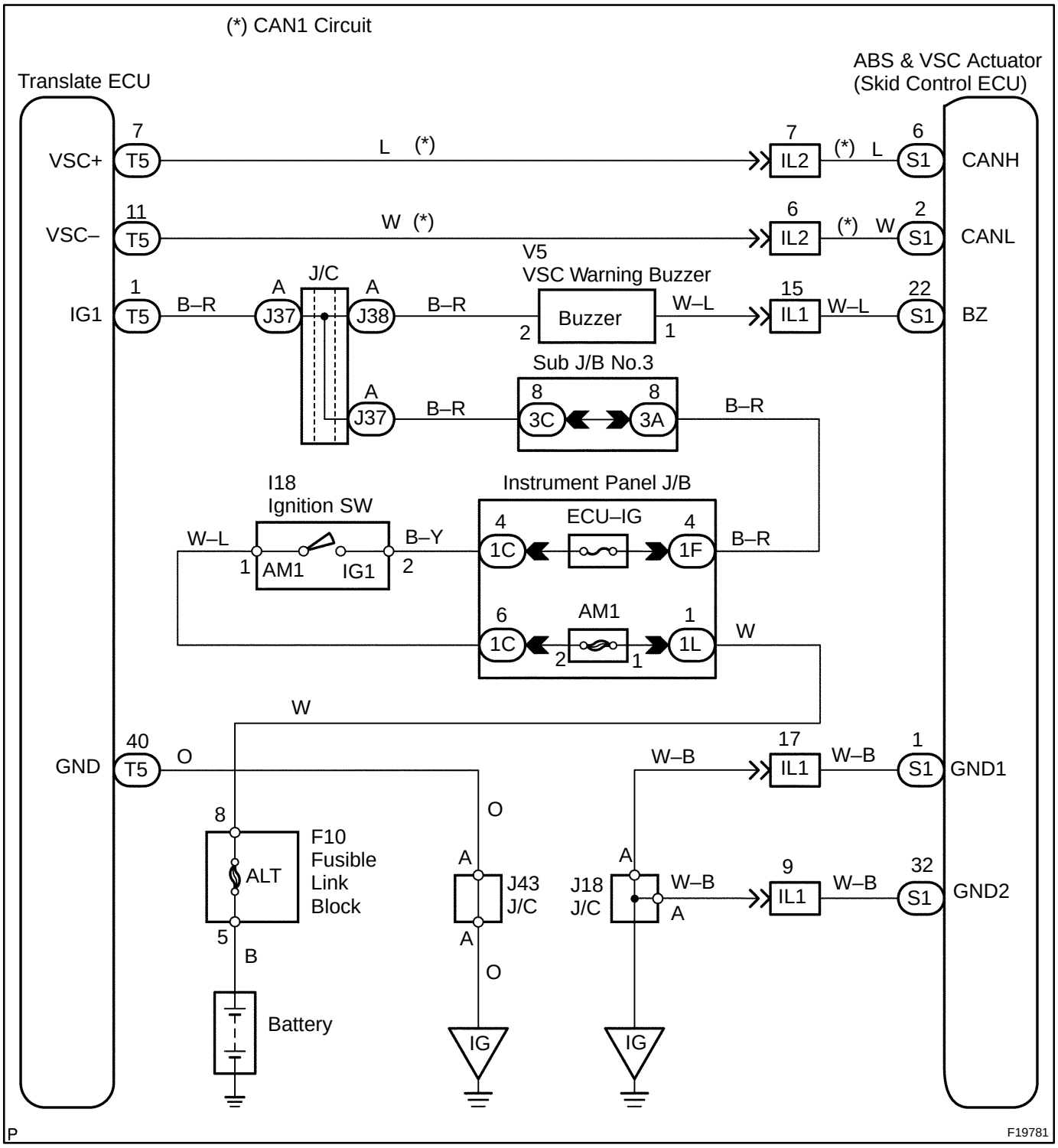
DI949–03

VSC Buzzer Circuit

CIRCUIT DESCRIPTION

The VSC buzzer sounds during VSC operation.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Check operation of the VSC buzzer.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and push the hand–held tester main switch ON.
(c) Select ACTIVE TEST mode on the hand–held tester.

CHECK:

Check ”ON–OFF” function of the VSC buzzer with the hand–held tester.

Item	Vehicle Condition / Test Details	Diagnostic Note
VSC / BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

OK:

Buzzer sound can be heard.

OK → **Replace skid control ECU (See page BR–52).**

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

NG

2	**Check voltage between terminal 2 of the VSC buzzer and body ground.**

PREPARATION:

Remove the VSC buzzer with connectors still connected.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage between terminal (2) of the VSC buzzer and body ground.

OK:

Voltage: 10 to 14 V

NG → **Repair or replace harness or connector from voltage supply to VSC buzzer.**

OK

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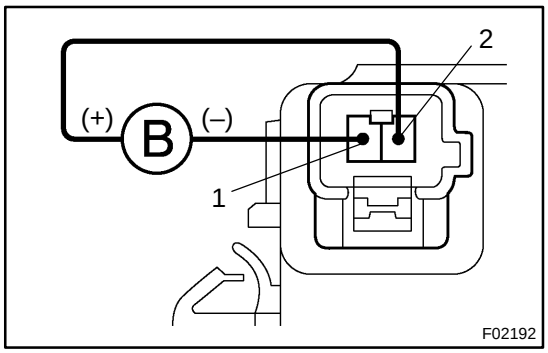
3	Check VSC buzzer.



PREPARATION:
Disconnect the VSC buzzer connector.
CHECK:
Apply battery positive voltage to terminals 1 and 2 of the VSC buzzer connector, and check that the VSC buzzer sounds.
OK:
Buzzer sound can be heard.

NG → **Replace VSC buzzer.**

OK ↓

4	Check for open and short circuit in harness and connector between skid control ECU and VSC buzzer (See page IN–35).

NG → **Repair or replace harness or connector.**

OK ↓

Replace skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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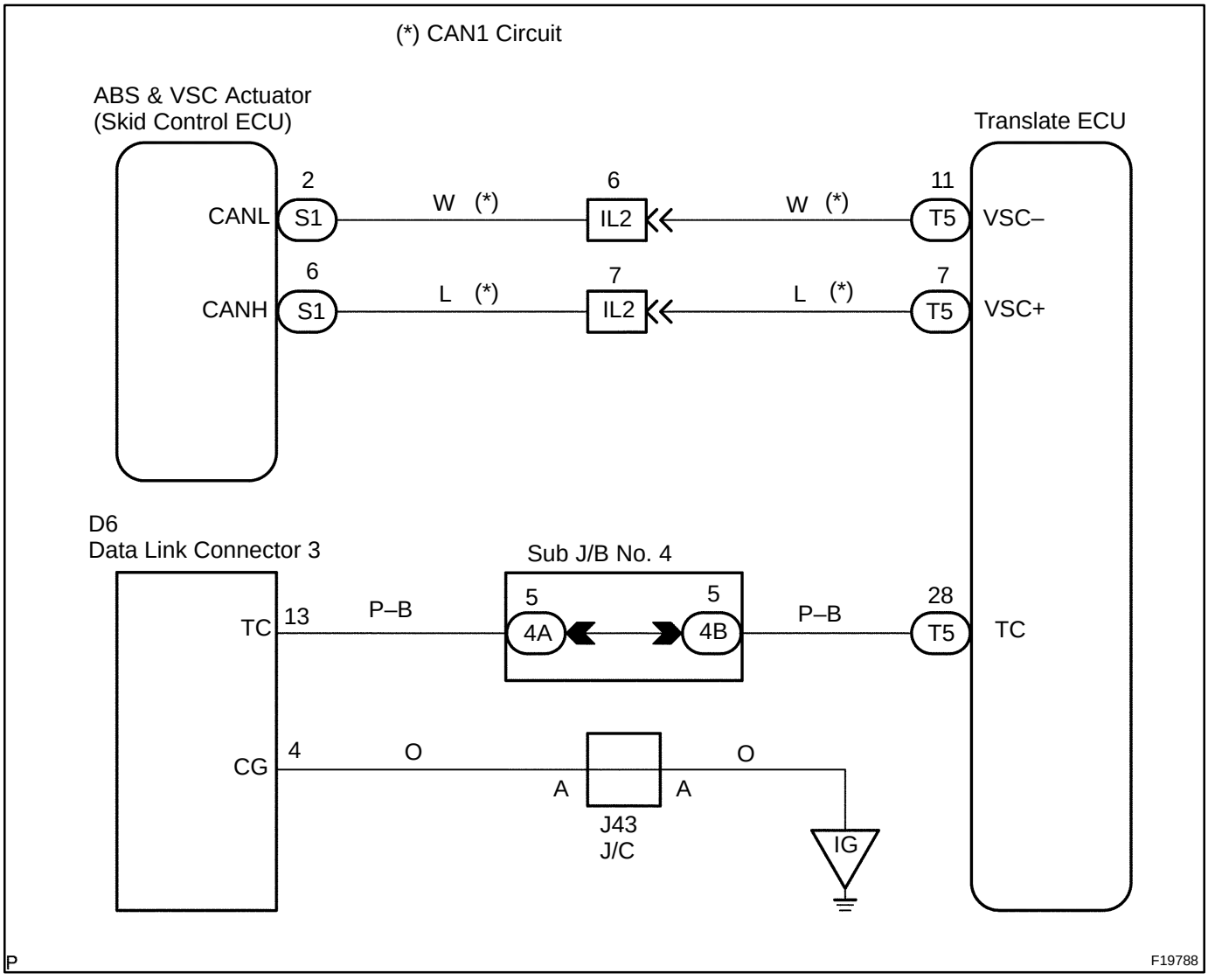
Tc Terminal Circuit

CIRCUIT DESCRIPTION

Connecting terminals Tc and CG of the DLC3 causes the skid control ECU to indicate the DTC by blinking the ABS warning light, VSC TRAC warning light and BRAKE warning light.

WIRING DIAGRAM



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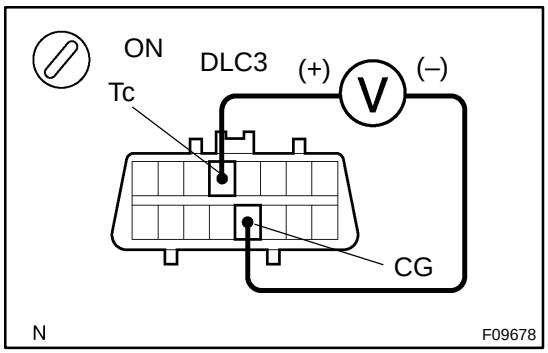
INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and CG of the DLC3.**



PREPARATION:
Turn the ignition switch to the ON position.
CHECK:
Measure the voltage between terminals Tc and CG of the DLC3.
OK:
Voltage: 10 to 14 V

OK	**If ABS warning light does not blink even after Tc and CG have been connected, the ECU may be defective.**

NG

2	**With ignition switch OFF, check for open and short circuit in harness and connector between skid control ECU and DLC3, DLC3 and body ground (See page IN–35).**

NG	**Repair or replace harness or connector.**

OK

Check and replace translate ECU or skid control ECU (See page BR–52).

NOTICE:
When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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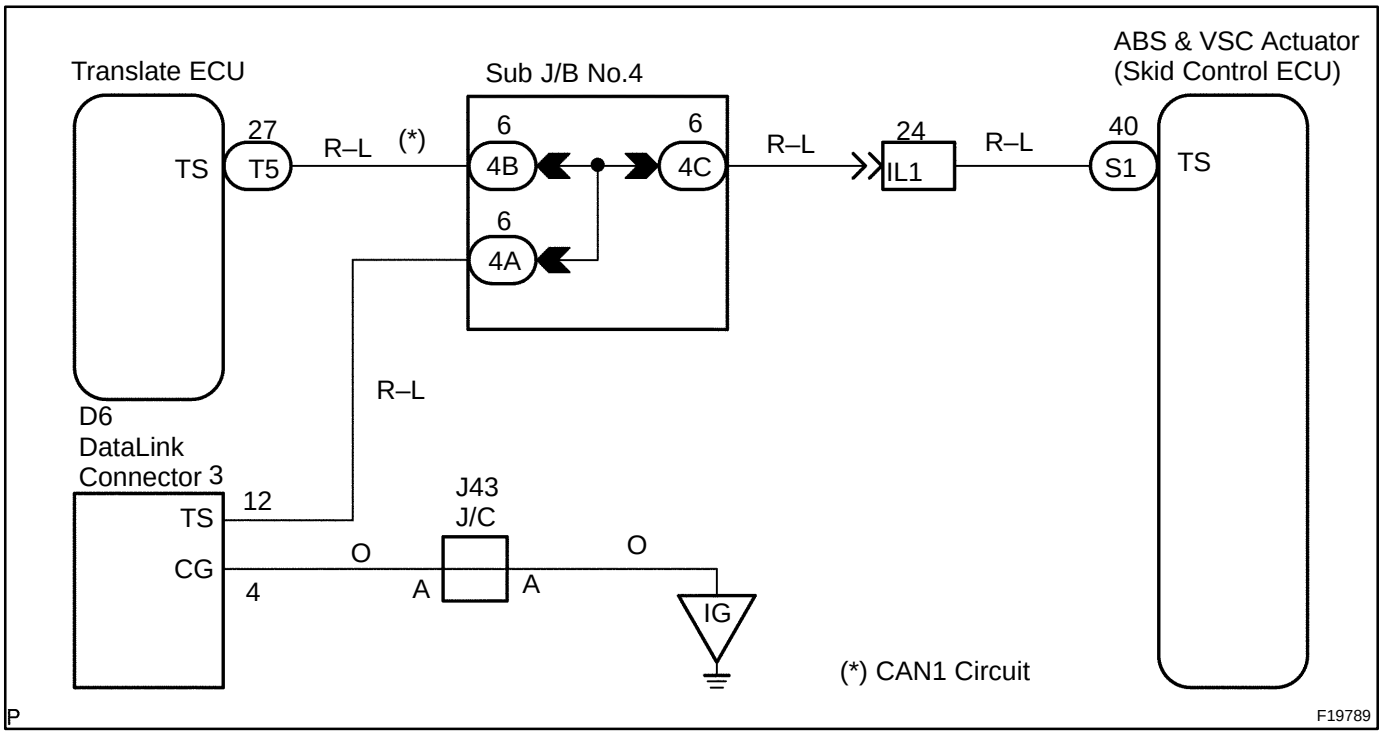
DI94A–05

Ts Terminal Circuit

CIRCUIT DESCRIPTION

In sensor check mode (test mode), a malfunction of the speed sensor that cannot be judged when the vehicle is stopped is judged while driving.
Transition to sensor check mode (test mode) can be performed by connecting terminals Ts and CG of the DLC3 and turning the ignition switch from OFF to ON.

WIRING DIAGRAM



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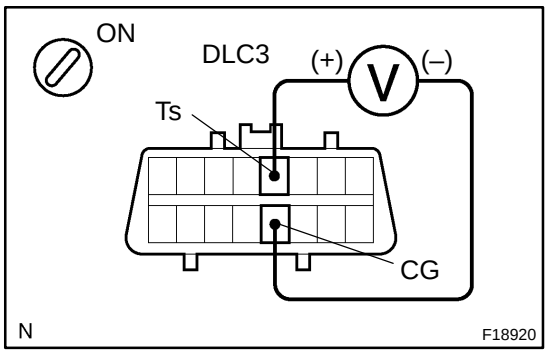
INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and CG of the DLC3.**



CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage between terminals Ts and CG of the DLC3.

OK:

Voltage: 10 to 14 V

OK → **If ABS warning light does not blink even after Ts and CG are connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between skid control ECU and DLC3, DLC3 and body ground (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU (See page BR–52).

NOTICE:

When replacing the skid control ECU, perform the zero point calibration (See page DI–897).

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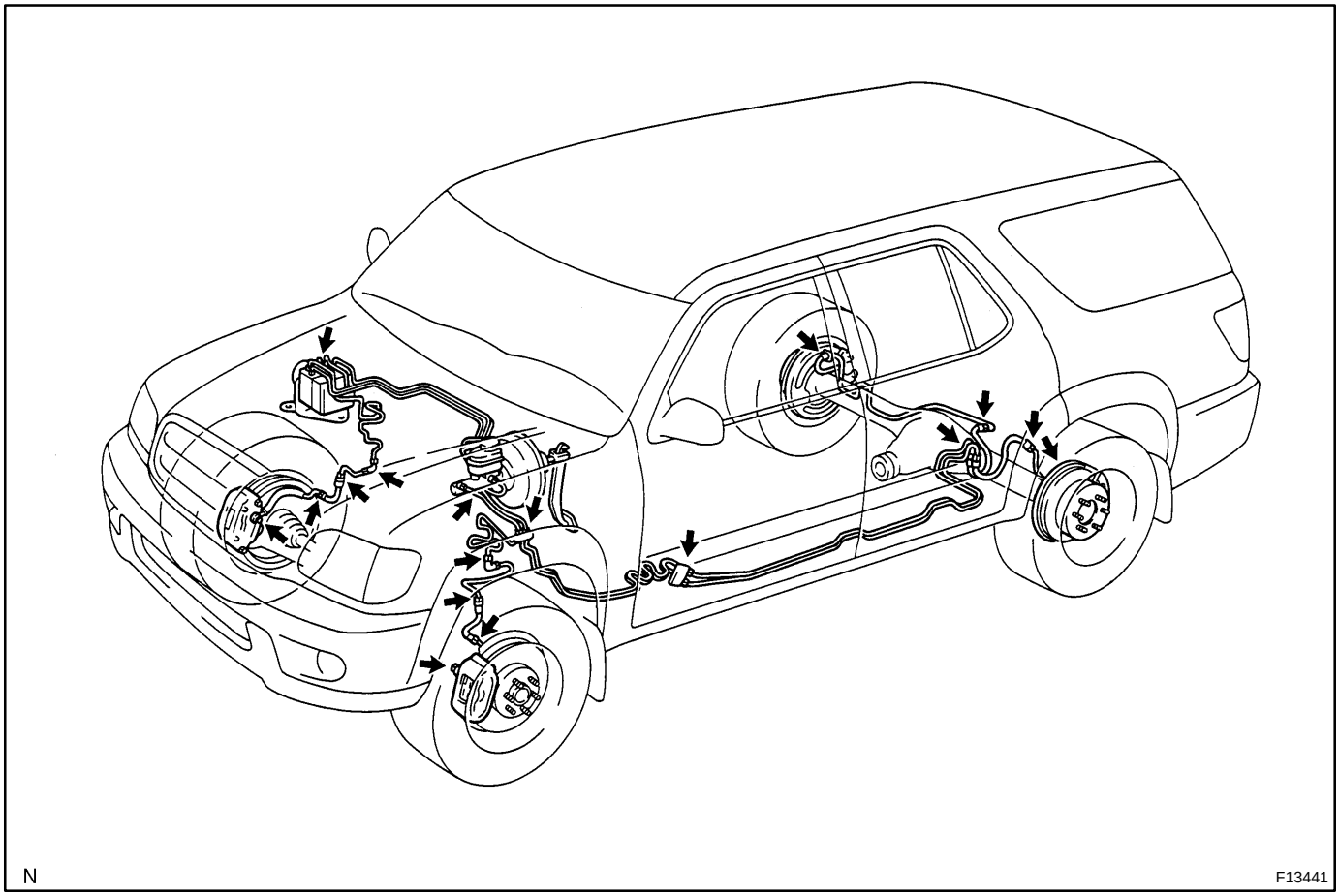
DI94C–03

Check for Fluid Leakage

Check actuators or hydraulic lines for fluid leakage.



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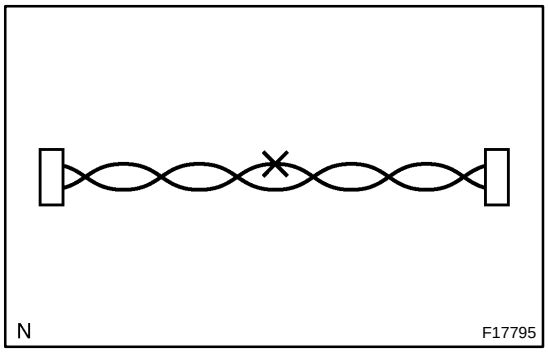
CAN COMMUNICATION SYSTEM

PRECAUTION

DIDHX–01

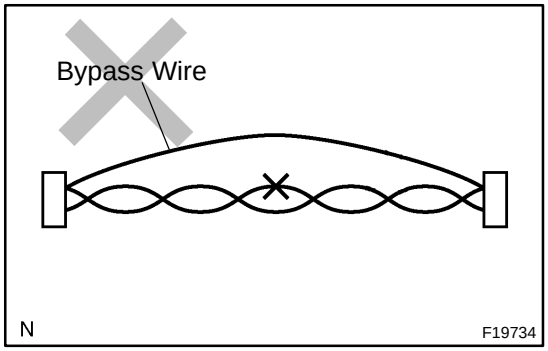


1. BUS LINE REPAIR

(a) After repairing the bus line with solder, wrap the repaired part with vinyl tape.

NOTICE:

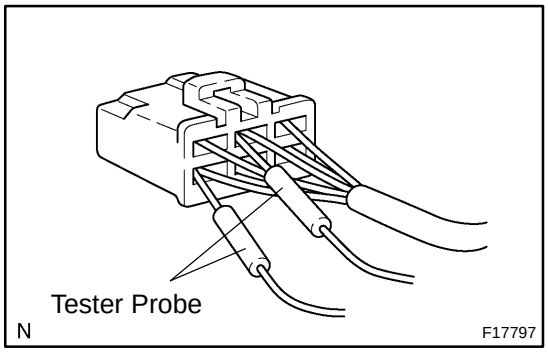
- **The CANL bus line and CANH bus line must be installed together all the time.**
  When installing, make sure to twist them.
  CAN bus lines are likely to be influenced by noise if the bus lines are not twisted.
- **The difference in length of the CANL bus line and CANH bus line should be within 100 mm (3.937 in.).**
- **Leave approximately 80 mm (3.150 in.) loose in the twist around the connector.**



(b) Do not use a bypass wire between the connectors.

NOTICE:

The feature of the twisted wire harness will be lost if you use a bypass wire.



2. CONNECTOR HANDLING

(a) When inserting tester probes into a connector, insert them from the rear of the connector.

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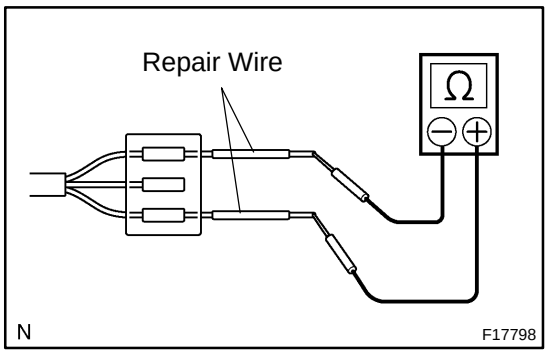

(b) If it is impossible to check continuity from the rear of the connector, then use a repair wire to check the connector.

3. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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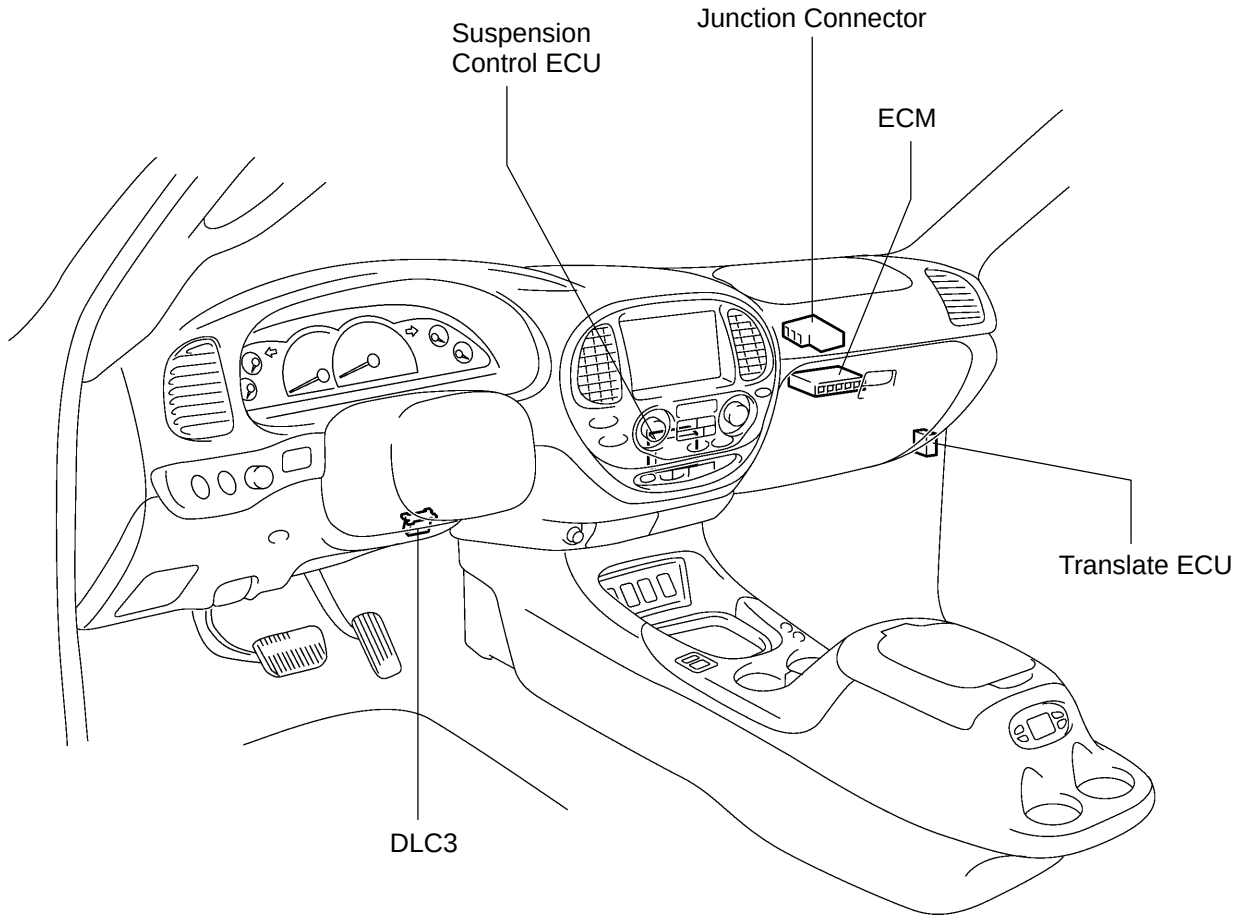
DIDHY–01

LOCATION



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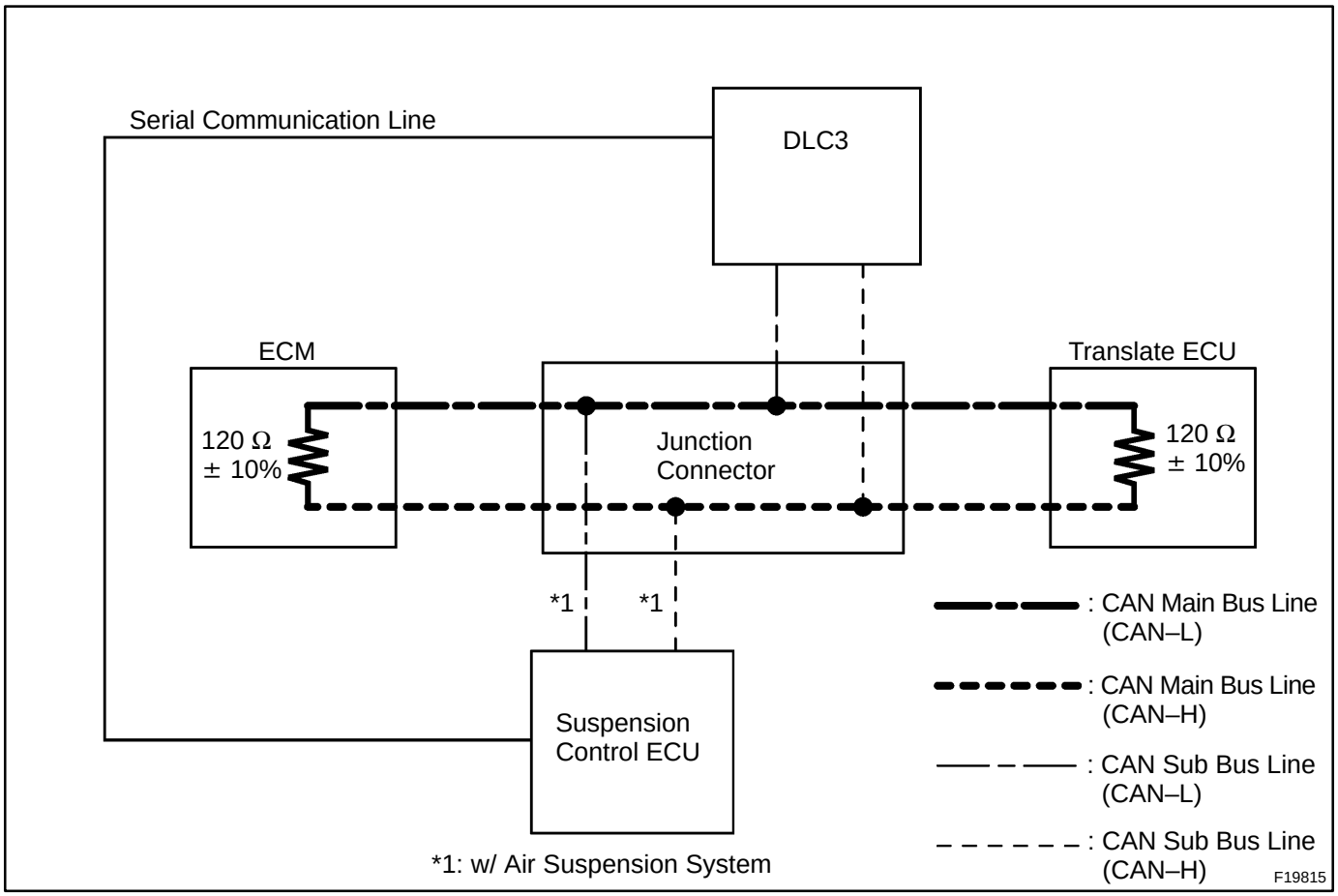
DIDHZ–01

SYSTEM DIAGRAM



HINT:

- The ECM uses the CAN communication system to perform DTC communication instead of the conventional serial communication line (SIL).
- The translate ECU outputs DTCs only via the BRAKE warning light. Therefore, the DTCs cannot be checked on the hand–held tester display via the CAN VIM.

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DIDI0–01

SYSTEM DESCRIPTION

1. BRIEF DESCRIPTION

(a) The CAN (Controller Area Network) is a serial data communication system for real time application. It is an in–vehicle multiplex communication system that has a high communication speed (500 kbps) and the function to detect malfunctions.

(b) By pairing the CANH and CANL bus lines, the CAN performs communication based on differential voltage.

(c) Many ECUs (sensors) installed in the vehicle operate by sharing information and communicating with each other.

(d) The CAN has two resistors of 120 Ω which are necessary to communicate with the main bus line.

2. DEFINITION OF TERMS

(a) Main bus line

(1) The main bus line is a wire harness between the two terminus circuits on the bus (communication line). This is the main bus in the CAN communication system.

(b) Sub bus line

(1) The sub bus line is a wire harness that diverges from the main bus line to the ECU.

3. ECUs THAT COMMUNICATE THROUGH CAN COMMUNICATION SYSTEM

(a) Translate ECU

(b) Suspension Control ECU

(c) ECM

4. DIAGNOSTIC CODE FOR CAN COMMUNICATION SYSTEM

DTCs for the CAN communication system are as follows:

U0100/65, U0122/67, U0132/72, 65, 94.

HINT:

If C1201/51, C1202/52 or C1203/53 is output from skid control ECU, perform troubleshooting of each diagnosis code (see page DI–921).

5. REMARK FOR TROUBLESHOOTING

(a) Trouble in the CAN bus (communication line) can be checked from the DLC3 (except when there is a wire break in lines other than the sub bus line of the DLC3).

NOTICE:

Do not insert the tester directly into the DLC3 connector. Be sure to use a service wire.

(b) The CAN communication system cannot detect trouble in the sub bus line of the DLC3 even though the DLC3 is also connected to the CAN communication system.

6. HOW TO DISTINGUISH THE CAN J/C CONNECTOR

In the CAN communication system, all connectors connected to the CAN J/C are the same shape. The connectors connected to the CAN J/C can be distinguished by the colors of the bus lines.

HINT:

See ”TERMINALS OF ECU” (see page DI–1068) for bus line colors.

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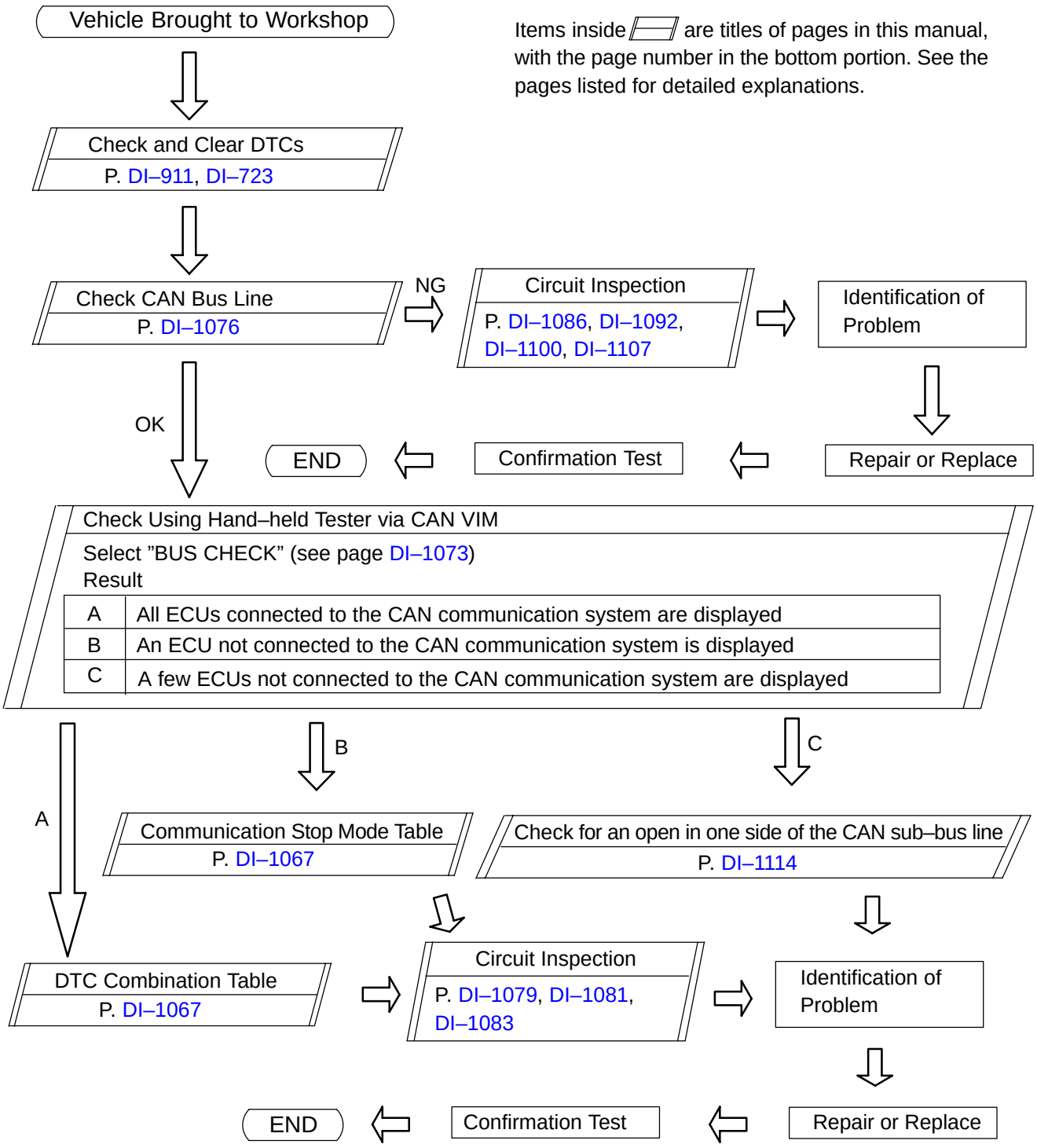
DIDI1–01

HOW TO PROCEED WITH TROUBLESHOOTING

NOTICE:

- **DTCs for the CAN communication system are as follows: U0100/65, U0122/67, U0132/72, 65, 94.**
- **Refer to troubleshooting of each system if DTCs regarding the CAN communication system are not output.**

Perform troubleshooting in accordance with the procedures on the following page.



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DIDI2–01

CUSTOMER PROBLEM ANALYSIS CHECK

CAN Communication System Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

DTC Check	**1st Time**	☐ Normal System Code ☐ Trouble Code (Code)
	2nd Time	☐ Normal System Code ☐ Trouble Code (Code)

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DIDI3–01

PROBLEM SYMPTOMS TABLE

1. COMMUNICATION STOP MODE TABLE

(a) Complete ”Check CAN Bus Line” (see page DI–1076) to confirm that there is no malfunction in the CAN bus line. Select ”BUS CHECK” on the hand–held tester via the CAN VIM (see page DI–1073).

(b) Check the communication stop mode of the ECUs not displayed among the following: ”ENGINE”, ”TRANSLATE ECU”, or ”REAR AIRSUS”.

Symptom	Inspection Item	See page
”ENGINE” is not displayed on the hand–held tester via CAN VIM.	ECM Communication Stop Mode	DI–1079
”TRANSLATE ECU” is not displayed on the hand–held tester via CAN VIM.	Translate ECU Communication Stop Mode	DI–1081
”REAR AIRSUS” is not displayed on the hand–held tester via CAN VIM. (*1)	Suspension Control ECU Communication Stop Mode	DI–1083

HINT:

*1: w/ Air Suspension System

2. DTC COMBINATION TABLE

(a) Perform troubleshooting according to the combination of DTCs output.

DTC		Trouble Mode		
Output from	Output DTC	ECM Communication Stop Mode	Translate ECU Communication Stop Mode	Suspension Control ECU Communication Stop Mode (*1)
Skid Control ECU	U0100/65	◀	◀	–
Translate ECU	65	◀	◀	–
	94	◀	◀	◀
Suspension Control ECU (*1)	U0100/65	◀	–	◀
	U0122/67	–	◀	◀
	U0132/71	–	–	◀
See page		DI–1079	DI–1081	DI–1083

HINT:

- ▶ *1: w/ Air Suspension System
- ▶ ◀: DTCs that are being output.
- ▶ –: DTCs that are not being output.
- ▶ Previous CAN communication system DTCs may be the cause if CAN communication system DTCs are output and all ECUs connected to the CAN communication system are displayed on the hand–held tester’s ”BUS CHECK” screen via the CAN VIM.

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DIDI4–01

TERMINALS OF ECU

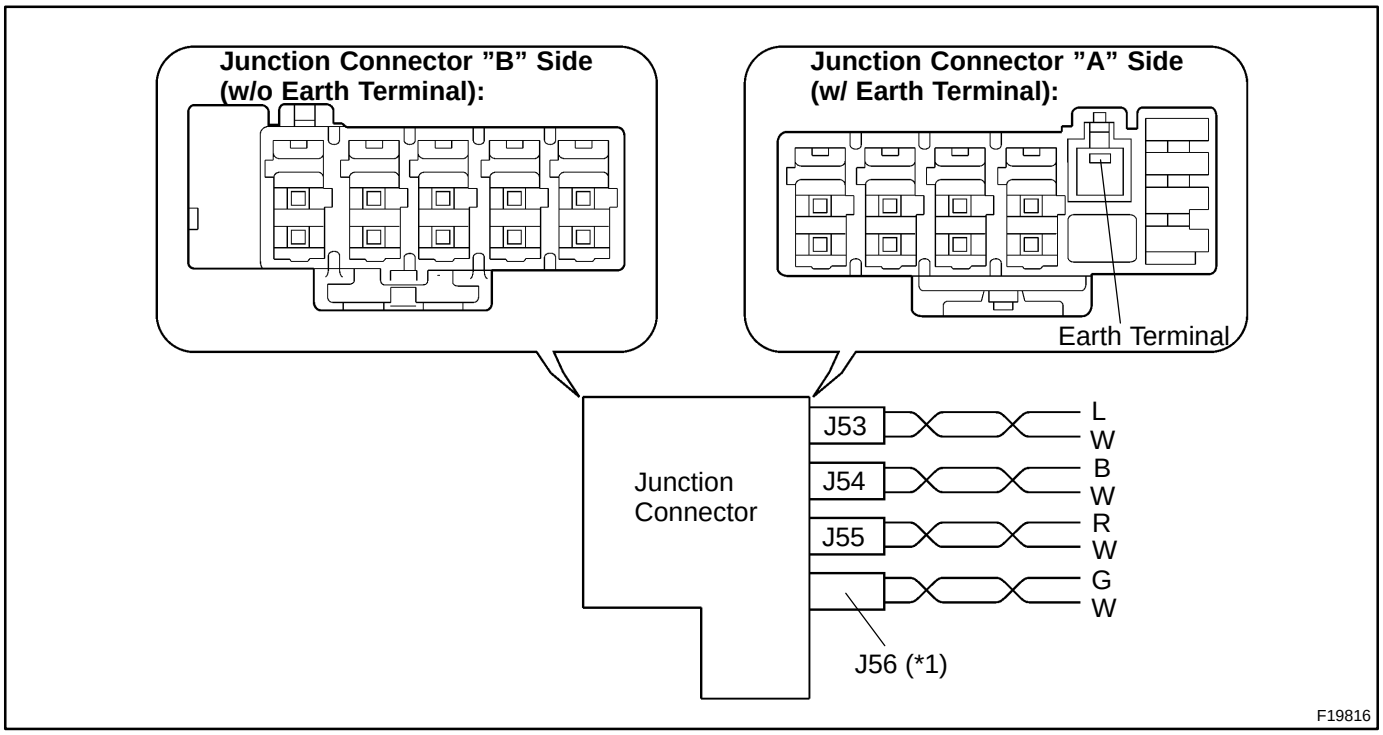
HINT:

This section describes the standard CAN values for all CAN related components.

1. Junction Connector

HINT:

- The connectors connected to the junction connector can be distinguished by the colors of the bus lines and the connecting side of the connector.
- J53, J54, J55 and J56 are interchangeable.
- *1: w/ Air Suspension System



CAN J/C connectors (A side, w/ earth terminal)	Color (CAN–H Side)	Color (CAN–L Side)
ECM (J53)	L	W
DLC3 (J54)	B	W
Translate ECU (J55)	R	W
Suspension Control ECU (J56) *1	G	W

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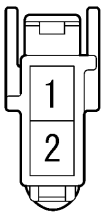
CAN J/C Connector Front View:

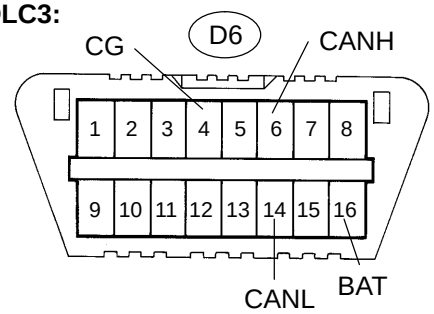


F19735

2. The Terminals of Connectors for the Junction Connector

Terminal	Terminal symbol
1	CANH
2	CANL

DLC3:



F19737

3. DLC3

(a) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Condition	Specified Value
D6–6 (CANH) – D6–14 (CANL)	B – W	Ignition Switch OFF	54 to 69 Ω
D6–6 (CANH) – D6–4 (CG)	B – O	Ignition Switch OFF	3 kΩ or more
D6–14 (CANL) – D6–4 (CG)	W – O	Ignition Switch OFF	3 kΩ or more
D6–6 (CANH) – D6–16 (BAT)	B – W–R	Ignition Switch OFF	1 MΩ or more
D6–14 (CANL) – D6–16 (BAT)	W – W–R	Ignition Switch OFF	1 MΩ or more

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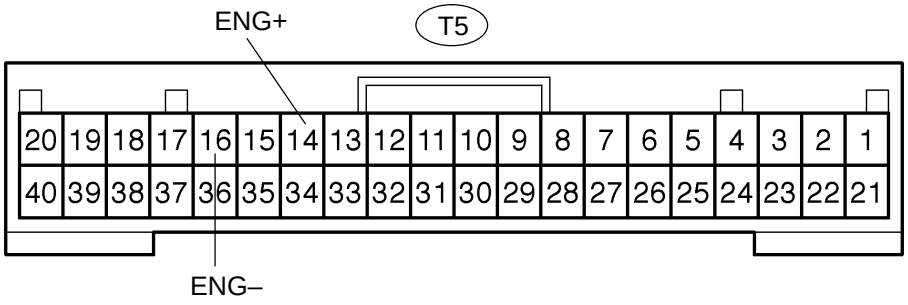
4. Translate ECU

(a) Measure the resistance according to the value(s) in the table below.

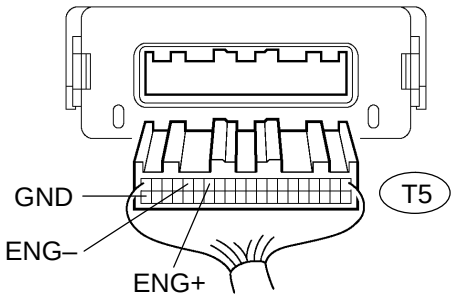
Translate ECU:



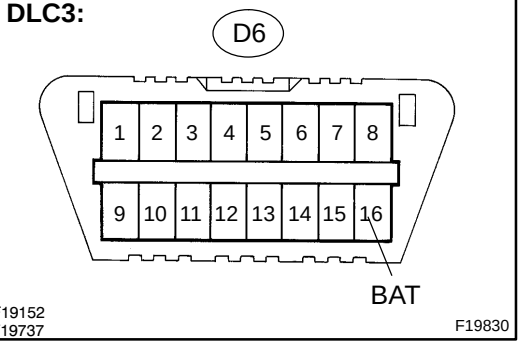
Standard:

Terminals	Condition	Specified Value
T5–14 (ENG+) – T5–16 (ENG–)	Ignition Switch OFF	108 to 132 Ω

Translate ECU Wire Harness View:



DLC3:



(b) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Condition	Specified Value
T5–14 (ENG+) – T5–16 (ENG–)	R – W	Ignition Switch OFF	108 to 132 Ω
T5–14 (ENG+) – T5–40 (GND)	R – O	Ignition Switch OFF	3 kΩ or more
T5–16 (ENG–) – T5–40 (GND)	W – O	Ignition Switch OFF	3 kΩ or more
T5–14 (ENG+) – D6–16 (BAT)	R – W–R	Ignition Switch OFF	1 MΩ or more
T5–16 (ENG–) – D6–16 (BAT)	W – W–R	Ignition Switch OFF	1 MΩ or more

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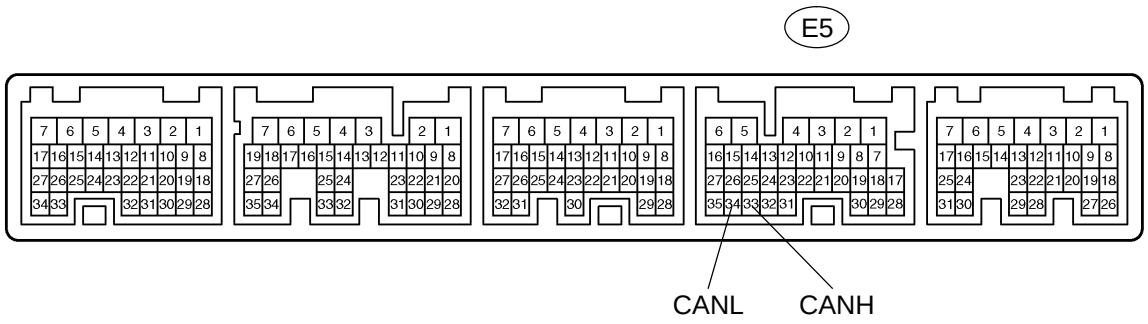
5. ECM

(a) Measure the resistance according to the value(s) in the table below.

ECM:

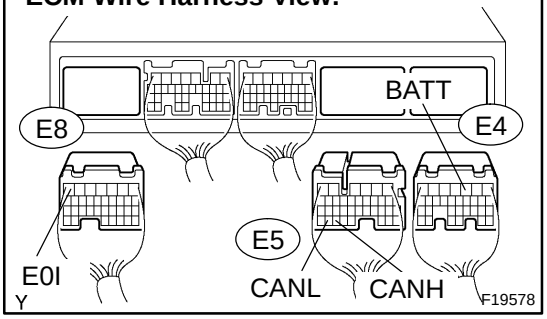


N B17410

Standard:

Terminals	Condition	Specified Value
E5–33 (CANH) – E5–34 (CANL)	Ignition Switch OFF	108 to 132 Ω

ECM Wire Harness View:



(b) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Condition	Specified Value
E5–33 (CANH) – E5–34 (CANL)	L – W	Ignition Switch OFF	108 to 132 Ω
E5–33 (CANH) – E8–7 (E0I)	L – W–B	Ignition Switch OFF	3 kΩ or more
E5–34 (CANL) – E8–7 (E0I)	W – W–B	Ignition Switch OFF	3 kΩ or more
E5–33 (CANH) – E4–3 (BATT)	L – B–Y	Ignition Switch OFF	1 MΩ or more
E5–34 (CANL) – E4–3 (BATT)	W – B–Y	Ignition Switch OFF	1 MΩ or more

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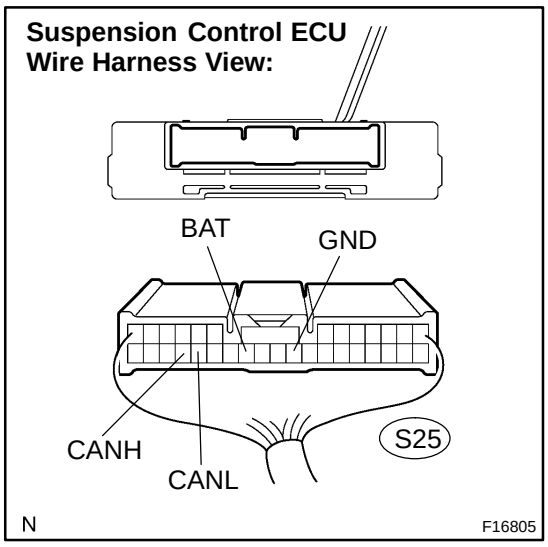

6. Suspension Control ECU

(a) Measure the resistance according to the value(s) in the table below.

Standard:

Terminals	Wiring Color	Condition	Specified Value
S25–29 (CANH) – S25–28 (CANL)	G – W	Ignition Switch OFF	54 to 69 Ω
S25–29 (CANH) – S25–22 (GND)	G – W–B	Ignition Switch OFF	3 kΩ or more
S25–28 (CANL) – S25–22 (GND)	W – W–B	Ignition Switch OFF	3 kΩ or more
S25–29 (CANH) – S25–25 (BAT)	G – V	Ignition Switch OFF	1 MΩ or more
S25–28 (CANL) – S25–25 (BAT)	W – V	Ignition Switch OFF	1 MΩ or more

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DIDI5–01

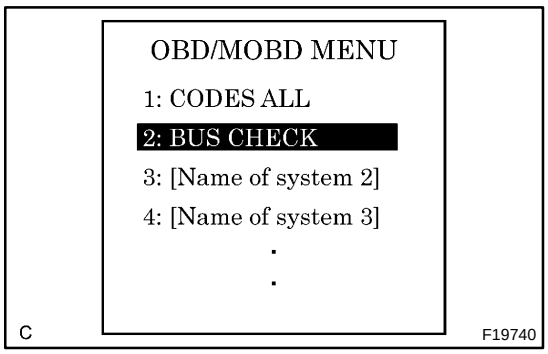
DIAGNOSIS SYSTEM

1. BUS CHECK

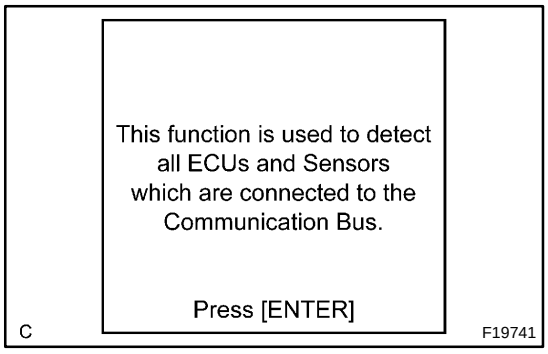
HINT:

The ECUs that are properly connected to the CAN communication system can be displayed using the hand–held tester via CAN VIM.

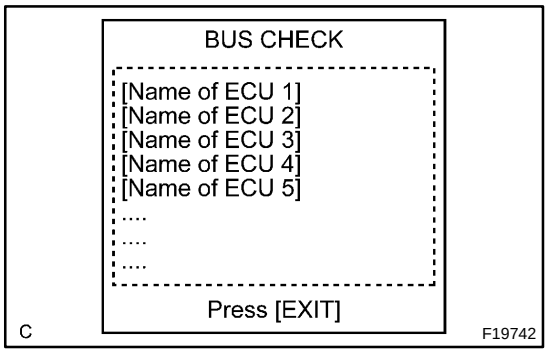
(a) Select ”BUS CHECK” from the ”OBD/MOBD MENU” screen.



(b) Press ”ENTER” on the hand–held tester via CAN VIM.



(c) The screen displays the ECUs and sensors that are properly connected to the CAN communication system.



HINT:

There is a communication stop in the system of any properly connected ECUs or sensors that are not displayed
(see page DI–1067).

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DIDI6–01

FAIL–SAFE CHART

1. FAIL–SAFE FUNCTION

(a) When communication fails in any of the CAN bus lines (communication lines) due to a short circuit or any other cause, the fail–safe function, which is specified for each system, operates to prevent the system from malfunctioning.

(b) Effects on each system when communication is impossible are as follows.

ECM	Translate ECU	Suspension Control ECU
Rx	Tx	—
Tx	Rx	Tx
Tx	Tx	Rx

	Action when unable to communicate	DTC detection (Driver detectable)
ECM	—	Not detectable (—)
Translate ECU	VSC/TRC function stops	Not detectable (VSC warning lamp comes on)
Suspension Control ECU	[When unable to communicate with ECM] Function stops (Vehicle height cannot be changed until the ignition switch is turned off) [When unable to communicate with Translate ECU] Vehicle height is maintained at the normal level until the ignition switch is turned off. If communication is still impossible even after the ignition switch is turned on again, the same height is maintained.	Detectable (Only DTCs are stored)

HINT:

- ▶ Rx: Reception from each ECU.
- ▶ Tx: Transmission to each ECU.

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DIDI7–01

DIAGNOSTIC TROUBLE CODE CHART

1. DTC TABLE BY ECU

HINT:

▶ If CAN communication system DTCs are output, trouble cannot be determined only by the DTCs. Perform troubleshooting according to ”HOW TO PROCEED WITH TROUBLESHOOTING” (see page DI–1065).

(a) Skid Control ECU

HINT:

▶ DTC communication uses the SIL line.

▶ If C1201/51, C1202/52 or C1203/53 is output from skid control ECU, perform troubleshooting of each diagnosis code (see page DI–921).

DTC No.	Detection Item
U0100/65	Lost Communication With ECM/PCM ”A”

(b) ECM

HINT:

The ECM is connected to the CAN communication system, but CAN communication system DTCs are not output.

(c) Translate ECU

HINT:

The translate ECU outputs DTCs only via the BRAKE warning light. Therefore, the DTCs cannot be checked on the hand–held tester display via the CAN VIM.

DTC No.	Detection Item
65	Abnormalities in EFI communication
94	Abnormalities in CAN communication

(d) Suspension Control ECU

HINT:

DTC communication uses the SIL line.

DTC No.	Detection Item
U0100/65	Lost Communication With ECM/PCM ”A”
U0122/67	Lost Communication With Vehicle Dynamics Control Module
U0132/74	Lost Communication With Ride Level Control Module

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DIDI8–01

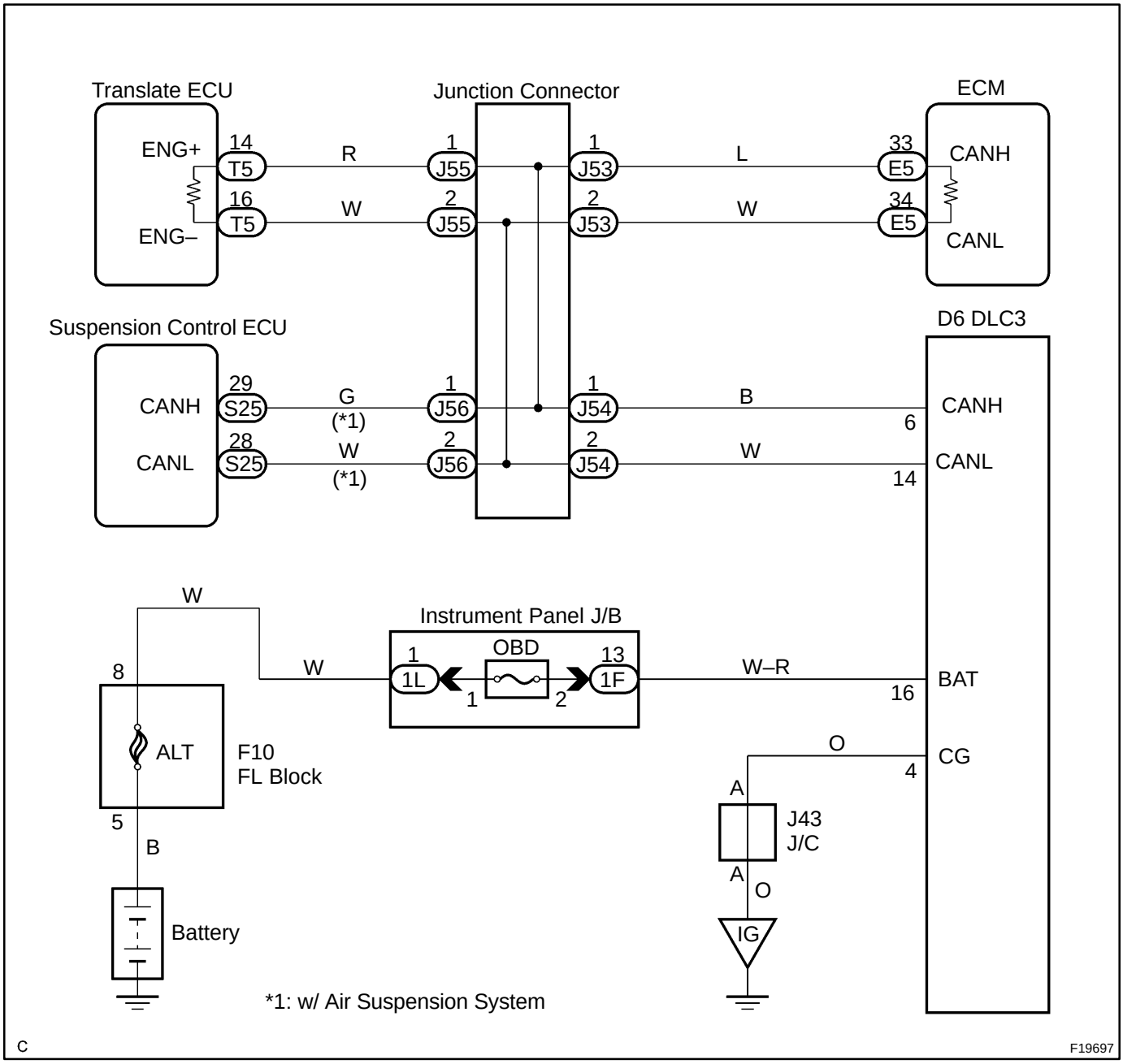
CIRCUIT INSPECTION

Check CAN Bus Line

CIRCUIT DESCRIPTION

When any DTC of the CAN communication system is output, first measure the resistance between the terminals of the DLC3 and the suspension control ECU connector to specify the trouble area.

WIRING DIAGRAM



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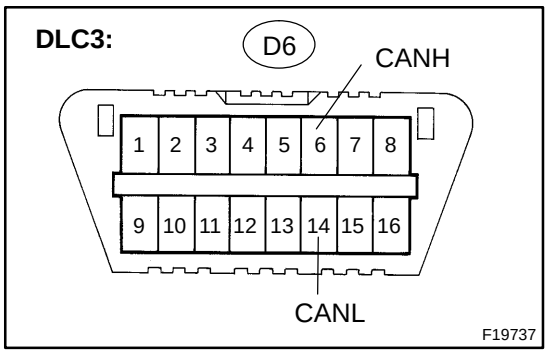
INSPECTION PROCEDURE

1	**Check CAN bus line (Main bus line for disconnection, bus lines for short circuit).**



PREPARATION:

Turn the ignition switch to the LOCK position.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value	Result
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	54 to 69 Ω	OK
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	69 Ω or more	NG–A
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	54 Ω or less	NG–B

NG–A → **Check CAN main bus line for disconnection (See page DI–1086).**

NG–B → **Check CAN bus lines for short circuit (See page DI–1092).**

OK

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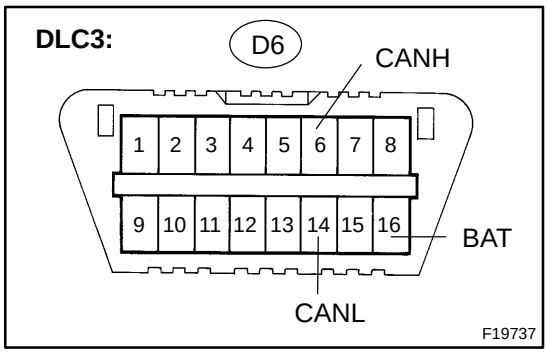
2	Check CAN bus line for short to +B.



CHECK:

Measure the resistance according to the value(s) in the table below.

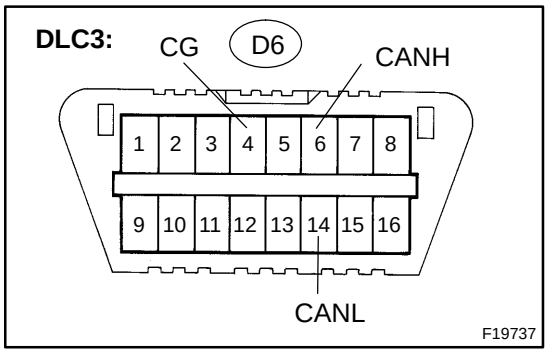
OK:

Tester connection	Condition	Specified value
D6–6 (CANH) – D6–16 (BAT)	Ignition Switch OFF	1 MΩ or more
D6–14 (CANL) – D6–16 (BAT)	Ignition Switch OFF	1 MΩ or more

NG → **Check CAN bus line for short to +B (See page DI–1107).**

OK

3	Check CAN bus line for short to GND.



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–4 (CG) – D6–6 (CANH)	Ignition Switch OFF	3 kΩ or more
D6–4 (CG) – D6–14 (CANL)	Ignition Switch OFF	3 kΩ or more

NG → **Check CAN bus line for short to GND (See page DI–1100).**

OK

Go to "How to proceed with troubleshooting" (See page DI–1065).

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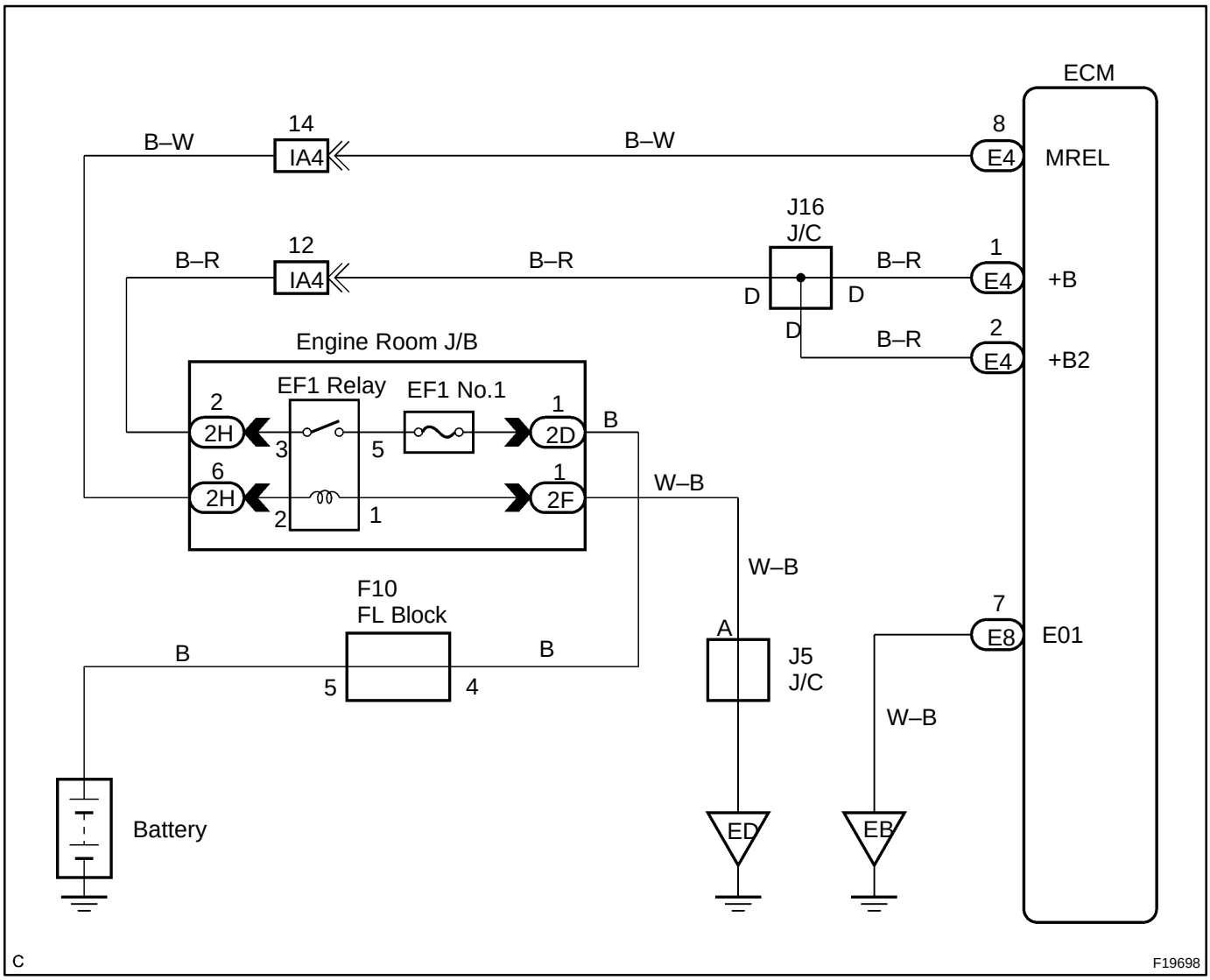
DIDI9–01

ECM Communication Stop Mode

MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
ECM Communication Stop Mode	▶"ENGINE" is not displayed on the "BUS CHECK" screen of the hand–held tester. ▶DTCs are output from each ECU in ECM communication stop mode as shown in the "DTC COMBINATION TABLE" (see page DI–1067).	▶Power source or inside the ECM

WIRING DIAGRAM



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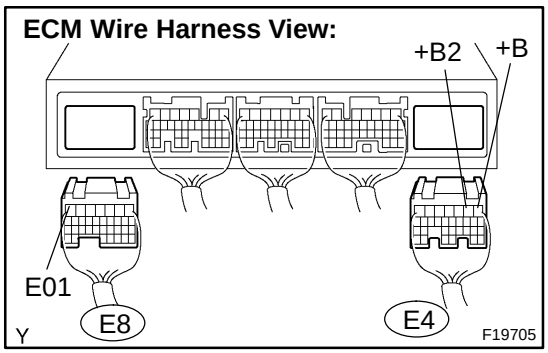
INSPECTION PROCEDURE

1	**Check wire harness (ECM – Battery and ECM – Body ground).**



PREPARATION:

Disconnect the ECM connectors (E4) and (E8).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
E8–7 (E01) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
E4–1 (+B) – Body ground	Ignition Switch ON	10 to 14 V
E4–2 (+B2) – Body ground	Ignition Switch ON	10 to 14 V

NG → **Repair or replace wire harness or connector (ECM – Battery or ECM – Body ground).**

OK

Replace ECM (See page SF–80).

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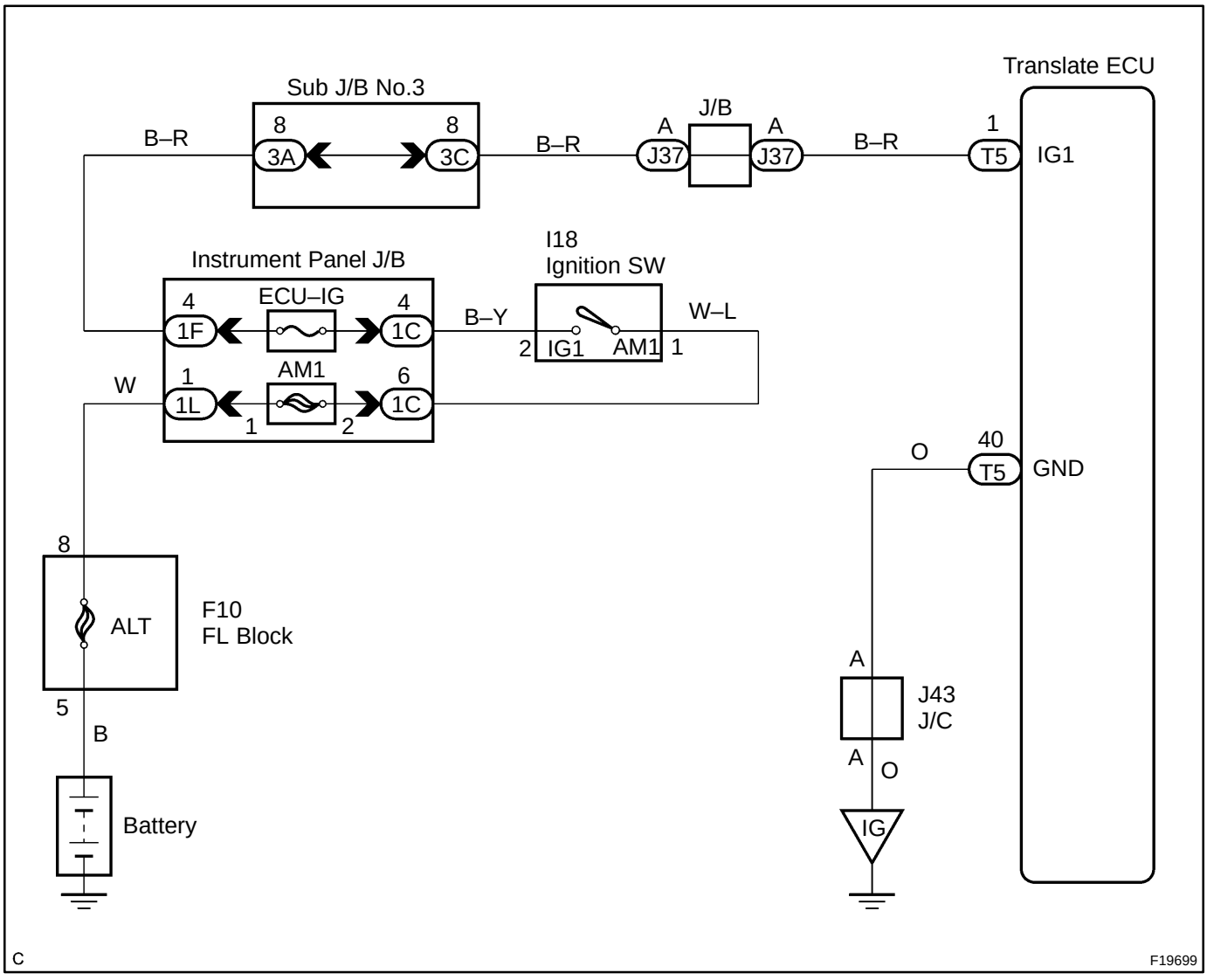
Translate ECU Communication Stop Mode

MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
Translate ECU Communication Stop Mode	▶"TRANSLATE ECU" is not displayed on the "BUS CHECK" screen of the hand–held tester. ▶DTCs are output from each ECU in translate ECU communication stop mode as shown in the "DTC COMBINATION TABLE" (see page DI–1067).	▶Power source or inside the translate ECU

WIRING DIAGRAM



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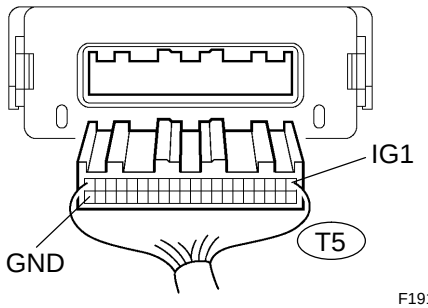
INSPECTION PROCEDURE

1	Check wire harness (Translate ECU – Battery and Translate ECU – Body ground).

Translate ECU Wire Harness View:



PREPARATION:

Disconnect the translate ECU connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
T5–40 (GND) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
T5–1 (IG1) – Body ground	Ignition Switch ON	10 to 14 V

NG → **Repair or replace wire harness or connector (Translate ECU – Battery or Translate ECU – Body ground).**

OK

Replace translate ECU.

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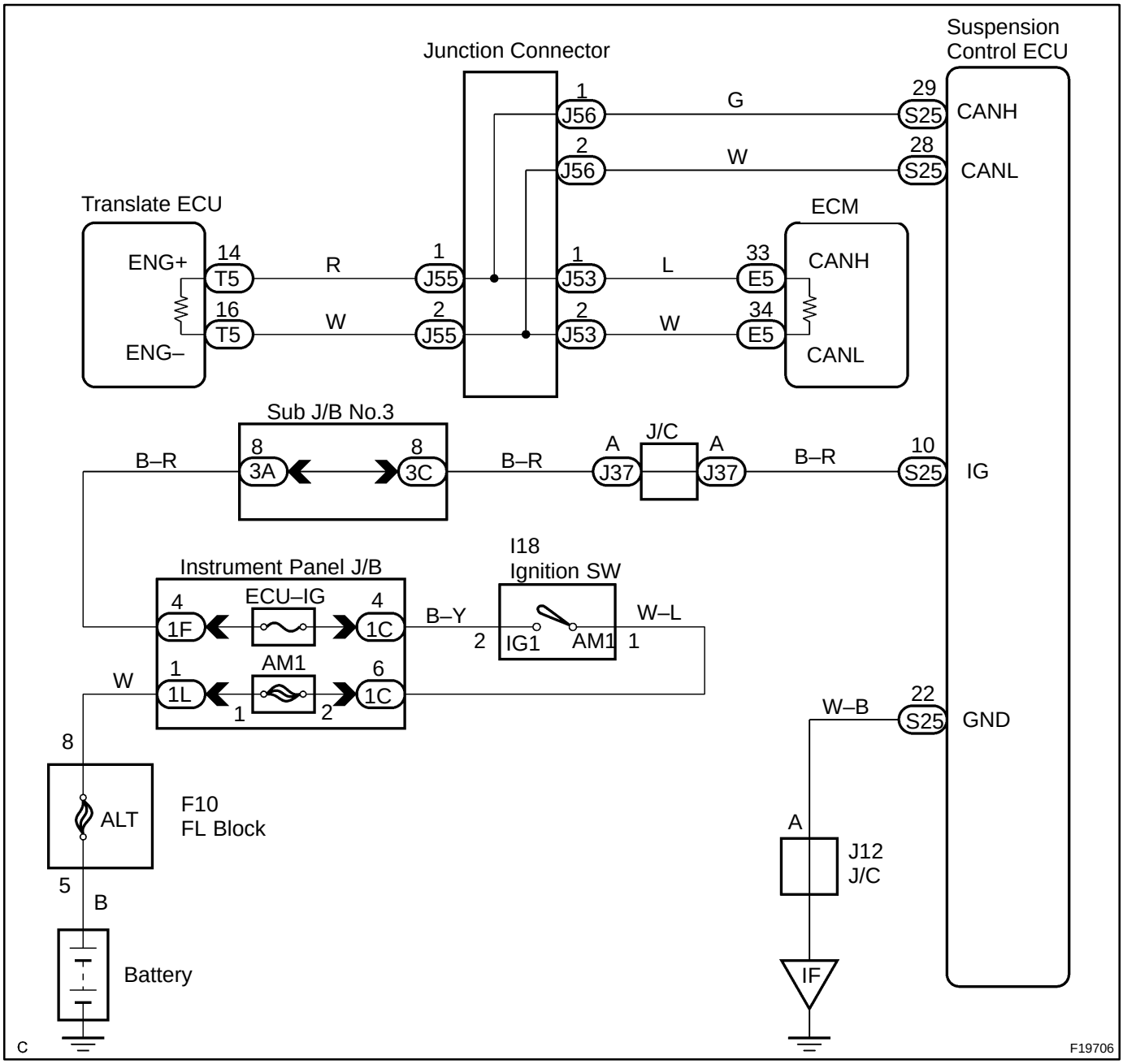
DIDIB–01

Suspension Control ECU Communication Stop Mode

MODE DESCRIPTION

Detection Item	Symptom	Trouble Area
Suspension Control ECU Communication Stop Mode	▶"RIAR AIRSUS" is not displayed on the "BUS CHECK" screen of the hand–held tester. ▶DTCs are output from each ECU in suspension control ECU communication stop mode in the "DTC COMBINATION TABLE" (see page DI–1067).	▶Power source or inside the suspension control ECU ▶Suspension control ECU sub bus line

WIRING DIAGRAM



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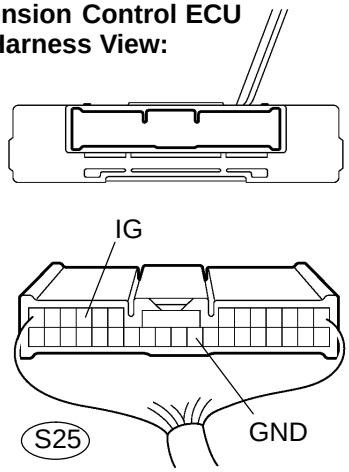
INSPECTION PROCEDURE

1	**Check wire harness (Suspension control ECU – Battery and Suspension control ECU – Body ground).**

Suspension Control ECU Wire Harness View:



PREPARATION:

Disconnect the suspension control ECU connector (S25).

CHECK:

(a) Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
S25–22 (GND) – Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
S25–10 (IG) – Body ground	Ignition Switch ON	10 to 14 V

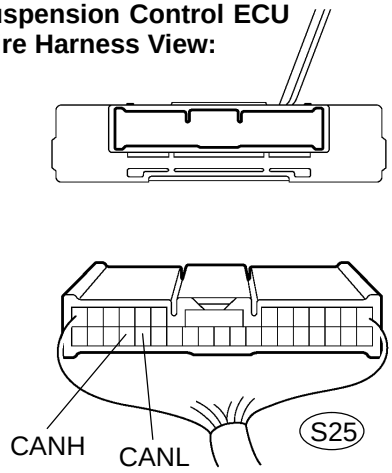
NG → **Repair or replace harness or connector (Suspension Control ECU – Battery or Suspension Control ECU – Body ground).**

OK

Dardoor.com

2	Check CAN bus line (Suspension control ECU sub bus line).

Suspension Control ECU Wire Harness View:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
S25–29 (CANH) – S25–28 (CANL)	Ignition Switch OFF	54 to 69 Ω

NG → **Repair or replace suspension control ECU sub bus line or connector (CAN–H, CAN–L).**

OK

Replace suspension control ECU (See page SA–171).

Dardoor.com

DIDIC–01

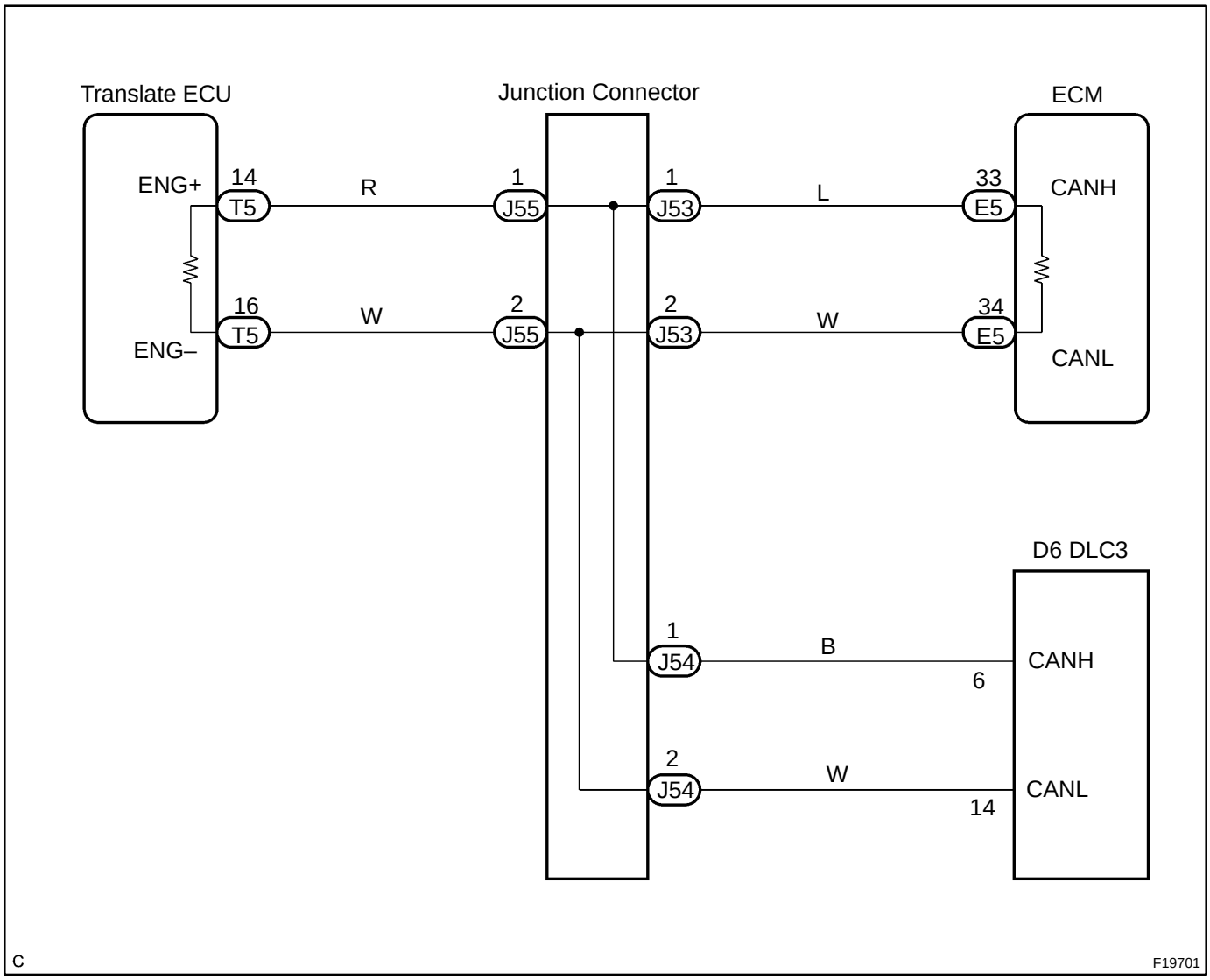
Check CAN Main Bus Line For Disconnection

CIRCUIT DESCRIPTION

The CAN main bus line and DLC3 sub bus line may have a disconnection when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is more than 69 Ω.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is more than 69 Ω.	▶CAN main bus line ▶ECM ▶Translate ECU ▶DLC3 sub bus line

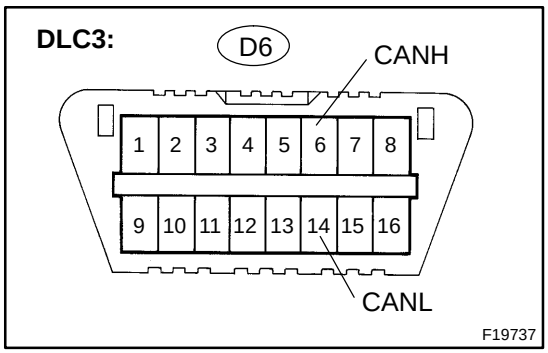
WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	**Check DLC3.**



CHECK:

Measure the resistance according to the value(s) in the table below.

RESULT:

Tester connection	Condition	Specified value	Result
D6–6 (CANH) – D6–14 (CANL)	Ignition switch OFF	108 to 132 Ω	A
D6–6 (CANH) – D6–14 (CANL)	Ignition switch OFF	132 Ω or higher	B

NOTICE:

When the measured value is 132 Ω or more and a CAN communication system diagnostic code is output, there may be a fault other than a disconnection in the DLC3 sub bus line. For that reason, troubleshooting should be performed again from "How to proceed with troubleshooting" after repairing the trouble area.

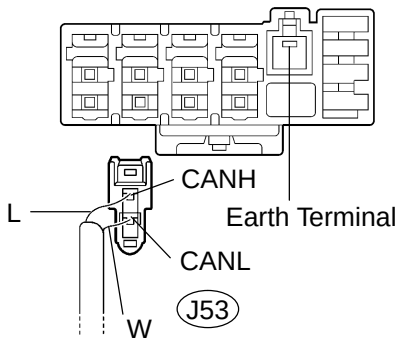
B → **Repair or replace DLC3 sub bus line or connector (CAN–H, CAN–L).**

A

Dardoor.com

2	Check CAN main bus line for disconnection (ECM – Junction connector).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



PREPARATION:

Disconnect the ECM main bus line connector (J53) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
J53–1 (CANH) – J53–2 (CANL)	Ignition switch OFF	108 to 132 Ω

NG	Go to step 5.

OK

3	Connect the connector.

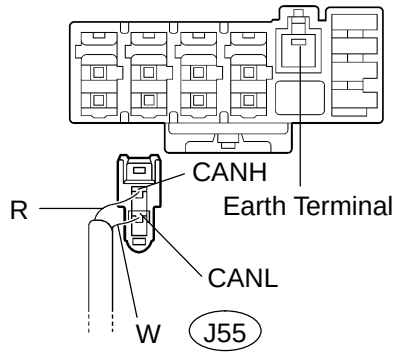
Reconnect the ECM main line connector (J53) to the junction connector.

NEXT

Dardoor.com

4	Check CAN main bus line for disconnection (Translate ECU – Junction connector).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



F19749

PREPARATION:

Disconnect the translate ECU main bus line connector (J55) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
J55–1 (CANH) – J55–2 (CANL)	Ignition Switch OFF	108 to 132 Ω

NG → **Go to step 7.**

OK

Replace junction connector.

5	Connect the connector.

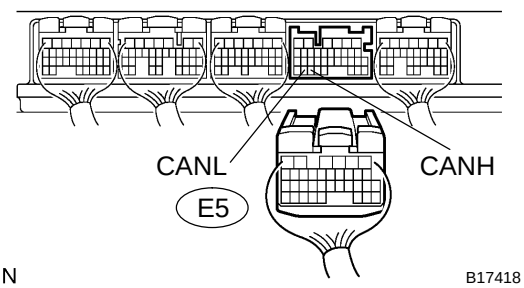
Reconnect the ECM main bus line connector (J53) to the junction connector.

NEXT

Dardoor.com

6	Inspect ECM.

ECM:



PREPARATION:

Disconnect the ECM connector (E5).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
33 (CANH) – 34 (CANL)	Ignition Switch OFF	108 to 132 Ω

NG → **Replace ECM (See page SF–80).**

OK

Repair or replace CAN main bus line or connector (ECM – junction connector).

7	Connect the connector.

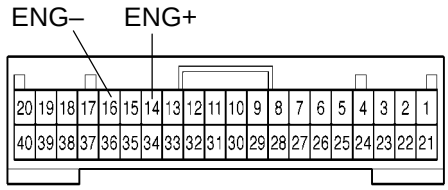
Reconnect the translate ECU main bus line connector (J55) to the junction connector.

NEXT

Dardoor.com

8	Inspect translate ECU.

Translate ECU:



F19822

PREPARATION:

Disconnect the translate ECU connector (T5).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
14 (ENG+) – 16 (ENG–)	Ignition Switch OFF	108 to 132 Ω

NG → **Replace translate ECU.**

OK →

Repair or replace CAN main bus line or connector (Translate ECU – Junction connector).

Dardoor.com

DIDID–01

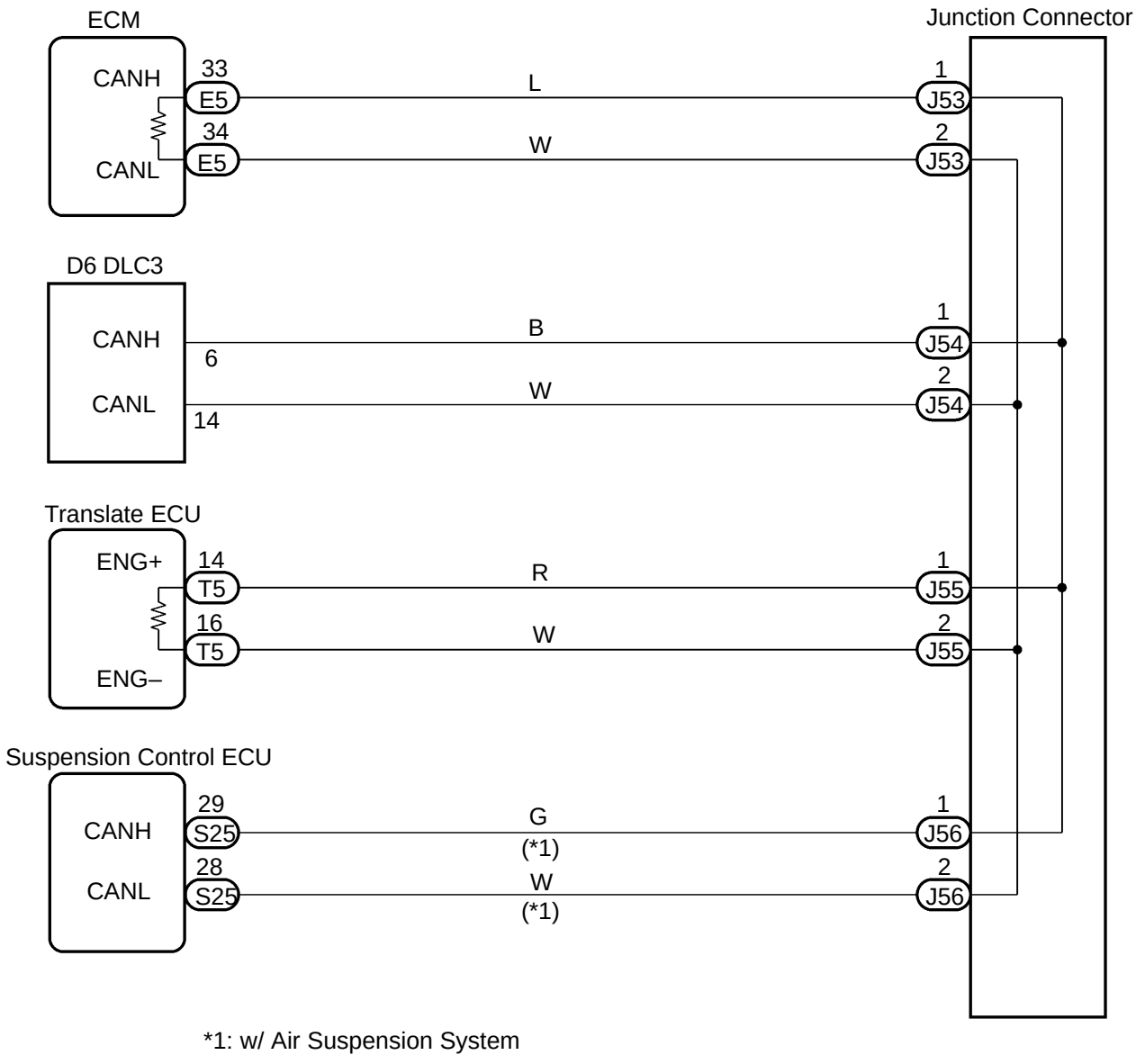
Check CAN Bus Lines For Short Circuit

CIRCUIT DESCRIPTION

There may be a short circuit between the CAN bus lines when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.	▶Short between CAN bus lines ▶Translate ECU ▶Suspension control ECU ▶ECM ▶Junction connector

WIRING DIAGRAM

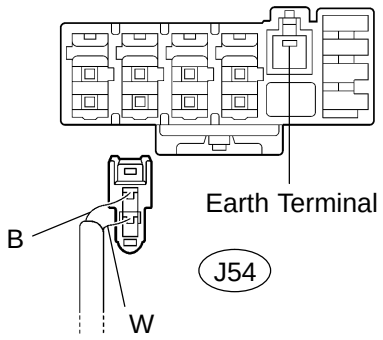


Dardoor.com

INSPECTION PROCEDURE

1	Check CAN bus lines for short circuit (DLC3 sub bus line).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



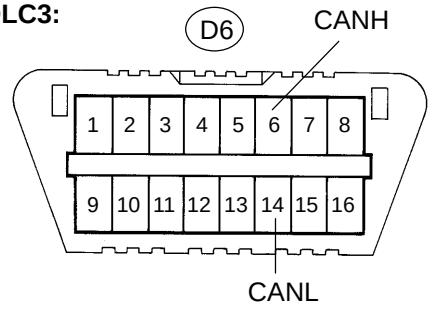
PREPARATION:

Disconnect the DLC3 sub bus line connector (J54) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	1 MΩ or more

NG → **Repair or replace DLC3 sub bus line or connector (CAN–H, CAN–L).**

OK

2	Connect the connector.

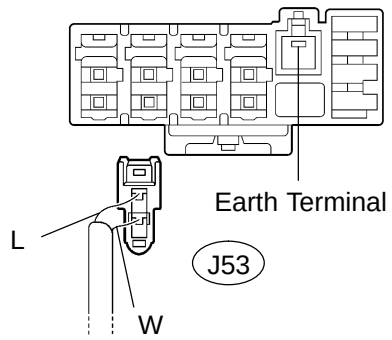
Reconnect the DLC3 sub bus line connector (J54) to the junction connector.

NEXT

Dardoor.com

3	Check CAN bus lines for short circuit (ECM main bus line).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



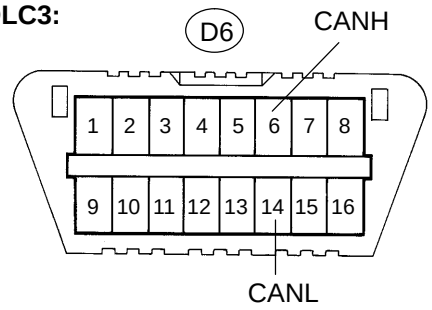
PREPARATION:

Disconnect the ECM main bus line connector (J53) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	108 to 132 Ω

OK	Go to step 8.

NG

4	Connect the connector.

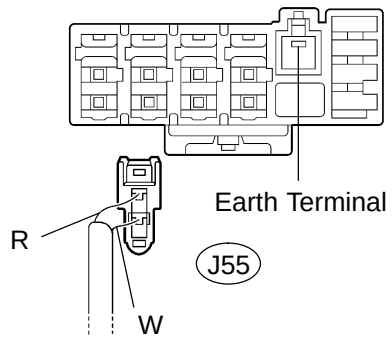
Reconnect the ECM main bus line connector (J53) to the junction connector.

NEXT

Dardoor.com

5	Check CAN bus lines for short circuit (Translate ECU main bus line).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



F19749

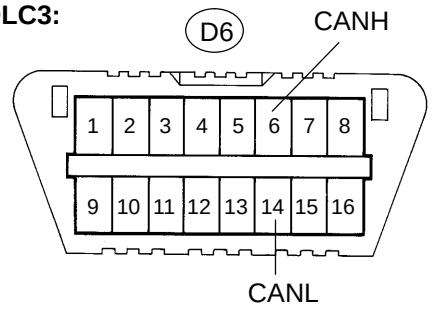
PREPARATION:

Disconnect the translate ECU main bus line connector (J55) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



F19737

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	108 to 132 Ω

OK	Go to step 10.

NG

6	Connect the connector.

Reconnect the translate ECU main bus line connector (J55) to the junction connector.

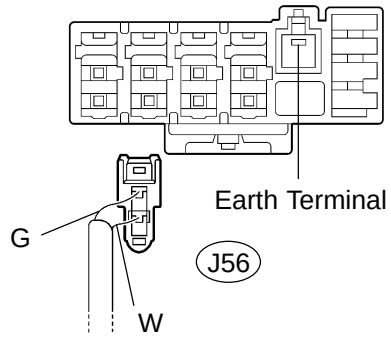
NEXT

Dardoor.com

7	Check CAN bus lines for short circuit (Suspension control ECU sub bus line).

HINT:
For vehicles without an enhanced air suspension system, go to NG.

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



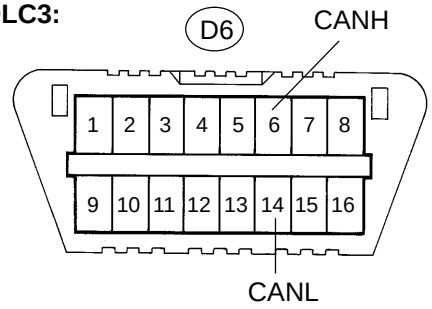
F19749

PREPARATION:
Disconnect the suspension control ECU sub bus line connector (J56) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



F19737

CHECK:
Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	54 to 69 Ω

OK	Go to step 12.

NG

Replace junction connector.

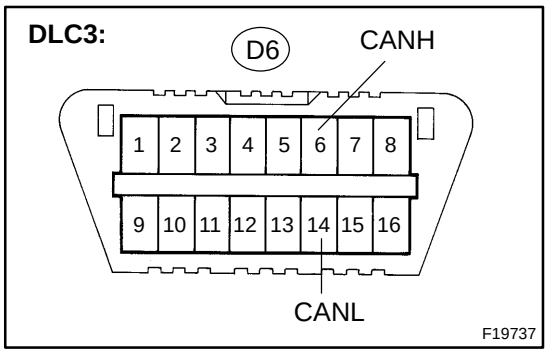
8	Connect the connector.

Reconnect the ECM main bus line connector (J53) to the junction connector.

NEXT

Dardoor.com

9	Check CAN bus lines for short circuit (ECM main bus line).



PREPARATION:

Disconnect the ECM connector (E5).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	108 to 132 Ω

OK → **Replace ECM (See page SF–80).**

NG

Repair or replace ECM main bus line or connector (CAN–H, CAN–L).

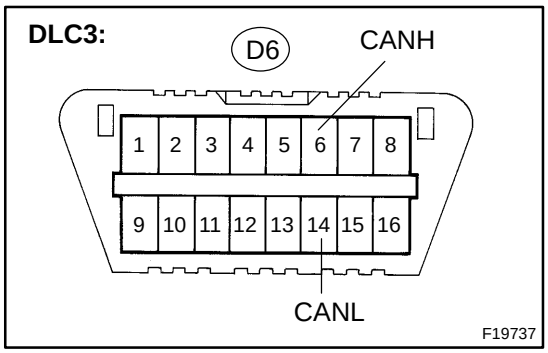
10	Connect the connector.

Reconnect the translate ECU main bus line connector (J55) to the junction connector.

NEXT

Dardoor.com

11	Check CAN bus lines for short circuit (Translate ECU main bus line).



PREPARATION:

Disconnect the translate ECU connector (T5).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	108 to 132 Ω

OK → **Replace translate ECU.**

NG

Repair or replace translate ECU main bus line or connector (CAN–H, CAN–L).

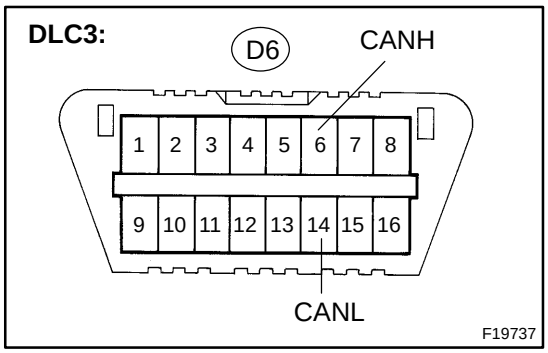
12	Connect the connector.

Reconnect the suspension control ECU sub bus line connector (J56) to the junction connector.

NEXT

Dardoor.com

13	Check CAN bus lines for short circuit (Suspension control ECU sub bus line).



PREPARATION:

Disconnect the suspension control ECU connector (S25).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–6 (CANH) – D6–14 (CANL)	Ignition Switch OFF	54 to 69 Ω

OK → **Replace suspension control ECU (See page SA–171).**

NG

Repair or replace suspension control ECU sub bus line or connector (CAN–H, CAN–L).

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DIDIE–01

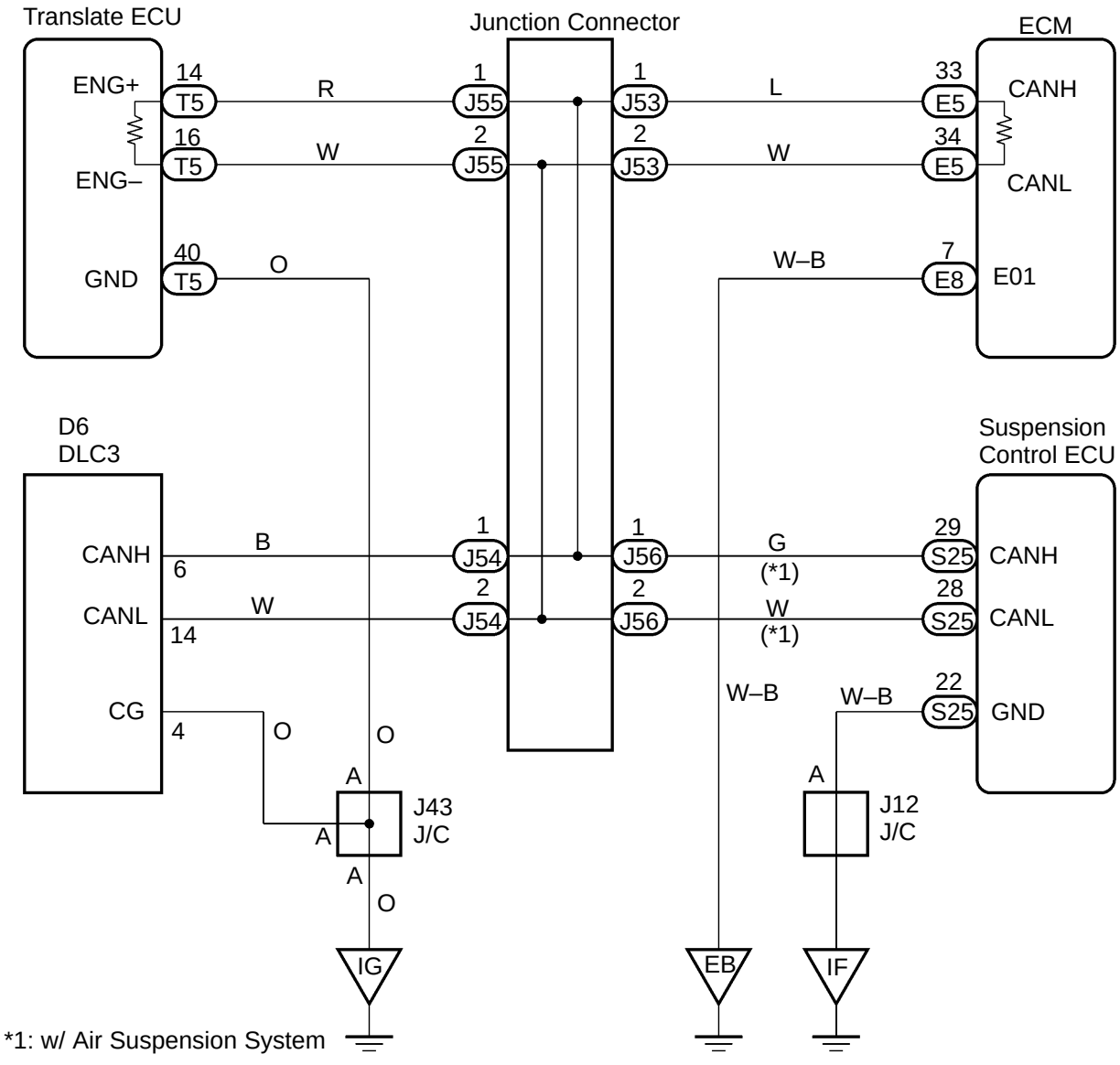
Check CAN Bus Line For Short To GND

CIRCUIT DESCRIPTION

A short to GND is suspected in the CAN bus line when there is continuity between terminals 4 (CG) and 6 (CANH) or terminals 4 (CG) and 14 (CANL) of the DLC3.

Symptom	Trouble Area
There is continuity between terminals 4 (CG) and 6 (CANH) or terminals 4 (CG) and 14 (CANL) of the DLC3.	▶Short to GND in CAN bus line ▶ECM ▶Translate ECU ▶Suspension control ECU

WIRING DIAGRAM



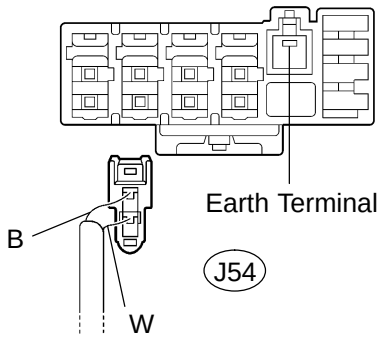
C F19703

Dardoor.com

INSPECTION PROCEDURE

1	Check CAN bus line for short to GND (DLC3 sub bus line).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



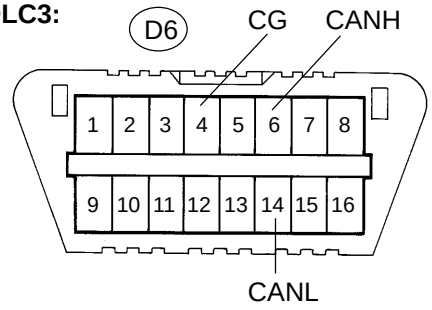
PREPARATION:

Disconnect the DLC3 sub bus line connector (J54) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–4 (CG) – D6–6 (CANH)	Ignition Switch OFF	1 MΩ or higher
D6–4 (CG) – D6–14 (CANL)	Ignition Switch OFF	1 MΩ or higher

NG	Repair or replace DLC3 sub bus line or connector (CAN–H, CAN–L).

OK

2	Connect the connector.

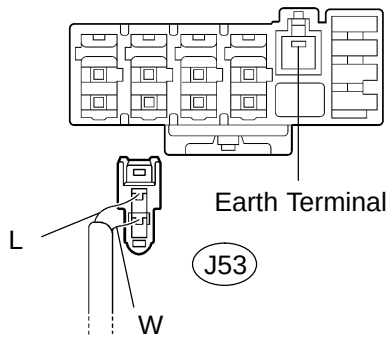
Reconnect the DLC3 sub bus line connector (J54) to the junction connector.

NEXT

Dardoor.com

3	Check CAN bus line for short to GND (ECM main bus line).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



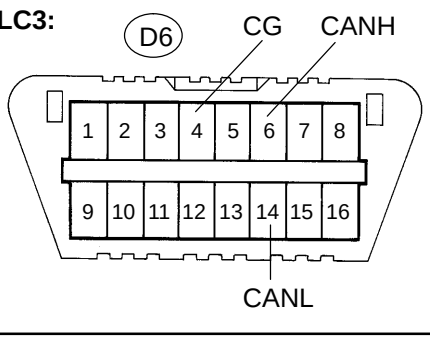
PREPARATION:

Disconnect the ECM main bus line connector (J53) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–4 (CG) – D6–6 (CANH)	Ignition Switch OFF	3 kΩ or higher
D6–4 (CG) – D6–14 (CANL)	Ignition Switch OFF	3 kΩ or higher

OK	Go to step 8.

NG

4	Connect the connector.

Reconnect the ECM main bus line connector (J53) to the junction connector.

NEXT

Dardoor.com

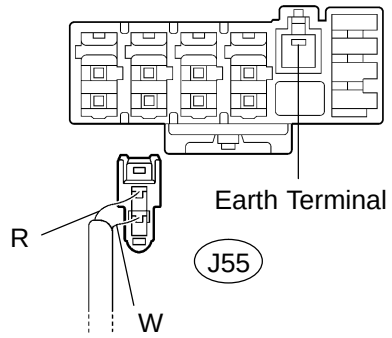
5	Check CAN bus line for short to GND (Translate ECU main bus line).

HINT:
For vehicles without an enhanced air suspension system, go to step 11.

PREPARATION:
Disconnect the translate ECU main bus line connector (J55) from the junction connector.

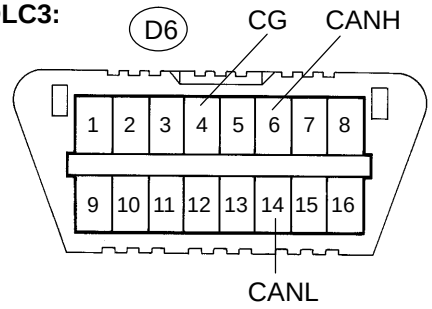
NOTICE:
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



F19749

DLC3:



F19737

CHECK:
Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–4 (CG) – D6–6 (CANH)	Ignition Switch OFF	3 kΩ or higher
D6–4 (CG) – D6–14 (CANL)	Ignition Switch OFF	3 kΩ or higher

OK	Go to step 10.

NG

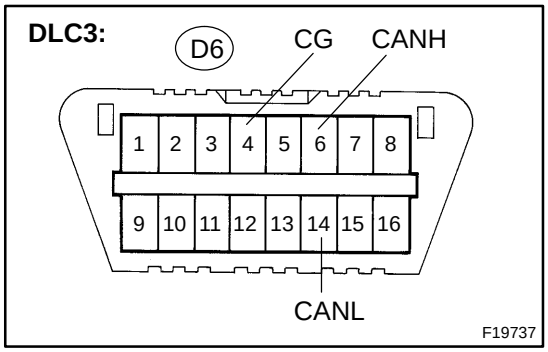
6	Connect the connector.

Reconnect the translate ECU main bus line connector (J55) to the junction connector.

NEXT

Dardoor.com

7	Check CAN bus line for short to GND (Suspension control ECU sub bus line).



PREPARATION:

Disconnect the suspension control ECU connector (S25).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–4 (CG) – D6–6 (CANH)	Ignition Switch OFF	3 kΩ or higher
D6–4 (CG) – D6–14 (CANL)	Ignition Switch OFF	3 kΩ or higher

OK → **Replace suspension control ECU. (See page SA–171)**

NG

Repair or replace suspension control ECU sub bus line or connector (CAN–H, CAN–L).

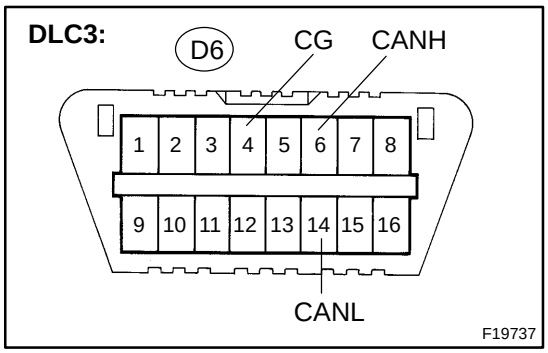
8	Connect the connector.

Reconnect the ECM main bus line connector (J53) to the junction connector.

NEXT

Dardoor.com

9	Check CAN bus line for short to GND (ECM main bus line).



PREPARATION:

Disconnect the ECM connector (E5).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–4 (CG) – D6–6 (CANH)	Ignition Switch OFF	3 kΩ or higher
D6–4 (CG) – D6–14 (CANL)	Ignition Switch OFF	3 kΩ or higher

OK	Replace ECM (See page SF–80).

NG

Repair or replace ECM main bus line or connector (CAN–H, CAN–L).

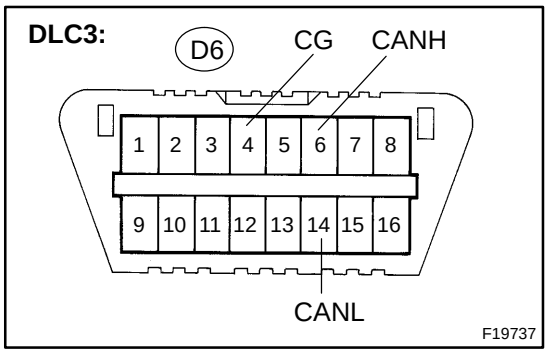
10	Connect the connector.

Reconnect the translate ECU main bus line connector (J55) to the junction connector.

NEXT

Dardoor.com

11	Check CAN bus line for short to GND (Translate ECU main bus line).



PREPARATION:

Disconnect the translate ECU connector (T5).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–4 (CG) – D6–6 (CANH)	Ignition Switch OFF	3 kΩ or higher
D6–4 (CG) – D6–14 (CANL)	Ignition Switch OFF	3 kΩ or higher

OK	Replace translate ECU.

NG

Repair or replace translate ECU main bus line or connector (CAN–H, CAN–L).

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DIDIF–01

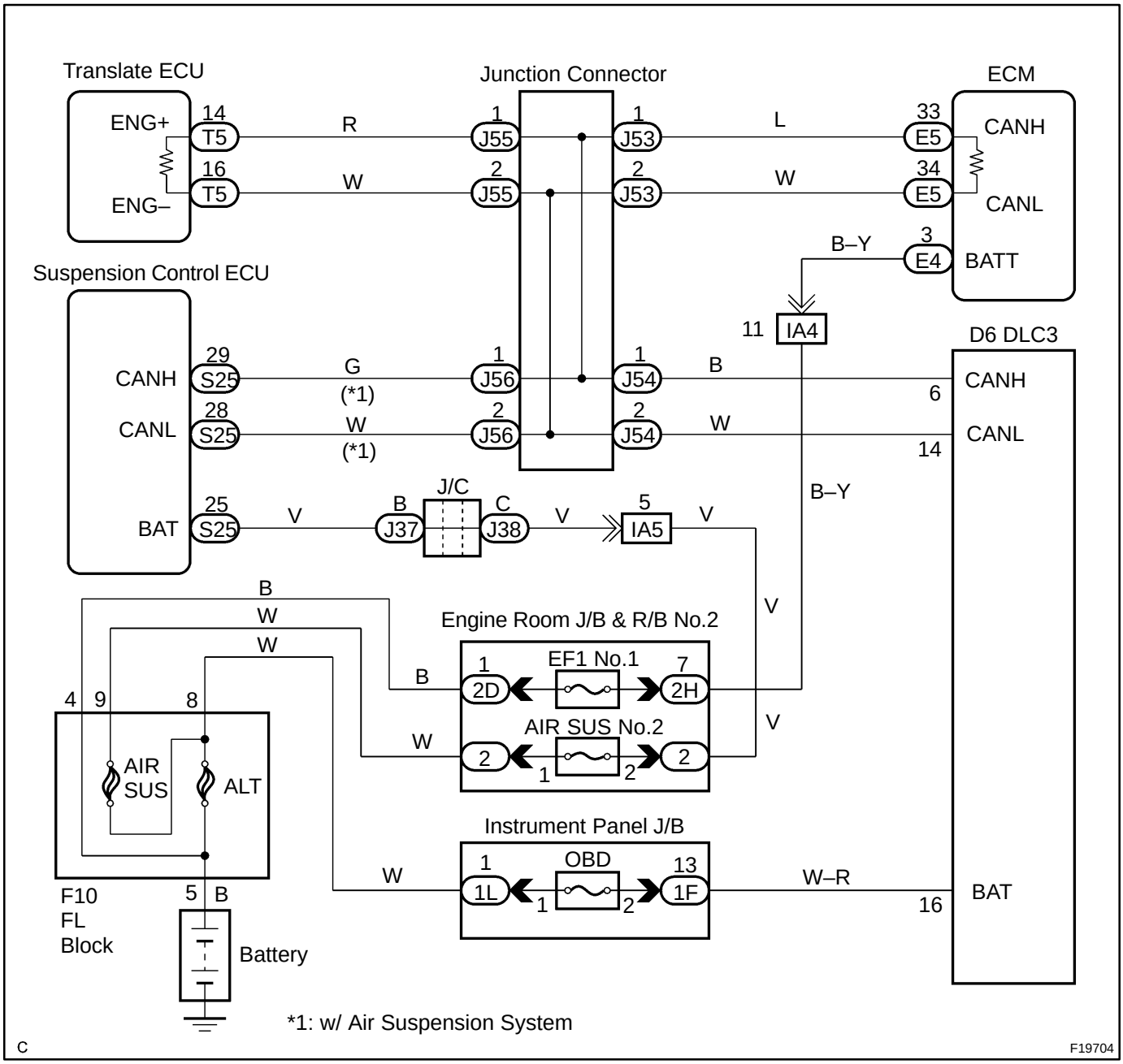
Check CAN Bus Line For Short To + B

CIRCUIT DESCRIPTION

A short to +B is suspected in the CAN bus line when there is continuity between terminals 16 (BAT) and 6 (CANH) or terminals 16 (BAT) and 14 (CANL) of the DLC3.

Symptom	Trouble Area
There is continuity between terminals 16 (BAT) and 6 (CANH) or 16 (BAT) and 14 (CANL) of the DLC3.	▶Short to +B in CAN bus line ▶ECM ▶Translate ECU ▶Suspension control ECU

WIRING DIAGRAM



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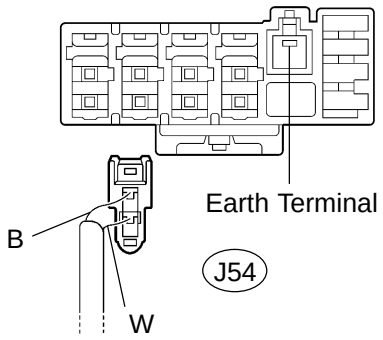
INSPECTION PROCEDURE

1	Check CAN bus line for short to +B (DLC3 sub bus line).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



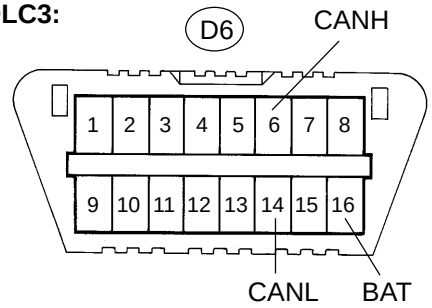
PREPARATION:

Disconnect the DLC3 sub bus line connector (J54) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–16 (BAT) – D6–6 (CANH)	Ignition Switch OFF	1 MΩ or higher
D6–16 (BAT) – D6–14 (CANL)	Ignition Switch OFF	1 MΩ or higher

NG	Repair or replace DLC3 sub bus line or connector (CAN–H, CAN–L).

OK

2	Connect the connector.

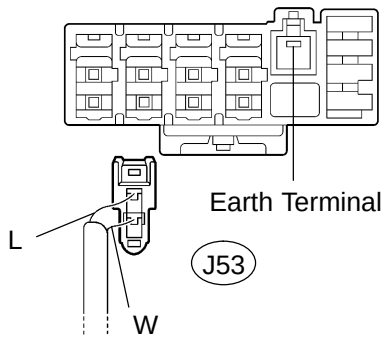
Reconnect the DLC3 sub bus line connector (J54) to the junction connector.

NEXT

Dardoor.com

3	Check CAN bus line for short to +B (ECM main bus line).

Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



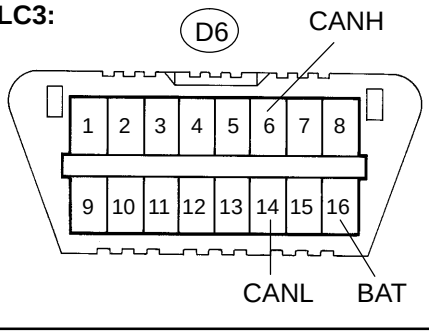
PREPARATION:

Disconnect the ECM main bus line connector (J53) from the junction connector.

NOTICE:

- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–16 (BAT) – D6–6 (CANH)	Ignition Switch OFF	1 MΩ or higher
D6–16 (BAT) – D6–14 (CANL)	Ignition Switch OFF	1 MΩ or higher

OK	Go to step 8.

NG

4	Connect the connector.

Reconnect the ECM main bus line connector (J53) to the junction connector.

NEXT

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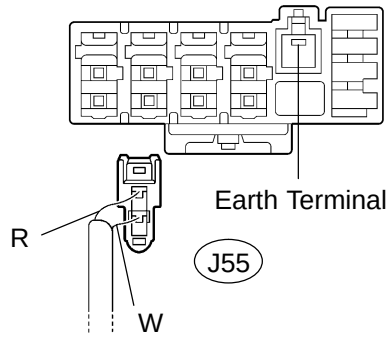
5	Check CAN bus line for short to +B (Translate ECU main bus line).

HINT:
For vehicles without an enhanced air suspension system, go to step 11.

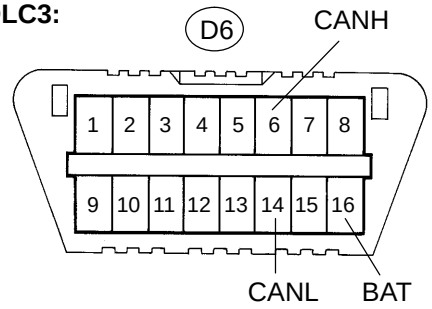
Junction Connector "A" Side (w/ Earth Terminal) Wire Harness View:



PREPARATION:
Disconnect the translate ECU main bus line connector (J55) from the junction connector.

NOTICE:
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



CHECK:
Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–16 (BAT) – D6–6 (CANH)	Ignition Switch OFF	1 MΩ or higher
D6–16 (BAT) – D6–14 (CANL)	Ignition Switch OFF	1 MΩ or higher

OK	Go to step 10.

NG

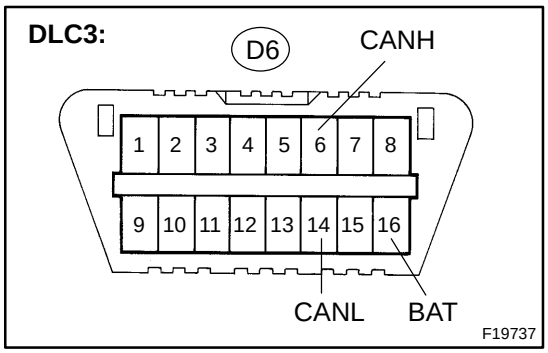
6	Connect the connector.

Reconnect the translate ECU main bus line connector (J55) to the junction connector.

NEXT

Dardoor.com

7	Check CAN bus line for short to +B (Suspension control ECU sub bus line).



PREPARATION:

Disconnect the suspension control ECU connector (S25).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–16 (BAT) – D6–6 (CANH)	Ignition Switch OFF	1 MΩ or higher
D6–16 (BAT) – D6–14 (CANL)	Ignition Switch OFF	1 MΩ or higher

OK → **Replace suspension control ecu (See page SA–171).**

NG

Repair or replace suspension control ECU sub bus line or connector (CAN–H, CAN–L).

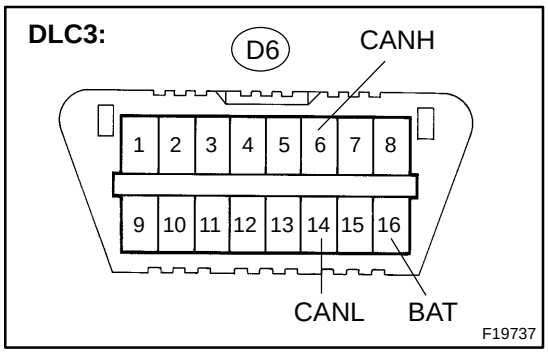
8	Connect the connector.

Reconnect the ECM main bus line connector (J53) to the junction connector.

NEXT

Dardoor.com

9	Check CAN bus line for short to +B (ECM main bus line).



PREPARATION:

Disconnect the ECM connector (E5).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–16 (BAT) – D6–6 (CANH)	Ignition Switch OFF	1 MΩ or higher
D6–16 (BAT) – D6–14 (CANL)	Ignition Switch OFF	1 MΩ or higher

OK	Replace ECM (See page SF–80).

NG

Repair or replace ECM main bus line or connector (CAN–H, CAN–L).

10	Connect the connector.

Reconnect the translate ECU main bus line connector (J55) to the junction connector.

NEXT

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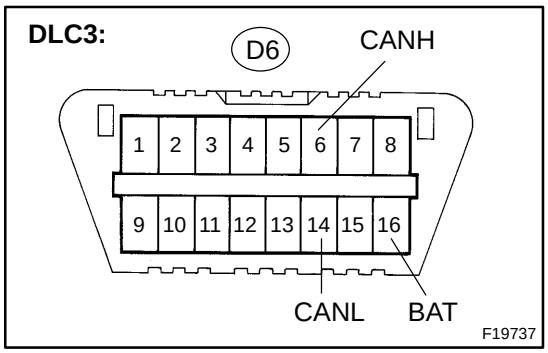
11	Check CAN bus line for short to +B (Translate ECU main bus line).



PREPARATION:

Disconnect the translate ECU connector (T5).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
D6–16 (BAT) – D6–6 (CANH)	Ignition Switch OFF	1 MΩ or higher
D6–16 (BAT) – D6–14 (CANL)	Ignition Switch OFF	1 MΩ or higher

OK → **Replace translate ECU.**

NG

Repair or replace translate ECU main bus line or connector (CAN–H, CAN–L).

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DIDIG–01

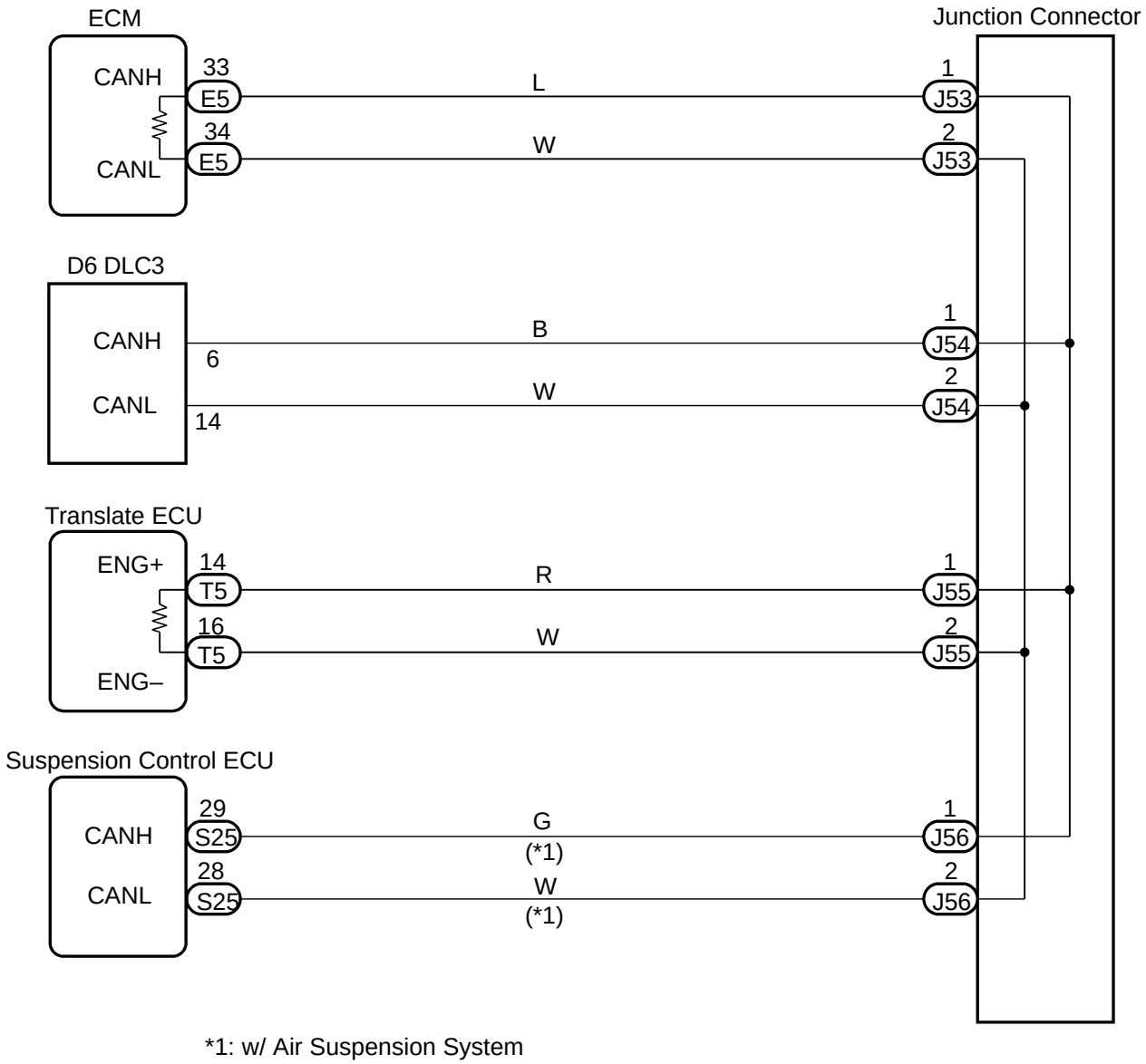
Check for an Open in one Side of the CAN Sub Bus Line

CIRCUIT DESCRIPTION

If 2 or more ECUs and/or sensors do not appear on the hand–held tester's "BUS CHECK" screen via the CAN VIM, one side of the CAN sub–bus line may be open. (One side of the CAN–H [sub–bus line] /CAN–L [sub–bus line] of the ECU and/or sensor is open.)

Symptom	Trouble Area
2 or more ECUs and/or sensors do not appear on the hand–held tester's "BUS CHECK" screen via the CAN VIM.	▶One side of the CAN sub–bus line is open ▶Suspension control ECU ▶ECM ▶Translate ECU ▶CAN J/C

WIRING DIAGRAM



*1: w/ Air Suspension System

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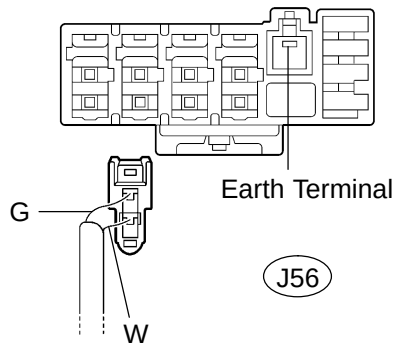
INSPECTION PROCEDURE

1	**Check for an open in one side of the CAN sub bus line (Suspension control ECU sub bus line).**

CAN J/C ”A” Side (w/ Earth Terminal) Wire Harness View:



HINT:
For vehicles without an enhanced air suspension system, go to step 3.

PREPARATION:

(a) Turn the ignition switch LOCK position.
(b) Disconnect the suspension control ECU sub bus line connector (J56) from the CAN J/C.

NOTICE:

- **Check the colors of the wire harnesses before disconnecting the connector.**
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

(c) Connect the hand–held tester to the DLC3 via CAN VIM.
(d) Turn the ignition switch ON.

CHECK:

Select ”BUS CHECK” on the hand–held tester display via the CAN VIM (see page DI–1073).

RESULT:

A	”REAR AIRSUS” does not appear
B	2 or more ECUs and/or sensors do not appear

A	**Go to step 4.**

B

2	**Connect the connector.**

(a) Turn the ignition switch LOCK position.
(b) Reconnect the suspension control ECU sub bus line connector (J56) to the CAN J/C.

NEXT

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3	**Replace translate ECU.**

PREPARATION:

(a) Replace the translate ECU.

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Turn the ignition switch ON.

CHECK:

Select ”BUS CHECK” on the hand–held teter display via the CAN (see page DI–1073).

OK:

All ECUs connected to the CAN communication system are displayed.

NG → **Replace ECM (See page SF–80).**

OK

End.

4	**Connect the connector.**

(a) Turn the ignition switch LOCK position.

(b) Reconnect the suspension control ECU sub bus line connector (J56) to CAN S/C.

NEXT

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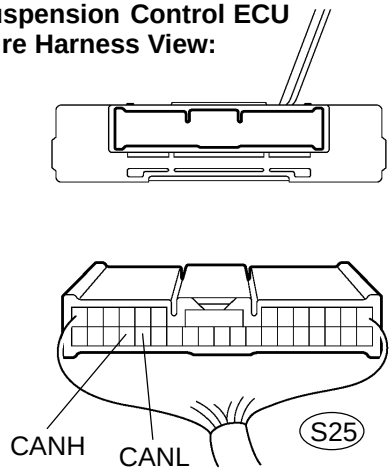
5	**Check for an open in one side of the CAN sub bus line (Suspension control ECU sub bus line).**

Suspension Control ECU Wire Harness View:



PREPARATION:

Disconnect the connector (S25) from the suspension control ECU.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified value
S25–29 (CANH) – S25–28 (CANL)	Ignition Switch OFF	54 to 69 Ω

NG → **Repair or replace suspension control ECU sub bus line or connector (CAN–H, CAN–L).**

OK

Replace suspension control ECU (See page SA–171).

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SUPPLEMENTAL RESTRAINT SYSTEM

PRECAUTION

DICY7–02

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

1. HANDLING PRECAUTIONS FOR AIRBAG SENSOR

HINT:

In this section, the airbag sensor assembly, front airbag sensor LH, front airbag sensor RH, side airbag sensor assembly LH, side airbag sensor assembly RH, curtain shield airbag sensor assembly LH, curtain shield airbag sensor assembly RH and seat position airbag sensor assembly are collectively referred to as the airbag sensor.

(a) Before starting the following operations, wait at least 90 seconds after disconnecting the negative (–) terminal of the battery:
  (1) Replacement of the airbag sensor.
  (2) Adjustment of the front/rear doors of the vehicle equipped with the side airbag and curtain shield airbag (fitting adjustment).

(b) When connecting or disconnecting the airbag sensor connector, ensure that all of the sensors are installed in the vehicle.

(c) Do not use an airbag sensor which has been dropped during the operation or transportation.

(d) Do not disassemble the airbag sensor.

2. INSPECTION PROCEDURE FOR VEHICLE INVOLVED IN ACCIDENT

(a) When the airbag has not deployed, confirm the DTC by checking the SRS warning light. If there is any malfunction in the SRS airbag system, perform troubleshooting.

(b) When any of the airbags have deployed, replace the airbag sensor and check the installation condition.

(c) Perform the zero point calibration and sensitivity check under the condition is listed below (see page DI–1128).
  ▶ The occupant classification ECU is replaced.
  ▶ Accessories (seatback tray, seat cover, etc.) are installed.
  ▶ The passenger seat removed from the vehicle.
  ▶ The passenger airbag ON/OFF indicator (”OFF”) comes on when the passenger seat is not occupied.
  ▶ The vehicle is brought to the workshop for repair due to an accident or a collision.

NOTICE:

When an accident vehicle is brought into the workshop for repair, check the flatness of the body side that is installed on the passenger seat. If the flatness is not within ± 3.0 mm (0.118 in.), repair it to the specified range (within ± 3.0 mm (0.118 in.)).

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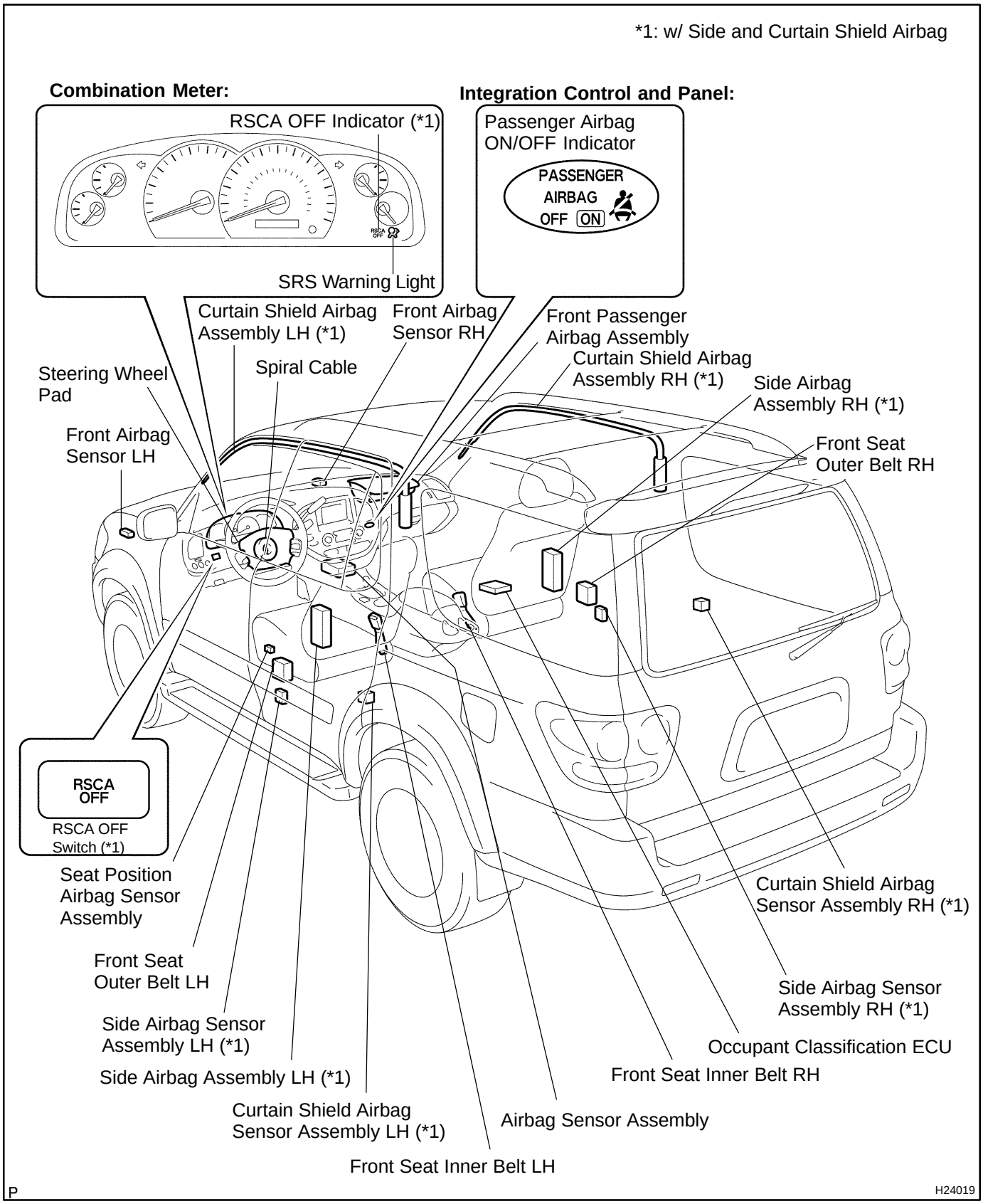
DIDGH–01

LOCATION



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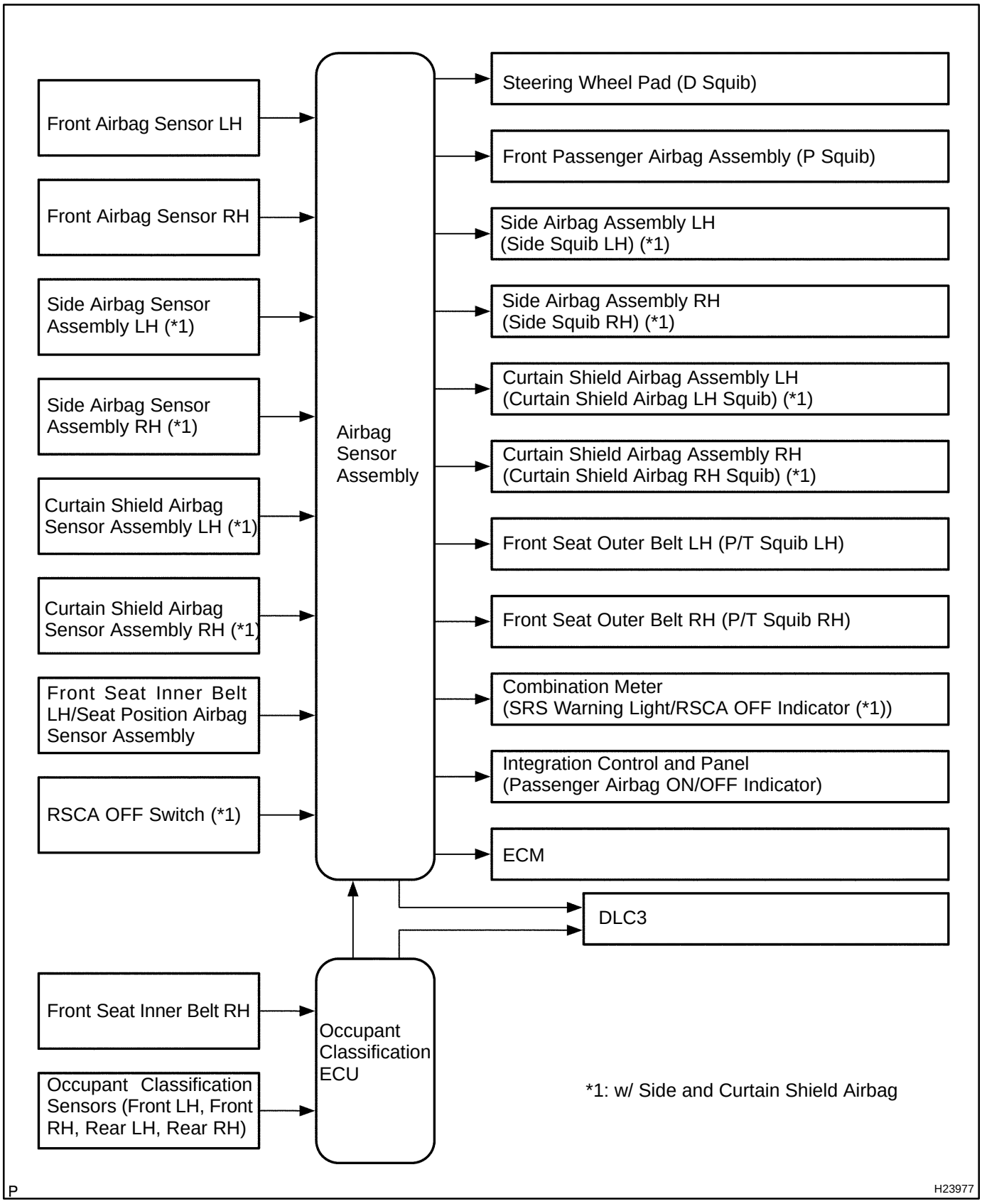
DIDGI–01

SYSTEM DIAGRAM



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DIDGJ–02

SYSTEM DESCRIPTION

1. DESCRIPTION OF SUPPLEMENTAL RESTRAINT SYSTEM

(a) General description.

In this system, the airbag sensor assembly installed on the floor under the A/C unit determines whether or not to activate the SRS airbags (driver airbag, passenger airbag, front seat airbags and curtain shield airbags) and seat belt pretensioners by receiving the collision signal from each sensor (excluding the airbag sensor assembly). When there is trouble in the system, the airbag sensor assembly turns on the SRS warning light on the combination meter to inform the driver.

(b) Description of the dual stage control.

The airbag sensor assembly controls the dual stage deployment of the driver airbag in the steering wheel pad and the passenger airbag on the instrument panel. The airbag sensor assembly controls the dual stage deployment of the driver airbag according to the collision impact, seat position and seat belt ON/OFF state. It also controls the dual stage deployment of the passenger airbag according to the collision impact and seat belt ON/OFF state.

(c) Description of the roll–over function.

(1) The airbag sensor assembly detects inclination signals from the inclination sensor installed on the vehicle. The roll–over function ensures passenger safety by using these signals to activate the RH and LH curtain shield airbag assembly and seat belt pretensioner when vehicle inclination exceeds the specified value.

(2) An RSCA OFF switch (roll–over sensing curtain shield airbag OFF switch), which allows optional deactivation of the roll–over function, is installed on the vehicle.

(d) Description of check mode (signal check).

This airbag sensor assembly is operable using the check mode of the hand–held tester function. Check mode can detect and output DTC by using a hand–held tester to switch the airbag sensor assembly to the check mode.

A simulation method is used, if the malfunction cannot be reproduced during troubleshooting (the malfunction is temporarily solved, etc.). In this case, joggling each connector, or driving on a city or rough road with the airbag sensor assembly in check mode makes it possible to obtain a more accurate malfunction condition.

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2. IGNITION JUDGEMENT AND CONDITIONS

(a) Operation in case of front collision.

(1) When the vehicle collides in the hatched area (Fig. 1) and shock is larger than a predetermined level, the airbags (driver and front passenger) are activated automatically. The deceleration sensor of the airbag sensor assembly determines the need for ignition in response to collisions within the hatched area based on the signal from the deceleration sensor of the front airbag sensor.

(2) Safing sensor of the airbag sensor assembly is designed to activate at by a smaller deceleration rate than the deceleration sensor. As illustrated in Fig. 2 below, when both the safing sensor and deceleration sensor go on simultaneously, current flows to the squib and ignition occurs.

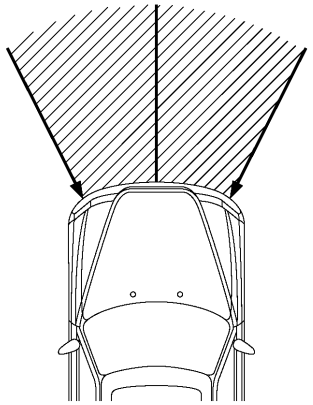

Fig. 1

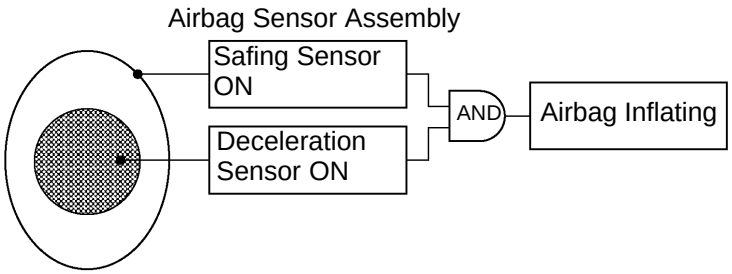

Fig. 2

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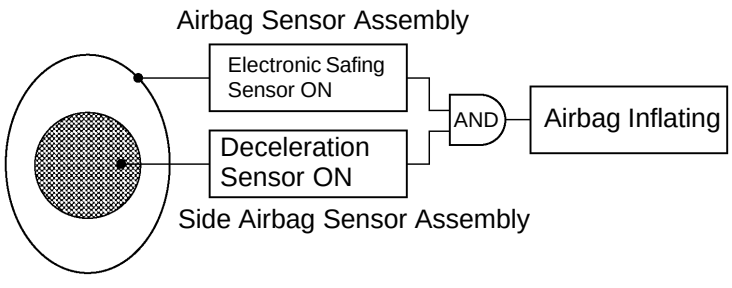
(b) w/ Side and curtain shield airbag:

Operation in case of front side collision.

Electronic safing sensor of the airbag sensor assembly is designed to activate at a smaller deceleration rate than the deceleration sensor of the side airbag sensor assembly. As illustrated below, when both the electronic safing sensor and deceleration sensor go on simultaneously, current flows to the squib and ignition occurs.



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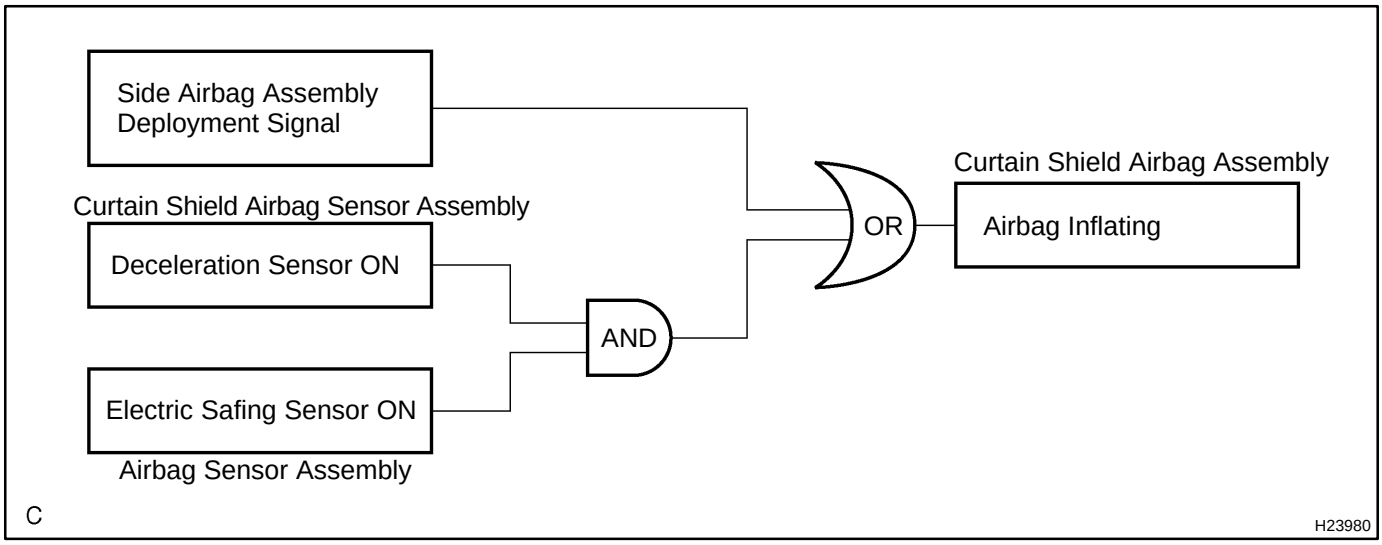
(c) w/ Side and curtain shield airbag:
Operation in case of rear side collision.
Electronic safing sensor of the airbag sensor assembly is designed to activate at a smaller deceleration rate than the deceleration sensor of the curtain shield airbag sensor assembly. As illustrated below, when both the electronic safing sensor and deceleration sensor go on simultaneously, current flows to the squib and ignition occurs.



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(d) w/ Side and curtain shield airbag:
Roll sensing of curtain shield airbag control.

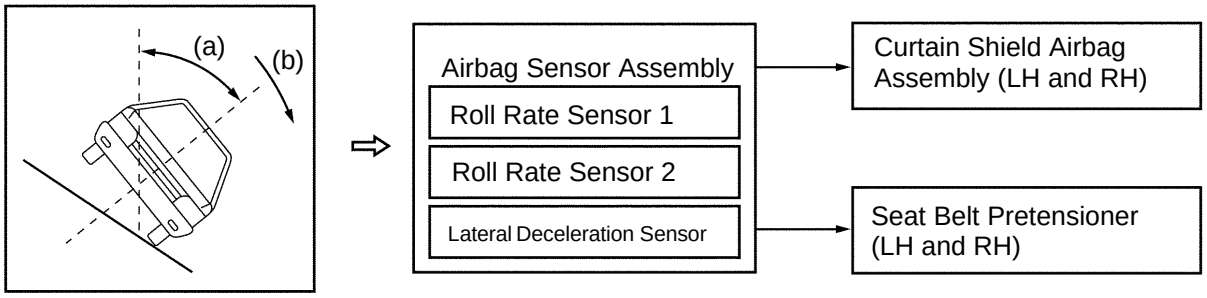
(1) The airbag sensor assembly contains a roll rate sensor and roll rate sensor (that determine the inclination angle the vehicle) and a lateral deceleration sensor (that determine the lateral force that is applied to the vehicle). These sensors detect the vehicle's roll angle, rotational speed, and lateral acceleration speed.

(2) Based on the information obtained from sensors, the airbag sensor assembly makes an overall judgment of the vehicle's roll angle rotational speed, and lateral acceleration speed. If the airbag sensor determines that the vehicle has rolled over due to cause other than the side collision, it deploys the right and left curtain shield airbags and the front right and left seat belt pretensioners.

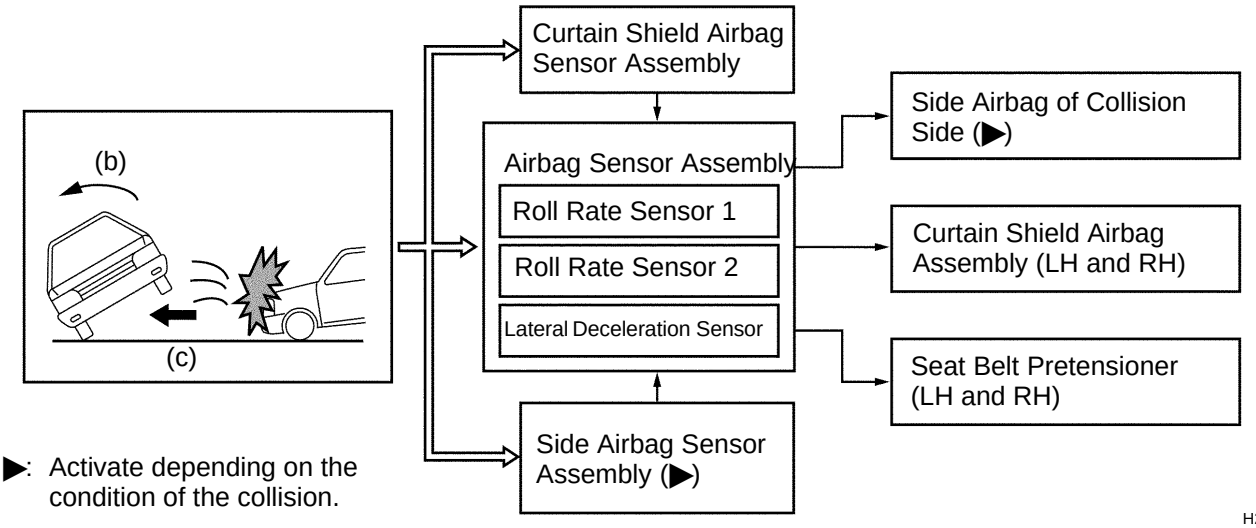
(3) This system provides a roll sensing of curtain shield airbags cutoff switch (RSCA OFF switch) on the driver side of the instrument panel with which the driver can stop the operation of the function.

(4) By operating the RSCA OFF switch and while the roll sensing of the curtain shield airbag control is OFF, and when the airbag sensor assembly judges to operate the side and curtain shield airbag system in the event of side collision, it is no need prohibit this operation.

Rollover Detection:



Side Collision and Rollover Detection:



▶: Activate depending on the condition of the collision.

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3. DESCRIPTION OF OCCUPANT CLASSIFICATION SYSTEM

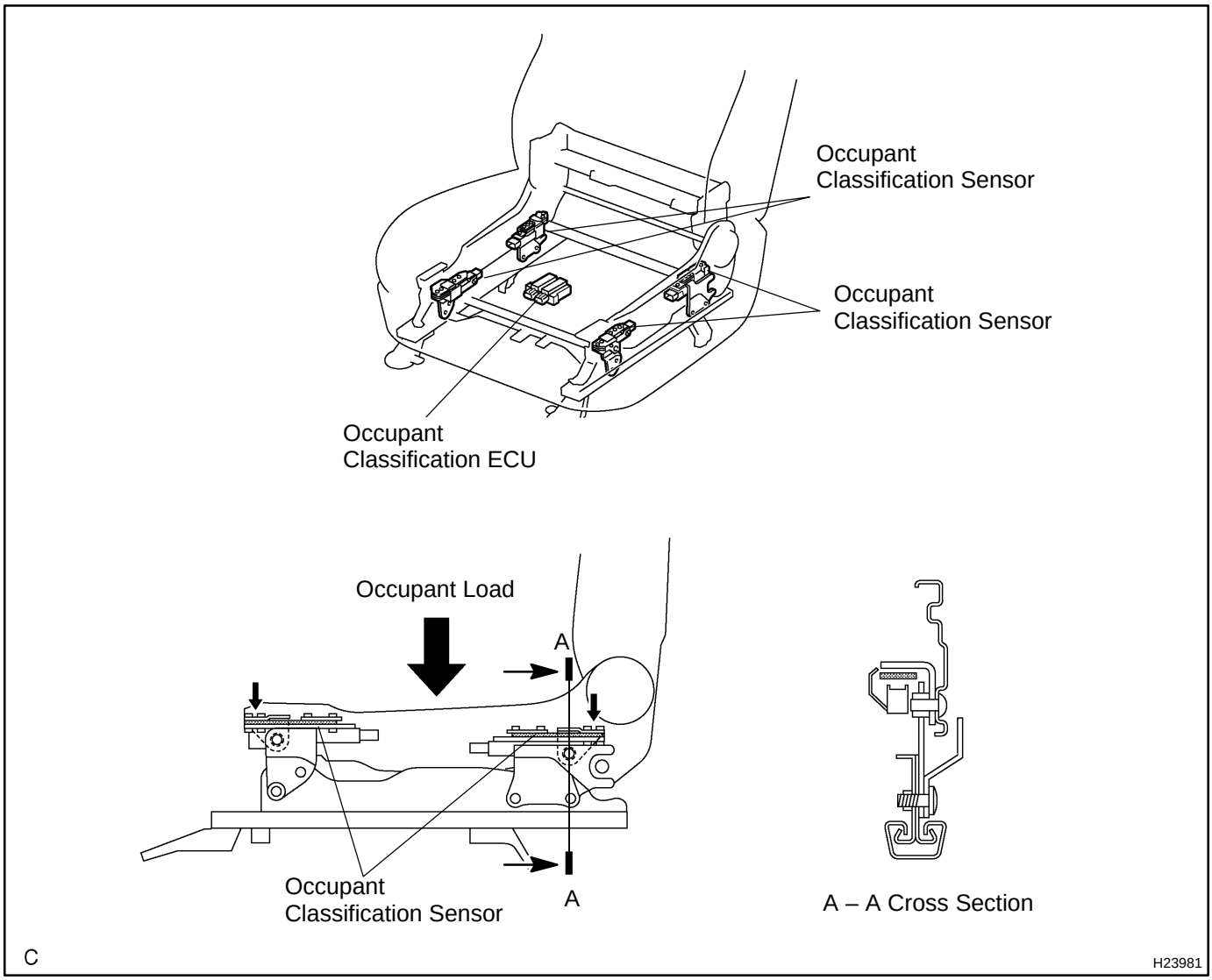
(a) GENERAL DESCRIPTION.

(1) In the occupant classification system, the occupant classification ECU calculates the weight of the occupant based on a signal from the occupant classification sensor. This system recognizes the occupant to be a child if it detects a weight of less than 36 kg (79.37 lb), and disables the front and side airbags.

(2) This system is mainly comprised of 4 occupant classification sensors that detect the load on the front passenger seat. The occupant classification ECU controls the system, and the passenger airbag ON/OFF indicator indicates the ON/OFF condition of the front passenger airbag assembly and side airbag assembly (passenger side).

(b) OCCUPANT CLASSIFICATION SENSOR.

The occupant classification sensors are installed on 4 brackets connecting the seat rail and seat frame. Accordingly, when load is applied to the passenger seat by an occupant sitting in it, the occupant classification sensors register a distortion.



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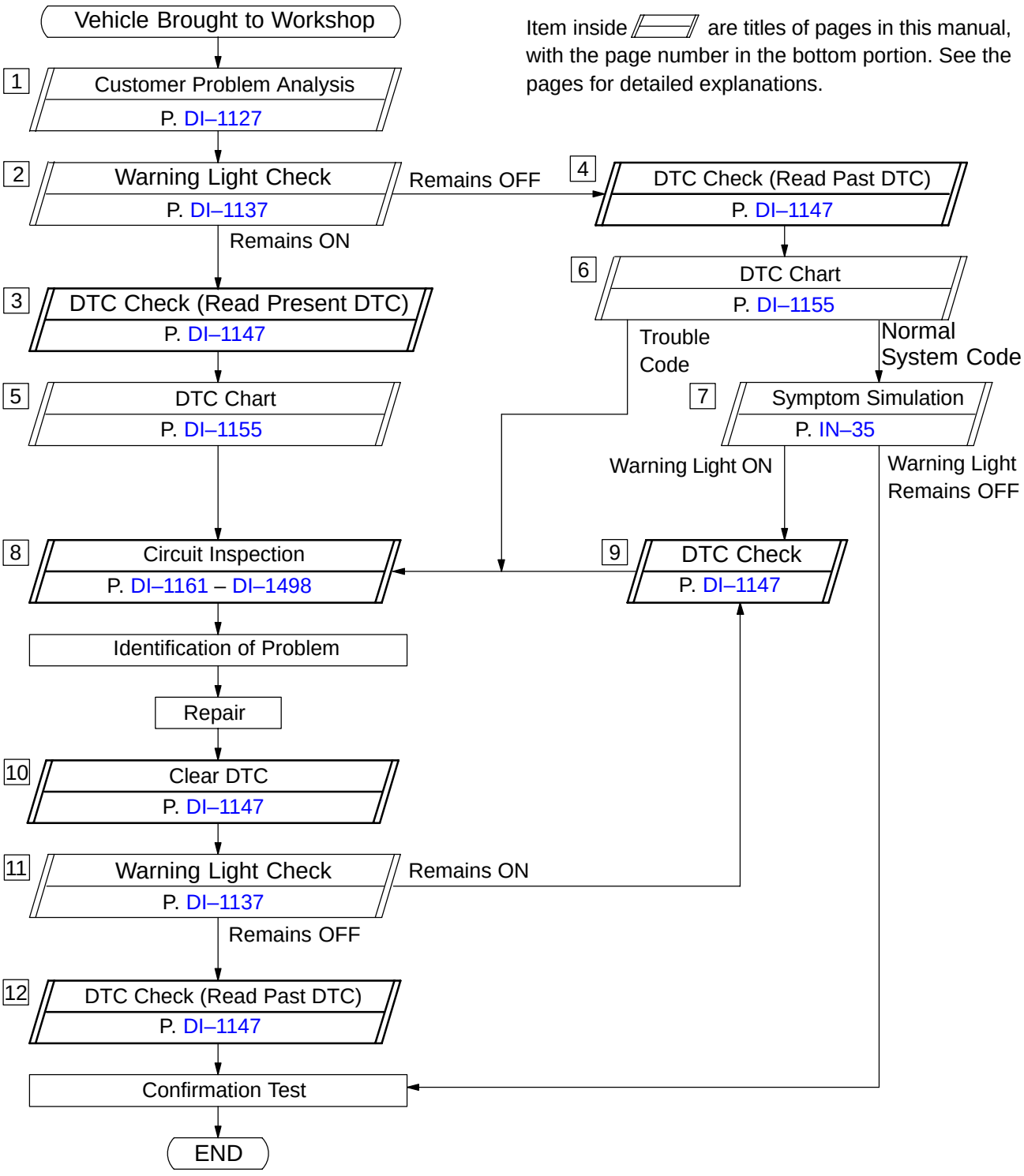
DI6OW–27

HOW TO PROCEED WITH TROUBLESHOOTING



Step 3, 4, 8, 9, 10, 12: Diagnostic steps permitting the use of the hand–held tester.

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DI6OX–17

CUSTOMER PROBLEM ANALYSIS CHECK

Supplemental Restraint System Check Sheet

Inspector's Name

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem Occurred	/ /
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	Approx.

Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]
Road Conditions	
Details of Problem	

Vehicle Inspection, and Repair History Prior to Occurrence of Malfunction (Including Supplemental Restraint System)	

Diagnostic System Inspection

SRS Warning Light Inspection	**1st Time**	☐ Remains ON ☐ Sometimes comes on ☐ Does not come on
	2nd Time	☐ Remains ON ☐ Sometimes comes on ☐ Does not come on
Passenger Airbag ON/OFF Indicator Inspection	**1st Time**	☐ Remains ON ☐ Does not come on
	2nd Time	☐ Remains ON ☐ Does not come on
RSCA OFF Indicator Inspection	**1st Time**	☐ Remains ON ☐ Does not come on
	2nd Time	☐ Remains ON ☐ Does not come on
DTC Inspection	**1st Time**	☐ Normal System Code ☐ Trouble Code [Code.]
	2nd Time	☐ Normal System Code ☐ Trouble Code [Code.]

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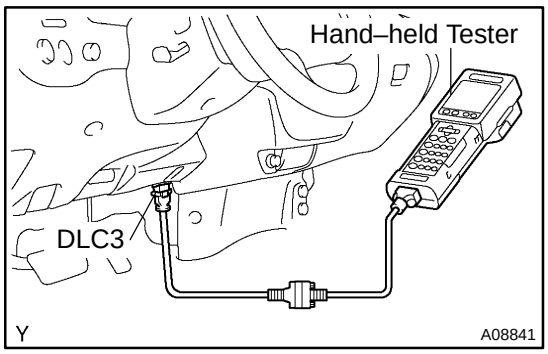

DIDGK–01

INITIALIZATION

ZERO POINT CALIBRATION AND SENSITIVITY CHECK

NOTICE:

Make sure that the seat is not occupied before performing the operation.

HINT:

Perform the zero point calibration and sensitivity check if any of the following conditions occur.

- The occupant classification ECU is replaced.
- Accessories (seatback tray and seat cover, etc.) are installed.
- The passenger seat is removed from the vehicle.
- The passenger airbag ON/OFF indicator (”OFF”) comes on when the passenger seat is not occupied.
- The vehicle is brought to the workshop for repair due to an accident or a collision.

Zero point calibration and sensitivity check procedures.

HINT:

Make sure that zero point calibration has finished normally, and then perform the sensitivity check.

(1) Adjust the seat position according to the table below.

Adjustment Component	Position
Slide Direction	Rearmost position
Reclining Angle	Upright position
Headrest Height	Lowest position
Lifter Height	Lowest position

(2) Connect the hand–held tester to the DLC3.

(3) Turn the ignition switch to the ON position.

(4) Perform the zero point calibration by following the prompts on the tester screen shown in 2 pages later.

HINT:

Refer to the hand–held tester operator’s manual for further details.

OK:

The ”COMPLETE” is displayed.

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(5) Perform the sensitivity check by following the prompts on the tester screen shown in 2 pages later.

(6) Confirm that the beginning sensor reading is within the standard value.

OK:

Standard value: –3.2 to 3.2 kg (–7 to 7 lb)

(7) Place a 30 kg (66.14 lb) weight (eg. a 30 kg (66.14 lb) of lead mass) onto the passenger seat.

(8) Confirm that the sensitivity is within the standard value.

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

HINT:

- When performing the sensitivity check, use a solid metal weight (the check result may not appear properly if the weight made from liquid is used).
- When the sensitivity deviates from the standard value, retighten the bolts of the passenger seat taking care not to deform the seat rail. After performing this procedure, if the sensitivity is not within the standard value, replace the front seat assembly RH.
- When zero point calibration has not finished normally, replace the front seat assembly RH.

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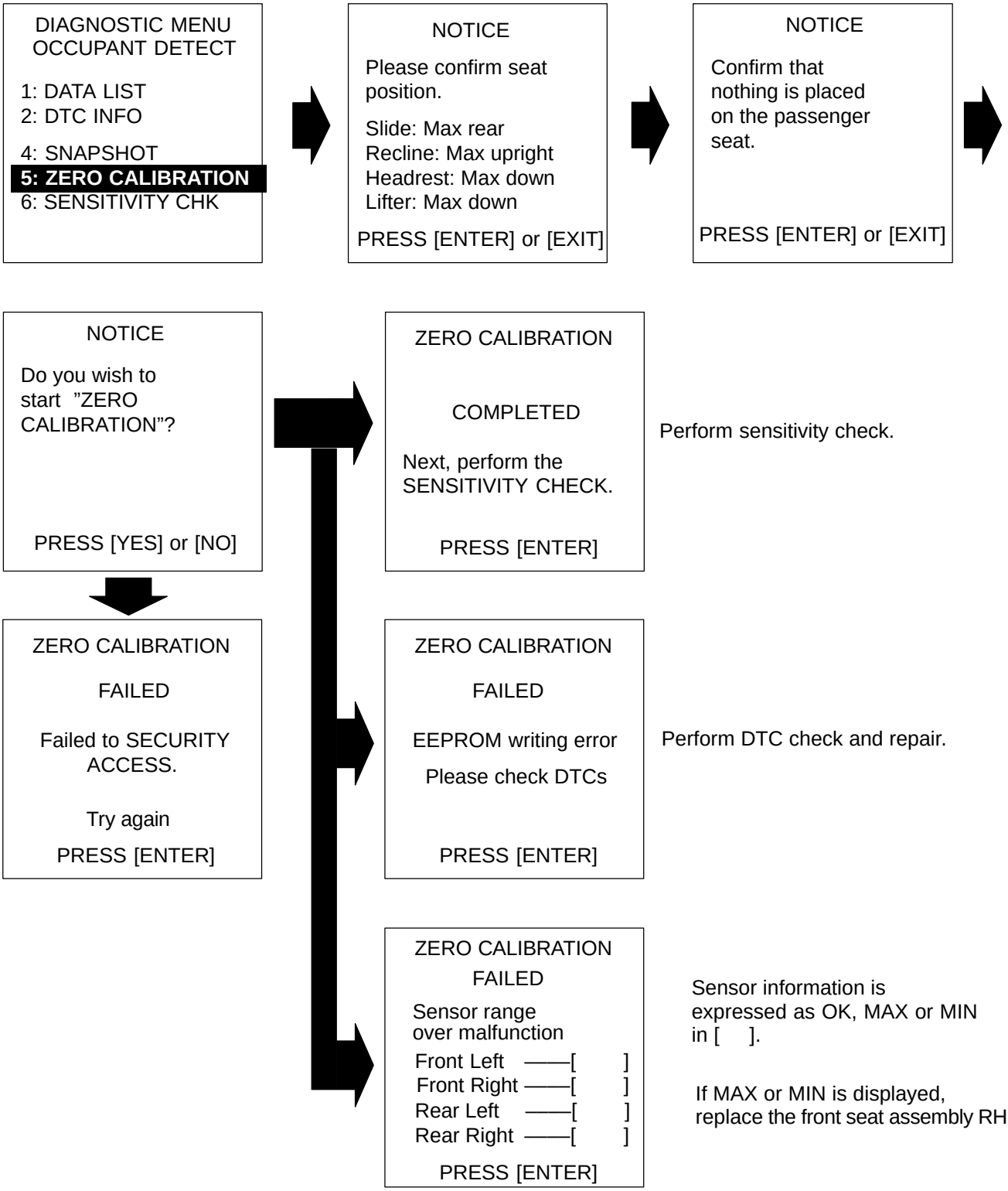
ZERO POINT CALIBRATION PROCEDURE

”1: DIAGNOSIS” – ”1: OBD/MOBD” – ”MODEL YEAR” – ”MODEL SELECTION = SEQUOIA” – Select the option parts – ”9: OCCUPANT DETECT” – Refer to the following screen flow.



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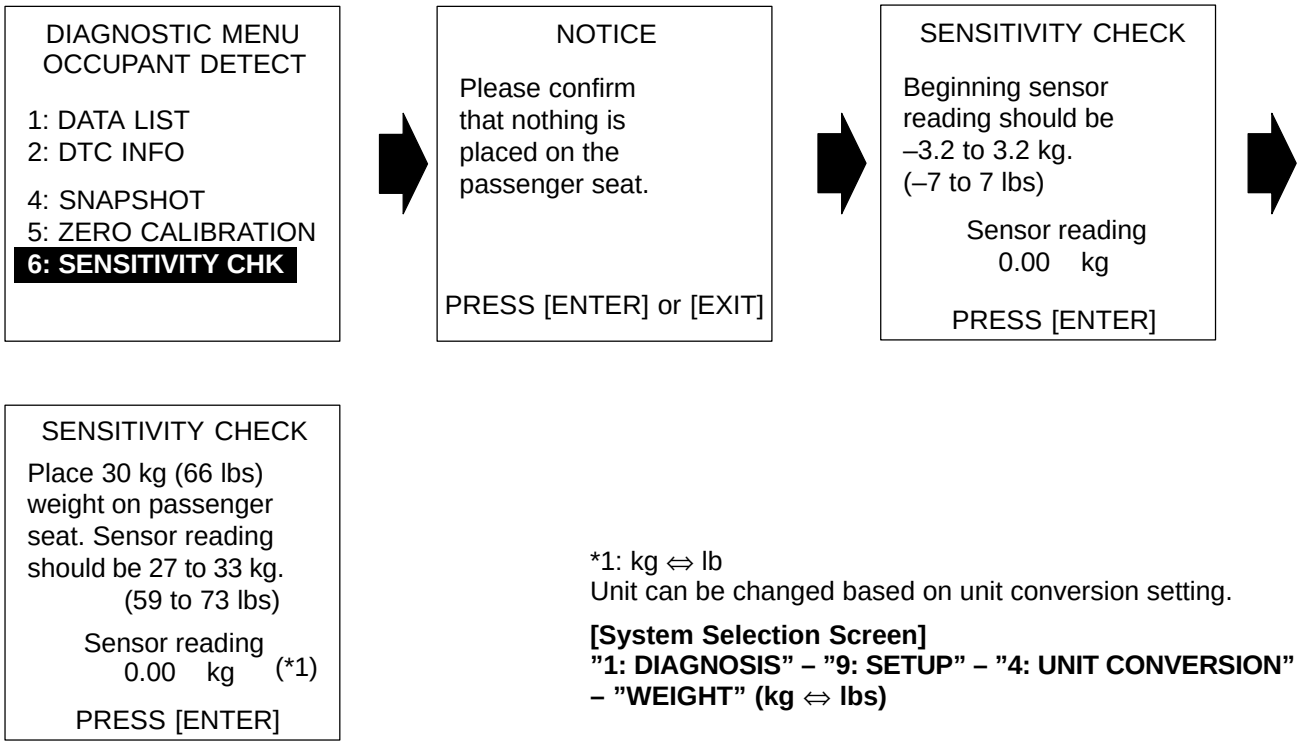
SENSITIVITY CHECK PROCEDURE

”1: DIAGNOSIS” – ”1: OBD/MOBD” – ”MODEL YEAR” – ”MODEL SELECTION = SEQUOIA” – Select the option parts – ”9: OCCUPANT DETECT” – Refer to the following screen flow.



*1: kg ⇔ lb
Unit can be changed based on unit conversion setting.

[System Selection Screen]
”1: DIAGNOSIS” – ”9: SETUP” – ”4: UNIT CONVERSION” – ”WEIGHT” (kg ⇔ lbs)

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DI6P2–15

PROBLEM SYMPTOMS TABLE

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspected Area	See page
▶The front passenger seat condition differs from the indication by the passenger airbag ON/OFF indicator (DTC is not output).	▶Trouble in indication of Passenger airbag ON/OFF indicator	DI–1485
▶With the ignition switch is in ON position, the SRS warning light sometimes comes on after approximately 6 seconds.	▶SRS warning light circuit (Always comes on, when DTC is not output)	DI–1491
▶The SRS warning light always comes on even when DTC is not output.	▶SRS warning light circuit (Always comes on, when DTC is not output)	DI–1491
▶With the ignition switch is in the ON position, the SRS warning light does not come on.	▶SRS warning light circuit (Does not come on, when ignition switch is turned to the ON position)	DI–1496
▶Although an SRS warning light operates normally, DTC or a normal system code is not display.	▶TC terminal circuit	DI–1498
▶Although terminals TC and CG of DLC3 are not connected, DTC or a normal system code is display.	▶TC terminal circuit	DI–1498

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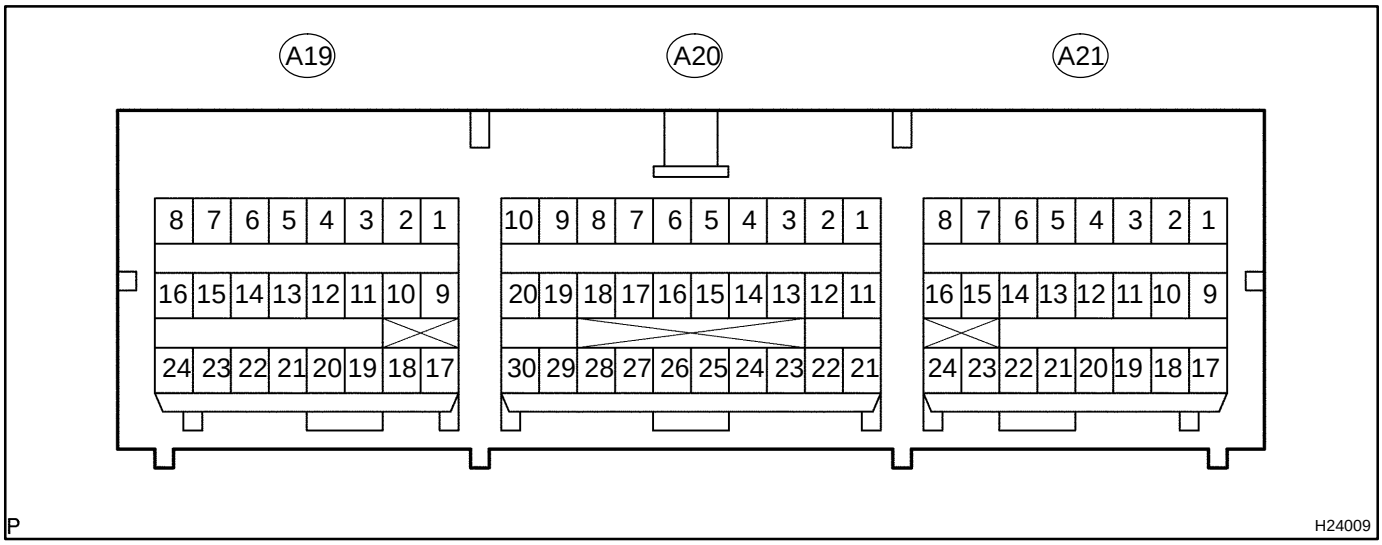
DIDGL–01

TERMINALS OF ECU

1. AIRBAG SENSOR ASSEMBLY



Terminal No.	Terminal Symbol	Destination
A19–1 (*1)	SFL+	Side airbag assembly LH (Side squib LH)
A19–2 (*1)	SFL–	Side airbag assembly LH (Side squib LH)
A19–3 (*1)	ICL–	Curtain shield airbag assembly LH (Curtain shield airbag LH squib)
A19–4 (*1)	ICL+	Curtain shield airbag assembly LH (Curtain shield airbag LH squib)
A19–5	PL+	Front seat outer belt LH (P/T squib LH)
A19–6	PL–	Front seat outer belt LH (P/T squib LH)
A19–9	LSP+	Seat position airbag sensor assembly
A19–10	LBE+	Front seat inner belt RH (Seat belt buckle switch LH)
A19–17	LSP–	Seat position airbag sensor assembly
A19–18	LBE–	Front seat inner belt RH (Seat belt buckle switch LH)
A19–19 (*1)	VUPL	Side airbag sensor assembly LH
A19–20 (*1)	VUCL	Curtain shield airbag sensor assembly LH
A19–21 (*1)	ESL	Side airbag sensor assembly LH
A19–22 (*1)	ESCL	Curtain shield airbag sensor assembly LH
A20–1	P2+	Front passenger airbag assembly (P squib (Dual stage – 2nd step))
A20–2	P2–	Front passenger airbag assembly (P squib (Dual stage – 2nd step))
A20–3	P–	Front passenger airbag assembly (P squib)
A20–4	P+	Front passenger airbag assembly (P squib)
A20–5	D+	Steering wheel pad (D squib)
A20–6	D–	Steering wheel pad (D squib)
A20–7	D2–	Steering wheel pad (D squib (Dual stage – 2nd step))
A20–8	D2+	Steering wheel pad (D squib (Dual stage – 2nd step))
A20–13	PBEW	Integration control and panel (Seat belt warning light)
A20–14	LA	Combination meter (SRS warning light)
A20–15	TC	DLC3

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A20–16	SIL	DLC3
A20–17	P–AB	Integration control and panel (Passenger airbag ON/OFF indicator)
A20–18	GSW	Body ECU
A20–19 (*1)	RMSW	RSCA cutoff switch
A20–20 (*1)	RMIL	Combination meter (RSCA OFF indicator)
A20–21	IG2	IGN1 Fuse (Power source)
A20–22	GSW2	ECM
A20–23	PAON	Integration control and panel (Passenger airbag ON/OFF indicator)
A20–25	E1	Ground
A20–26	E2	Ground
A20–27	–SR	Front airbag sensor RH
A20–28	–SL	Front airbag sensor LH
A20–29	+SR	Front airbag sensor RH
A20–30	+SL	Front airbag sensor LH
A21–3	PR–	Front seat outer belt RH (P/T squib RH)
A21–4	PR+	Front seat outer belt RH (P/T squib RH)
A21–5 (*1)	ICR+	Curtain shield airbag assembly RH (Curtain shield airbag RH squib)
A21–6 (*1)	ICR–	Curtain shield airbag assembly RH (Curtain shield airbag RH squib)
A21–7 (*1)	SFR–	Side airbag assembly RH (Side squib RH)
A21–8 (*1)	SFR+	Side airbag assembly RH (Side squib RH)
A21–16	FSR+	Occupant classification ECU
A21–19 (*1)	ESCR	Curtain shield airbag sensor assembly RH
A21–20 (*1)	ESR	Side airbag sensor assembly RH
A21–21 (*1)	VUCR	Curtain shield airbag sensor assembly RH
A21–22 (*1)	VUPR	Side airbag sensor assembly RH
A21–24	FSR–	Occupant classification ECU

*1: w/ Side and curtain shield airbag

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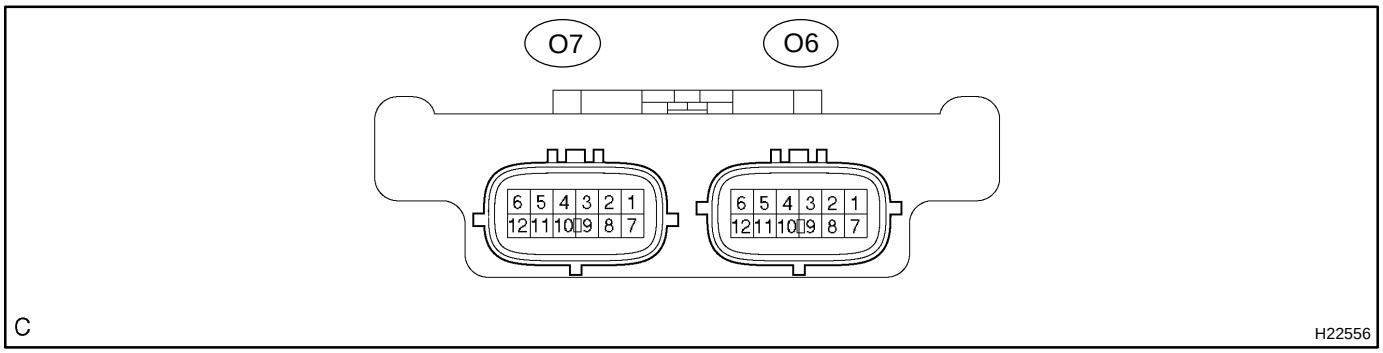
2. OCCUPANT CLASSIFICATION ECU



Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
O6–1 (+B) – O6–3 (GND)	W–R – W–B	Battery	Ignition switch ON	10 to 14 V
O6–2 (DIA) – O6–3 (GND)	G–R – W–B	Diagnosis (DLC3)	Ignition switch ON	Pulse generation
O6–3 (GND) – Body ground	W–B – Body ground	Ground	Always	Below 1 V
O6–4 (FSR–) – O6–3 (GND)	B – W–B	Airbag sensor assy center communication line (–)	Always	Below 1 V
O6–5 (BGND) – O6–3 (GND)	L – W–B	Passenger side buckle switch ground line	Always	Below 1 V
O6–7 (IG) – O6–3 (GND)	B–O – W–B	Power source (IGN1 Fuse)	Ignition switch ON	10 to 14 V
O6–8 (FSR+) – O6–4 (FSR–)	W – B	Airbag sensor assy center communication line	Ignition switch ON	Pulse generation
O6–9 (BSW) – O6–5 (BGND)	R – L	Passenger side buckle switch line	Always	Pulse generation
O7–1 (SGD1) – O6–3 (GND)	O – W–B	Occupant classification sensor front LH ground line	Always	Below 1 V
O7–2 (SGD2) – O6–3 (GND)	B–Y – W–B	Occupant classification sensor front RH ground line	Always	Below 1 V
O7–3 (SGD3) – O6–3 (GND)	R–B – W–B	Occupant classification sensor rear LH ground line	Always	Below 1 V
O7–4 (SGD4) – O6–3 (GND)	R–W – W–B	Occupant classification sensor rear RH ground line	Always	Below 1 V
O7–5 (SVC3) – O7–3 (SGD3)	Y–B – R–B	Occupant classification sensor rear LH power supply line	Ignition switch ON, a load is applied to occupant classification sensor rear LH	4.5 to 5.1 V
O7–6 (SVC4) – O7–4 (SGD4)	Y – R–W	Occupant classification sensor rear RH power supply line	Ignition switch ON, a load is applied to occupant classification sensor rear RH	4.5 to 5.1 V
O7–7 (SIG1) – O7–1 (SGD1)	G – O	Occupant classification sensor front LH signal line	Ignition switch ON, a load is applied to occupant classification sensor front LH	0.2 to 4.9 V
O7–8 (SIG2) – O7–2 (SGD2)	LG – B–Y	Occupant classification sensor front RH signal line	Ignition switch ON, a load is applied to occupant classification sensor front RH	0.2 to 4.9 V
O7–9 (SIG3) – O7–3 (SGD3)	G–B – R–B	Occupant classification sensor rear LH signal line	Ignition switch ON, a load is applied to occupant classification sensor rear LH	0.2 to 4.9 V
O7–10 (SIG4) – O7–4 (SGD4)	L–W – R–W	Occupant classification sensor rear RH signal line	Ignition switch ON, a load is applied to occupant classification sensor rear RH	0.2 to 4.9 V

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O7–11 (SVC1) – O7–1 (SGD1)	V – O	Occupant classification sensor front LH power supply line	Ignition switch ON, a load is applied to occupant classification sensor front LH	4.5 to 5.1 V
O7–12 (SVC2) – O7–2 (SGD2)	P – B–Y	Occupant classification sensor front RH power supply line	Ignition switch ON, a load is applied to occupant classification sensor front RH	4.5 to 5.1 V

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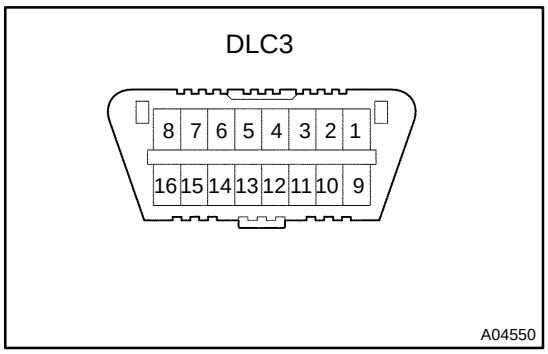

DIAGNOSIS SYSTEM

1. CHECK DLC3

The vehicle's ECM uses ISO 14230 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 14230 format.

Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus ≧ Line/Pulse generation	During Transmission
4	Chassis Ground ↔ Body Ground/Below 1 Ω	Always
16	Battery Positive ↔ Body Ground/10 to 14 V	Always

HINT:

If the display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the OBD II scan tool or hand–held tester to the DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

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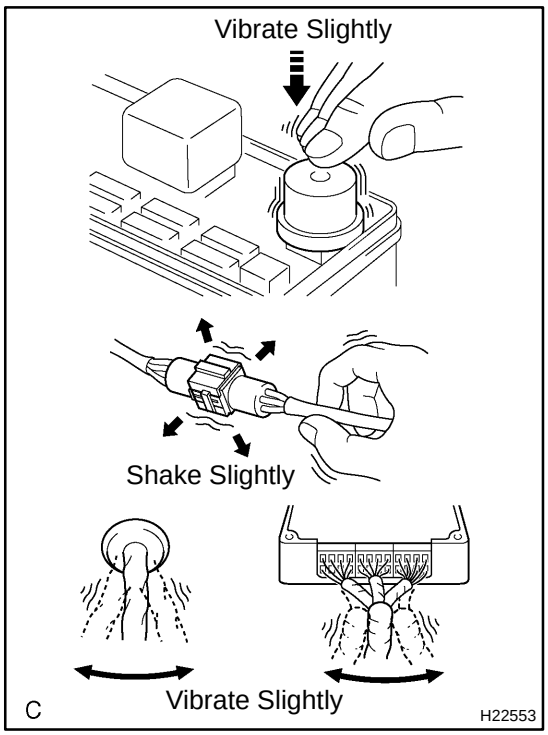

2. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be simulated. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.

(a) Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is turned to the ON position).

(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

HINT:

Shaking the relays too strongly may result in open relays.

(2) Slightly shake the connector vertically and horizontally.

(3) Slightly shake the wire harness vertically and horizontally.

The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

(b) Simulation method for DTC B1794: Turn the ignition switch from the LOCK to ON, hold for 10 seconds, and back to LOCK again 50 times in a row.

HINT:

DTC B1794 is output if the occupant classification ECU receives the ignition switch LOCK–ON–LOCK signal 50 times in a row when a malfunction occurs in the power circuit for the occupant classification system.

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3. FUNCTION OF SRS WARNING LIGHT

(a) Primary check.

Turn the ignition switch to the LOCK position. Wait for at least 2 seconds, then turn the ignition switch to the ON position. The SRS warning light comes on for approximately 6 seconds and the SRS airbag system diagnosis (including the seat belt pretensioner and occupant classification system) is performed.

HINT:

If trouble is detected during the primary check, the SRS warning light remains on even after the primary check period (for approximately 6 seconds) has elapsed.

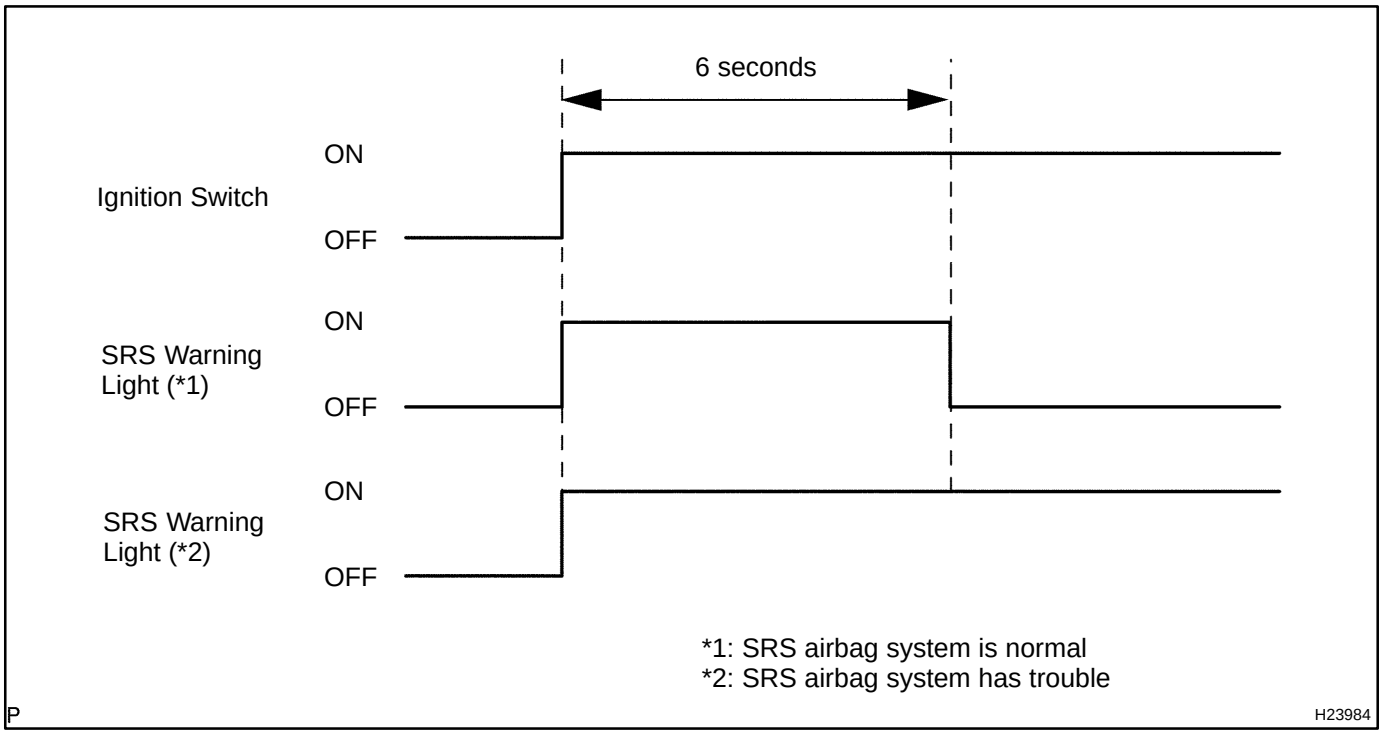
(b) Constant check.

After the primary check, the airbag sensor assembly constantly monitors the SRS airbag system for trouble.

HINT:

If trouble is detected during the constant check, the airbag sensor assembly functions as follows:

- The SRS warning light comes on.
- The SRS warning light goes off, and then comes on. This blinking pattern indicates the source voltage drop. The SRS warning light goes off 10 seconds after the source voltage returns to normal.



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(c) Review.

(1) When the SRS airbag system is normal:
The SRS warning light comes on only during the primary check period (for approximately 6 seconds after the ignition switch is turned to the ON position).

(2) When the SRS airbag system has trouble:
- ▶ The SRS warning light remains on even after the primary check period has elapsed.
- ▶ The SRS warning light goes off after the primary check, but comes on again during the constant check.
- ▶ The SRS warning light does not come on when turning the ignition switch from the LOCK to ON position.

HINT:
The airbag sensor assembly keeps the SRS warning light on if the airbag has been deployed.

4. FUNCTION OF PASSENGER AIRBAG ON/OFF INDICATOR

The passenger airbag ON/OFF indicator function as follows:

(1) Turn the ignition switch to the ON position.

(2) The passenger airbag ON/OFF indicator (”ON” and ”OFF”) comes on for approximately 4 seconds, then goes off for approximately 2 seconds.

(3) Approximately 6 seconds after the ignition switch is turned to the ON position, the passenger airbag ON/OFF indicator will be ON/OFF depending on the conditions listed below.

HINT:
If the front passenger seat condition and the indication by the passenger airbag ON/OFF indicator differ from those shown in the table below, and the SRS warning light is off, then the DTC is not output. If this occurs, perform troubleshooting of ”Trouble in indication of Passenger airbag ON/OFF indicator” (see page DI–1485).

Condition	”ON” indicator	”OFF” indicator
Vacant	OFF	OFF
Adult is seated.	ON	OFF
Child is seated.	OFF	ON
Child restraint system (CRS) is set.	OFF	ON
Occupant classification system failure	OFF	ON

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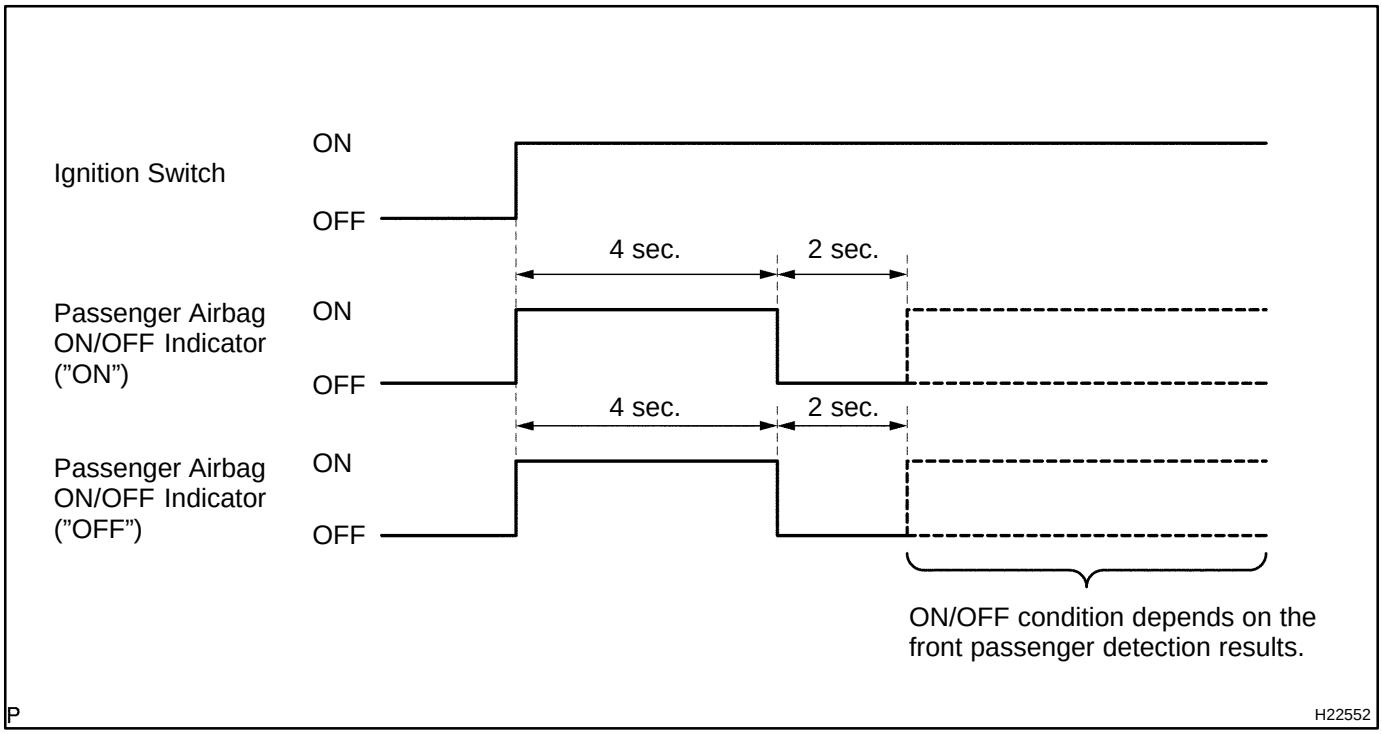
HINT:

- The passenger airbag ON/OFF indicator comes on or goes off based on the timing chart below in order to check the indicator light circuit.
- When the occupant classification system has trouble, both the SRS warning light and the passenger airbag ON/OFF indicator (”OFF”) comes on. In this case, check the DTCs in the supplemental restraint system first. Then troubleshoot the occupant classification system if DTC B1650/32 is indicated, and troubleshoot the passenger airbag ON/OFF indicator if DTC B1660/43 is detected.



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5. FUNCTION RSCA OFF INDICATOR

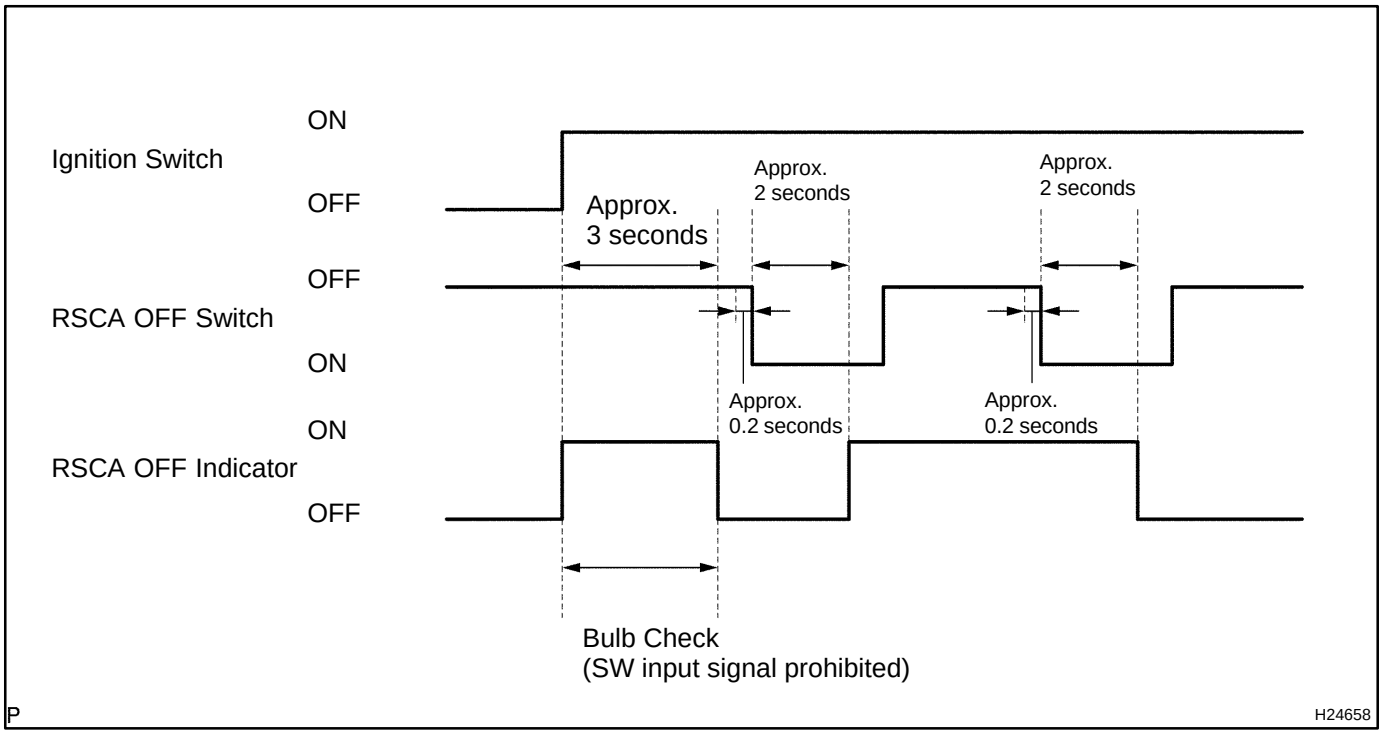
(a) The RSCA OFF indicator comes on for approximately 3 seconds after the ignition switch is turned ON, then goes off.

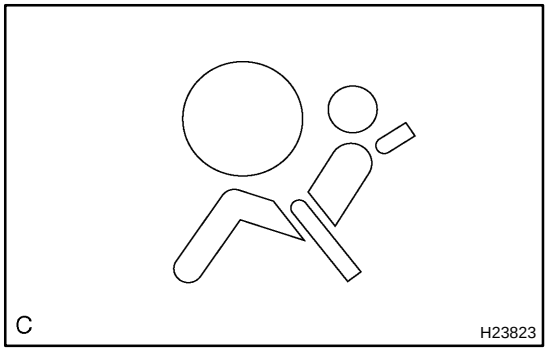
(b) Approximately 3 seconds after the turning the ignition switch ON, the RSCA OFF indicator comes on or goes off every time it detects OFF (press the switch for approximately 0.2 seconds) or ON (press the switch for approximately 2 seconds).

HINT:

The RSCA OFF switch is reset by turning the ignition switch to the LOCK position.

As a result, the RSCA OFF switch and RSCA OFF indicator are off when the ignition switch is turned to the ON position.





6. CHECK SRS WARNING LIGHT

(a) Turn the ignition switch to the ON position, and check that the SRS warning light comes on for approximately 6 seconds (primary check).

(b) Check that the SRS warning light goes off approximately 6 seconds after the ignition switch is turned to the ON position (constant check).

HINT:

When any of the following symptoms occur, refer to the "Problem Symptoms Table" (see page DI–1132).

- The ignition switch is turned from the LOCK to ON position, but the SRS warning light does not come on.
- The SRS warning light comes on occasionally after the primary check period has elapsed.
- The SRS warning light comes on, but DTC is not output.

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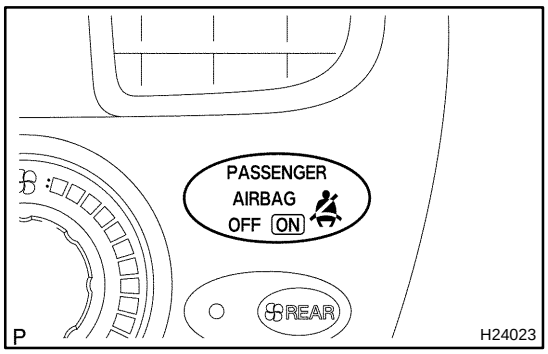


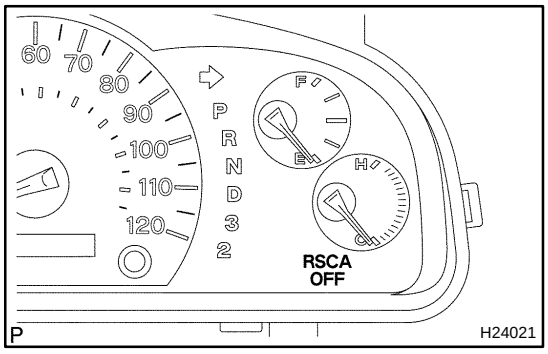
7. CHECK PASSENGER AIRBAG ON/OFF INDICATOR

(a) Turn the ignition switch to the ON position.

(b) Check that the passenger airbag ON/OFF indicator (”ON” and ”OFF”) comes on for approximately 4 seconds, then goes off for approximately 2 seconds.

HINT:

Refer to the table in step 4 regarding the passenger airbag ON/OFF indicator when the ignition switch is turned to the ON position and approximately 6 seconds pass.



8. CHECK RSCA OFF INDICATOR

(a) Check that the RSCA OFF indicator is off when turning the ignition switch to the ON position.

(b) Check that the RSCA OFF indicator comes on when turning the RSCA OFF switch on (press the switch for approximately 2 seconds) with the ignition switch on.

(c) Turn the ignition switch to the LOCK position with the RSCA OFF indicator is on, and then turn the ignition switch to the ON position. Check that the RSCA OFF indicator is off.

9. RELEASE METHOD OF ACTIVATION PREVENTION MECHANISM

The activation prevention mechanism is built into the connector for the squib circuit of the SRS.

As explained in the troubleshooting section, insert a piece of paper that is the same thickness as the male terminal between the terminal and the short spring to release it (Refer to the illustrations on the next 3 pages).

CAUTION:

Never release the activation prevention mechanism on the squib connector even when inspecting with the squib disconnected.

NOTICE:

- **Do not release the activation prevention mechanism unless specially directed by the troubleshooting procedure.**
- **To prevent the terminal and the short spring from being damaged, always use a piece of paper that is the same thickness as the male terminal.**

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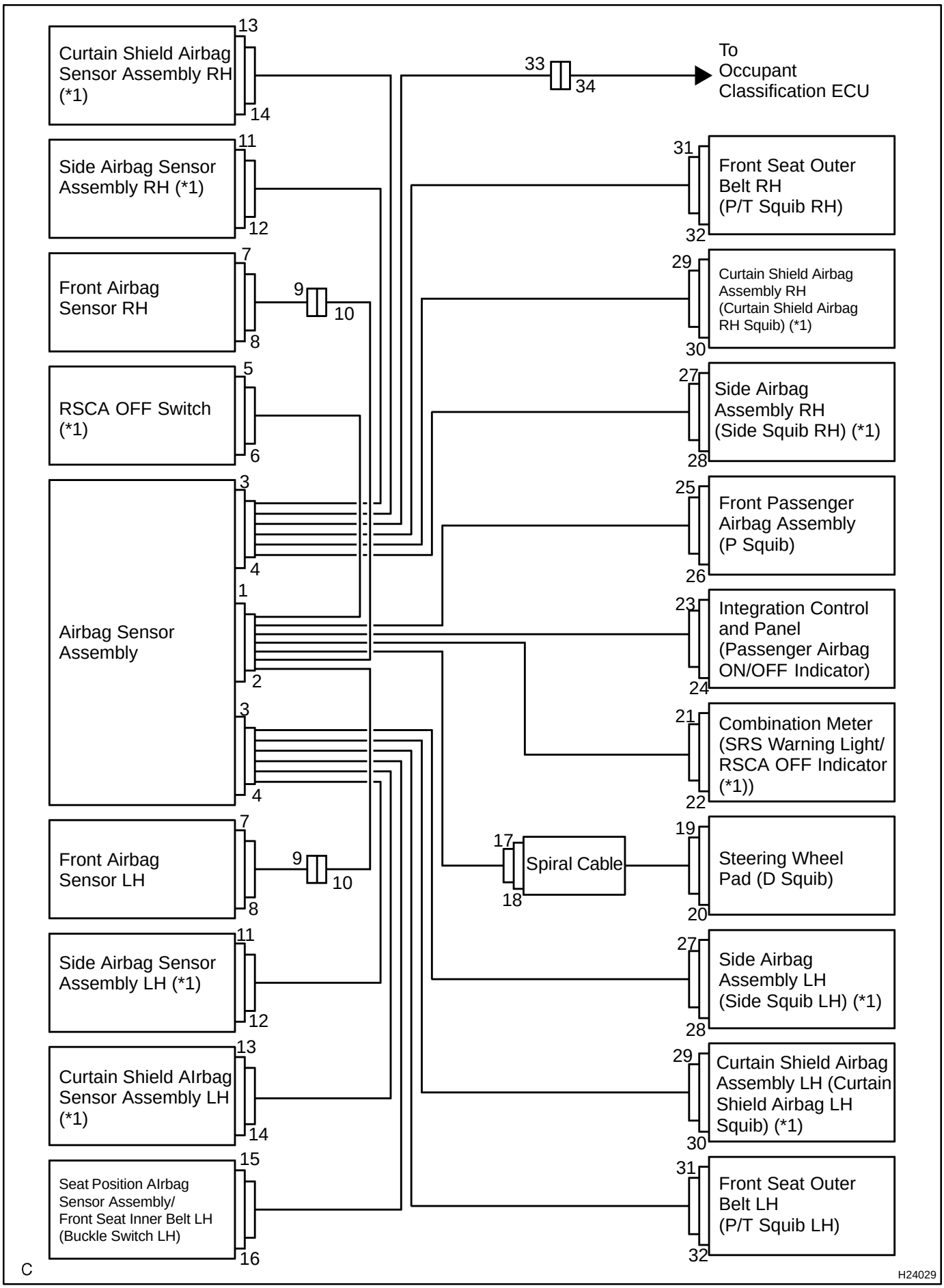
Curtain Shield Airbag Sensor Assembly RH (*1)
13
14
Side Airbag Sensor Assembly RH (*1)
11
12
Front Airbag Sensor RH
7
8
9
10
RSCA OFF Switch (*1)
5
6
Airbag Sensor Assembly
3
4
1
2
3
4
Front Airbag Sensor LH
7
8
9
10
Side Airbag Sensor Assembly LH (*1)
11
12
Curtain Shield AIrbag Sensor Assembly LH (*1)
13
14
Seat Position AIrbag Sensor Assembly/ Front Seat Inner Belt LH (Buckle Switch LH)
15
16
33
34
To Occupant Classification ECU
17
18
Spiral Cable
Front Seat Outer Belt RH (P/T Squib RH)
31
32
Curtain Shield Airbag Assembly RH (Curtain Shield Airbag RH Squib) (*1)
29
30
Side Airbag Assembly RH (Side Squib RH) (*1)
27
28
Front Passenger Airbag Assembly (P Squib)
25
26
Integration Control and Panel (Passenger Airbag ON/OFF Indicator)
23
24
Combination Meter (SRS Warning Light/ RSCA OFF Indicator (*1))
21
22
Steering Wheel Pad (D Squib)
19
20
Side Airbag Assembly LH (Side Squib LH) (*1)
27
28
Curtain Shield Airbag Assembly LH (Curtain Shield Airbag LH Squib) (*1)
29
30
Front Seat Outer Belt LH (P/T Squib LH)
31
32
C
H24029

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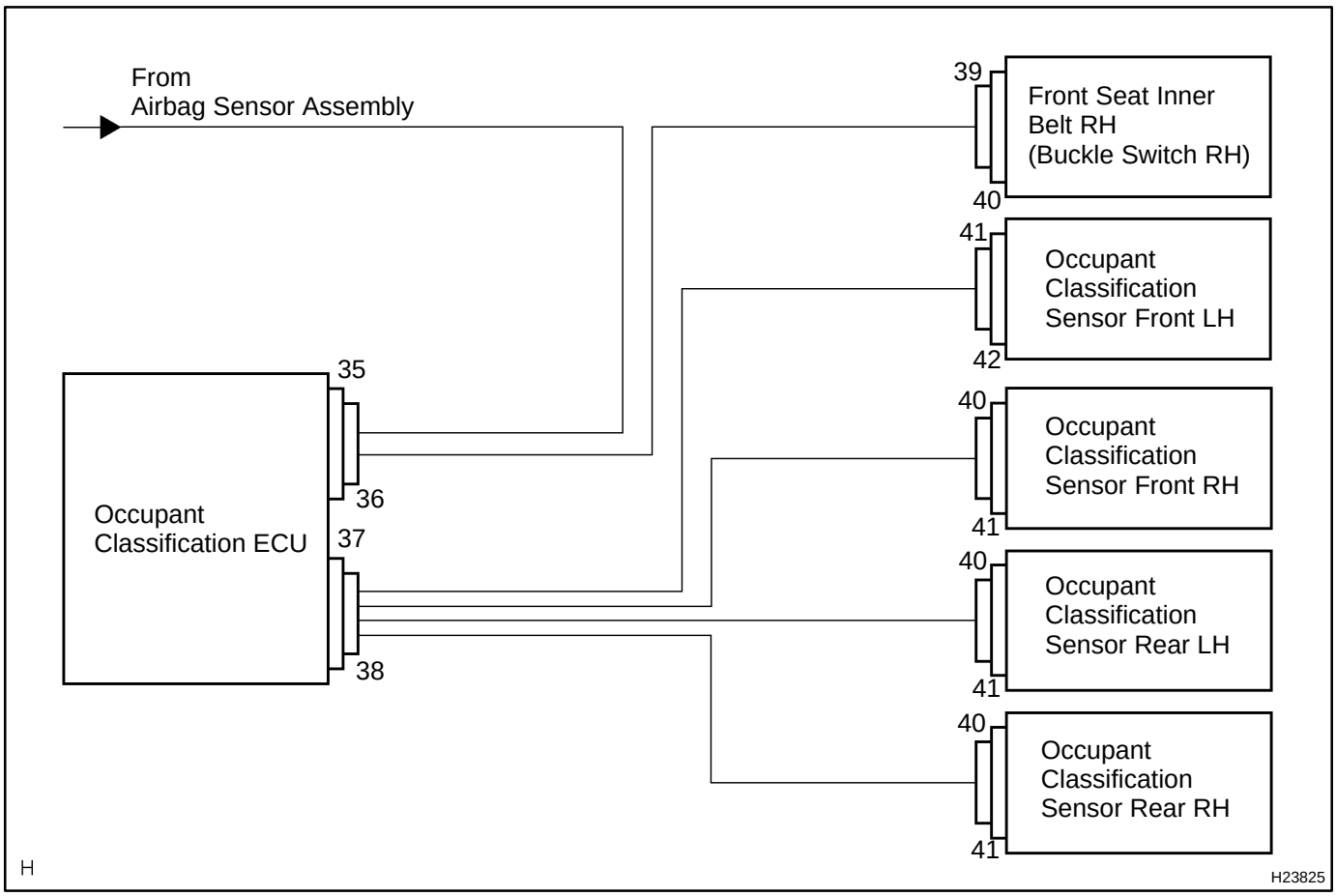
From
Airbag Sensor Assembly
Occupant
Classification ECU
35
36
37
38
39
40
Front Seat Inner
Belt RH
(Buckle Switch RH)
41
42
Occupant
Classification
Sensor Front LH
40
41
Occupant
Classification
Sensor Front RH
40
41
Occupant
Classification
Sensor Rear LH
40
41
Occupant
Classification
Sensor Rear RH
H
H23825

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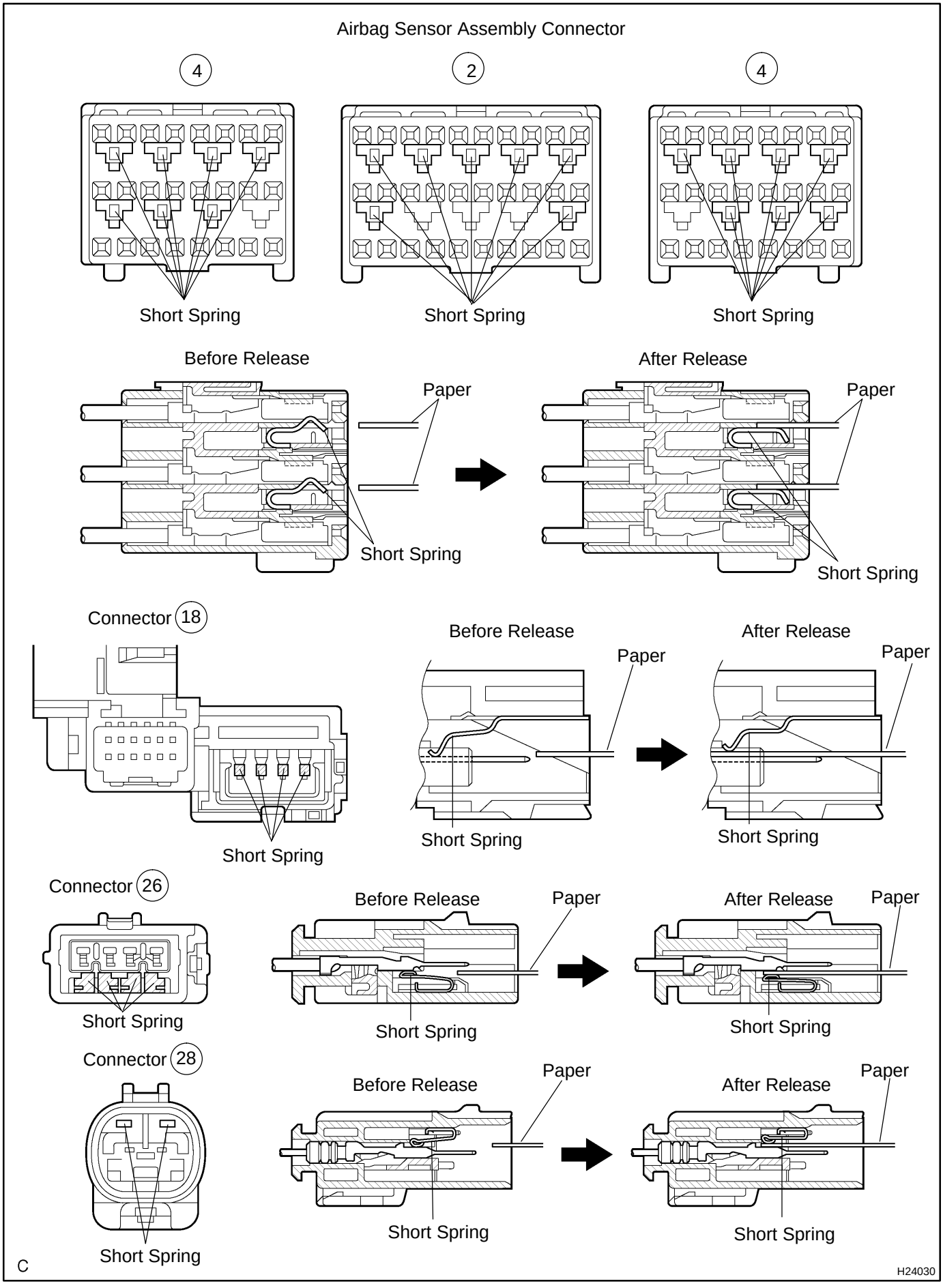
Airbag Sensor Assembly Connector
4
2
4
Short Spring
Short Spring
Short Spring
Before Release
After Release
Paper
Paper
Short Spring
Short Spring
Connector 18
Before Release
After Release
Paper
Paper
Short Spring
Short Spring
Short Spring
Connector 26
Before Release
After Release
Paper
Paper
Short Spring
Short Spring
Short Spring
Connector 28
Before Release
After Release
Paper
Paper
Short Spring
Short Spring
Short Spring
C
H24030

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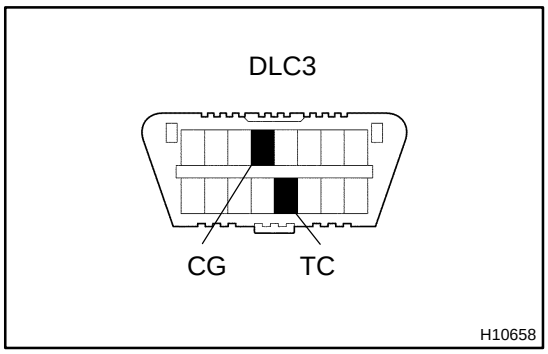
DIDGN–01

DTC CHECK / CLEAR



1. CHECK DTC (Using SST check wire)

(a) Check the DTCs (Present trouble code).

(1) Turn the ignition switch to the ON position, and wait for approximately 60 seconds.

(2) Using SST, connect terminals TC and CG of the DLC3.

SST 09843–18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(b) Check the DTCs (Past trouble code).

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843–18040

NOTICE:

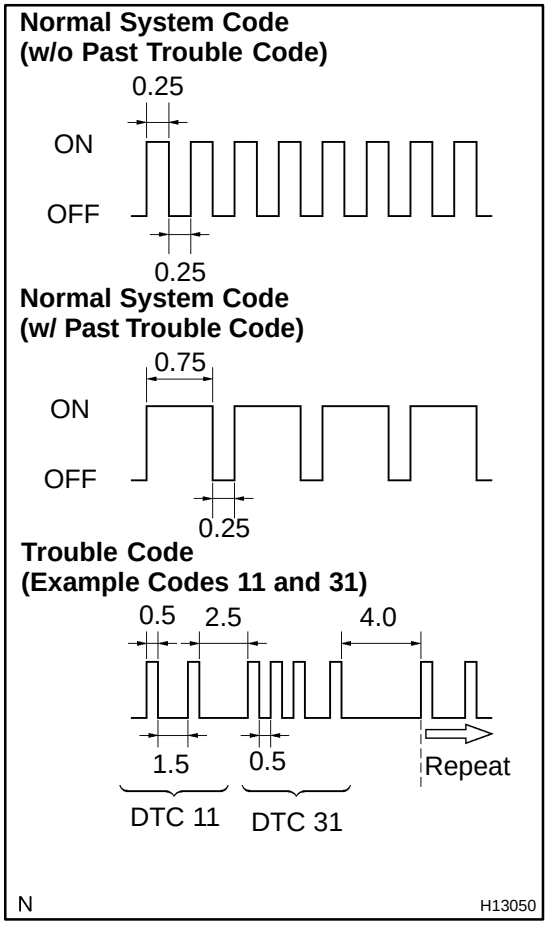
Connect the terminals to the correct positions to avoid a malfunction.

(2) Turn the ignition switch to the ON position, and wait for approximately 60 seconds.

(c) Read the DTCs.

Read the blinking patterns of the DTCs. As examples, the blinking patterns for trouble codes 11 and 31 are shown in the illustration to the left.

- Normal system code (w/o past trouble code)
  The light blinks twice per second.
- Normal system code (w/ past trouble code)
  When the past trouble code is stored in the airbag sensor assy center, the light blinks only once per second.
- Trouble code
  The first blinking indicates the first DTC. The second blinking occurs after a 1.5–second pause.



If there are more than 1 code, there will be a 2.5–second pause between each code. After all codes are shown, there will be a 4.0–second pause, and they all will be repeated.

HINT:

- If 2 or more malfunctions are found, the indication begins with the smallest numbered code.
- If DTCs are indicated without connecting the terminals, proceed to the ”TC terminal circuit” on page DI–1498.

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2. CLEAR DTC (Using SST service wire)

Clear the DTCs.

(1) When the ignition switch is turned off, the DTCs are cleared.

HINT:

Some DTC may not be cleared by turning off the ignition switch. In this case, proceed to the next procedure.

(2) Using SST, connect terminals TC and CG of the DLC3, and then turn the ignition switch to the ON position.

SST 09843–18040

(3) Disconnect terminal TC of the DLC3 within 3 to 10 seconds after the DTCs are output, and check if the SRS warning light comes on after 3 seconds of disconnecting.

(4) Within 2 to 4 seconds after the SRS warning light comes on, connect terminals TC and CG of the DLC3.

(5) The SRS warning light should go off within 2 to 4 seconds after connecting terminals TC and CG of the DLC3. Then, disconnect terminal TC within 2 to 4 seconds after the SRS warning light goes off.

(6) The SRS warning light comes on again within 2 to 4 seconds after disconnecting terminal TC. Then, reconnect terminals TC and CG within 2 to 4 seconds after the SRS warning light comes on.

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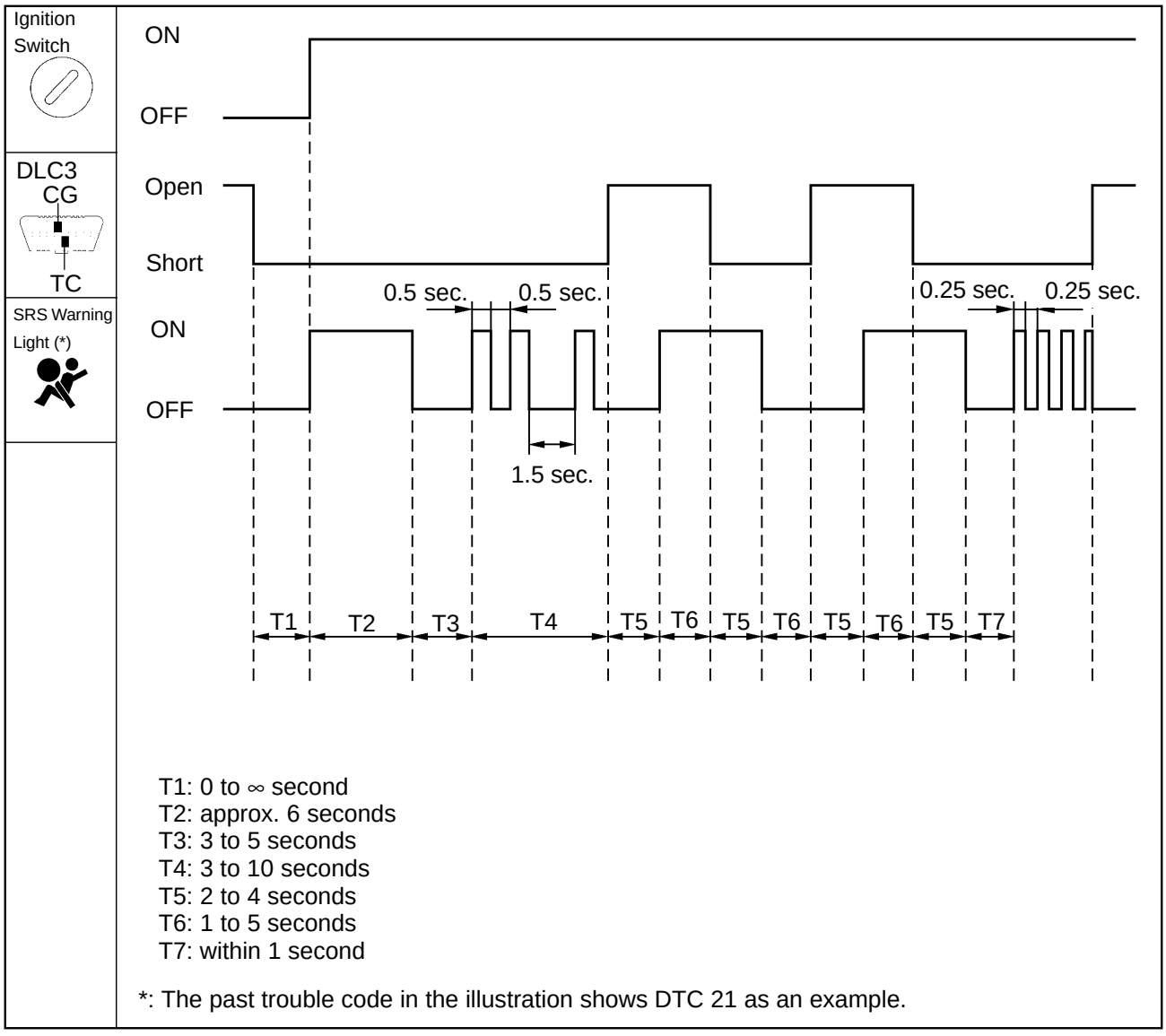
(7) Check if the SRS warning light goes off 2 to 4 seconds after connecting terminals TC and CG of the DLC3. Also check if the normal system code is output within 1 second after the SRS warning light goes off.

If DTCs are not cleared, repeat this procedure until the codes are cleared.



T1: 0 to ∞ second
T2: approx. 6 seconds
T3: 3 to 5 seconds
T4: 3 to 10 seconds
T5: 2 to 4 seconds
T6: 1 to 5 seconds
T7: within 1 second

*: The past trouble code in the illustration shows DTC 21 as an example.

N

H13049

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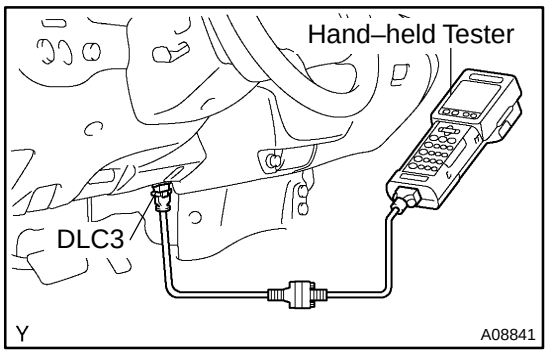

3. CHECK DTC (Using hand–held tester)

HINT:

Refer to the hand–held tester operator's manual for further details.

(a) Check the DTCs.
  (1) Connect the hand–held tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Check the DTCs by following the prompts on the tester screen.

HINT:

When check the DTC of the occupant classification ECU, select the "OCCUPANT DETECT" on the hand–held tester.

(b) Clear the DTCs.
  (1) Connect the hand–held tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Clear the DTCs by following the prompts on the tester screen.

HINT:

When clear the DTC of the occupant classification ECU, select the "OCCUPANT DETECT" on the hand–held tester.

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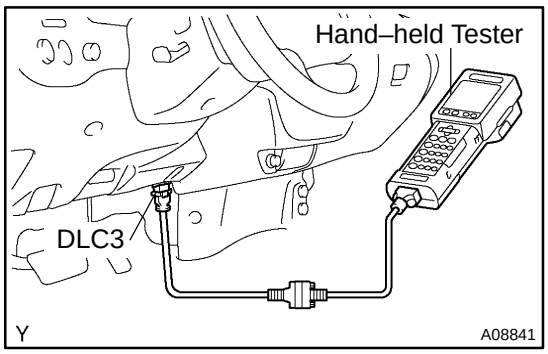
DIDGO–01



CHECK MODE PROCEDURE

Using hand–held tester:

CHECK MODE (SIGNAL CHECK)

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON position.
(c) Select the ”SIGNAL CHECK”, and proceed cheeking with the hand–held tester screen.

HINT:

Hand–held tester only:

Compared to the normal mode, the check mode has an increased sensitivity to detect malfunctions. Furthermore, the same diagnostic items as ones detected in the normal mode can also be detected in the check mode.

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DIDGP–01

DATA LIST / ACTIVE TEST

HINT:

By accessing the DATA LIST displayed by the hand–held tester, you can perform such functions as reading the values of the switches and sensors without removing any parts. Reading the DATA LIST is the first step of troubleshooting and is one method to shorten labor time.

1. DATA LIST FOR AIRBAG SENSOR ASSEMBLY

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Following the display on the tester screen, read the ”DATA LIST”.

Item	Measurement tem/ Range (Display)	Normal Condition	Diagnostic Note
D SEAT POSITION	Seat position (Driver side)/ FORWARD: Seat position is forward BKWARD: Seat position is rearward FAIL: A failure is detected	FORWARD/BKWARD	–
PASSENGER CLASS	Passenger classification/ NG: Data is not determined NONE: Vacant CHILD: Child (less than 36 kg (79.37 lb)) is seated SMALL: Adult (36 to 54 kg (79.37 to 119.05 lb)) is seated REGULAR: Adult (more than 54 kg (119.05 lb)) is seated FAIL: A failure is detected	NG/NONE/CHILD/SMALL/ REGULAR	–
D BUCKLE SW	Buckle switch (Driver side)/ UNSET: The seat belt is not fastened SET: The seat belt is fastened NG: Data is not determined	UNSET/SET	–
P BUCKLE SW	Buckle switch (Passenger side)/ UNSET: The seat belt is not fastened SET: The seat belt is fastened NG: Data is not determined	UNSET/SET	–
DISPLAY TYPE	Display type identification information/ LR: The display is indicated by LH/RH DP: The display is indicated by Driver/Passenger	LR/DP	For this vehicle, the display is displayed by LH/RH.

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2. DATA LIST FOR OCCUPANT CLASSIFICATION ECU

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Following the display on the tester screen, read the ”DATA LIST”.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
IG SW	Ignition switch condition/ ON: Ignition switch ON OFF: Ignition switch OFF	ON/OFF	–
P BUCKLE SW	Buckle switch (Passenger side)/ OFF: Unfasten the passenger side seat belt ON: Fasten the passenger side seat belt NG: Passenger side seat belt has a trouble	OFF/ON	–
PASSENGER CLASS	Passenger classification/ AF05: Adult (36 to 54 kg (79.37 to 119.05 lb)) is seated AM50: Adult (more than 54 kg (119.05 lb)) is seated CHILD: Child (less than 36 kg (79.37 lb) is seated CRS: Child restraint system (less than 7 kg (15.43 lb)) and passenger side buckle switch is ON, then 7 to 36 kg (15.43 to 79.37 lb)) is set OFF: Vacant	AF05/AM50/CHILD/CRS/ OFF	–
SENS RANGE INF	Sensor range information/ OK: The value of a sensor is within the range NG: The value of a sensor is over the range	OK	–
FL SENS RANGE	Front left sensor range information/ OK: Sensor range is –17 to 27 kg (–37.48 to 59.52 lb) Min.: Less than –17 kg (–37.48 lb) Max.: More than 27 kg (59.52 lb)	OK	–
FR SENS RANGE	Front right sensor range information/ OK: Sensor range is –17 to 27 kg (–37.48 to 59.52 lb) Min.: Less than –17 kg (–37.48 lb) Max.: More than 27 kg (59.52 lb)	OK	–

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RL SENS RANGE	Rear left sensor range information/ OK: Sensor range is –17 to 37 kg (–37.48 to 81.57 lb) Min.: Less than –17 kg (–37.48 lb) Max.: More than 37 kg (81.57 lb)	OK	–
RR SENS RANGE	Rear right sensor range information/ OK: Sensor range is –17 to 37 kg (–37.48 to 81.57 lb) Min.: Less than –17 kg (–37.48 lb) Max.: More than 37 kg (81.57 lb)	OK	–
FL SENS VOL	Front left sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	–
FR SENS VOL	Front right sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	–
RL SENS VOL	Rear left sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	–
RR SENS VOL	Rear right sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	–
FL SENS WEIGHT	Front left sensor weight information/ Min.: –17 kg (–37.48 lb) Max.: 27 kg (59.52 lb)	–17 to 27 kg (–37.48 to 59.52 lb)	–
FR SENS WEIGHT	Front right sensor weight information/ Min.: –17 kg (–37.48 lb) Max.: 27 kg (59.52 lb)	–17 to 27 kg (–37.48 to 59.52 lb)	–
RL SENS WEIGHT	Rear left sensor weight information/ Min.: –17 kg (–37.48 lb) Max.: 37 kg (81.57 lb)	–17 to 37 kg (–37.48 to 81.57 lb)	–
RR SENS WEIGHT	Rear right sensor weight information/ Min.: –17 kg (–37.48 lb) Max.: 37 kg (81.57 lb)	–17 to 37 kg (–37.48 to 81.57 lb)	–
TOTAL WEIGHT	Total weight information/ Min.: –40 kg (–88.18 lb) Max.: 100 kg (220.46 lb)	–68 to 128 kg (–149.91 to 282.19 lb)	–
#PRESENT CODES	Number of DTC/ Min.: 0, Max.: 255	0	–
#PAST CODES	Number of Past DTC/ Min.: 0, Max.: 255	0	–

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DIDGQ–01

DIAGNOSTIC TROUBLE CODE CHART

1. DTCS FOR SUPPLEMENTAL RESTRAINT SYSTEM

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (Proceed to the page listed for that circuit).

HINT:

- When the SRS warning light remains on and the DTC output is the normal system code, a voltage source drop is likely to occur. This malfunction is not stored in the memory by the airbag sensor assembly. If the power source voltage returns to normal, the SRS warning light will automatically go off.
- When 2 or more codes are indicated, the code with the lower number appears first.
- If a code is not listed on the display chart, the airbag sensor assembly may have failed.
- In the case of any malfunction concerning an open circuit, short to ground, or short to B+ due to a squib, other malfunction codes may not be detected. In this case, repair the malfunction currently indicated and then perform malfunction diagnosis again.
- Mark in the check mode column:
  "◀": DTC is corresponding to the check mode.
  "—": DTC is not corresponding to the check mode.
- When the DTC B1650/32 is detected as a result of troubleshooting for the Supplemental Restraint System, perform troubleshooting for the occupant classification system as shown in the chart below.

DTC No. (See Page)	Detection Item	Trouble Area	Check Mode	SRS Warning Light
B1000/31 (DI–1161)	▶Airbag sensor assembly malfunction	▶Airbag sensor assembly	◀	ON
B1610/13 (DI–1162)	▶Front airbag sensor RH malfunction	▶Front airbag sensor RH ▶Airbag sensor assembly ▶Cowl wire ▶Engine room main wire	◀	ON
B1615/14 (DI–1171)	▶Front airbag sensor LH malfunction	▶Front airbag sensor LH ▶Airbag sensor assembly ▶Cowl wire ▶Engine room main wire	◀	ON
B1620/21 (*1) (DI–1180)	▶Side airbag sensor assembly RH malfunction	▶Side airbag sensor assembly RH ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1625/22 (*1) (DI–1186)	▶Side airbag sensor assembly LH malfunction	▶Side airbag sensor assembly LH ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1630/23 (*1) (DI–1192)	▶Curtain shield airbag sensor RH malfunction	▶Curtain shield airbag sensor assembly RH ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1635/24 (*1) (DI–1198)	▶Curtain shield airbag sensor LH malfunction	▶Curtain shield airbag sensor assembly LH ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1650/32 (DI–1204)	▶Occupant classification system malfunction	▶Occupant classification system ▶Airbag sensor assembly ▶Floor wire ▶Seat wire No. 1	◀	ON
B1653/35 (DI–1213)	▶Seat position sensor assembly malfunction	▶Seat position airbag sensor assembly ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON

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B1656/38 (DI–1220)	▶Seat belt buckle switch LH malfunction	▶Front seat inner belt LH ▶Airbag sensor assembly ▶Floor wire No. 2	⍰	ON
B1660/43 (DI–1227)	▶Passenger airbag ON/OFF indicator malfunction	▶Integration control and panel (Passenger airbag ON/OFF indicator) ▶Airbag sensor assembly ▶Cowl wire	⍰	ON
B1661/44 (*1) (DI–1238)	▶Roll over cut off indicator malfunction	▶Combination meter (RSCA OFF indicator) ▶Airbag sensor assembly ▶Cowl wire	⍰	ON
B1662/45 (DI–1247)	▶SRS warning light circuit malfunction	▶Combination meter (SRS warning light) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1800/51 (DI–1352)	▶Short in D squib circuit	▶Steering wheel pad (D squib) ▶Spiral cable ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1801/51 (DI–1352)	▶Open in D squib circuit	▶Steering wheel pad (D squib) ▶Spiral cable ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1802/51 (DI–1352)	▶Short in D squib circuit (to ground)	▶Steering wheel pad (D squib) ▶Spiral cable ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1803/51 (DI–1352)	▶Short in D squib circuit (to B+)	▶Steering wheel pad (D squib) ▶Spiral cable ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1805/52 (DI–1374)	▶Short in P squib circuit	▶Front passenger airbag assembly (P squib) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1806/52 (DI–1374)	▶Open in P squib circuit	▶Front passenger airbag assembly (P squib) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1807/52 (DI–1374)	▶Short in P squib circuit (to ground)	▶Front passenger airbag assembly (P squib) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1808/52 (DI–1374)	▶Short in P squib circuit (to B+)	▶Front passenger airbag assembly (P squib) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1810/53 (DI–1384)	▶Short in D squib (Dual stage – 2nd step) circuit	▶Steering wheel pad (D squib, Dual stage – 2nd step) ▶Spiral cable ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1811/53 (DI–1384)	▶Open in D squib (Dual stage – 2nd step) circuit	▶Steering wheel pad (D squib, Dual stage – 2nd step) ▶Spiral cable ▶Airbag sensor assembly ▶Cowl wire	◀	ON

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B1812/53 (DI–1384)	▶Short in D squib (Dual stage – 2nd step) circuit (to ground)	▶Steering wheel pad (D squib, Dual stage – 2nd step) ▶Spiral cable ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1813/53 (DI–1384)	▶Short in D squib (Dual stage – 2nd step) circuit (to B+)	▶Steering wheel pad (D squib, Dual stage – 2nd step) ▶Spiral cable ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1815/54 (DI–1406)	▶Short in P squib (Dual stage – 2nd step) circuit	▶Front passenger airbag assembly (P squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1816/54 (DI–1406)	▶Open in P squib (Dual stage – 2nd step) circuit	▶Front passenger airbag assembly (P squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1817/54 (DI–1406)	▶Short in P squib (Dual stage – 2nd step) circuit (to ground)	▶Front passenger airbag assembly (P squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1818/54 (DI–1406)	▶Short in P squib (Dual stage – 2nd step) circuit (to B+)	▶Front passenger airbag assembly (P squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Cowl wire	◀	ON
B1820/55 (*1) (DI–1416)	▶Short in side squib RH circuit	▶Side airbag assembly RH (Side squib RH) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1821/55 (*1) (DI–1416)	▶Open in side squib RH circuit	▶Side airbag assembly RH (Side squib RH) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1822/55 (*1) (DI–1416)	▶Short in side squib RH circuit (to ground)	▶Side airbag assembly RH (Side squib RH) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1823/55 (*1) (DI–1416)	▶Short in side squib RH circuit (to B+)	▶Side airbag assembly RH (Side squib RH) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1825/56 (*1) (DI–1426)	▶Short in side squib LH circuit	▶Side airbag assembly LH (Side squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1826/56 (*1) (DI–1426)	▶Open in side squib LH circuit	▶Side airbag assembly LH (Side squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1827/56 (*1) (DI–1426)	▶Short in side squib LH circuit (to ground)	▶Side airbag assembly LH (Side squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1828/56 (*1) (DI–1426)	▶Short in side squib LH circuit (to B+)	▶Side airbag assembly LH (Side squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1830/57 (*1) (DI–1436)	▶Short in curtain shield airbag RH squib circuit	▶Curtain shield airbag assembly RH (Curtain shield airbag RH squib) ▶Airbag sensor assembly ▶Floor wire	◀	ON

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B1831/57 (*1) (DI–1436)	▶Open in curtain shield airbag RH squib circuit	▶Curtain shield airbag assembly RH (Curtain shield airbag RH squib) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1832/57 (*1) (DI–1436)	▶Short in curtain shield airbag RH squib circuit (to ground)	▶Curtain shield airbag assembly RH (Curtain shield airbag RH squib) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1833/57 (*1) (DI–1436)	▶Short in curtain shield airbag RH squib circuit (to B+)	▶Curtain shield airbag assembly RH (Curtain shield airbag RH squib) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1835/58 (*1) (DI–1447)	▶Short in curtain shield airbag LH squib circuit	▶Curtain shield airbag assembly LH (Curtain shield airbag LH squib) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1836/58 (*1) (DI–1447)	▶Open in curtain shield airbag LH squib circuit	▶Curtain shield airbag assembly LH (Curtain shield airbag LH squib) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1837/58 (*1) (DI–1447)	▶Short in curtain shield airbag LH squib circuit (to ground)	▶Curtain shield airbag assembly LH (Curtain shield airbag LH squib) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1838/58 (*1) (DI–1447)	▶Short in curtain shield airbag LH squib circuit (to B+)	▶Curtain shield airbag assembly LH (Curtain shield airbag LH squib) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1900/73 (DI–1458)	▶Short in P/T squib RH circuit	▶Front seat outer belt RH (P/T squib RH) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1901/73 (DI–1458)	▶Open in P/T squib RH circuit	▶Front seat outer belt RH (P/T squib RH) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1902/73 (DI–1458)	▶Short in P/T squib RH circuit (to ground)	▶Front seat outer belt RH (P/T squib RH) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1903/73 (DI–1458)	▶Short in P/T squib RH circuit (to B+)	▶Front seat outer belt RH (P/T squib RH) ▶Airbag sensor assembly ▶Floor wire	◀	ON
B1905/74 (DI–1469)	▶Short in P/T squib LH circuit	▶Front seat outer belt LH (P/T squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1906/74 (DI–1469)	▶Open in P/T squib LH circuit	▶Front seat outer belt LH (P/T squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1907/74 (DI–1469)	▶Short in P/T squib LH circuit (to ground)	▶Front seat outer belt LH (P/T squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON
B1908/74 (DI–1469)	▶Short in P/T squib LH circuit (to B+)	▶Front seat outer belt LH (P/T squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2	◀	ON

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Normal (DI–1480)	▶Source voltage drop	▶Battery ▶Airbag sensor assembly	○	ON
Normal	▶System normal	○	○	OFF

*1: w/ Side and curtain shield airbag

2. DTCS FOR OCCUPANT CLASSIFICATION SYSTEM

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (Proceed to the page listed for that circuit).

HINT:

- ▶ When the DTC B1650/32 is detected as a result of troubleshooting for the Supplemental Restraint System, perform troubleshooting for the occupant classification system as shown in the chart below.
- ▶ Use the hand–held tester to check/clear the DTC of the occupant classification ECU, otherwise the DTC cannot be check/clear.

DTC No. (See Page)	Detection Item	Trouble Area	Passenger Airbag ON/OFF Indicator
B1771 (DI–1251)	▶Passenger side buckle switch circuit malfunction	▶Front seat inner belt RH ▶Occupant classification ECU ▶Seat wire No. 1	ON
B1780 (DI–1260)	▶Occupant classification sensor front LH circuit malfunction	▶Front seat assembly RH (Occupant classification sensor front LH) ▶Occupant classification ECU ▶Seat wire No. 1	ON
B1781 (DI–1270)	▶Occupant classification sensor front RH circuit malfunction	▶Front seat assembly RH (Occupant classification sensor front RH) ▶Occupant classification ECU ▶Seat wire No. 1	ON
B1782 (DI–1280)	▶Occupant classification sensor rear LH circuit malfunction	▶Front seat assembly RH (Occupant classification sensor rear LH) ▶Occupant classification ECU ▶Seat wire No. 1	ON
B1783 (DI–1290)	▶Occupant classification sensor rear RH circuit malfunction	▶Front seat assembly RH (Occupant classification sensor rear RH) ▶Occupant classification ECU ▶Seat wire No. 1	ON
B1785 (DI–1300)	▶Occupant classification sensor front LH collision detection	▶Front seat assembly RH (Occupant classification sensor front LH) ▶Occupant classification ECU	ON
B1786 (DI–1305)	▶Occupant classification sensor front RH collision detection	▶Front seat assembly RH (Occupant classification sensor front RH) ▶Occupant classification ECU	ON
B1787 (DI–1310)	▶Occupant classification sensor rear LH collision detection	▶Front seat assembly RH (Occupant classification sensor rear LH) ▶Occupant classification ECU	ON
B1788 (DI–1315)	▶Occupant classification sensor rear RH collision detection	▶Front seat assembly RH (Occupant classification sensor rear RH) ▶Occupant classification ECU	ON
B1790 (DI–1320)	▶Airbag sensor assembly communication circuit malfunction	▶Occupant classification ECU ▶Airbag sensor assembly ▶Floor wire ▶Seat wire No. 1	ON
B1793 (DI–1332)	▶Occupant classification sensor power supply circuit malfunction	▶Occupant classification ECU ▶Front seat assembly RH (Occupant classification sensors) ▶Seat wire No. 1	ON

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B1794 (DI–1342)	▶Occupant classification ECU battery positive line open	▶Battery ▶ECU–B Fuse ▶Floor wire ▶Seat wire No. 1 ▶Occupant classification ECU	ON
B1795 (DI–1348)	▶Occupant classification ECU circuit malfunction	▶Occupant classification ECU ▶Seat wire No. 1 ▶Front seat inner belt RH	ON
B1796 (DI–1350)	▶Sleep operation failure of occupant classification ECU	▶Occupant classification ECU	ON

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DIDGR–01

CIRCUIT INSPECTION

DTC	B1000/31	Airbag Sensor Assembly Malfunction

CIRCUIT DESCRIPTION

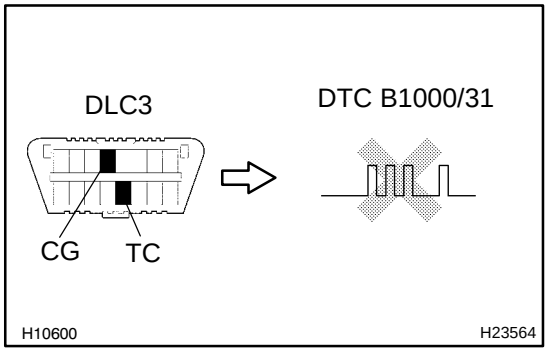
The airbag sensor assembly consists of the airbag sensor, the safing sensor, the drive circuit, the diagnostic circuit, ignition control, etc.
If the airbag sensor assembly receives signals from the airbag sensor, it determines whether or not the SRS should be activated.
DTC B1000/31 is recorded when a malfunction is detected in the airbag sensor assembly.

DTC No.	DTC Detection Condition	Trouble Area
B1000/31	▶Airbag sensor assembly malfunction	▶Airbag sensor assembly

HINT:
When a trouble code is displayed simultaneously with B1000/31, repair the malfunction indicated by this code (except B1000/31) first.

INSPECTION PROCEDURE

1	Check airbag sensor assembly.



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1000/31 is not output.

NG → **Replace airbag sensor assembly (see page RS–84).**

OK →

Using simulation method, reproduce malfunction symptoms (see page IN–24).

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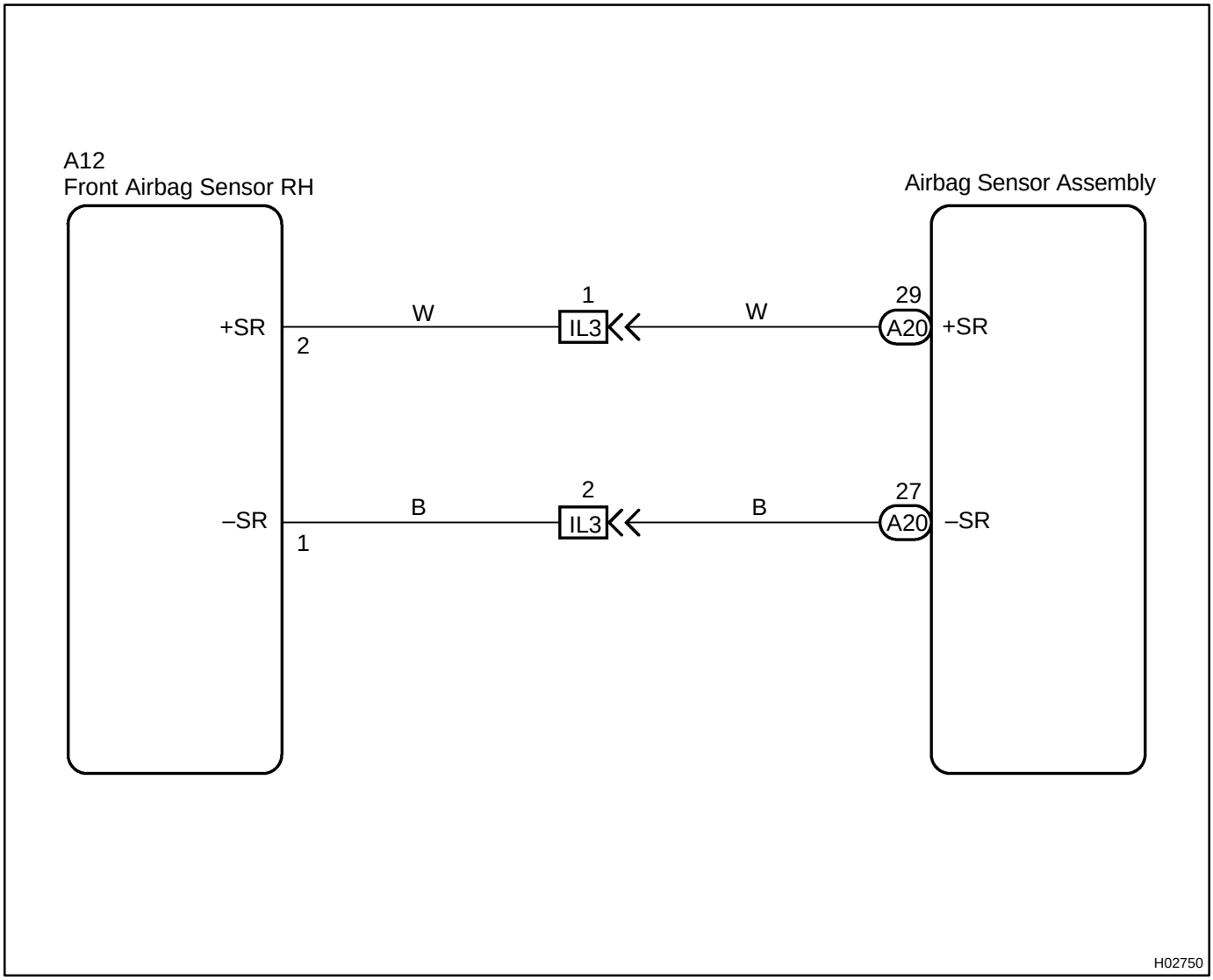
DTC	B1610/13	Front Airbag Sensor RH Malfunction

CIRCUIT DESCRIPTION

The front airbag sensor RH consists of the diagnosis circuit, the frontal deceleration sensor, etc.
If the airbag sensor assembly receives signals from the frontal deceleration sensor, it determines whether or not the SRS should be activated.
DTC B1610/13 is recorded when a malfunction is detected in the front airbag sensor RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1610/13	▶The airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front airbag sensor RH circuit for 2 seconds. ▶Front airbag sensor RH malfunction ▶Airbag sensor assembly malfunction	▶Front airbag sensor RH ▶Airbag sensor assembly ▶Cowl wire ▶Engine room main wire

WIRING DIAGRAM



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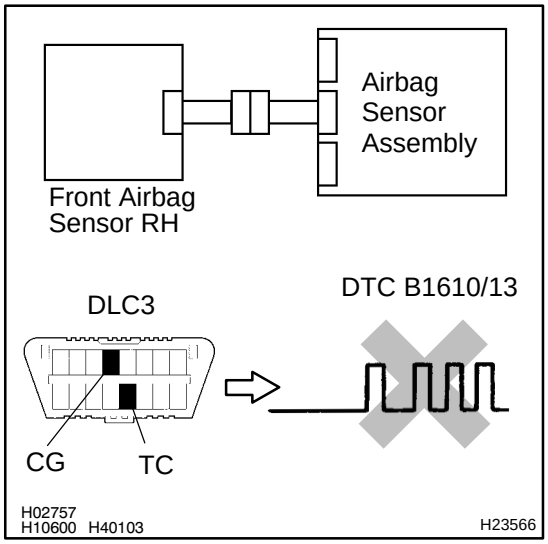
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1610/13 is not output.

HINT:

Codes other than DTC B1610/13 may be output at this time, but they are not related to this check.

NG	**Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the front airbag sensor RH.

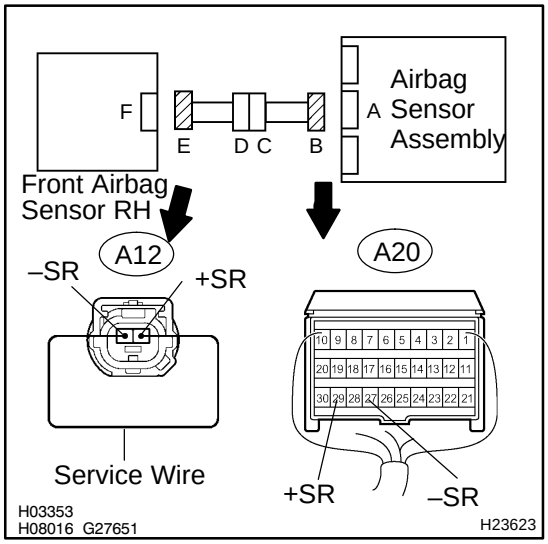
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check front airbag sensor RH circuit (open).



PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly and the front airbag sensor RH.

(b) Using a service wire, connect A12–2 (+SR) and A12–1 (–SR) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–29 (+SR) – A20–27 (–SR)	Always	Below 1 Ω

NG → **Go to step 8.**

OK

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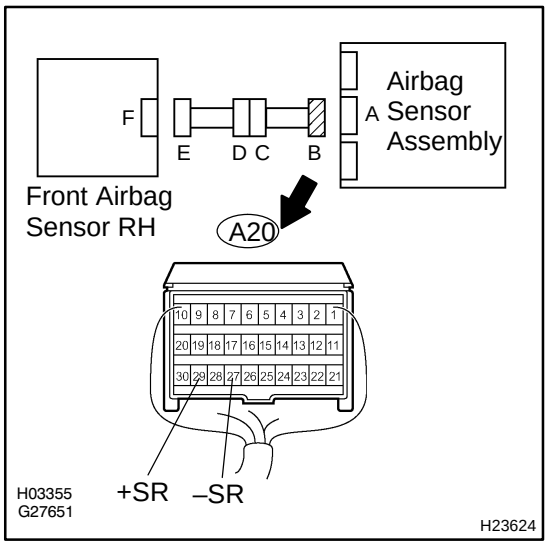
4	Check front airbag sensor RH circuit (short).



PREPARATION:

Disconnect the service wire from connector "E".

CHECK:

Measure the resistance according to the value(s) in the table below.

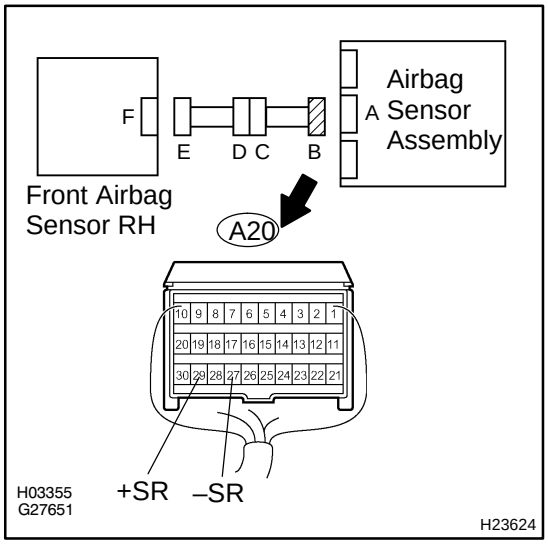
OK:

Tester Connection	Condition	Specified Condition
A20–29 (+SR) – A20–27 (–SR)	Always	1 MΩ or higher

NG → **Go to step 9.**

OK

5	Check front airbag sensor RH circuit (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–29 (+SR) – Body ground	Ignition switch ON	Below 1 V
A20–27 (–SR) – Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 10.**

OK

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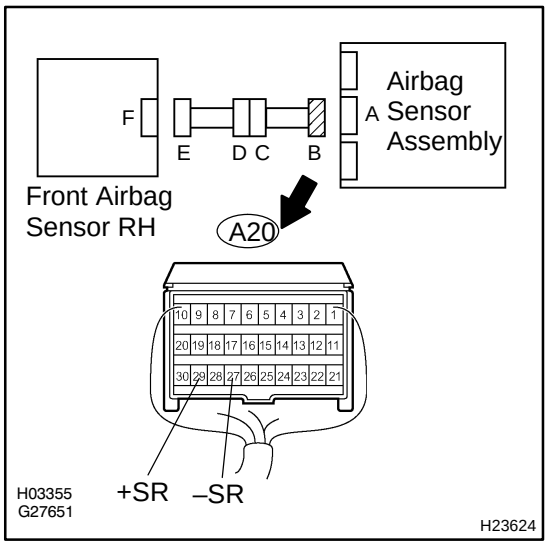
6	Check front airbag sensor RH circuit (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–29 (+SR) – Body ground	Always	1 MΩ or higher
A20–27 (–SR) – Body ground	Always	1 MΩ or higher

NG → **Go to step 11.**

OK

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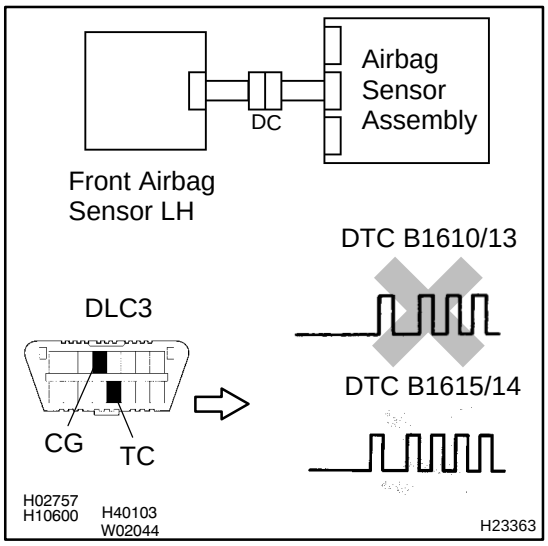
7	Check front airbag sensor RH.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Interchange the front airbag sensor RH with LH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1610/13 is output.	A
DTC B1615/14 is output.	B
DTC B1610/13 and B1615/14 are not output.	C

HINT:
Codes other than DTC B1610/13 and B1615/14 may be output at this time, but they are not related to this check.

A → **Replace airbag sensor assembly (see page RS–84).**

B → **Replace front airbag sensor RH (see page RS–89).**

C

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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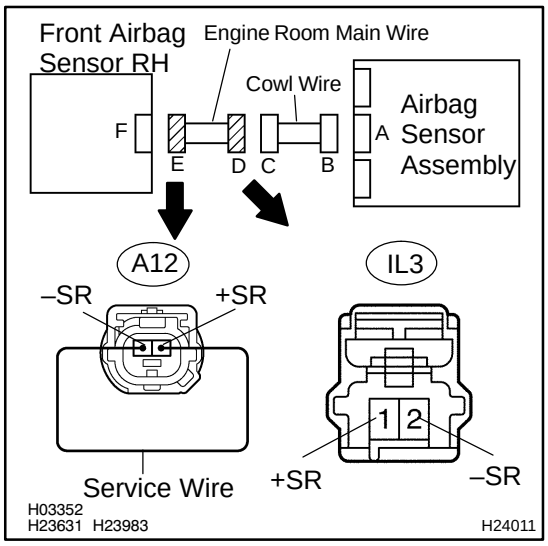
8	Check engine room main wire (open).



PREPARATION:

Disconnect the engine room main wire connector from the cowl wire.

HINT:

The service wire has already been inserted into connector "E".

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

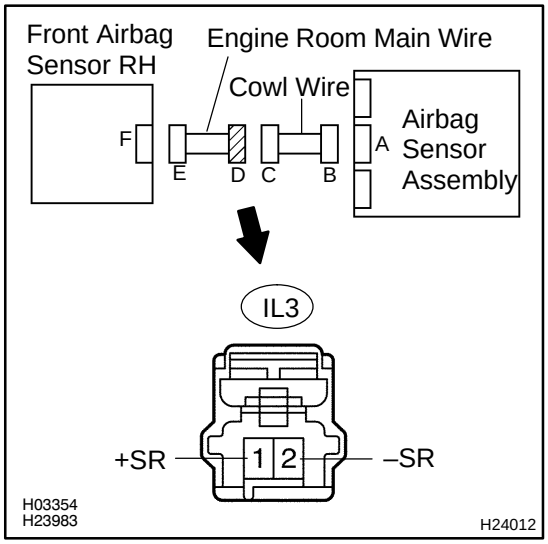
Tester Connection	Condition	Specified Condition
IL3–1 (+SR) – IL3–2 (–SR)	Always	Below 1 Ω

NG → **Repair or replace engine room main wire.**

OK

Repair or replace cowl wire.

9	Check engine room main wire (short).



PREPARATION:

Disconnect the engine room main wire connector from the cowl wire.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
IL3–1 (+SR) – IL3–2 (–SR)	Always	1 MΩ or higher

NG → **Repair or replace engine room main wire.**

OK

Repair or replace cowl wire.

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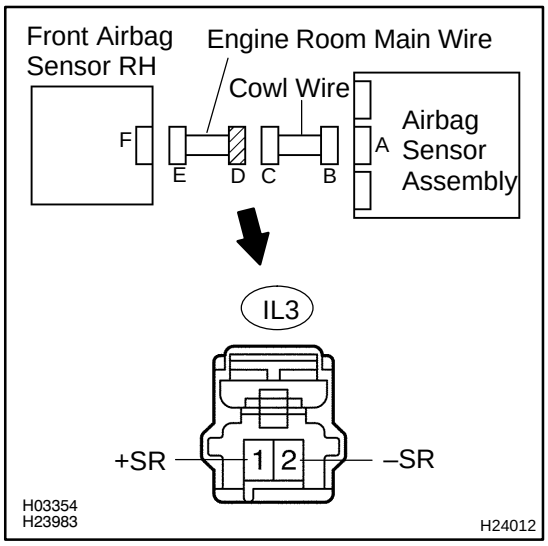
10	Check engine room main wire (short to B+).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the engine room main wire connector from the cowl wire.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
IL3–1 (+SR) – Body ground	Ignition switch ON	Below 1 V
IL3–2 (–SR) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace engine room main wire.**

OK

Repair or replace cowl wire.

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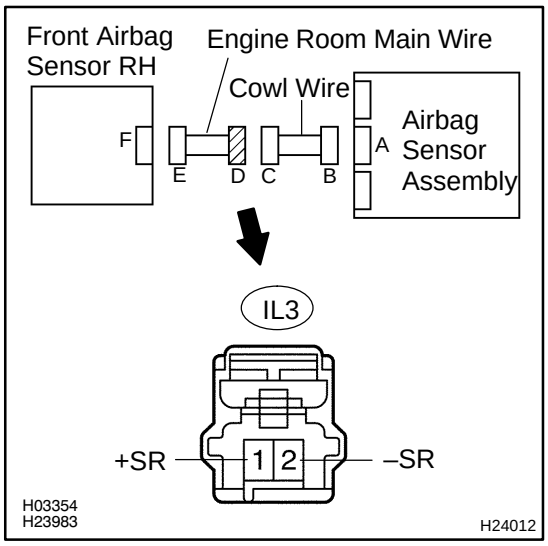
11	Check engine room main wire (short to ground).



PREPARATION:

Disconnect the engine room main wire connector from the cowl wire.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
IL3–1 (+SR) – Body ground	Always	1 MΩ or higher
IL3–2 (–SR) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace engine room main wire.**

OK

Repair or replace cowl wire.

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DIDGT–01

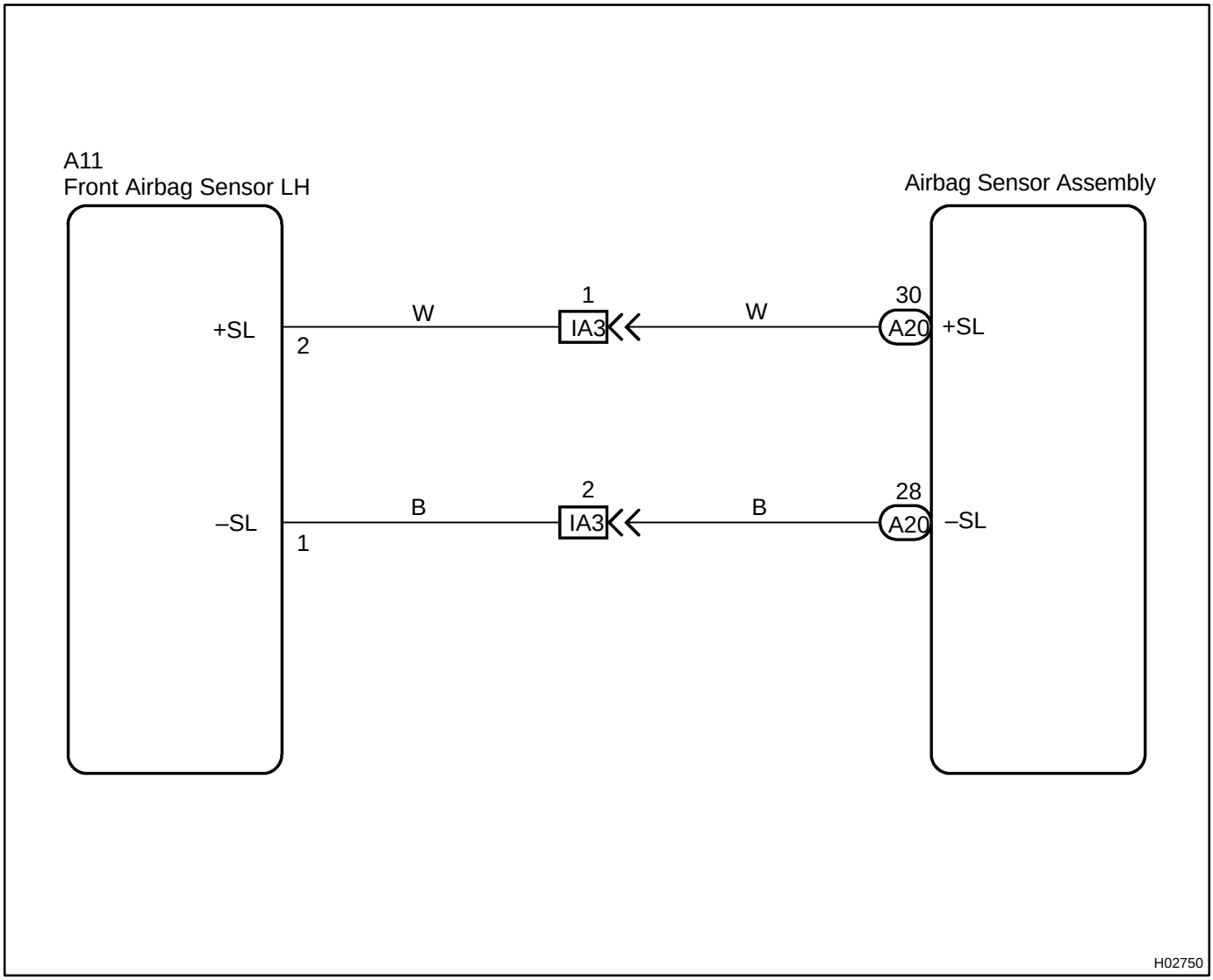
DTC	B1615/14	Front Airbag Sensor LH Malfunction

CIRCUIT DESCRIPTION

The front airbag sensor LH consists of the diagnosis circuit, the frontal deceleration sensor, etc.
If the airbag sensor assembly receives signals from the frontal deceleration sensor, it determines whether or not the SRS should be activated.
DTC B1615/14 is recorded when a malfunction is detected in the front airbag sensor LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1615/14	▶The airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front airbag sensor LH circuit for 2 seconds. ▶Front airbag sensor LH malfunction ▶Airbag sensor assembly malfunction	▶Front airbag sensor LH ▶Airbag sensor assembly ▶Cowl wire ▶Engine room main wire

WIRING DIAGRAM



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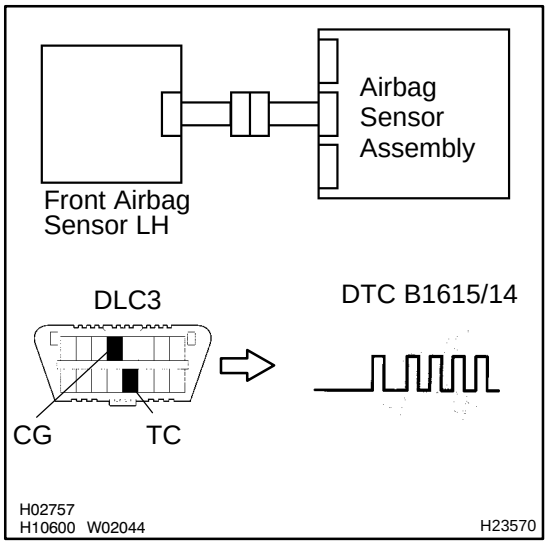
INSPECTION PROCEDURE

CAUTION:
Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**



PREPARATION:
(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:
(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:
DTC B1615/14 is not output.

HINT:
Codes other than DTC B1615/14 may be output at this time, but they are not related to this check.

NG	**Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the front airbag sensor LH.

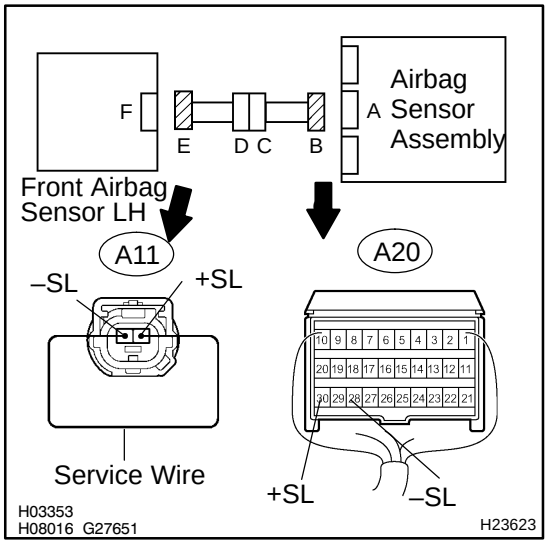
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check front airbag sensor LH circuit (open).



PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly and the front airbag sensor LH.

(b) Using a service wire, connect A11–2 (+SL) and A11–1 (–SL) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–30 (+SL) – A20–28 (–SL)	Always	Below 1 Ω

NG → **Go to step 8.**

OK

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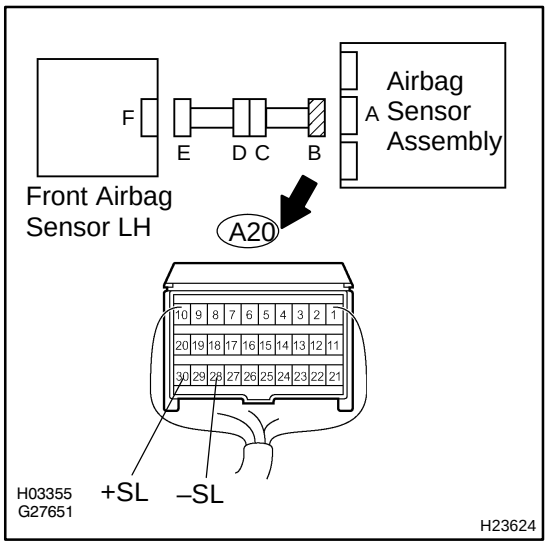
4	Check front airbag sensor LH circuit (short).



PREPARATION:

Disconnect the service wire from connector "E".

CHECK:

Measure the resistance according to the value(s) in the table below.

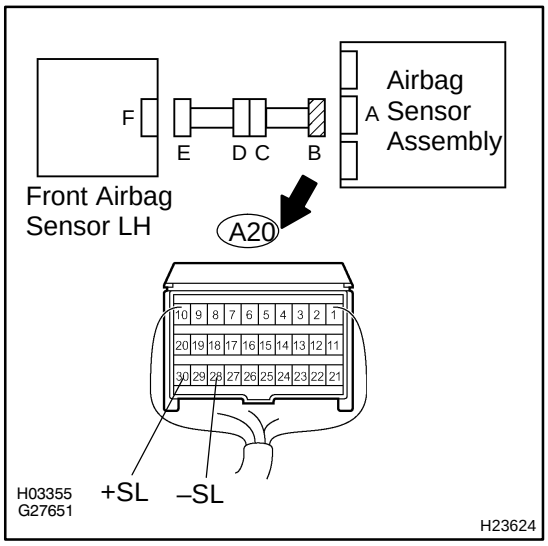
OK:

Tester Connection	Condition	Specified Condition
A20–30 (+SL) – A20–28 (–SL)	Always	1 MΩ or higher

NG → **Go to step 9.**

OK

5	Check front airbag sensor LH circuit (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–30 (+SL) – Body ground	Ignition switch ON	Below 1 V
A20–28 (–SL) – Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 10.**

OK

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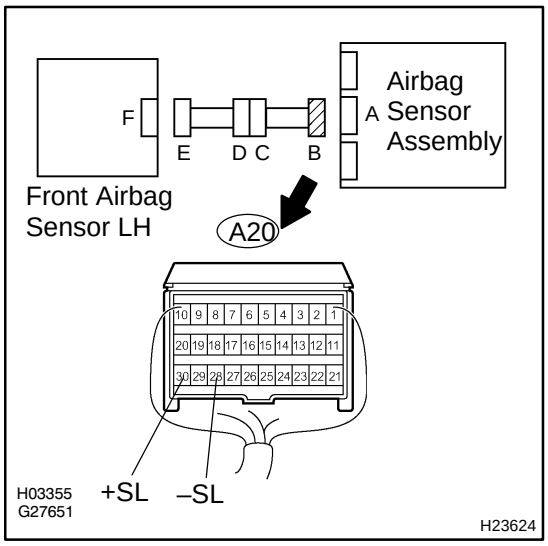
6	Check front airbag sensor LH circuit (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

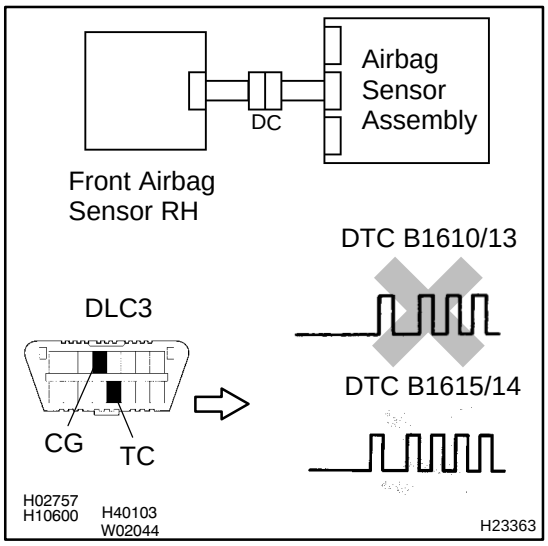
Tester Connection	Condition	Specified Condition
A20–30 (+SL) – Body ground	Always	1 MΩ or higher
A20–28 (–SL) – Body ground	Always	1 MΩ or higher

NG → **Go to step 11.**

OK

Dardoor.com

7	Check front airbag sensor LH.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Interchange the front airbag sensor RH with LH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1615/14 is output.	A
DTC B1610/13 is output.	B
DTC B1610/13 and B1615/14 are not output.	C

HINT:
Codes other than DTC B1610/13 and B1615/14 may be output at this time, but they are not related to this check.

A → **Replace airbag sensor assembly (see page RS–84).**

B → **Replace front airbag sensor LH (see page RS–89).**

C

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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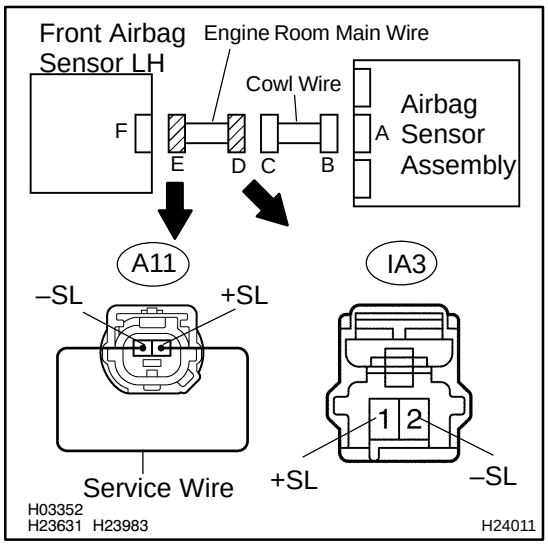
8	Check engine room main wire (open).



PREPARATION:

Disconnect the engine room main wire connector from the cowl wire.

HINT:

The service wire has already been inserted into connector "E".

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

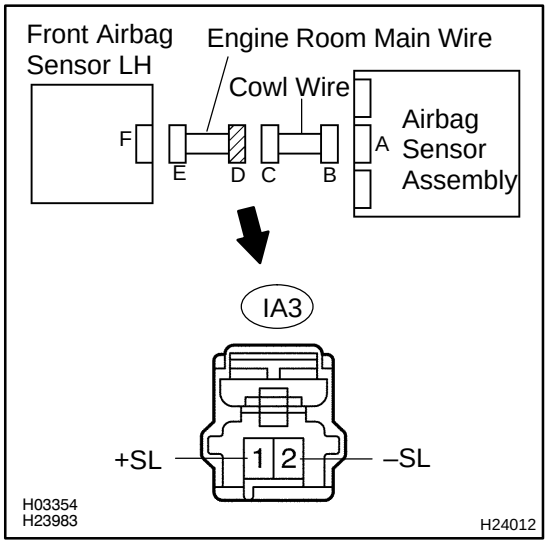
Tester Connection	Condition	Specified Condition
IA3–1 (+SL) – IA3–2 (–SL)	Always	Below 1 Ω

NG → **Repair or replace engine room main wire.**

OK

Repair or replace cowl wire.

9	Check engine room main wire (short).



PREPARATION:

Disconnect the engine room main wire connector from the cowl wire.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
IA3–1 (+SL) – IA3–2 (–SL)	Always	1 MΩ or higher

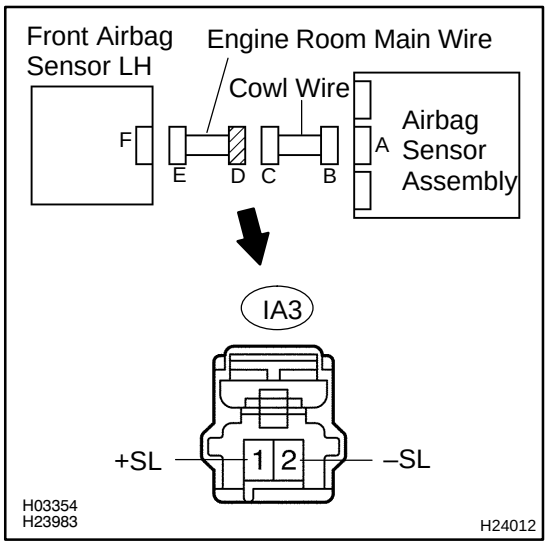
NG → **Repair or replace engine room main wire.**

OK

Repair or replace cowl wire.

Dardoor.com

10	Check engine room main wire (short to B+).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the engine room main wire connector from the cowl wire.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
IA3–1 (+SL) – Body ground	Ignition switch ON	Below 1 V
IA3–2 (–SL) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace engine room main wire.**

OK →

Repair or replace cowl wire.

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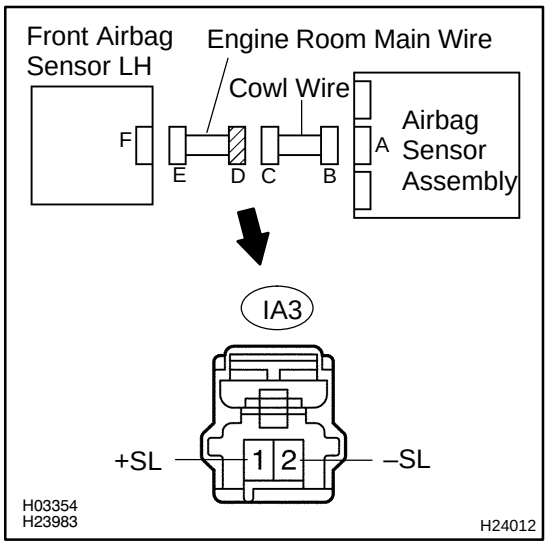
11	Check engine room main wire (short to ground).



PREPARATION:

Disconnect the engine room main wire connector from the cowl wire.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
IA3–1 (+SL) – Body ground	Always	1 MΩ or higher
IA3–2 (–SL) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace engine room main wire.**

OK →

Repair or replace cowl wire.

Dardoor.com

DIDGU–01

DTC	B1620/21	Side Airbag Sensor Assembly (RH) Malfunction

CIRCUIT DESCRIPTION

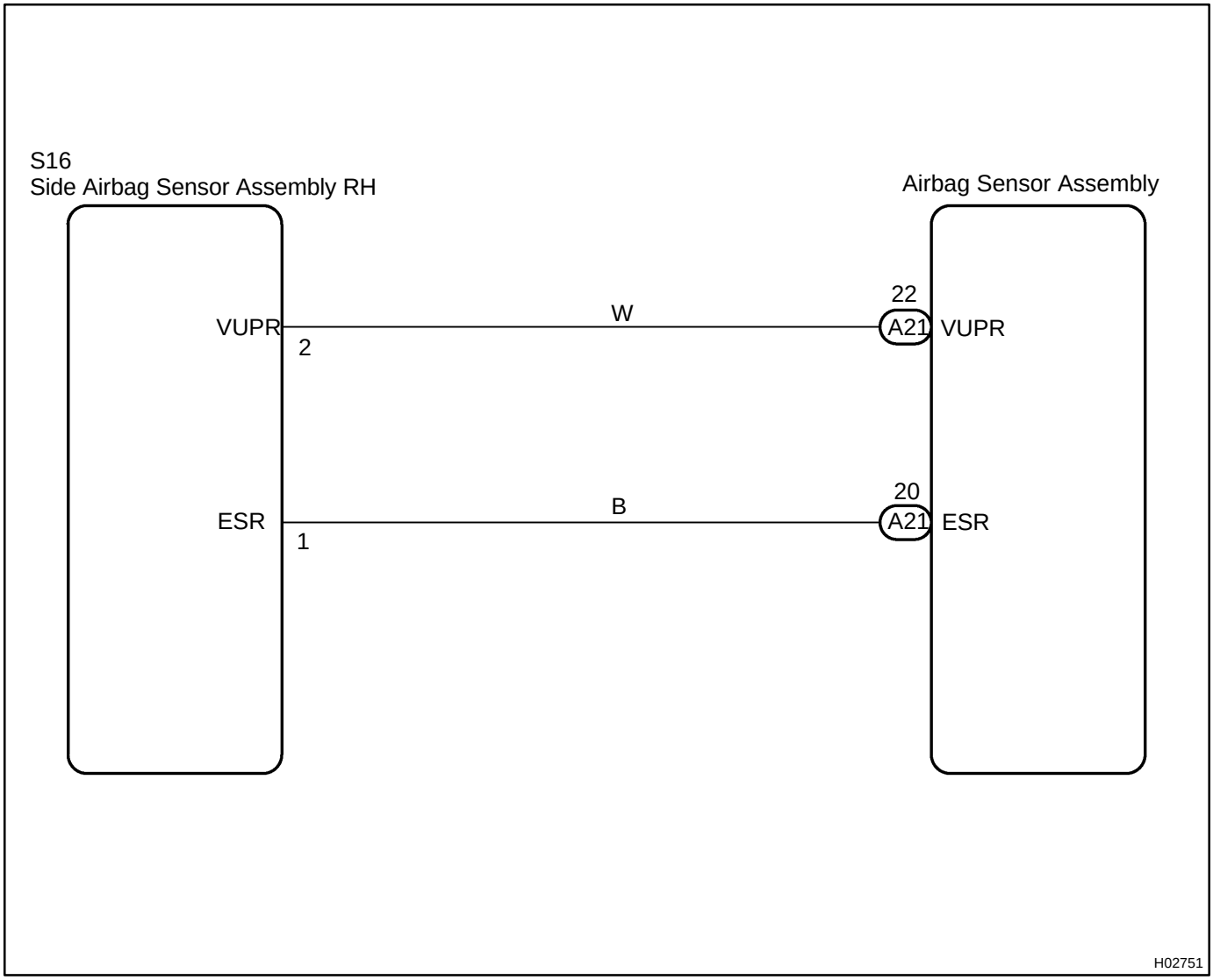
The side airbag sensor assembly RH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.

If the airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1620/21 is recorded when a malfunction is detected in the side airbag sensor assembly RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1620/21	▶The airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the side airbag sensor assembly RH circuit for 2 seconds. ▶Side airbag sensor assembly RH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag sensor assembly RH ▶Airbag sensor assembly ▶Floor wire

WIRING DIAGRAM



Dardoor.com

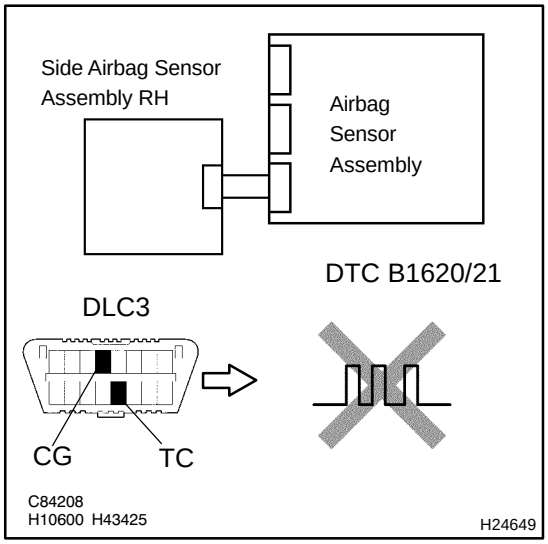
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1620/21 is not output.

HINT:

Codes other than DTC B1620/21 may be output at this time, but they are not related to this check.

NG	**Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

Dardoor.com

2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the side airbag sensor assembly RH.

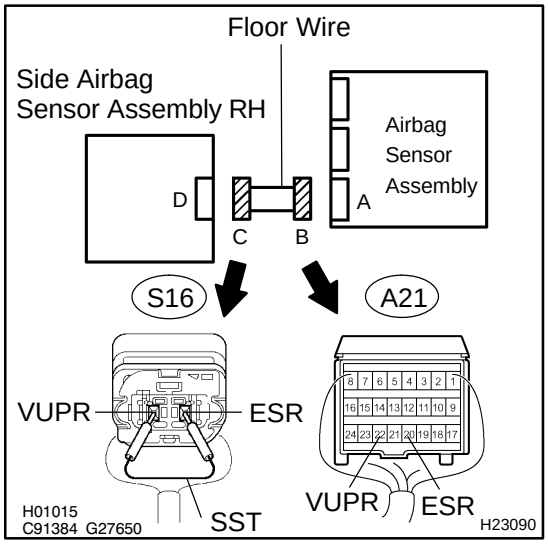
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check floor wire (open).



PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly and the side airbag sensor assembly RH.

(b) Using SST, connect S16–2 (VUPR) and S16–1 (ESR) of connector "C".
SST 09843–18040

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

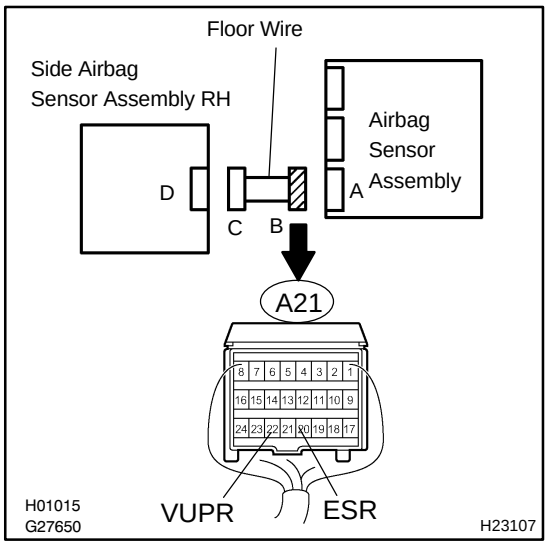
Tester Connection	Condition	Specified Condition
A21–22 (VUPR) – A21–20 (ESR)	Always	Below 1 Ω

NG → **Repair or replace floor wire.**

OK

Dardoor.com

4	Check floor wire (short).



PREPARATION:

Disconnect the SST from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

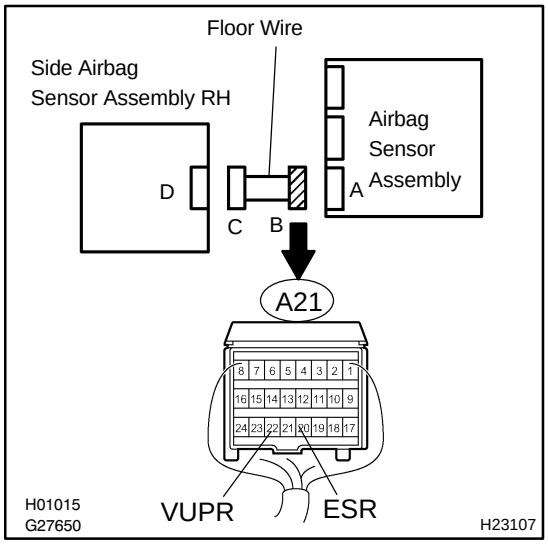
OK:

Tester Connection	Condition	Specified Condition
A21–22 (VUPR) – A21–20 (ESR)	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

5	Check floor wire (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

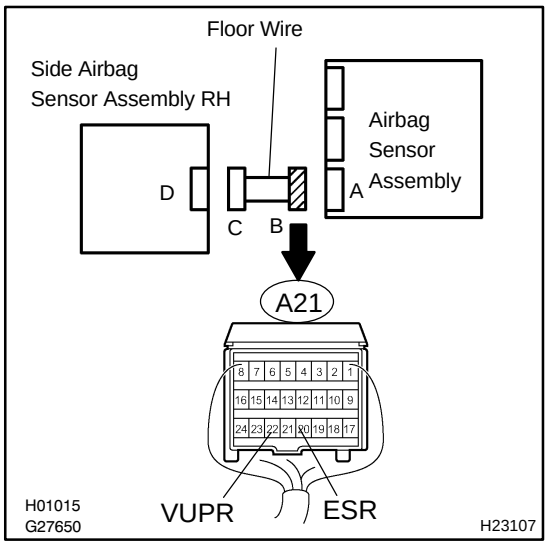
Tester Connection	Condition	Specified Condition
A21–22 (VUPR) – Body ground	Ignition switch ON	Below 1 V
A21–20 (ESR) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire.**

OK

Dardoor.com

6	Check floor wire (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

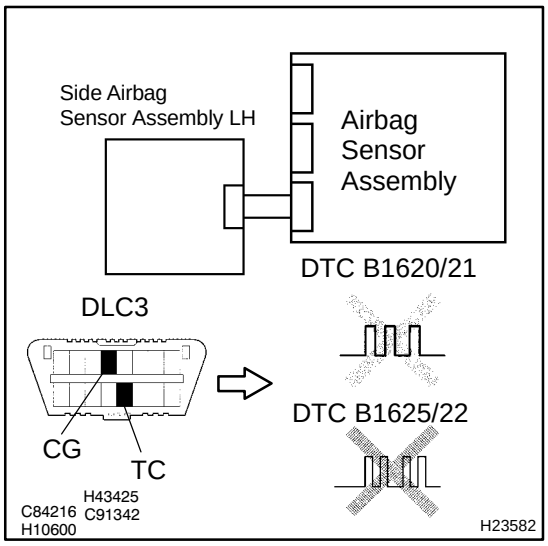
Tester Connection	Condition	Specified Condition
A21–22 (VUPR) – Body ground	Always	1 MΩ or higher
A21–20 (ESR) – Body ground	Always	1 MΩ or higher

NG	Repair or replace floor wire.

OK

Dardoor.com

7	Check side airbag sensor assembly RH.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Interchange the side airbag sensor assembly RH with LH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1620/21 is output.	A
DTC B1625/22 is output.	B
DTC B1620/21 and B1625/22 are not output.	C

HINT:
Codes other than DTC B1620/21 and B1625/22 may be output at this time, but they are not related to this check.

A → **Replace airbag sensor assembly (see page RS–82).**

B → **Replace side airbag sensor assembly RH (see page RS–92).**

C

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

Dardoor.com

DIDGV–01

DTC	B1625/22	Side Airbag Sensor Assembly (LH) Malfunction

CIRCUIT DESCRIPTION

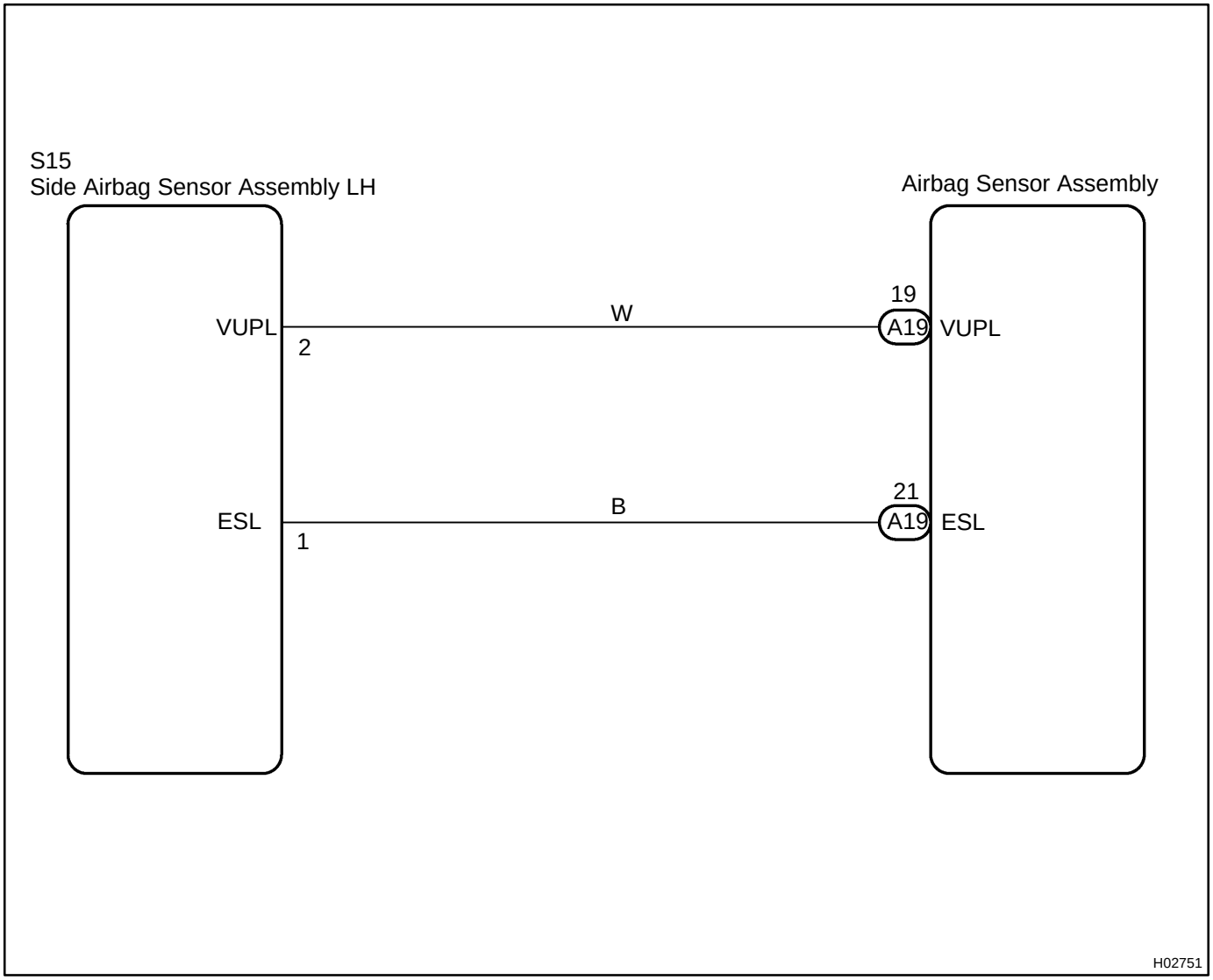
The side airbag sensor assembly LH consists of the safing sensor, the diagnosis circuit, the lateral deceleration sensor, etc.

If the airbag sensor assembly receives signals from the lateral deceleration sensor, it determine whether or not the SRS should be activated.

DTC B1625/22 is recorded when a malfunction is detected in the side airbag sensor assembly LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1625/22	▶The airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the side airbag sensor assembly LH circuit for 2 seconds. ▶Side airbag sensor assembly LH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag sensor assembly LH ▶Airbag sensor assembly ▶Floor wire No. 2

WIRING DIAGRAM



Dardoor.com

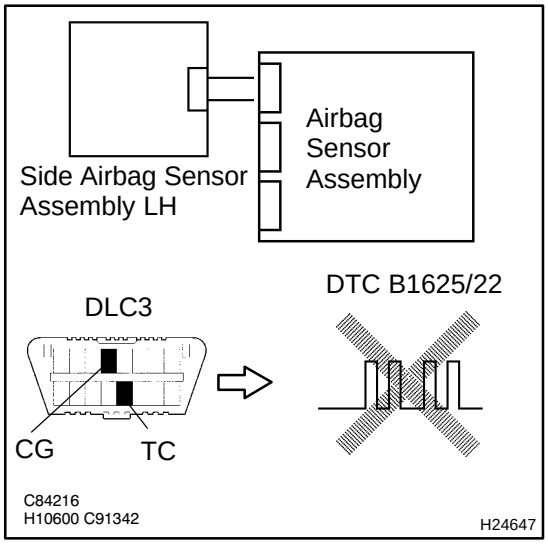
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1625/22 is not output.

HINT:

Codes other than DTC B1625/22 may be output at this time, but they are not related to this check.

NG	**Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the side airbag sensor assembly LH.

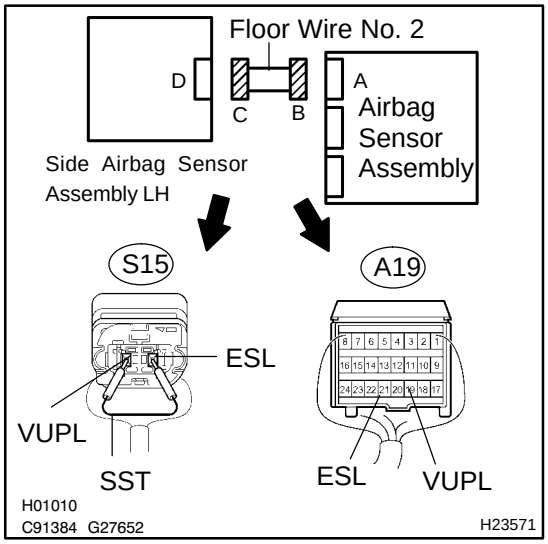
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check floor wire No. 2 (open).



PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly and the side airbag sensor assembly LH.

(b) Using SST, connect S15–2 (VUPL) and S15–1 (ESL) of connector "C."
SST 09843–18040

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–19 (VUPL) – A19–21 (ESL)	Always	Below 1 Ω

NG → **Repair or replace floor wire No. 2.**

OK

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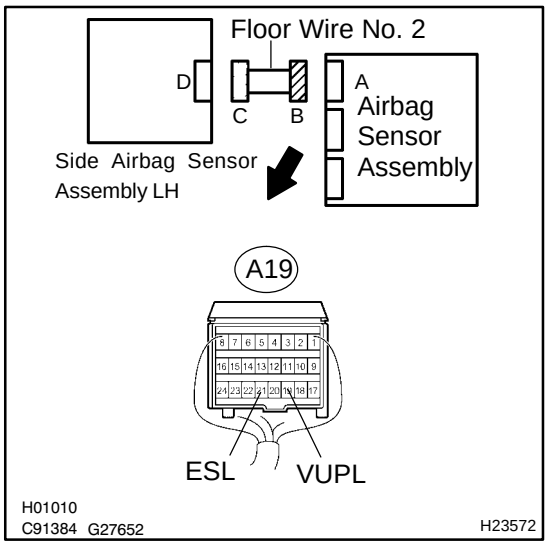
4	Check floor wire No. 2 (short).



PREPARATION:

Disconnect the SST from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

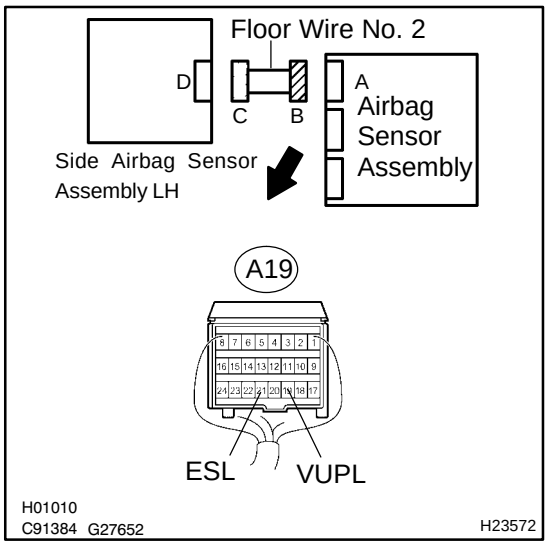
OK:

Tester Connection	Condition	Specified Condition
A19–19 (VUPL) – A19–21 (ESL)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

5	Check floor wire No. 2 (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

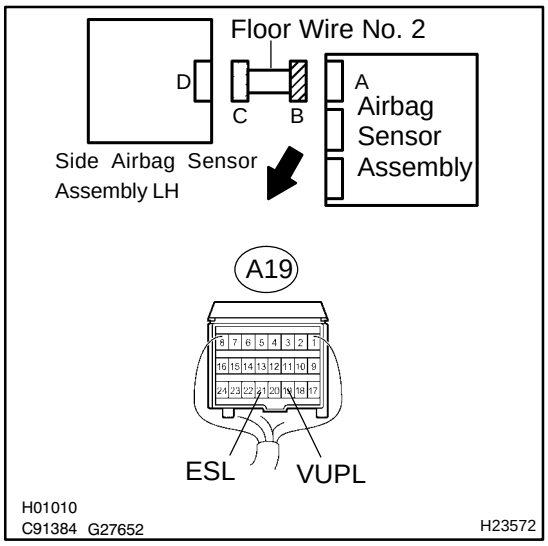
Tester Connection	Condition	Specified Condition
A19–19 (VUPL) – Body ground	Ignition switch ON	Below 1 V
A19–21 (ESL) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire No. 2.**

OK

Dardoor.com

6	Check floor wire No. 2 (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–19 (VUPL) – Body ground	Always	1 MΩ or higher
A19–21 (ESL) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

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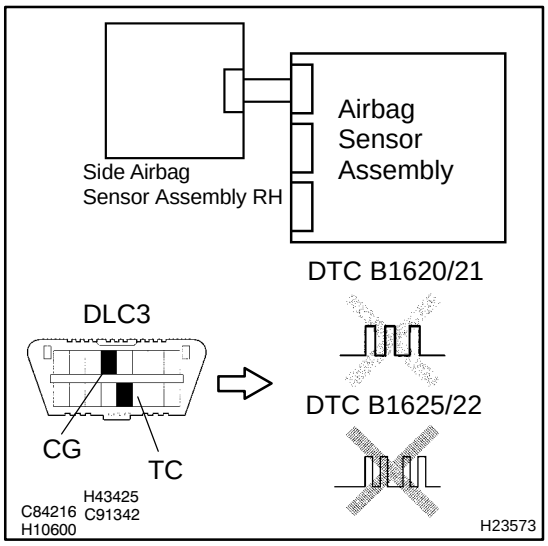
7	Check side airbag sensor assembly LH.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Interchange the side airbag sensor assembly RH with LH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1625/22 is output.	A
DTC B1620/21 is output.	B
DTC B1620/21 and B1625/22 are not output.	C

HINT:
Codes other than DTC B1620/21 and B1625/22 may be output at this time, but they are not related to this check.

A → **Replace airbag sensor assembly (see page RS–82).**

B → **Replace side airbag sensor assembly LH (see page RS–92).**

C

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

Dardoor.com

DIDGW–01

DTC	B1630/23	Curtain Shield Airbag Sensor (RH) Malfunction

CIRCUIT DESCRIPTION

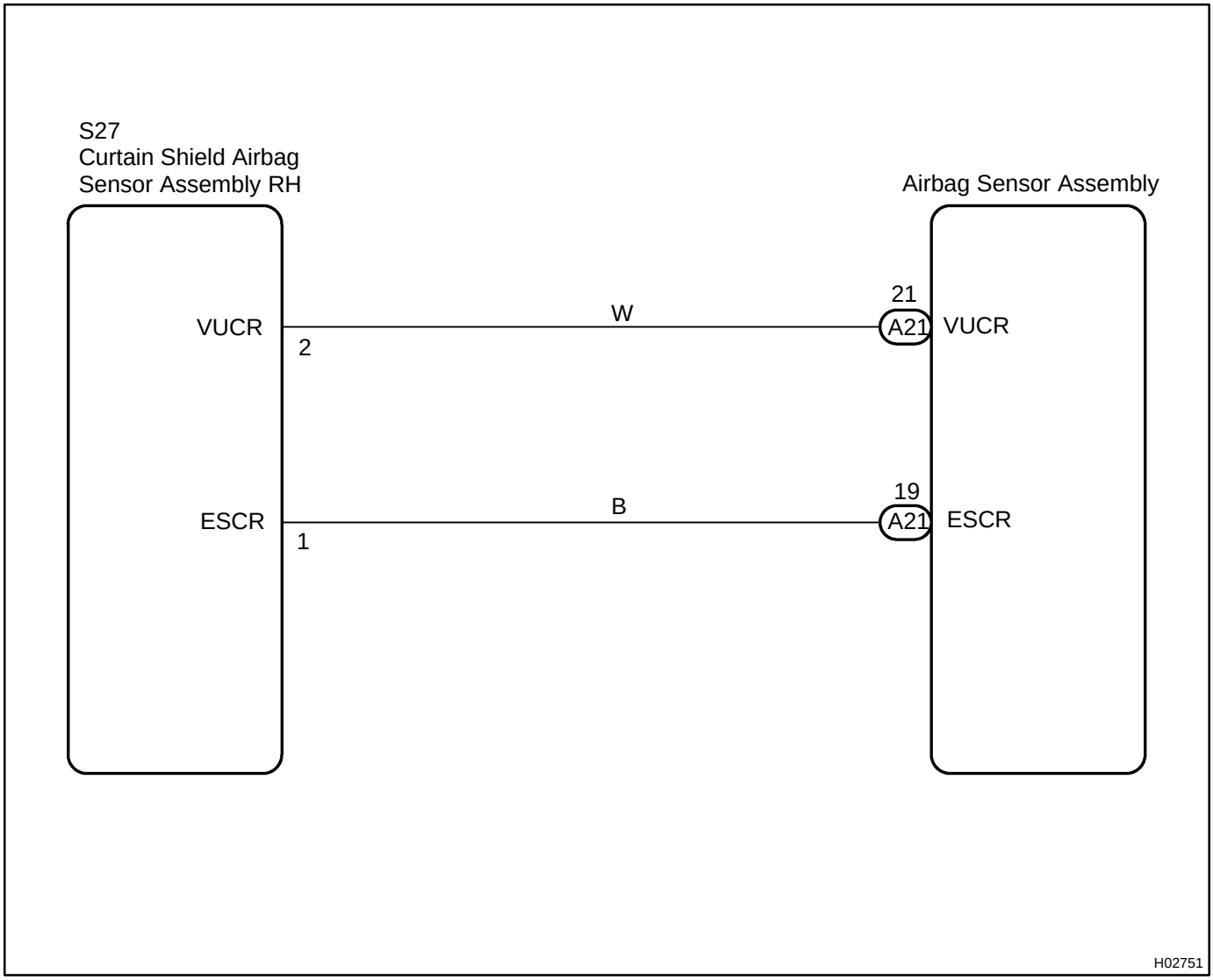
The curtain shield airbag sensor assembly RH consists of the safing sensor the diagnostic circuit, the lateral deceleration sensor, etc.

If the airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1630/23 is recorded when a malfunction is detected in the curtain shield airbag sensor RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1630/23	▶The airbag sensor assembly receives a short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the curtain shield airbag sensor RH circuit for 2 seconds. ▶Curtain shield airbag sensor assembly RH malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag sensor assembly RH ▶Airbag sensor assembly ▶Floor wire

WIRING DIAGRAM



Dardoor.com

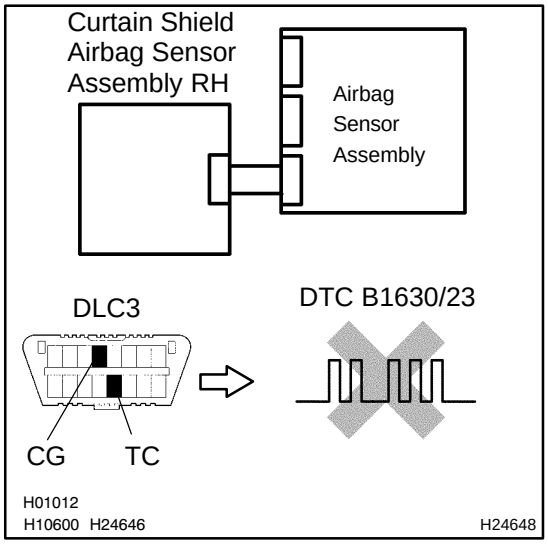
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the horn button assembly.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the front seat airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt assembly LH and RH.

1	**Check DTC.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1630/23 is not output.

HINT:

Codes other than DTC B1630/23 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connections of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the curtain shield airbag sensor assembly RH.

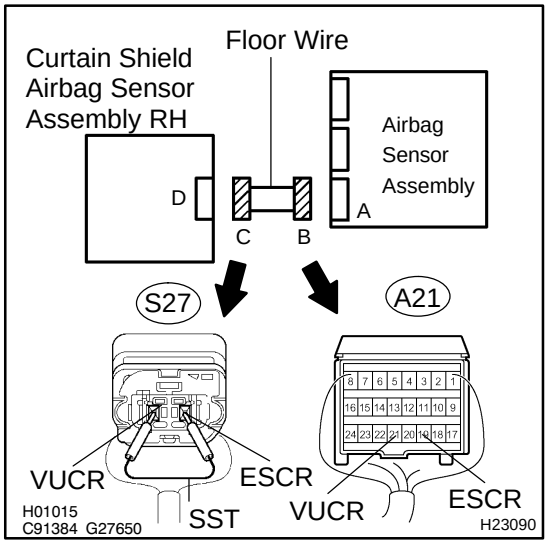
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check floor wire (open).



PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly and the curtain shield airbag sensor assembly RH.

(b) Using SST, connect S27–2 (VUCR) and S27–1 (ESCR) of connector "C".
SST SST 09843–18040

CHECK:

Measure the resistance according to the value(s) in the table below.

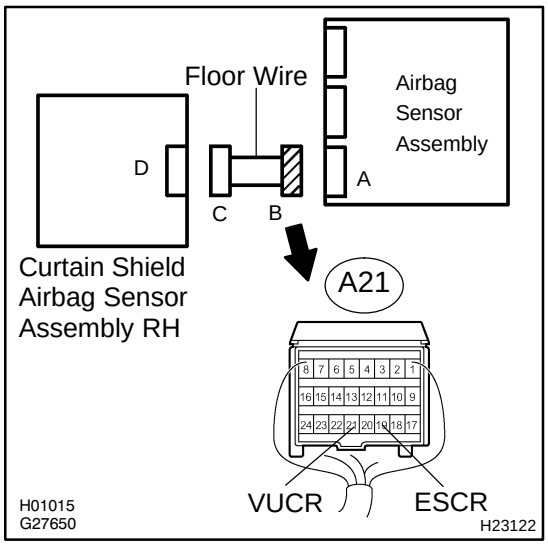
Tester Connection	Condition	Specified Condition
A21–21 (VUCR) – A21–19 (ESCR)	Always	Below 1 Ω

NG → **Repair or replace floor wire.**

OK

Dardoor.com

4	Check floor wire (short).



PREPARATION:

Disconnect the SST from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

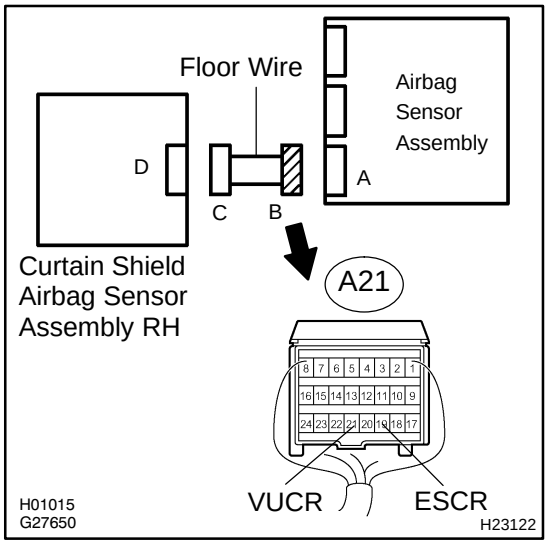
OK:

Tester Connection	Condition	Specified Condition
A21–21 (VUCR) – A21–19 (ESCR)	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

5	Check floor wire (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A21–21 (VUCR) – Body ground	Ignition switch ON	Below 1 V
A21–19 (ESCR) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire.**

OK

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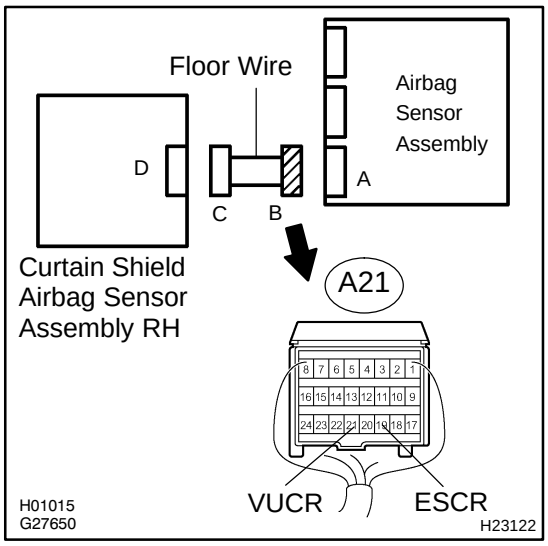
6	Check floor wire (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A21–21 (VUCR) – Body ground	Always	1 MΩ or higher
A21–19 (ESCR) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

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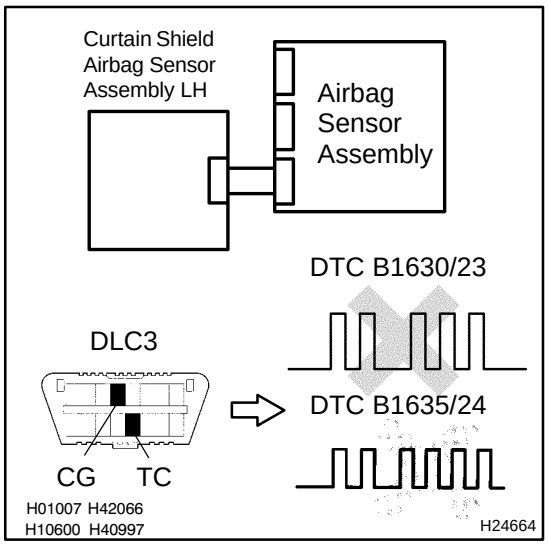
7	Check curtain shield airbag sensor assembly RH.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Interchange the curtain shield airbag sensor assembly RH with LH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1630/23 is output.	A
DTC B1635/24 is output.	B
DTC B1630/23 and B1635/24 are not output.	C

HINT:
Codes other than DTC B1630/23 and B1635/24 may be output at this time, but they are not relevant to this check.

A → **Replace airbag sensor assembly (see page RS–82).**

B → **Replace curtain shield airbag sensor assembly RH (see page RS–97).**

C

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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DTC	B1635/24	Curtain Shield Airbag Sensor (LH) Malfunction

CIRCUIT DESCRIPTION

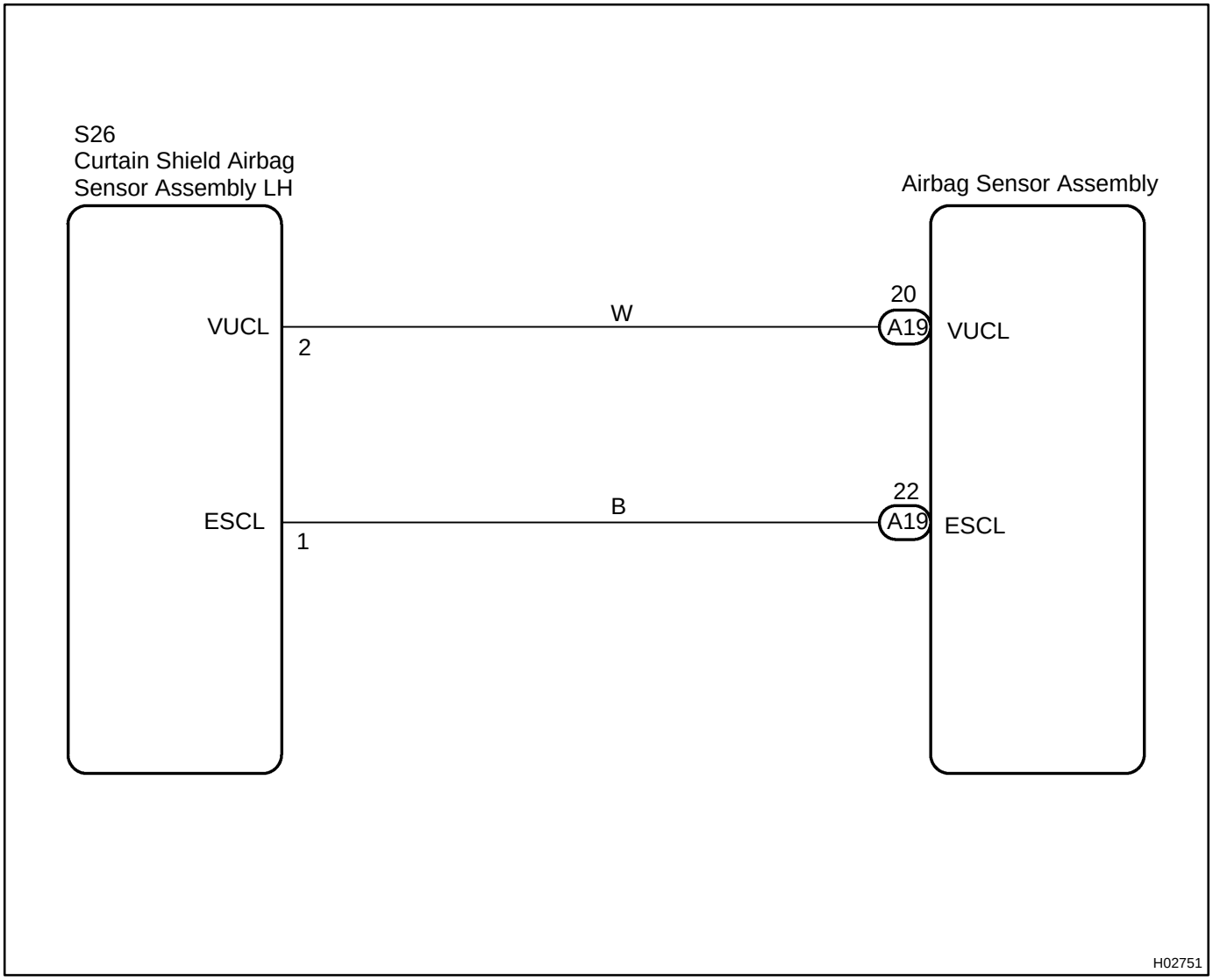
The curtain shield airbag sensor assembly LH consists of the safing sensor, the diagnosis circuit, the lateral deceleration sensor, etc.

If the airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1635/24 is recorded when a malfunction is detected in the curtain shield airbag sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1635/24	▶The airbag sensor assembly receives a short circuit signal, an open circuit signal, a short circuit to ground or a short circuit to B+ signal in the curtain shield airbag sensor LH circuit for 2 seconds. ▶Curtain shield airbag sensor assembly LH malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag sensor assembly LH ▶Airbag sensor assembly ▶Floor wire No. 2

WIRING DIAGRAM



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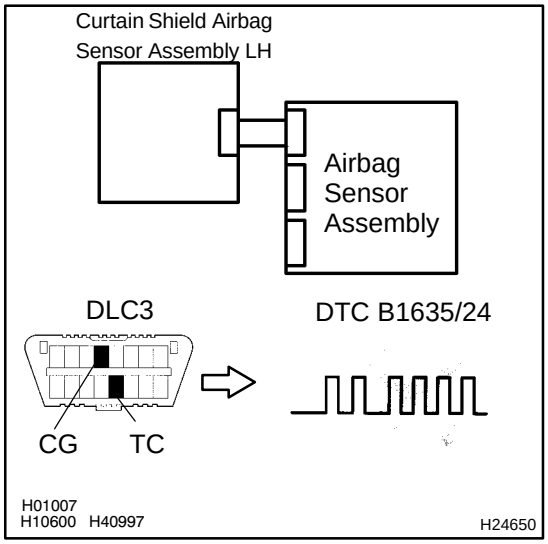
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1635/24 is not output.

HINT:

Codes other than DTC B1635/24 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the curtain shield airbag sensor assembly LH.

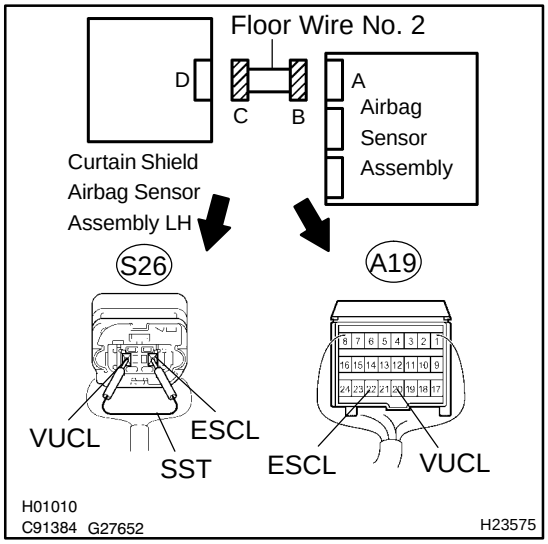
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check floor wire No. 2 (open).



PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly and the curtain shield airbag sensor assembly LH.

(b) Using SST, connect S26–2 (VUCL) and S26–1 (ESCL) of connector "C".
SST 09843–18040

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–20 (VUCL) – A19–22 (ESCL)	Always	Below 1 Ω

NG → **Repair or replace floor wire No. 2.**

OK

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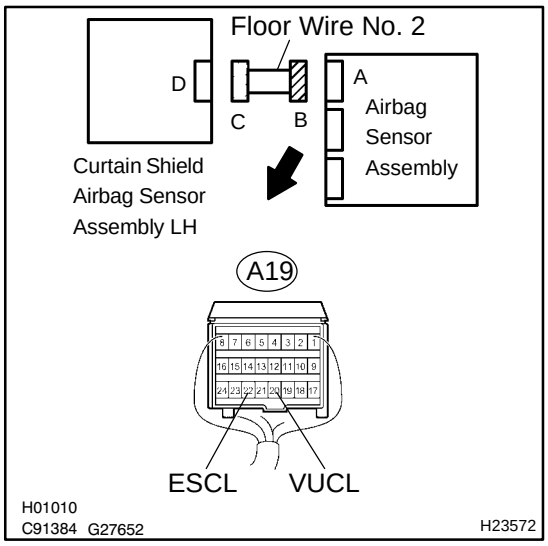
4	Check floor wire No. 2 (short).



PREPARATION:

Disconnect the SST from connector ”C”.

CHECK:

Measure the resistance according to the value(s) in the table below.

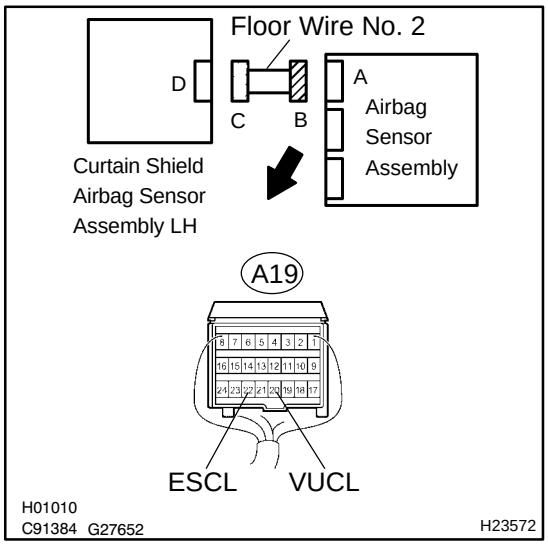
OK:

Tester Connection	Condition	Specified Condition
A19–20 (VUCL) – A19–22 (ESCL)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

5	Check floor wire No. 2 (short to B+).



PREPARATION:

(a) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–20 (VUCL) – Body ground	Ignition switch ON	Below 1 V
A19–22 (ESCL) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire No. 2.**

OK

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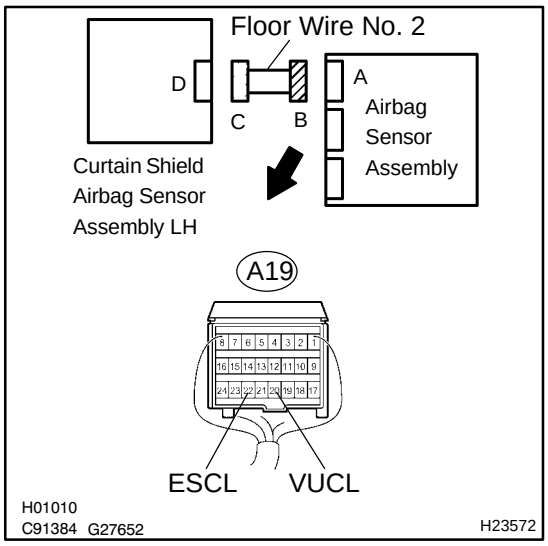
6	Check floor wire No. 2 (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–20 (VUCL) – Body ground	Always	1 MΩ or higher
A19–22 (ESCL) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

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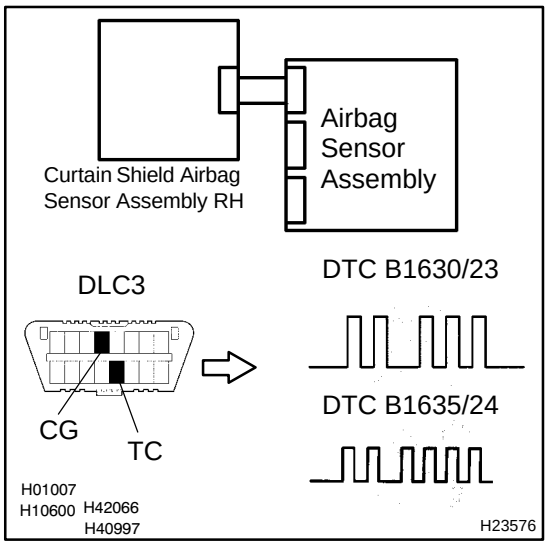
7	Check curtain shield airbag sensor assembly LH.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Interchange the curtain shield airbag sensor assembly RH with LH and connect the connectors to them.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1635/24 is output.	A
DTC B1630/23 is output.	B
DTC B1630/23 and B1635/24 are not output.	C

HINT:
Codes than other DTC B1630/23 and B1635/24 may be output at this time, but they are not related to this check.

A → **Replace airbag sensor assembly (see page RS–82).**

B → **Replace curtain shield airbag sensor assembly LH (see page RS–97).**

C

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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DIDGY–01

DTC	B1650/32	Occupant Classification System Malfunction

CIRCUIT DESCRIPTION

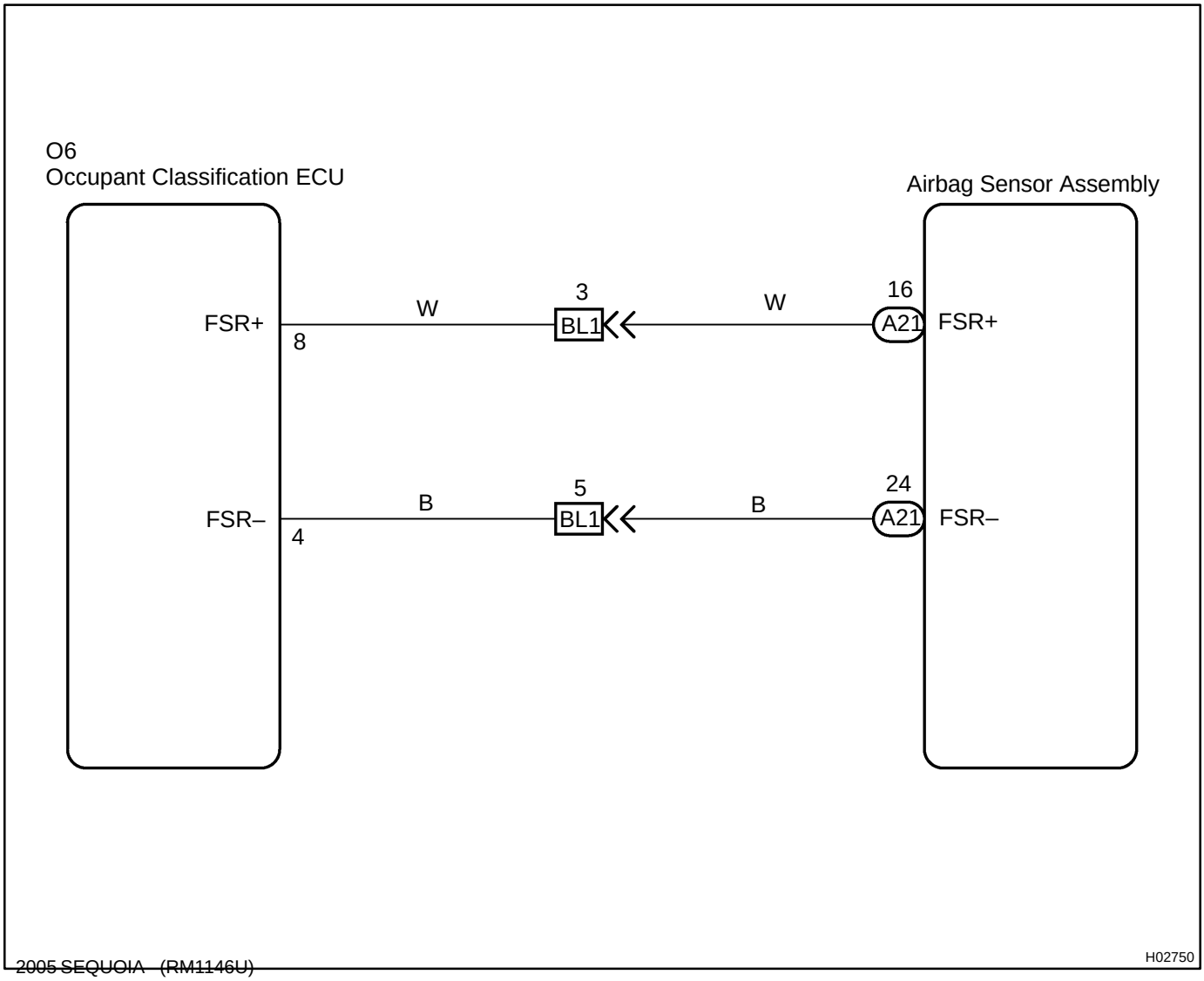
The occupant classification system circuit consists of the airbag sensor assembly and the occupant classification system.

If the airbag sensor assembly receives signals from the occupant classification ECU, it determines whether or not the front passenger airbag assembly, side airbag assembly RH and seat belt pretensioner RH should be operated.

DTC B1650/32 is recorded when a malfunction is detected in the occupant classification system circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1650/32	▶Occupant classification system malfunction ▶The airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification system circuit for 2 seconds. ▶Airbag sensor assembly malfunction	▶Occupant classification system ▶Airbag sensor assembly ▶Floor wire ▶Seat wire No. 1

WIRING DIAGRAM



H02750

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INSPECTION PROCEDURE

1	**Check DTC (occupant classification ECU).**

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 10 seconds.

(b) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

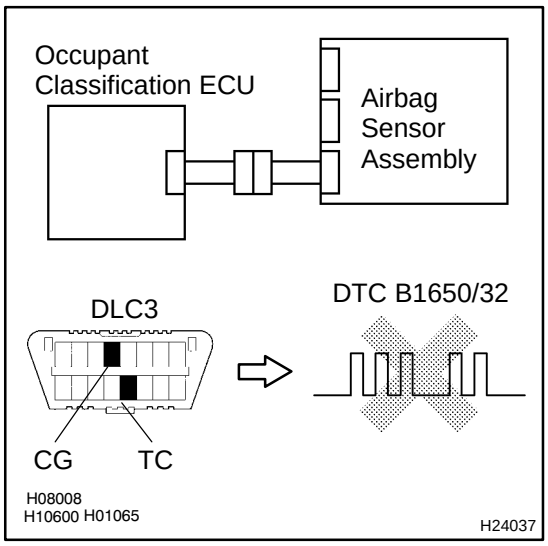
OK:

DTC is not output of the occupant classification ECU.

NG → **Go to inspection procedure of DTC output (see page DI–1155).**

OK

2	**Check DTC (airbag sensor assembly).**



CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1650/32 is not output.

HINT:

Codes other than DTC B1650/32 may be output at this time, but they are not related to this check.

NG → **Go to step 3.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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3	**Check connection of connectors.**

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the occupant classification ECU.

OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

4	**Prepare for inspection.**

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Disconnect the connectors from the airbag sensor assembly.

(b) Disconnect the connectors from the steering wheel pad.

(c) Disconnect the connectors from the front passenger airbag assembly.

(d) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.

(e) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.

(f) Disconnect the connectors from the front seat outer belt LH and RH.

NEXT

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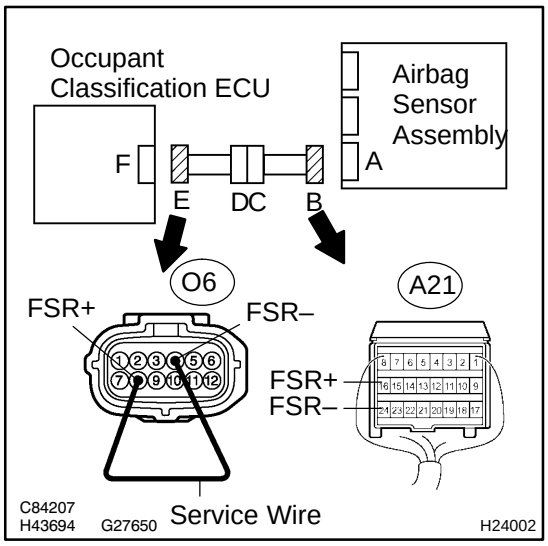
5	Check occupant classification system circuit (open).



PREPARATION:

(a) Disconnect the connector from the occupant classification ECU.

(b) Using a service wire, connect O6–8 (FSR+) and O6–4 (FSR–) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

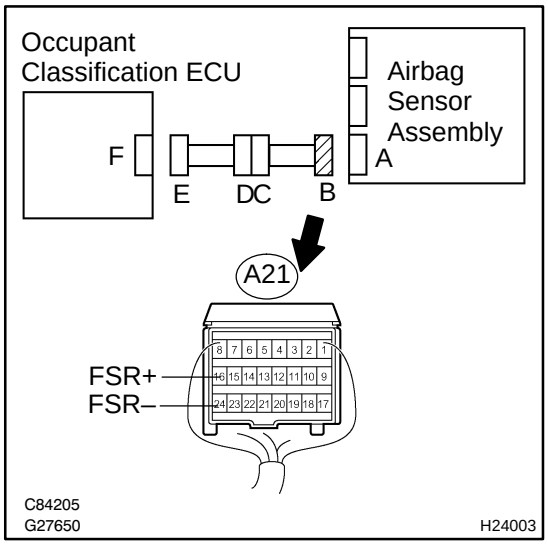
OK:

Tester Connection	Condition	Specified Condition
A21–16 (FSR+) – A21–24 (FSR–)	Always	Below 1 Ω

NG → **Go to step 9.**

OK

6	Check occupant classification system circuit (short).



PREPARATION:

Disconnect the service wire from connector "E".

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A21–16 (FSR+) – A21–24 (FSR–)	Always	1 MΩ or higher

NG → **Go to step 10.**

OK

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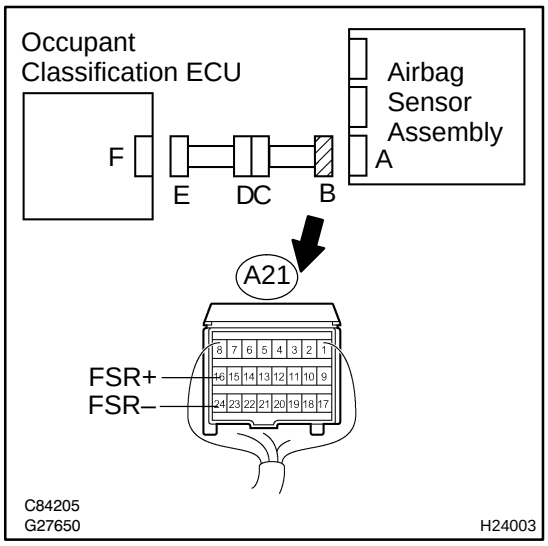
7	Check occupant classification system circuit (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A21–16 (FSR+) – Body ground	Ignition switch ON	Below 1 V
A21–24 (FSR–) – Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 11.**

OK

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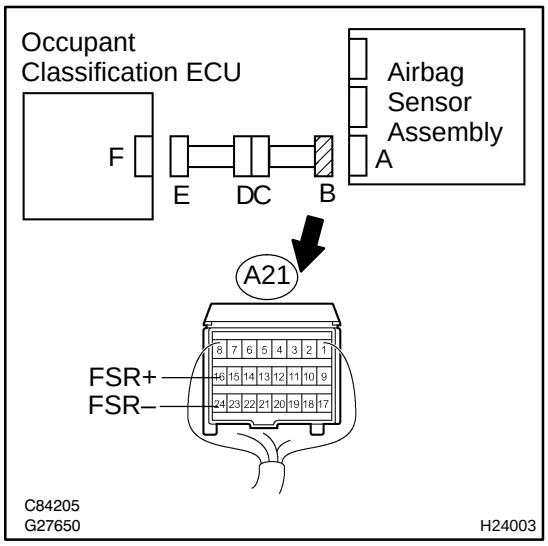
8	Check occupant classification system circuit (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A21–16 (FSR+) – Body ground	Always	1 MΩ or higher
A21–24 (FSR–) – Body ground	Always	1 MΩ or higher

NG → **Go to step 12.**

OK →

Replace airbag sensor assembly (see page RS–82).

HINT:

Check for DTCs of the airbag sensor assembly. If the DTC B1650/32 is detected, replace the occupant classification ECU (see page RS–111) and perform a ”Zero point calibration” and ”Sensitivity check” of the occupant classification system (see page DI–1128).

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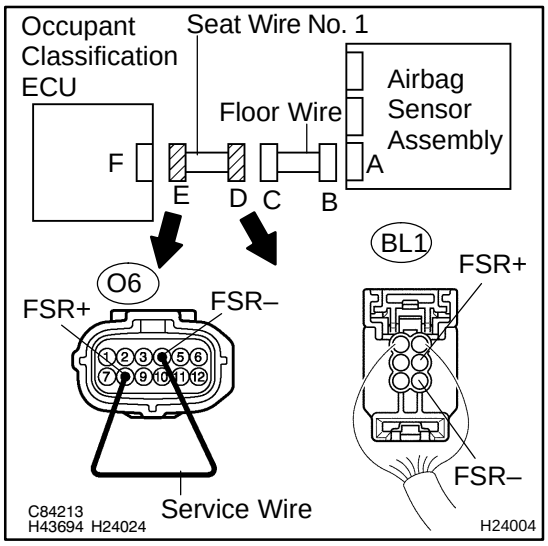
9	Check seat wire No. 1 (open).



PREPARATION:

Disconnect the seat wire No. 1 connector from the floor wire.

HINT:

The service wire has already been inserted into connector "E".

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

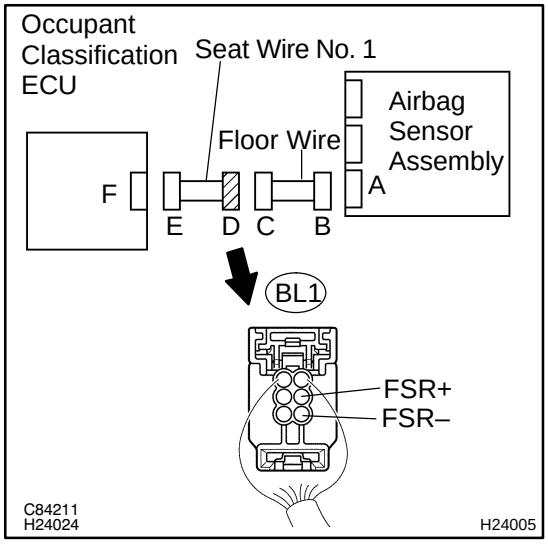
Tester Connection	Condition	Specified Condition
BL1–3 (FSR+) – BL1–5 (FSR–)	Always	Below 1 Ω

NG → **Repair or replace seat wire No. 1.**

OK

Repair or replace floor wire.

10	Check seat wire No. 1 (short).



PREPARATION:

Disconnect the seat wire No. 1 connector from the floor wire.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
BL1–3 (FSR+) – BL1–5 (FSR–)	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

Repair or replace floor wire.

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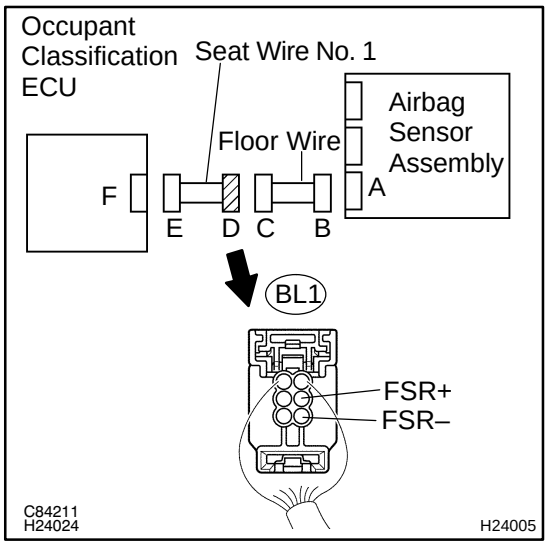
11	Check seat wire No. 1 (short to B+).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least for 90 seconds.
(c) Disconnect the seat wire No. 1 connector from the floor wire.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
BL1–3 (FSR+) – Body ground	Ignition switch ON	Below 1 V
BL1–5 (FSR–) – Body ground	Ignition switch ON	Below 1 V

NG	Repair or replace seat wire No. 1.

OK

Repair or replace floor wire.

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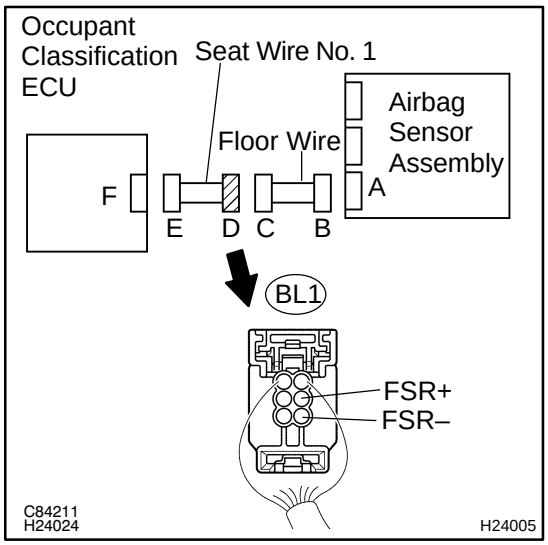
12	Check seat wire No. 1 (short to ground).



PREPARATION:

Disconnect the seat wire No. 1 connector from the floor wire.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
BL1–3 (FSR+) – Body ground	Always	1 MΩ or higher
BL1–5 (FSR–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

Repair or replace floor wire.

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DIDGZ–01

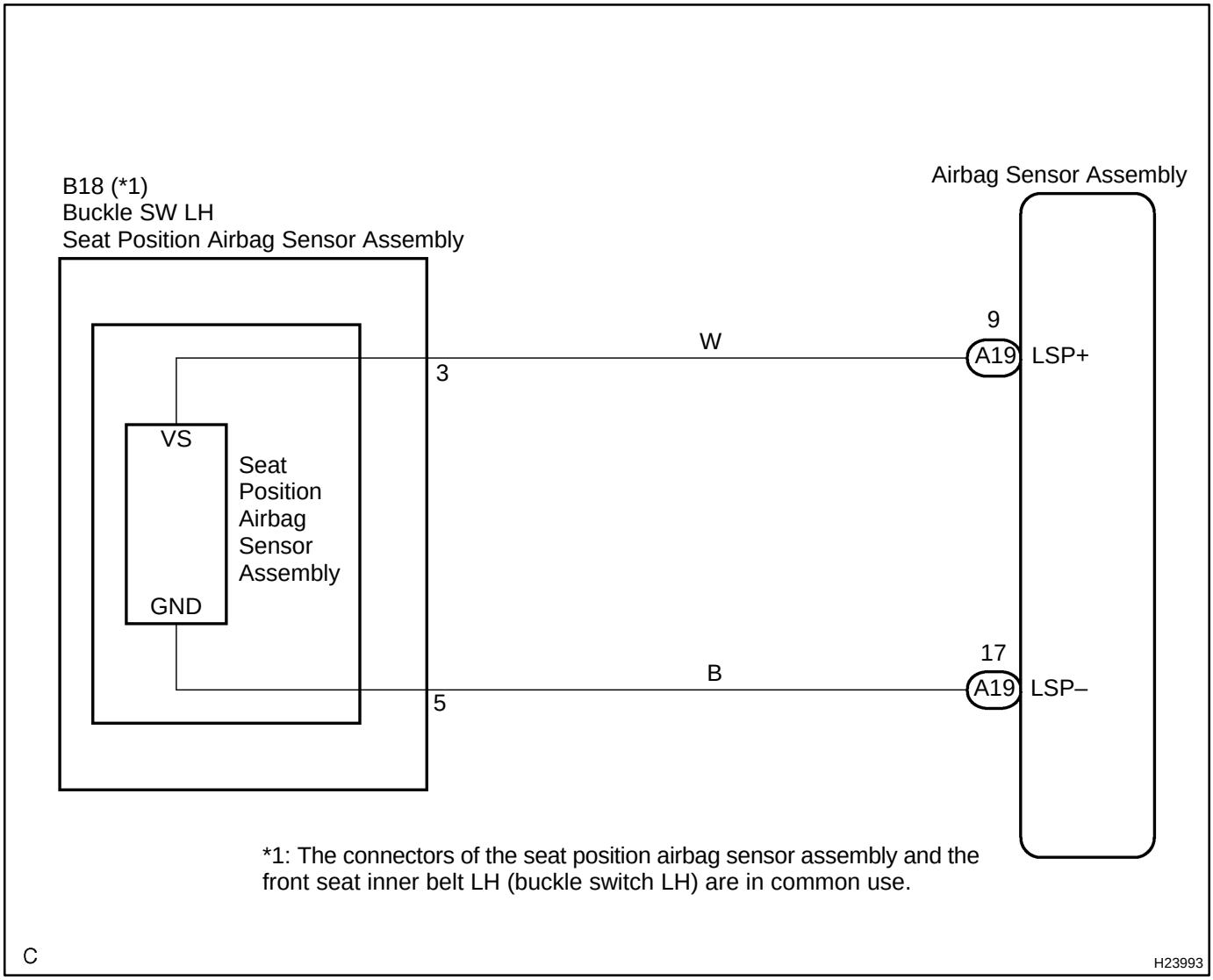
DTC	B1653/35	Seat Position Sensor Assembly Malfunction

CIRCUIT DESCRIPTION

The seat position airbag sensor assembly circuit consists of the airbag sensor assembly and the seat position airbag sensor assembly.
DTC B1653/35 is recorded when a malfunction is detected in the seat position sensor assembly circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1653/35	▶The airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the seat position sensor assembly circuit for 2 seconds. ▶Seat position airbag sensor assembly malfunction ▶Airbag sensor assembly malfunction	▶Seat position airbag sensor assembly ▶Airbag sensor assembly ▶Floor wire No. 2

WIRING DIAGRAM



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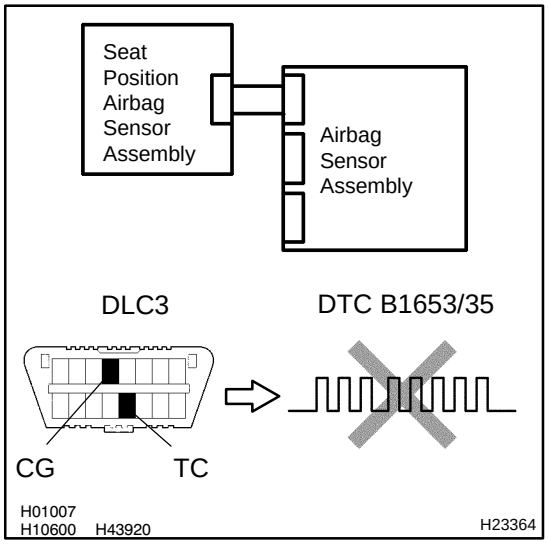
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1653/35 is not output.

HINT:

Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

NG	**Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the seat position airbag sensor assembly.

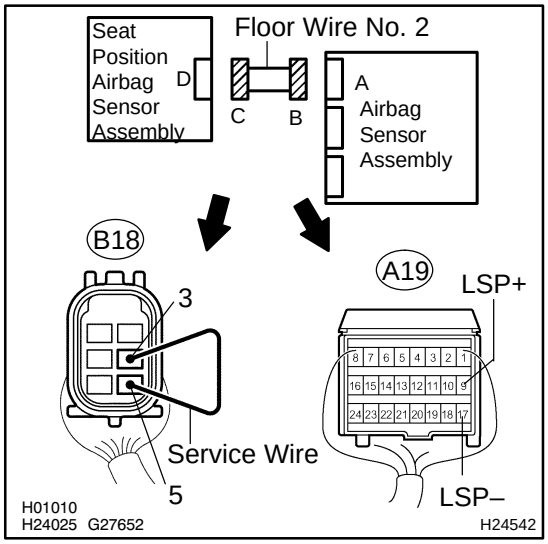
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check floor wire No. 2 (open).



PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly and the seat position airbag sensor assembly.

(b) Using a service wire, connect B18–3 and B18–5 of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified Condition
A19–9 (LSP+) – A19–17 (LSP–)	Always	Below 1 Ω

NG → **Repair or replace floor wire No. 2.**

OK

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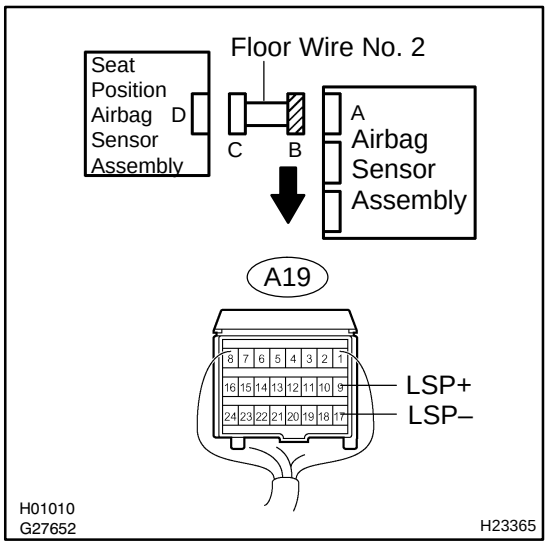
4	Check floor wire No. 2 (short).



PREPARATION:

Disconnect the service wire from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

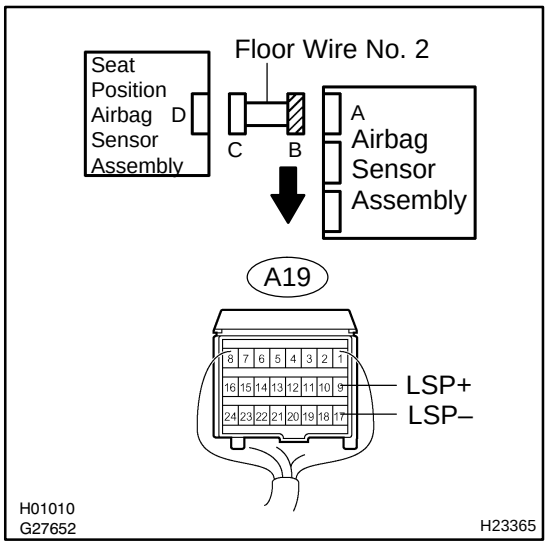
OK:

Tester Connection	Condition	Specified Condition
A19–9 (LSP+) – A19–17 (LSP–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

5	Check floor wire No. 2 (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–9 (LSP+) – Body ground	Ignition switch ON	Below 1 V
A19–17 (LSP–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire No. 2.**

OK

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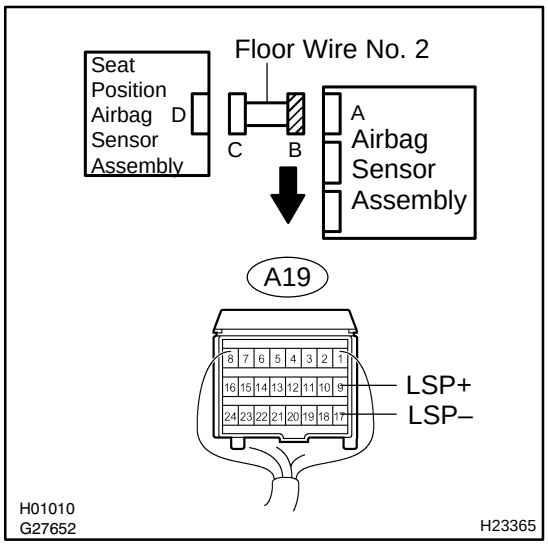
6	Check floor wire No. 2 (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–9 (LSP+) – Body ground	Always	1 MΩ or higher
A19–17 (LSP–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

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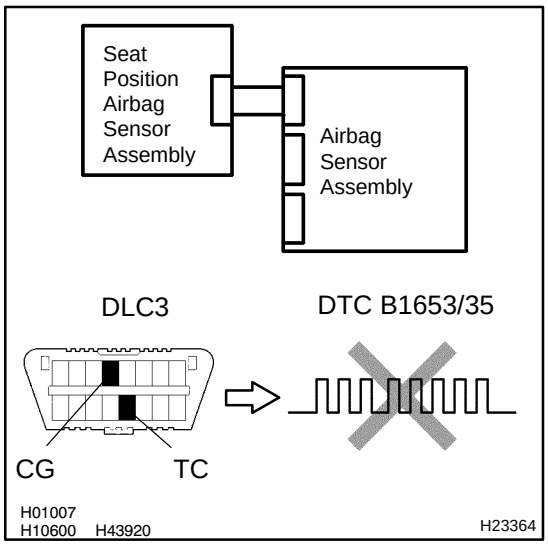
7	Check seat position airbag sensor assembly.



PREPARATION:

(a) Connect the connectors of the seat position airbag sensor assembly and the airbag sensor assembly.

(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1653/35 is not output.

HINT:

Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

NG	Go to step 8.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

8	Replace seat position airbag sensor assembly.

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Replace the seat position airbag sensor assembly (see page RS–104).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

NEXT

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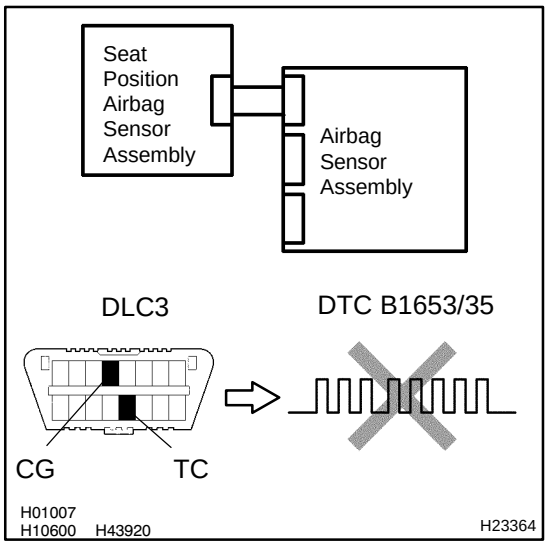
9	Check airbag sensor assembly.



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least for 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1653/35 is not output.

HINT:

Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

NG	**Replace airbag sensor assembly (see page RS–82).**

OK

END

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DIDH0–01

DTC	B1656/38	Seat Belt Buckle Switch (LH) Malfunction

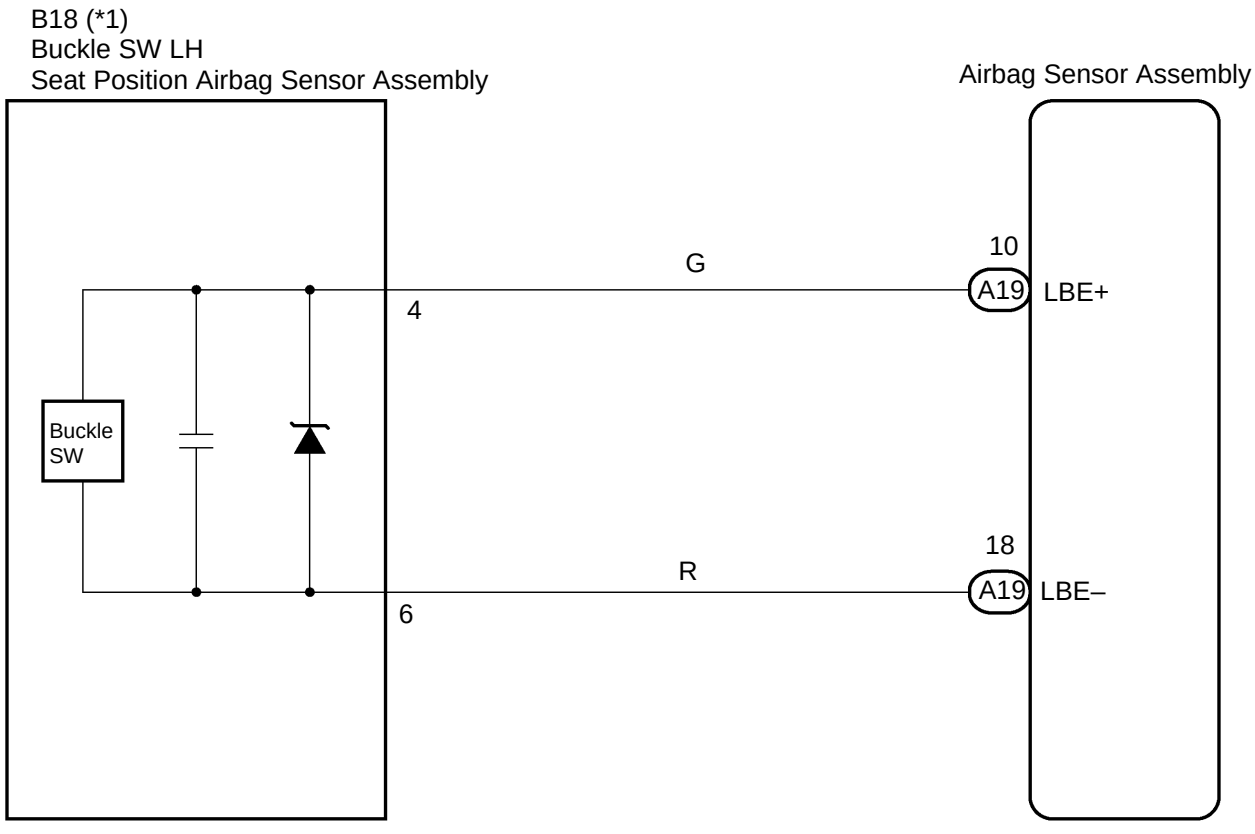
CIRCUIT DESCRIPTION

The seat belt buckle switch LH circuit consists of the airbag sensor assembly and the front seat inner belt LH.

DTC B1656/38 is recorded when a malfunction is detected in the seat belt buckle switch LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1656/38	▶The airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the seat belt buckle switch LH circuit for 2 seconds. ▶Front seat inner belt LH malfunction ▶Airbag sensor assembly malfunction	▶Front seat inner belt LH ▶Airbag sensor assembly ▶Floor wire No. 2

WIRING DIAGRAM



*1: The connectors of the seat position airbag sensor assembly and the front seat inner belt LH (buckle switch LH) are in common use.

H23244

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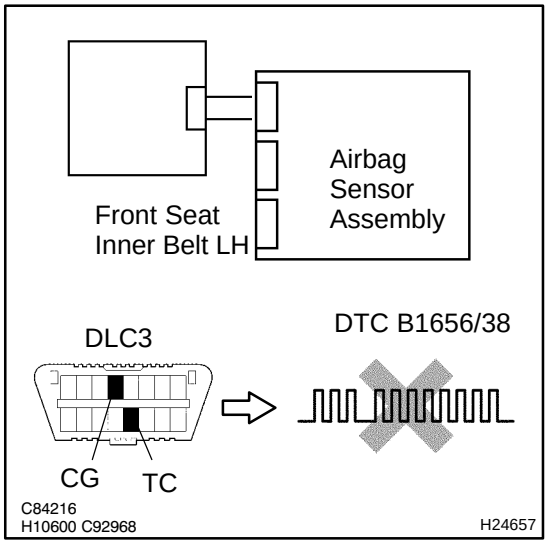
INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1656/38 is not output.

HINT:

Codes other than DTC B1656/38 may be output at this time, but they are not related to this check.

NG	**Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the front seat inner belt LH.

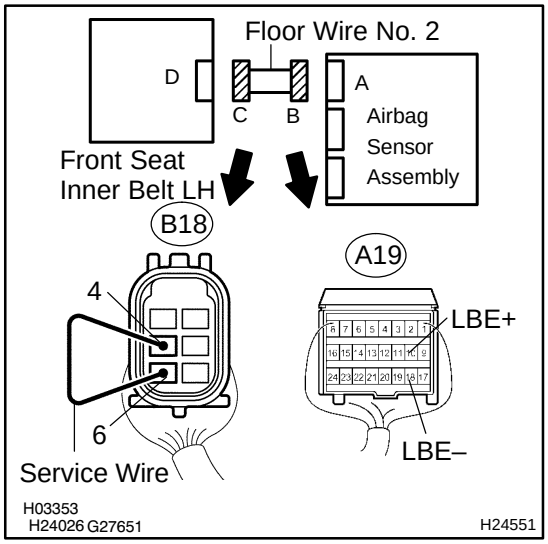
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check floor wire No. 2 (open).



PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly and the front seat inner belt LH.

(b) Using a service wire, connect B18–4 and B18–6 of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–10 (LBE+) – A19–18 (LBE–)	Always	Below 1 Ω

NG → **Repair or replace floor wire No. 2.**

OK

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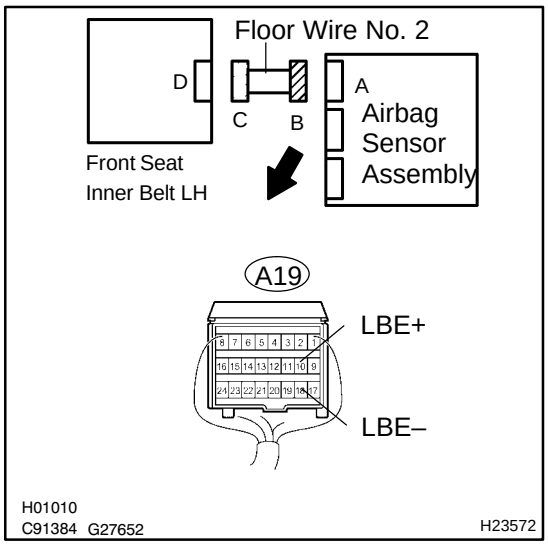
4	Check floor wire No. 2 (short).



PREPARATION:

Disconnect the service wire from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

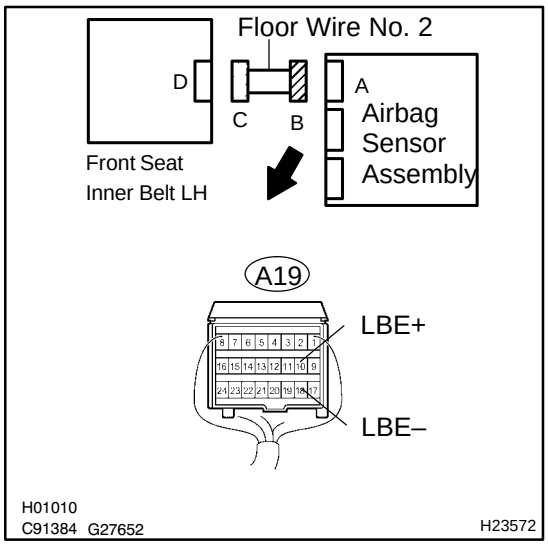
OK:

Tester Connection	Condition	Specified Condition
A19–10 (LBE+) – A19–18 (LBE–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

5	Check floor wire No. 2 (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–10 (LBE+) – Body ground	Ignition switch ON	Below 1 V
A19–18 (LBE–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire No. 2.**

OK

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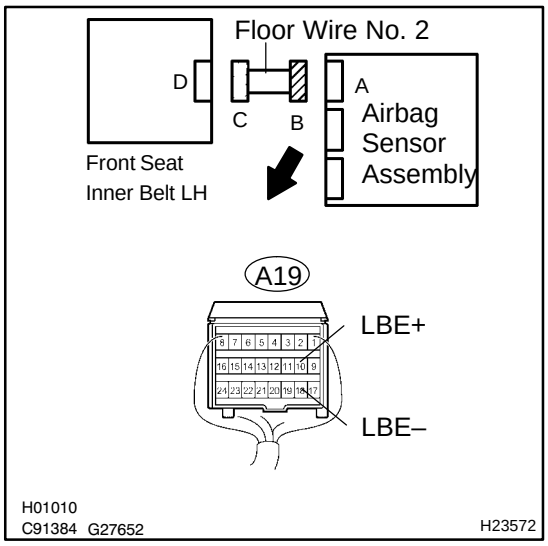
6	Check floor wire No. 2 (short to ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A19–10 (LBE+) – Body ground	Always	1 MΩ or higher
A19–18 (LBE–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

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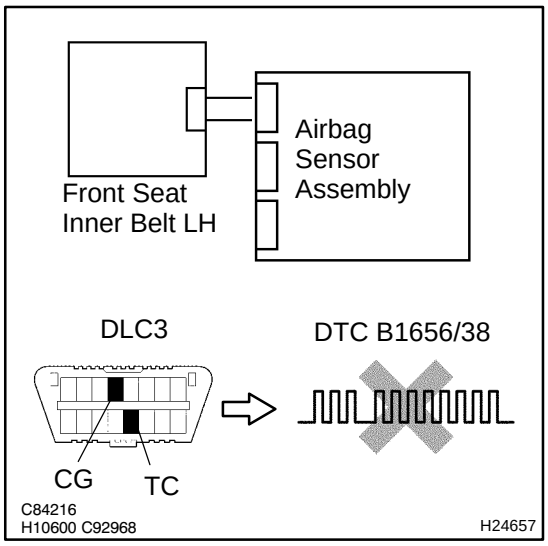
7	Check front seat inner belt LH.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly and the front seat inner belt LH.

(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1656/38 is not output.

HINT:

Codes other than DTC B1656/38 may be output at this time, but they are not related to this check.

NG	Go to step 8.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

8	Replace front seat inner belt LH.

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Replace the front seat inner belt LH (see page BO–112, BO–126).

HINT:

Perform inspection using parts from a normal vehicle if possible.

NEXT

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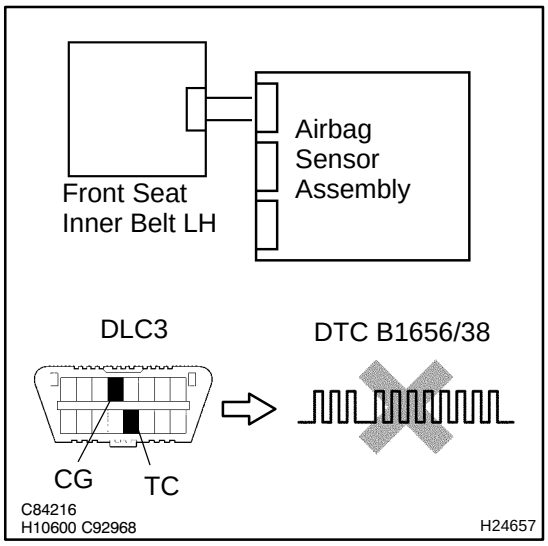
9	Check airbag sensor assembly.



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1656/38 is not output.

HINT:

Codes other than DTC B1656/38 may be output at this time, but they are not related to this check.

NG	Replace airbag sensor assembly (see page RS–82).

OK

END

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DIDH1–01

DTC	B1660/43	Passenger Airbag ON/OFF Indicator Malfunction

CIRCUIT DESCRIPTION

The passenger airbag ON/OFF indicator circuit consists of the airbag sensor assembly and the integration control and panel.

This circuit indicates the operation condition of the front passenger airbag assembly, the side airbag assembly RH and seat belt pretensioner RH.

DTC B1660/43 is recorded when a malfunction is detected in the passenger airbag ON/OFF indicator circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1660/43	▶The airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the passenger airbag ON/OFF indicator circuit for 2 seconds. ▶Passenger airbag ON/OFF indicator malfunction ▶Airbag sensor assembly malfunction	▶Integration control and panel (Passenger airbag ON/OFF indicator) ▶Airbag sensor assembly ▶Cowl wire

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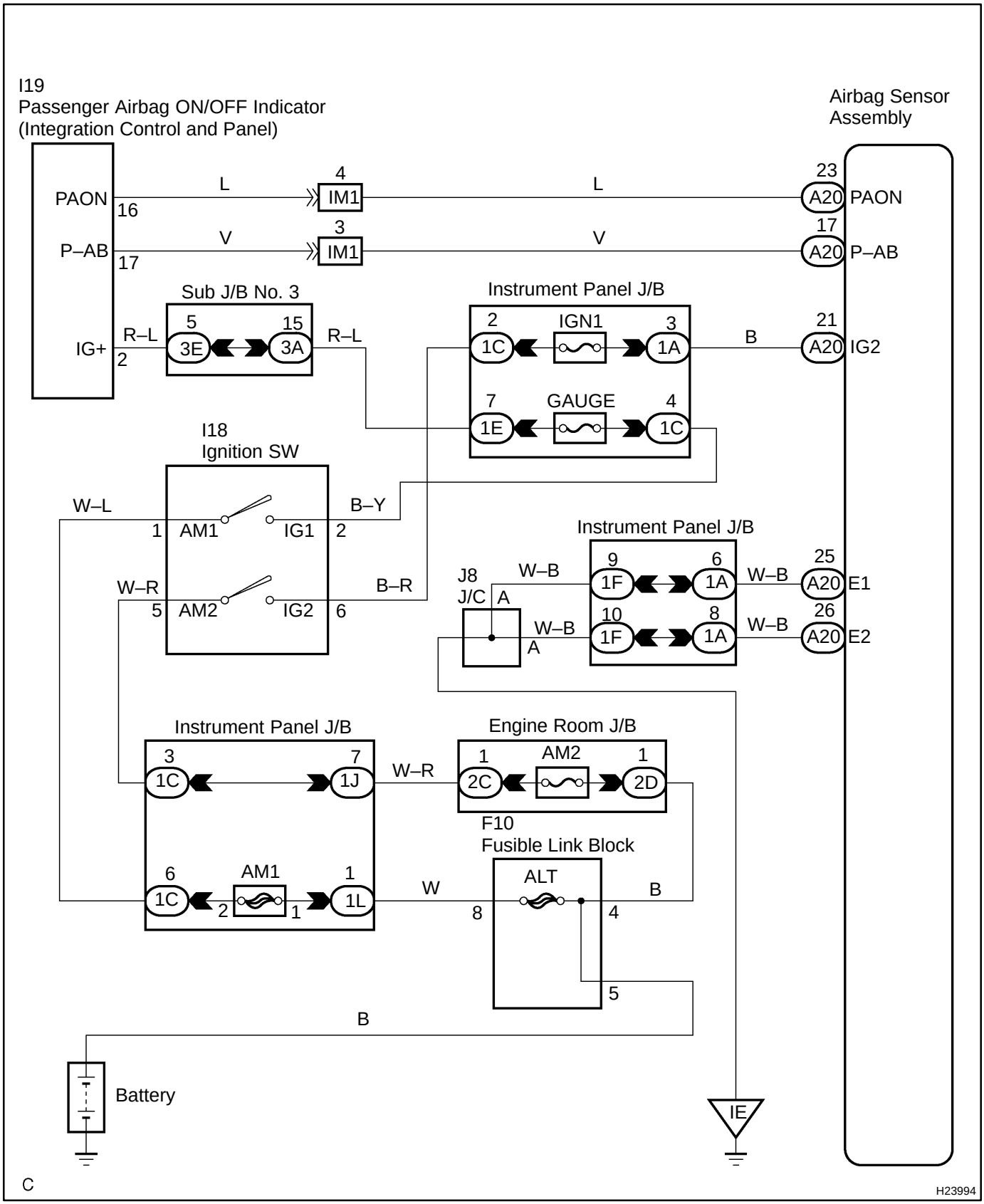
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check passenger airbag ON/OFF indicator.**

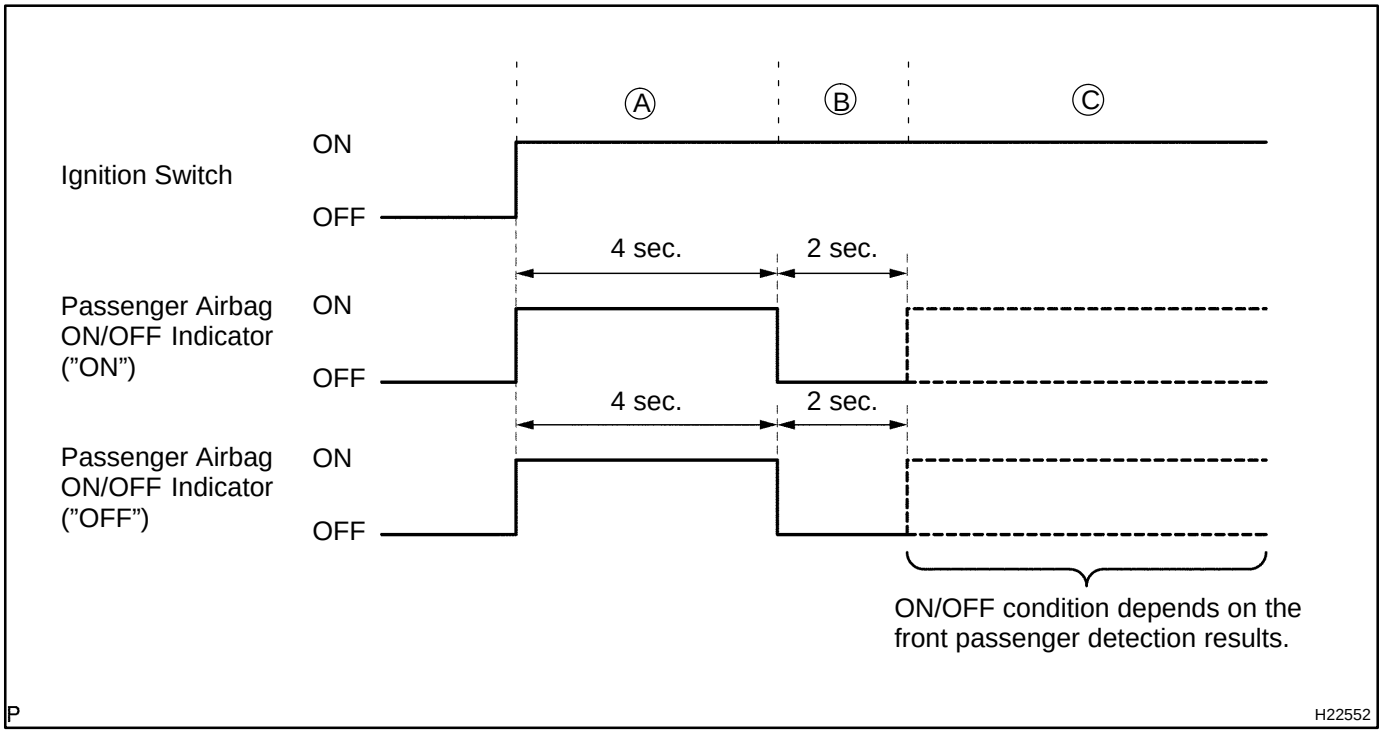
CHECK:

(a) Turn the ignition switch to the ON position.

(b) Check the passenger airbag ON/OFF indicator operation.

HINT:

Refer to the normal condition of the passenger airbag ON/OFF indicator (see page DI–1137).



RESULT:

A:

During period ”A” in the illustration, even if both the ”ON” and ”OFF” passenger airbag ON/OFF indicators normally come on, both of them do not go off during period ”B”.

During periods ”A” and ”B” in the illustration, even if both the ”ON” and ”OFF” passenger airbag ON/OFF indicators normally come on, both of them come on during period ”C”.

B:

During period ”A”, neither the ”ON” nor ”OFF” passenger airbag ON/OFF indicators come on, or either of them does not come on.

During period ”C”, even if the front passenger seat is occupied, neither the ”ON” nor ”OFF” passenger airbag ON/OFF indicators come on.

B	**Go to step 7.**

A

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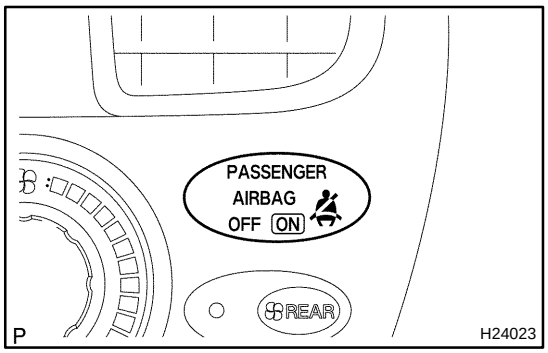
2	Check integration control and panel (passenger airbag ON/OFF indicator).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Check the passenger airbag ON/OFF indicator operation.

OK:

Neither the "ON" nor "OFF" passenger airbag ON/OFF indicators come on.

NG	Go to step 3.

OK

Replace airbag sensor assembly (see page RS–82).

3	Prepare for inspection.

PREPARATION:

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

NEXT

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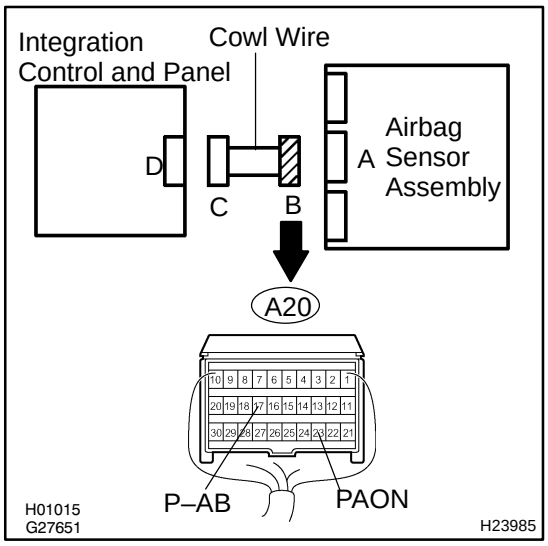
4	Check cowl wire (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

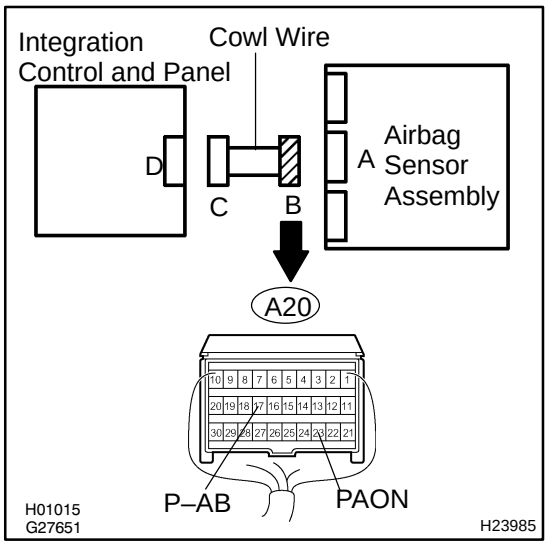
OK:

Tester Connection	Condition	Specified Condition
A20–17 (P–AB) – Body ground	Always	1 MΩ or higher
A20–23 (PAON) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

5	Check cowl wire (short).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–17 (P–AB) – A20–23 (PAON)	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

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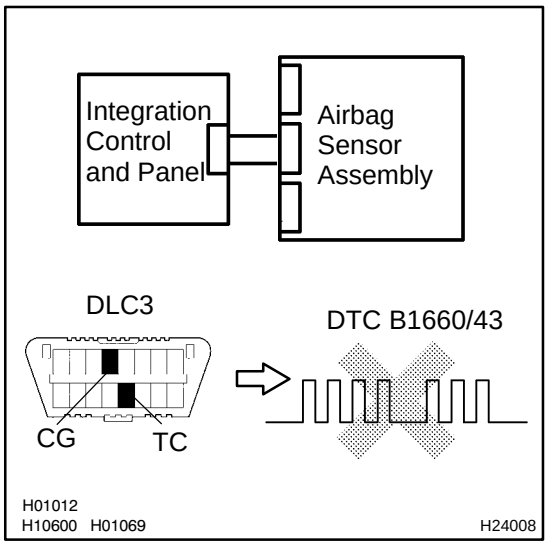
6	Check integration control and panel.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the connector to the integration control and panel.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1660/43 is not output.

HINT:

Codes other than DTC B1660/43 may be output at this time, but they are not related to this check.

NG	**Replace integration control and panel (see page BO–89).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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7	Prepare for inspection.

PREPARATION:

CAUTION:

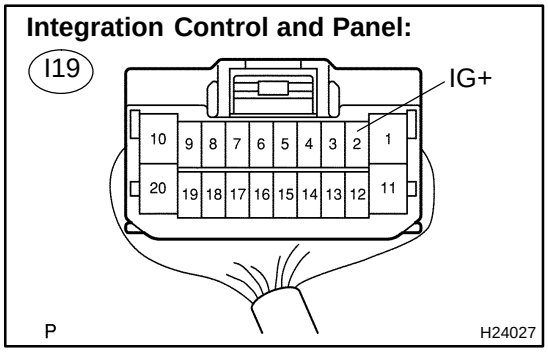
Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH.
(h) Disconnect the connectors from the front seat outer belt LH.

NEXT

8	Check cowl wire (source voltage).

Integration Control and Panel:



PREPARATION:

(a) Disconnect the connector from the integration control and panel.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
I19–2 (IG+) – Body ground	Ignition switch ON	10 to 14 V

NG → **Repair or replace cowl wire (integration control and panel – battery).**

OK

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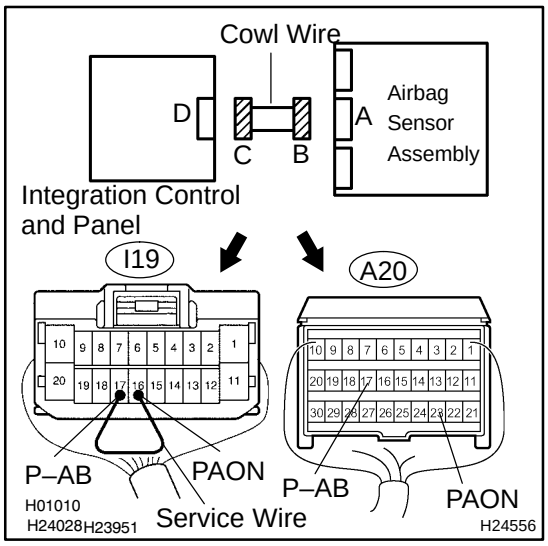
9	Check cowl wire (open).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect I19–17 (P–AB) and I19–16 (PAON) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–17 (P–AB) – A20–23 (PAON)	Always	Below 1 Ω

NG → **Repair or replace cowl wire.**

OK

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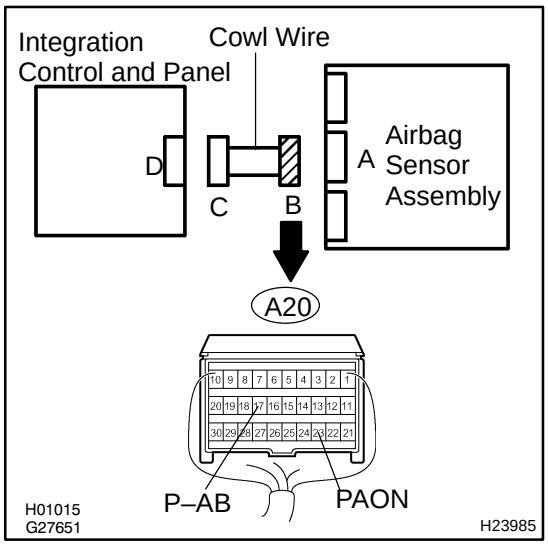
10	Check cowl wire (short to B+).



PREPARATION:

(a) Disconnect the service wire from connector "C".

(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

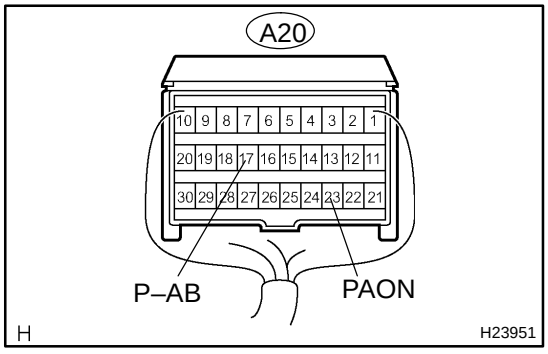
OK:

Tester Connection	Condition	Specified Condition
A20–17 (P–AB) – Body ground	Ignition switch ON	Below 1 V
A20–23 (PAON) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace cowl wire.**

OK

11	Check cowl wire (airbag sensor assembly – body ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–17 (P–AB) – Body ground	Always	1 MΩ or higher
A20–23 (PAON) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

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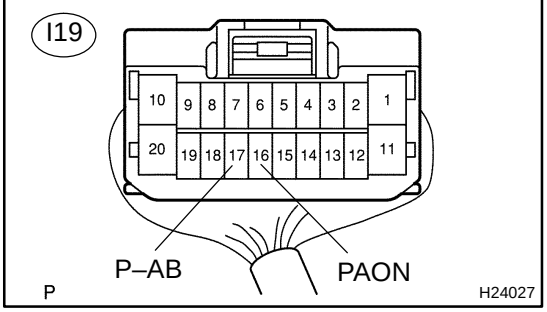
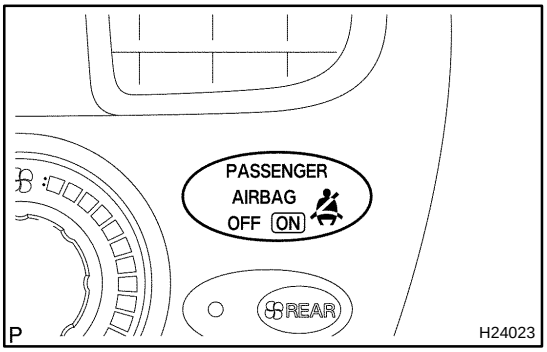
12	Check integration control and panel (passenger airbag ON/OFF indicator).

Integration Control and Panel:





OK

PREPARATION:

(a) Connect the connector to the integration control and panel.

(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Check that the passenger airbag ON/OFF indicator condition in the table below.

OK:

Tester Connection	Condition	Indicator
I19–16 (PAON) – Body ground	Ignition switch ON	ON indicator comes on
I19–17 (P–AB) – Body ground	Ignition switch ON	OFF indicator comes on

NG → **Replace integration control and panel (see page BO–89).**

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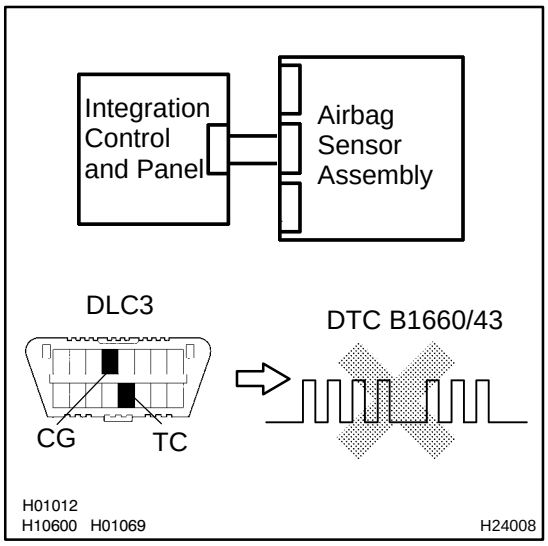
13	Check airbag sensor assembly.



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag sensor assembly.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1660/43 is not output.

HINT:
Codes other than DTC B1660/43 may be output at this time, but they are not related to this check.

NG	**Replace airbag sensor assembly (see page RS–82).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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DIDH2–01

DTC	B1661/44	Roll Over Cut Off Indicator Malfunction

CIRCUIT DESCRIPTION

The RSCA OFF switch is a mechanism that operates both right and left side of the curtain shield airbag assembly and the seat belt pretensioners when the airbag sensor assembly detects a roll–over.
The RSCA OFF indictor is installed in the combination meter.
As operating the RSCA OFF switch, the indicator comes on to inform the driver that the roll–over detection system is not working.
The initial setting of the roll–over detection system is on. It automatically operates every time the ignition switch is turned on.

DTC No.	DTC Detecting Condition	Trouble Area
B1661/44	▶The airbag sensor assembly receives an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the roll over cut off indicator circuit for 2 seconds. ▶RSCA OFF indicator malfunction ▶Airbag sensor assembly malfunction	▶Combination meter (RSCA OFF indicator) ▶Airbag sensor assembly ▶Cowl wire

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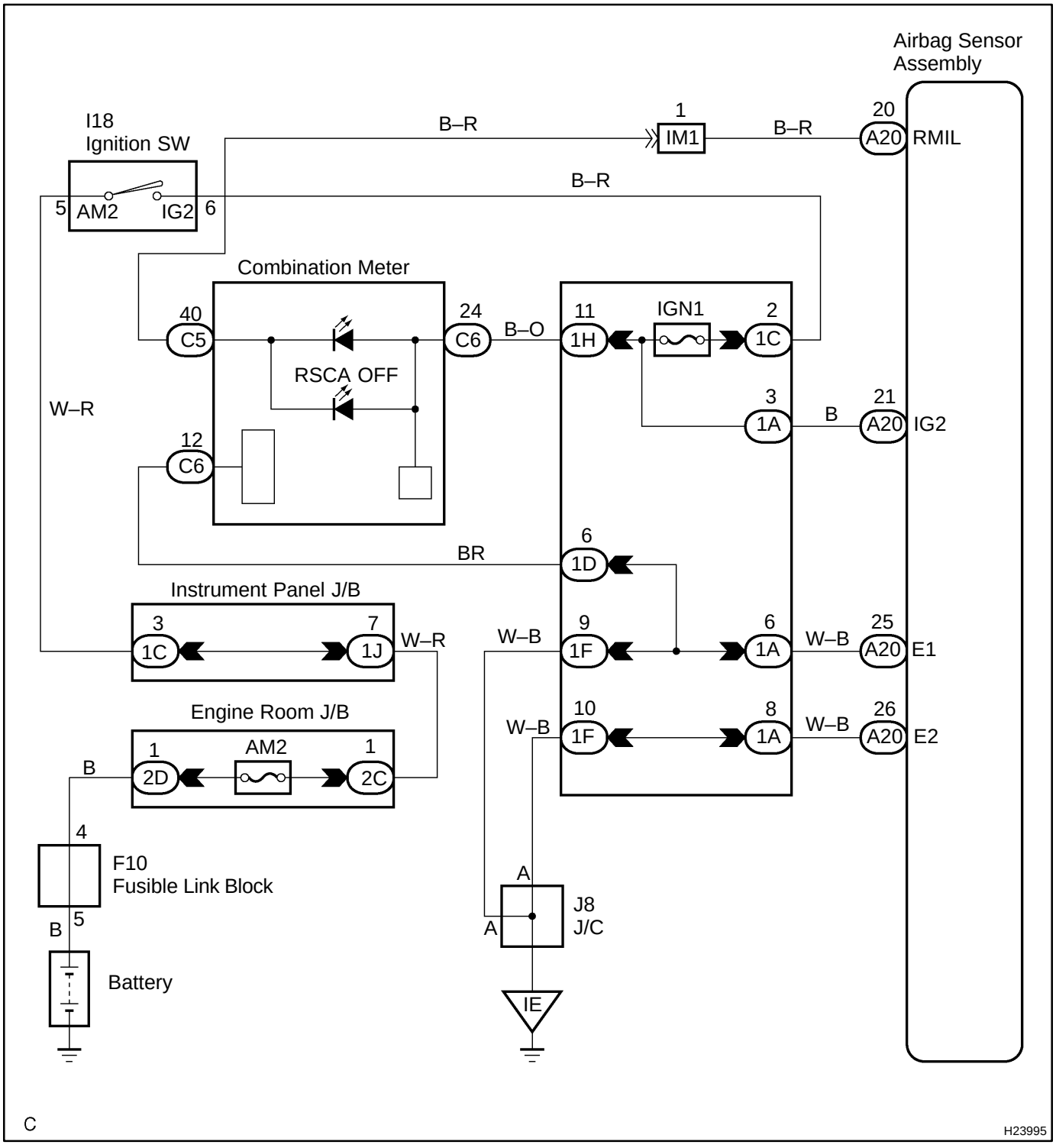
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check RSCA OFF indicator condition.**

CHECK:

Turn the ignition switch to the ON position, check the RSCA OFF indicator condition.

RESULT:

The RSCA OFF indicator does not come on when the RSCA OFF switch is operate (remains off).	A
The RSCA OFF indicator remains on when the RSCA OFF switch is not operate (remains on).	B

B → **Go to step 7.**

A

2	**Prepare for inspection.**

PREPARATION:

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

NEXT

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3	Check battery.

CHECK:

Measure the voltage of the battery.

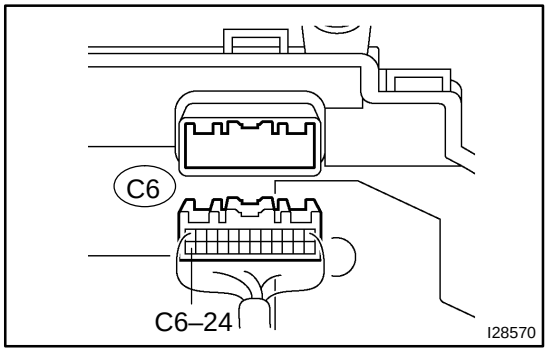
OK:

Voltage: 11 to 14 V

NG → **Replace battery.**

OK

4	Check combination meter (source voltage).



PREPARATION:

Disconnect the connector from the combination meter.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C6–24 – Body ground	Ignition switch ON	8 to 14 V

NG → **Repair or replace wire harness (combination meter – battery).**

OK

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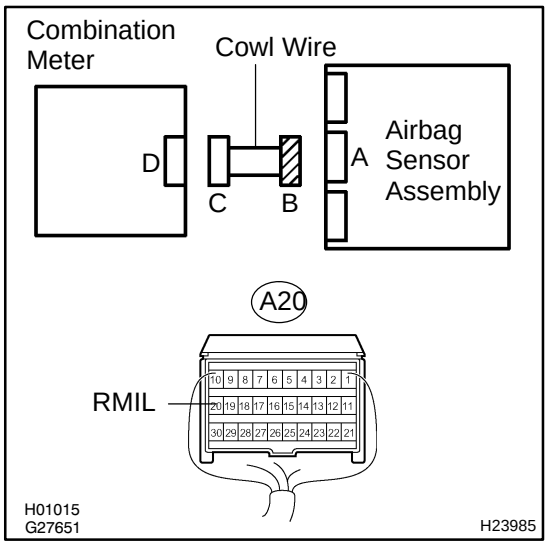
5	Check cowl wire (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–20 (RMIL) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace cowl wire.**

OK

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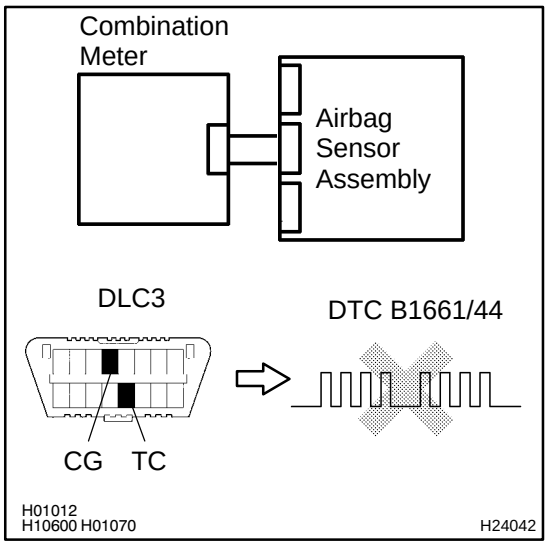
6	Check airbag sensor assembly.



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the airbag sensor assembly and the combination meter.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1661/44 is not output.

HINT:

Codes other than DTC B1661/44 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

HINT:

If the DTC B1661/44 is output after replacing the airbag sensor assembly, there may be trouble in the combination meter.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal To make sure of this, use the simulation method to check (see page DI–1137).

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7	**Check connection of connectors.**

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and the combination meter.

OK:

The connectors are connected securely.

NG → **Connect connector, then go to step 1.**

OK

8	**Prepare for inspection.**

PREPARATION:

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Disconnect the connectors from the airbag sensor assembly.

(b) Disconnect the connectors from the steering wheel pad.

(c) Disconnect the connectors from the front passenger airbag assembly.

(d) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.

(e) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.

(f) Disconnect the connectors from the front seat outer belt LH and RH.

NEXT

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9	Check combination meter.

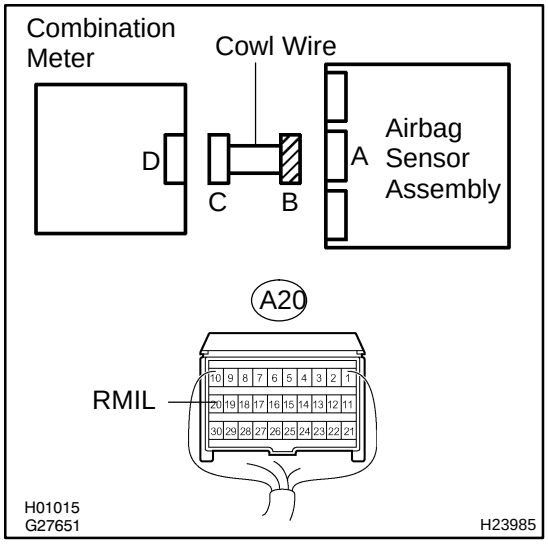
PREPARATION:
Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
CHECK:
Turn the ignition switch to the ON position, and check the RSCA OFF indicator condition.
OK:

The RSCA OFF indicator comes on when the RSCA OFF switch is ON.

NG	Go to combination meter system (see page DI–1610).

OK

10	Check cowl wire (short to ground).



PREPARATION:
(a) Turn the ignition switch to the LOCK position.
(b) DIsconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the combination meter.
CHECK:
Measure the resistance according to the value(s) in the table below.
OK:

Tester Connection	Condition	Specified Condition
A20–20 (RMIL) – Body ground	Always	1 MΩ or higher

NG	Repair or replace cowl wire.

OK

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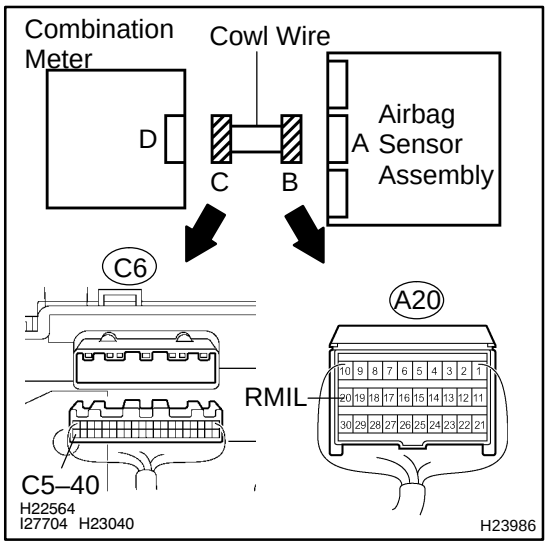
11	Check cowl wire (airbag sensor assembly – combination meter).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–20 (RMIL) – C5–40	Always	Below 1 Ω

NG → **Repair or replace cowl wire.**

OK

Replace airbag sensor assembly (see page RS–82).

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DIDH3–01

DTC	B1662/45	SRS Warning Light Circuit Malfunction

CIRCUIT DESCRIPTION

The SRS warning light circuit consists of the airbag sensor assembly and the combination meter.
When the airbag sensor assembly detects a malfunction in the SRS airbag system, the SRS warning light comes on to inform the driver.
It also comes on when the power voltage drops, and automatically goes off in approximately 10 seconds after the power voltage returns to normal (DTC is not stored).
The SRS warning light comes on for 6 seconds after the ignition switch is turned to the ON position and goes off if the system is normal.
When an open circuit is detected, such as when the connector between the combination meter and the airbag sensor assembly is disconnected, the SRS warning light remains on even when approximately 6 seconds elapsed after the ignition switch is turned to the ON position.
DTC B1662/45 is recorded when a malfunction is detected in the SRS warning light circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1662/45	▶The airbag sensor assembly receives an open circuit signal or a short circuit to ground signal in the SRS warning light circuit for 2 seconds. ▶SRS warning light malfunction ▶Airbag sensor assembly malfunction	▶Combination meter (SRS warning light) ▶Airbag sensor assembly ▶Cowl wire

HINT:
When DTC B1662/45 and B1000/31 are output simultaneously, perform the troubleshooting for DTC B1662/45 first.

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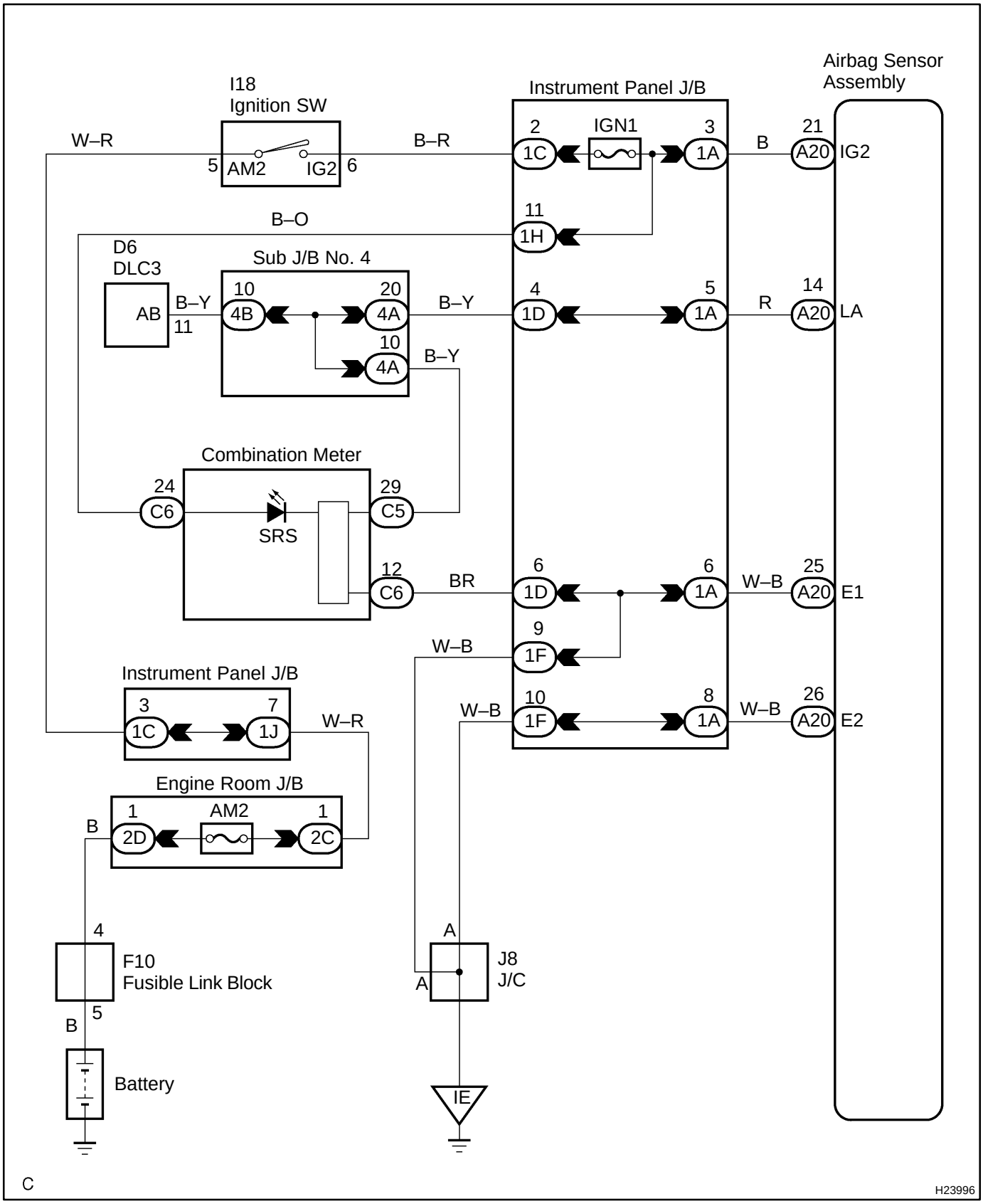
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check battery.**

CHECK:

Measure the voltage of the battery.

OK:

Voltage: 11 to 14 V

NG → **Replace battery.**

OK

2	**Check connection of connectors.**

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and combination meter.

OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	**Check combination meter.**

PREPARATION:

(a) Disconnect the connectors from the airbag sensor assembly.

(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

Turn the ignition switch to the ON position, check the operation of the SRS warning light.

OK:

The SRS warning light comes on (goes off 6 seconds after the ignition switch is turned to the ON position).

NG → **Go to combination meter system (see page DI–1610).**

OK

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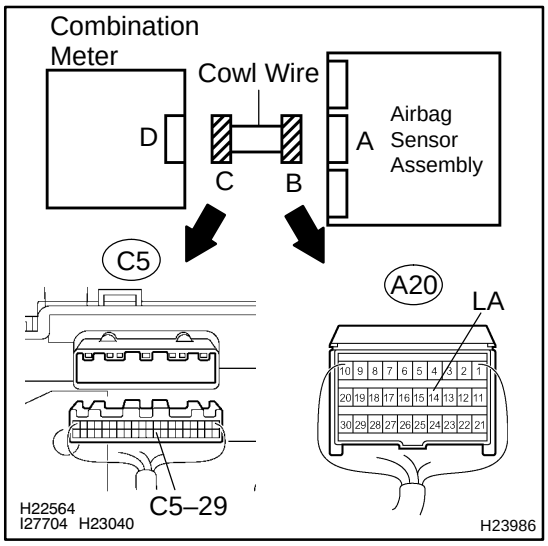
4	Check cowl wire (airbag sensor assembly – combination meter).



PREPARATION:

Disconnect the connector from the combination meter.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–14 (LA) – C5–29	Always	Below 1 Ω
A20–14 (LA) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

Replace airbag sensor assembly (see page RS–82).

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DIDH4–01

DTC	B1771	Passenger Side Buckle Switch Circuit Malfunction

CIRCUIT DESCRIPTION

The passenger side buckle switch circuit consists of the occupant classification ECU and the front seat inner belt RH.

DTC B1771 is recorded when a malfunction is detected in the passenger side buckle switch circuit.

Troubleshoot DTC B1771 first when the DTC B1771 and B1795 are output simultaneously.

DTC No.	DTC Detecting Condition	Trouble Area
B1771	▶The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the passenger side buckle switch circuit for 2 seconds. ▶Passenger side buckle switch malfunction ▶Occupant classification ECU malfunction	▶Front seat inner belt RH ▶Occupant classification ECU ▶Seat wire No. 1

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1771 is output, perform troubleshooting for the DTC.

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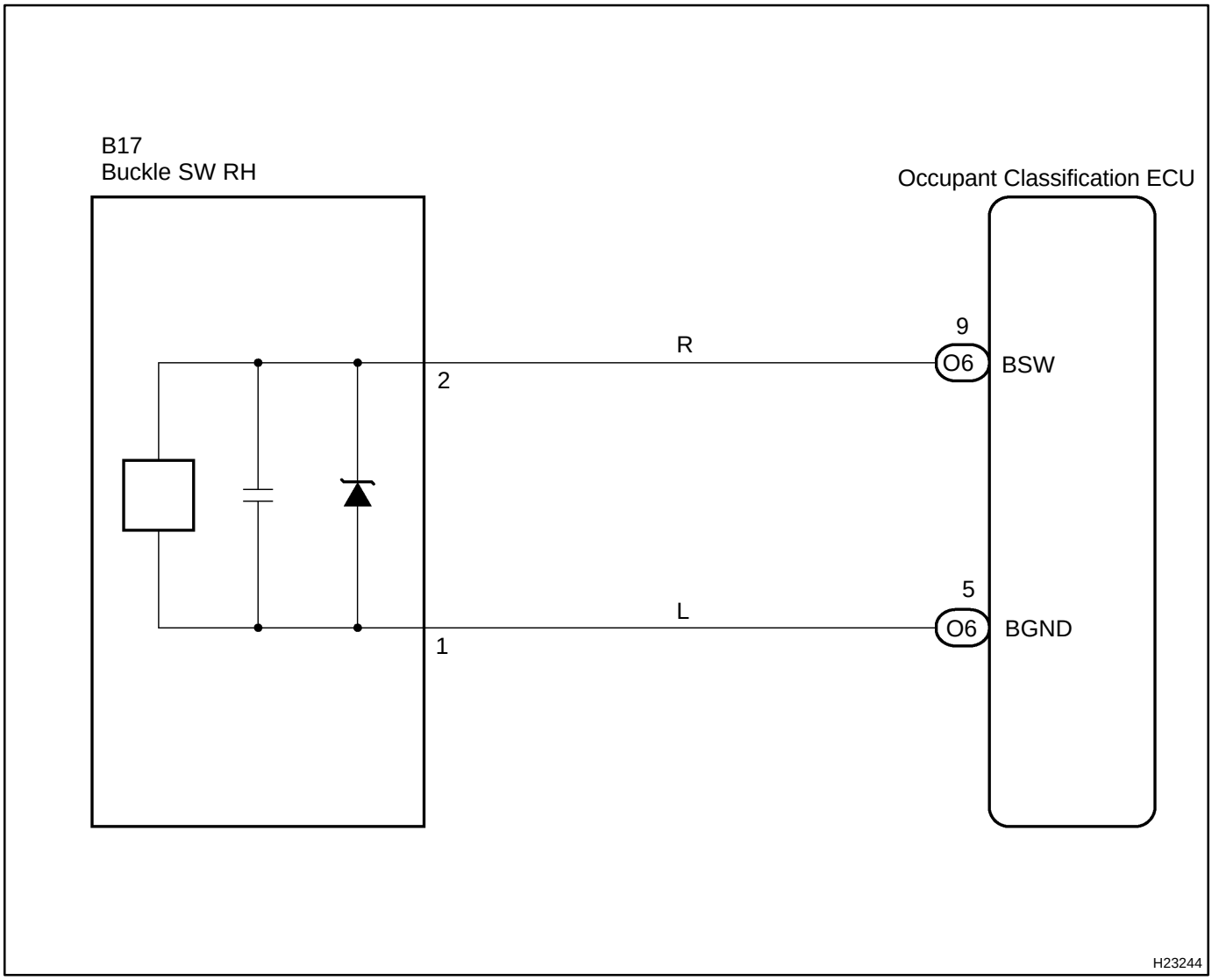
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If troubleshooting (wire harness inspection) is difficult to perform, remove the passenger seat installation bolts to see the under surface of seat cushion.
- ▶ In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1771 is not output.

HINT:

Codes other than DTC B1771 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the occupant classification ECU and the front seat inner belt RH.

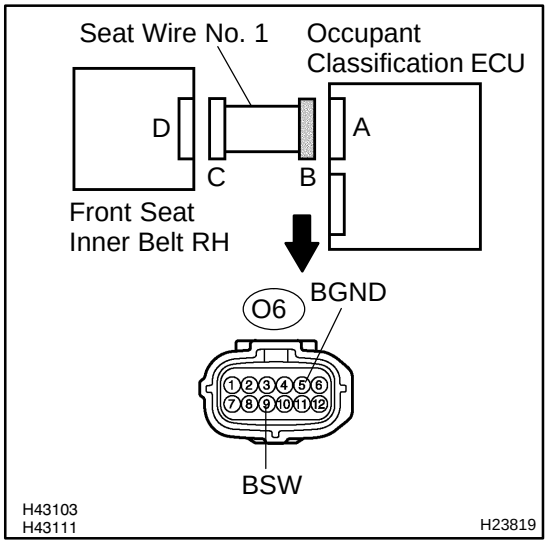
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check seat wire No. 1 (short to B+).



PREPARATION:

(a) Disconnect the connectors from the occupant classification ECU and the front seat inner belt RH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

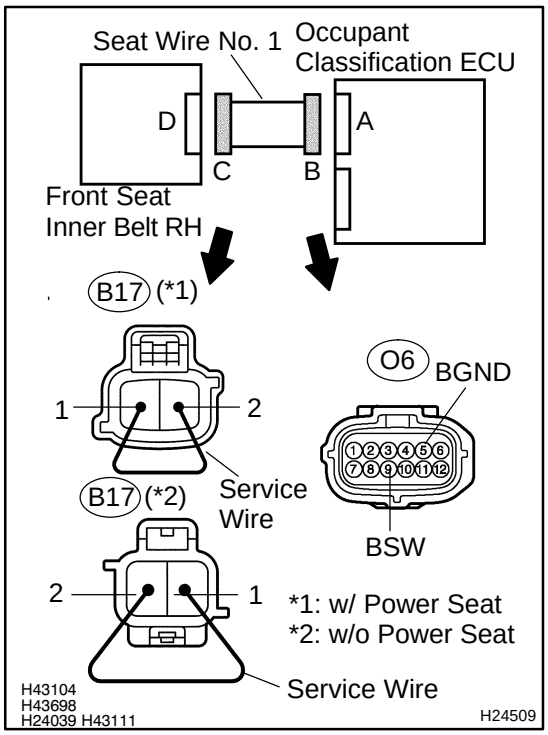
Tester Connection	Condition	Specified Condition
O6–9 (BSW) – Body ground	Ignition switch ON	Below 1 V
O6–5 (BGND) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace seat wire No. 1.**

OK

Dardoor.com

4	Check seat wire No. 1 (open).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect B17–1 and B17–2 of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

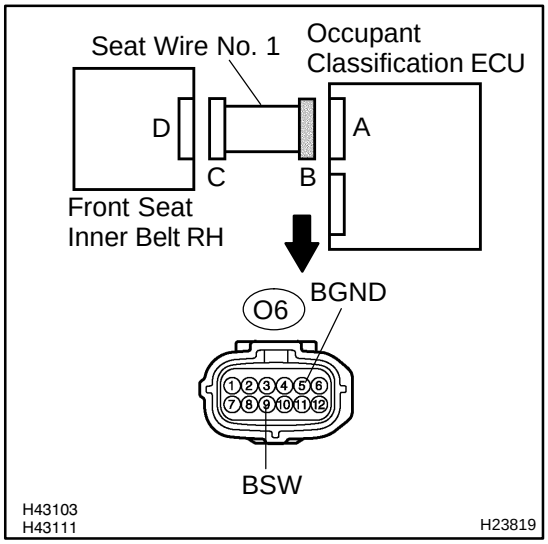
OK:

Tester Connection	Condition	Specified Condition
O6–9 (BSW) – O6–5 (BGND)	Always	Below 1 Ω

NG → **Repair or replace seat wire No. 1.**

OK

5	Check seat wire No. 1 (short).



PREPARATION:

Disconnect the service wire from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O6–9 (BSW) – O6–5 (BGND)	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

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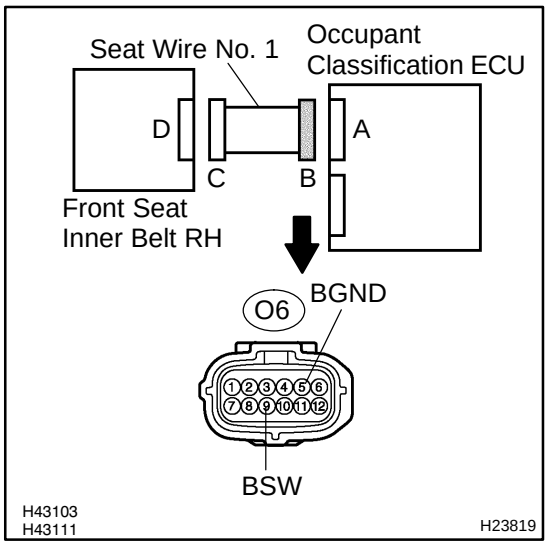
6	Check seat wire No. 1 (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O6–9 (BSW) – Body ground	Always	1 MΩ or higher
O6–5 (BGND) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

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7	**Check DTC.**

PREPARATION:

(a) Connect the connectors to the occupant classification ECU and the front seat inner belt RH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1771 is not output.

HINT:

Codes other than DTC B1771 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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8	**Replace front seat inner belt RH.**

PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat inner belt RH (see page BO–112, BO–126).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(d) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1771 is not output.

HINT:

Codes other than DTC B1771 may be output at this time, but they are not related to this check.

NG → **Go to step 9.**

OK

END

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9	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the ON position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

NEXT

10	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

11	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Dardoor.com

DIDH5–01

DTC	B1780	Occupant Classification Sensor Front LH Circuit Malfunction

CIRCUIT DESCRIPTION

The occupant classification sensor front LH circuit consists of the occupant classification ECU and the occupant classification sensor front LH.
DTC B1780 is recorded when a malfunction is detected in the occupant classification sensor front LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1780	▶The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification sensor front LH circuit for 2 seconds. ▶Occupant classification sensor front LH malfunction ▶Occupant classification ECU malfunction	▶Front seat assembly RH (Occupant classification sensor front LH) ▶Occupant classification ECU ▶Seat wire No. 1

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1780 is output, perform troubleshooting for the DTC.

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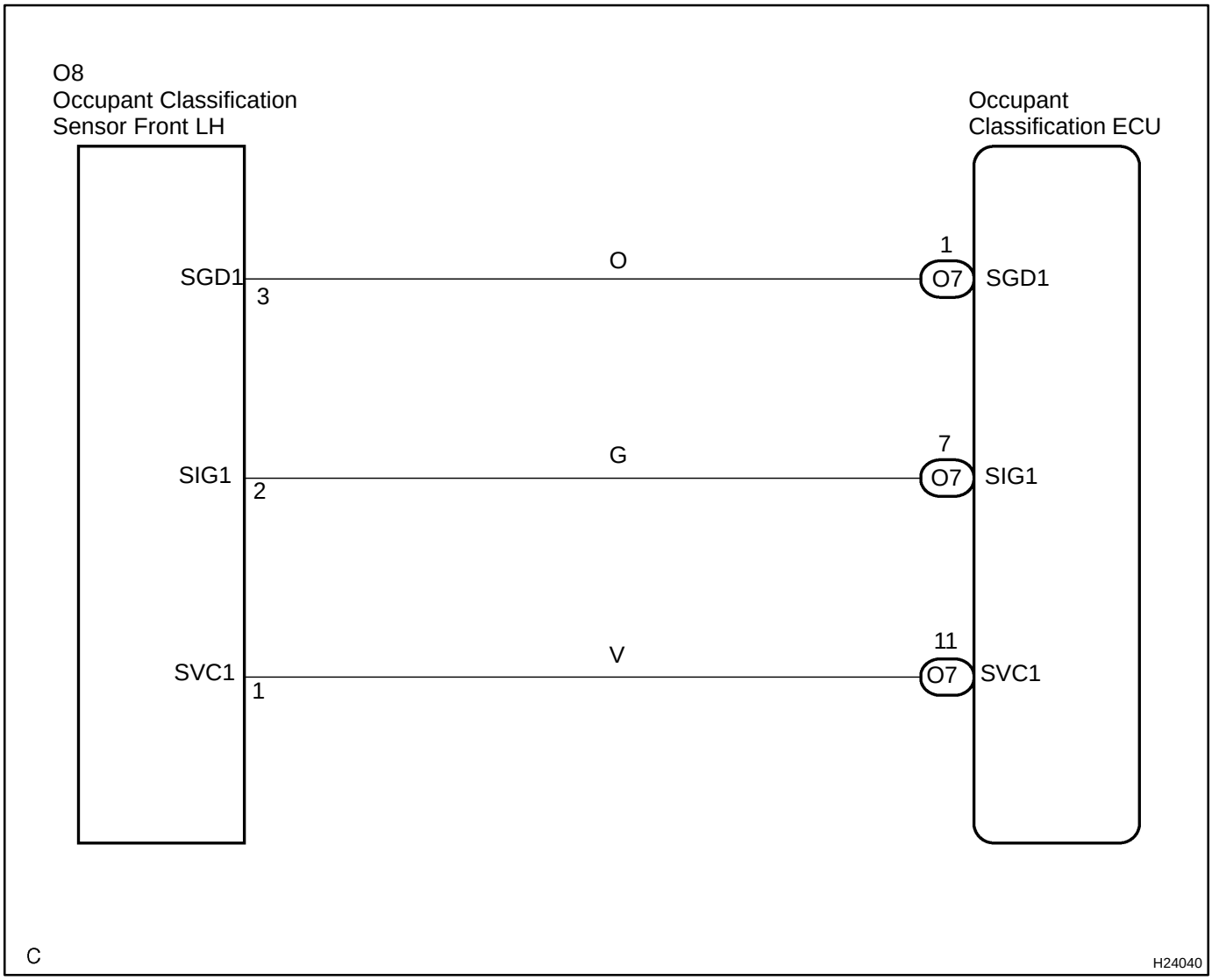
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If troubleshooting (wire harness inspection) is difficult to perform, remove the passenger seat installation bolts to see the under surface of seat cushion.
- ▶ In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1780 is not output.

HINT:

Codes other than DTC B1780 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensor front LH.

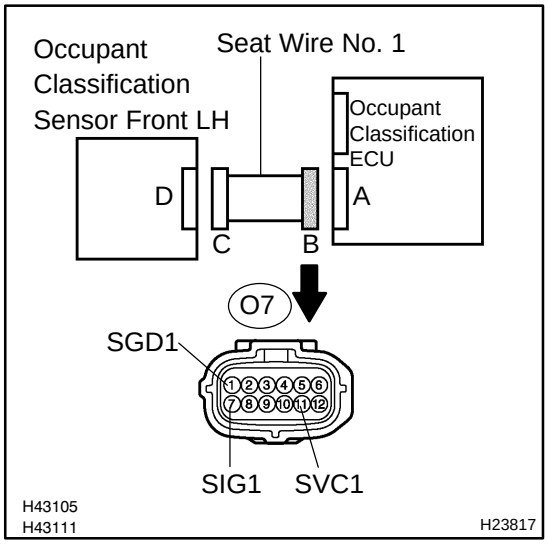
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check seat wire No. 1 (short to B+).



PREPARATION:

(a) Disconnect the connectors from the occupant classification ECU and the occupant classification sensor front LH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

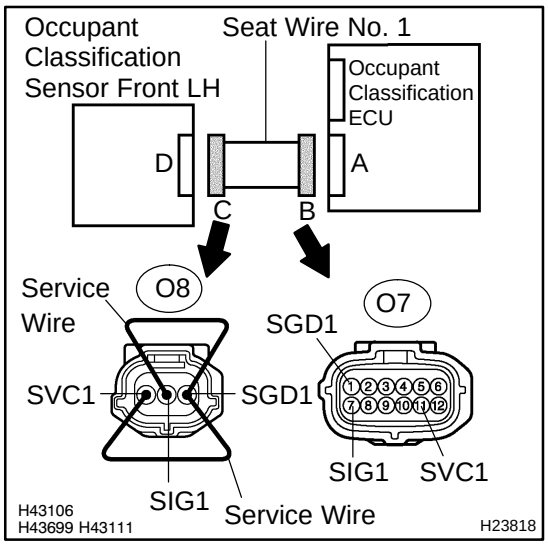
Tester Connection	Condition	Specified Condition
O7–1 (SGD1) – Body ground	Ignition switch ON	Below 1 V
O7–7 (SIG1) – Body ground	Ignition switch ON	Below 1 V
O7–11 (SVC1) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace seat wire No. 1.**

OK

Dardoor.com

4	Check seat wire No. 1 (open).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect O8–1 (SVC1) and O8–3 (SGD1), O8–2 (SIG1) and O8–3 (SGD1) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–11 (SVC1) – O7–1 (SGD1)	Always	Below 1 Ω
O7–7 (SIG1) – O7–1 (SGD1)	Always	Below 1 Ω

NG	Repair or replace seat wire No. 1.

OK

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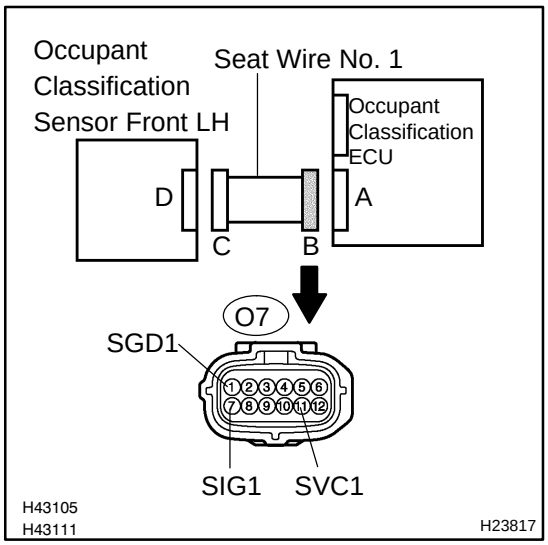
5	Check seat wire No. 1 (short).



PREPARATION:

Disconnect the service wire from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

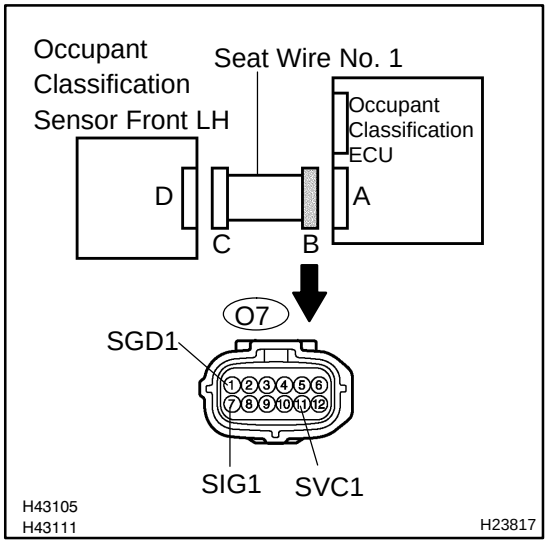
OK:

Tester Connection	Condition	Specified Condition
O7–7 (SIG1) – O7–1 (SGD1)	Always	1 MΩ or higher
O7–11 (SVC1) – O7–1 (SGD1)	Always	1 MΩ or higher
O7–7 (SIG1) – O7–11 (SVC1)	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

6	Check seat wire No. 1 (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–1 (SGD1) – Body ground	Always	1 MΩ or higher
O7–7 (SIG1) – Body ground	Always	1 MΩ or higher
O7–11 (SVC1) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

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7	**Check DTC.**

PREPARATION:

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor front LH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1780 is not output.

HINT:

Codes other than DTC B1780 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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8	Replace occupant classification ECU.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	Perform zero point calibration.

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 12.**

OK

10	Perform sensitivity check.

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12.**

OK

Dardoor.com

11	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1780 is not output.

HINT:

Codes other than DTC B1780 may be output at this time, but they are not related to this check.

NG → **Go to step 12.**

OK ↓

END

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12	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

NEXT

13	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

14	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Dardoor.com

DIDH6–01

DTC	B1781	Occupant Classification Sensor Front RH Circuit Malfunction

CIRCUIT DESCRIPTION

The occupant classification sensor front RH circuit consists of the occupant classification ECU and the occupant classification sensor front RH.
DTC B1781 is recorded when a malfunction is detected in the occupant classification sensor front RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1781	▶The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification sensor front RH for 2 seconds. ▶Occupant classification sensor front RH malfunction ▶Occupant classification ECU malfunction	▶Front seat assembly RH (Occupant classification sensor front RH) ▶Occupant classification ECU ▶Seat wire No. 1

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1781 is output, perform troubleshooting for the DTC.

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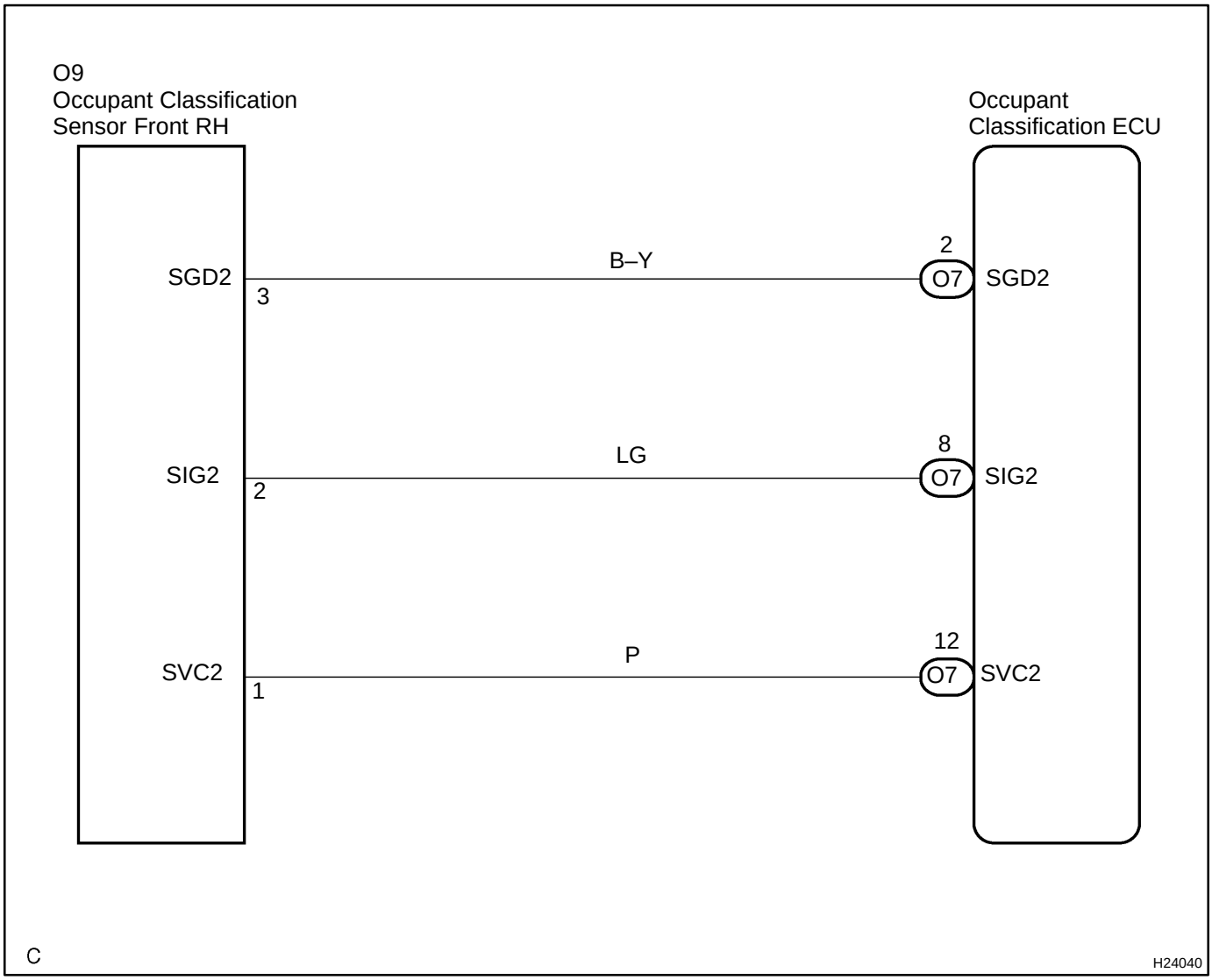
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If troubleshooting (wire harness inspection) is difficult to perform, remove the passenger seat installation bolts to see the under surface of seat cushion.
- ▶ In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1781 is not output.

HINT:

Codes other than DTC B1781 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensor front RH.

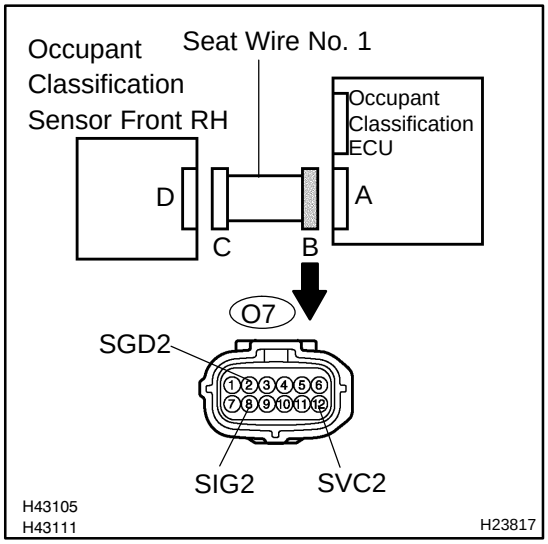
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check seat wire No. 1 (short to B+).



PREPARATION:

(a) Disconnect the connectors from the occupant classification ECU and the occupant classification sensor front RH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

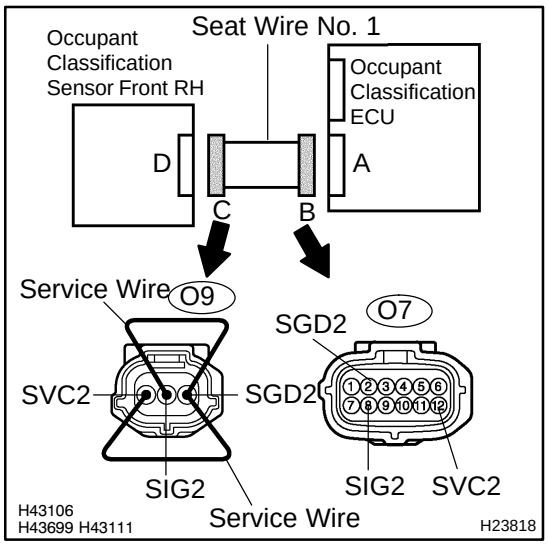
Tester Connection	Condition	Specified Condition
O7–2 (SGD2) – Body ground	Ignition switch ON	Below 1 V
O7–8 (SIG2) – Body ground	Ignition switch ON	Below 1 V
O7–12 (SVC2) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace seat wire No. 1.**

OK

Dardoor.com

4	Check seat wire No. 1 (open).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect O9–1 (SVC2) and O9–3 (SGD2), O9–2 (SIG2) and O9–3 (SGD2) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–12 (SVC2) – O7–2 (SGD2)	Always	Below 1 Ω
O7–8 (SIG2) – O7–2 (SGD2)	Always	Below 1 Ω

NG	Repair or replace seat wire No. 1.

OK

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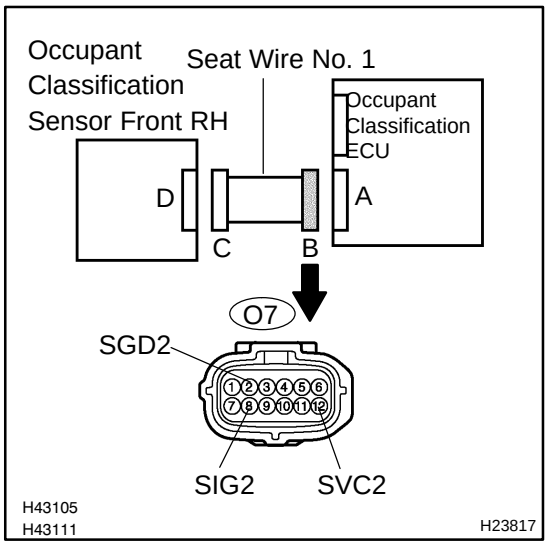
5	Check seat wire No. 1 (short).



PREPARATION:

Disconnect the service wire from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

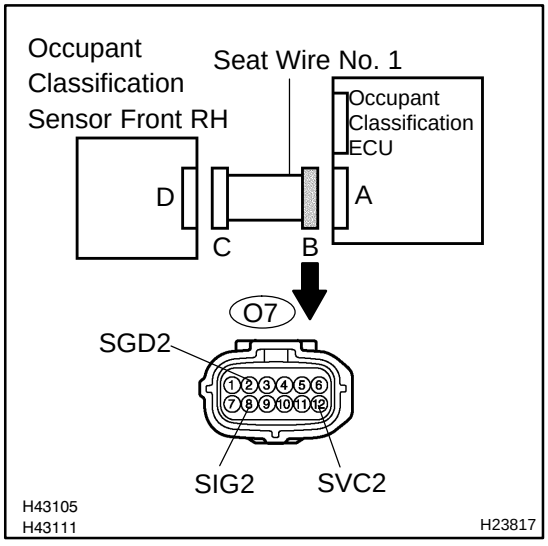
OK:

Tester Connection	Condition	Specified Condition
O7–8 (SIG2) – O7–2 (SGD2)	Always	1 MΩ or higher
O7–12 (SVC2) – O7–2 (SGD2)	Always	1 MΩ or higher
O7–8 (SIG2) – O7–12 (SVC2)	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

6	Check seat wire No. 1 (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–8 (SIG2) – Body ground	Always	1 MΩ or higher
O7–12 (SVC2) – Body ground	Always	1 MΩ or higher
O7–2 (SGD2) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

Dardoor.com

7	**Check DTC.**

PREPARATION:

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor front RH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1781 is not output.

HINT:

Codes other than DTC B1781 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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8	Replace occupant classification ECU.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	Perform zero point calibration.

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 12.**

OK

10	Perform sensitivity check.

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12.**

OK

Dardoor.com

11	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1781 is not output.

HINT:

Codes other than DTC B1781 may be output at this time, but they are not related to this check.

NG → **Go to step 12.**

OK ↓

END

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12	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

NEXT

13	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

14	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

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DIDH7–01

DTC	B1782	Occupant Classification Sensor Rear LH Circuit Malfunction

CIRCUIT DESCRIPTION

The occupant classification sensor rear LH circuit consists of the occupant classification ECU and the occupant classification sensor rear LH.
DTC B1782 is recorded when a malfunction is detected in the occupant classification sensor rear LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1782	▶The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification sensor rear LH circuit for 2 seconds. ▶Occupant classification sensor rear LH malfunction ▶Occupant classification ECU malfunction	▶Front seat assembly RH (Occupant classification sensor rear LH) ▶Occupant classification ECU ▶Seat wire No. 1

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1782 is output, perform troubleshooting for the DTC.

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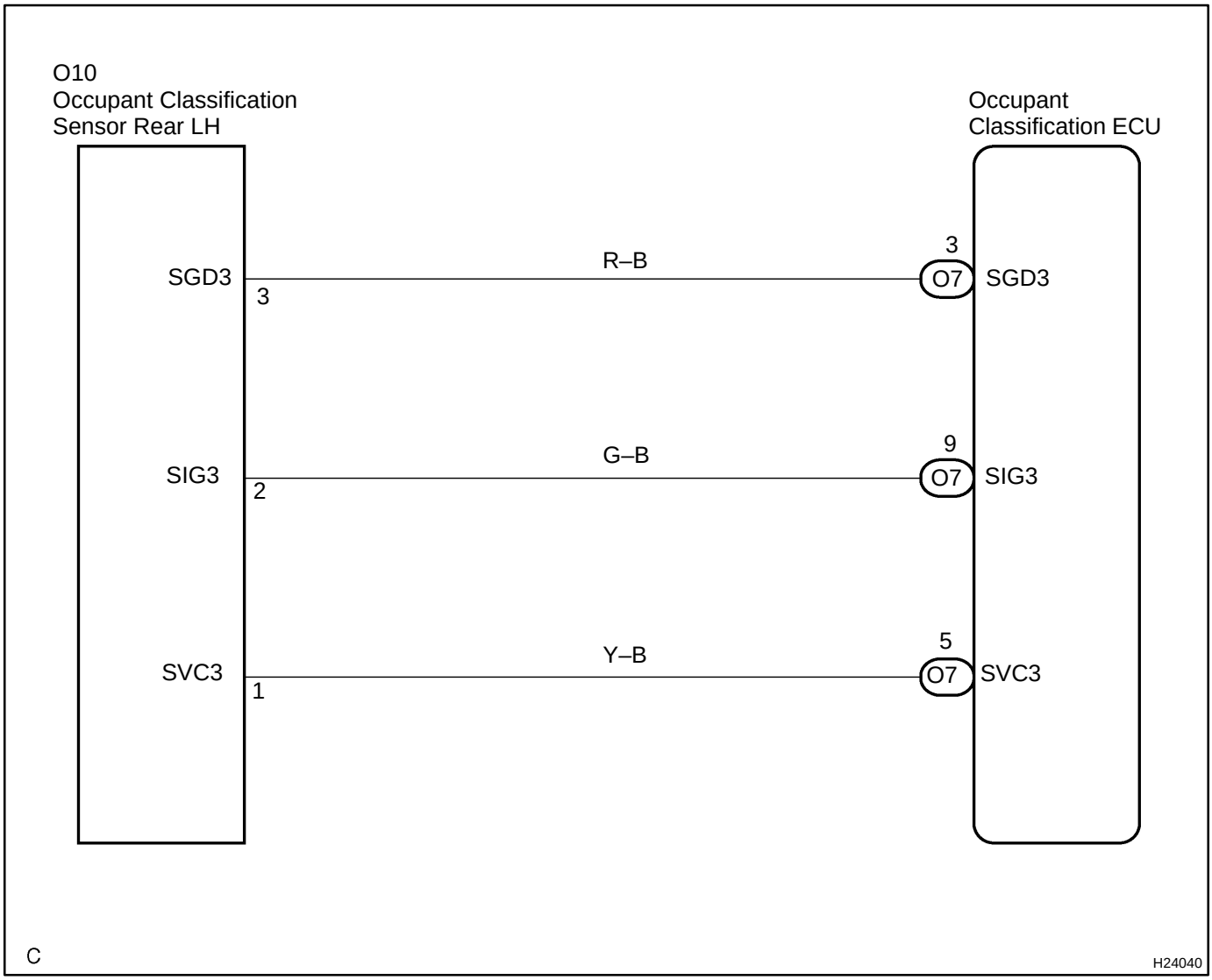
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If troubleshooting (wire harness inspection) is difficult to perform, remove the passenger seat installation bolts to see the under surface of seat cushion.
- ▶ In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1782 is not output.

HINT:

Codes other than DTC B1782 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

Dardoor.com

2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensor rear LH.

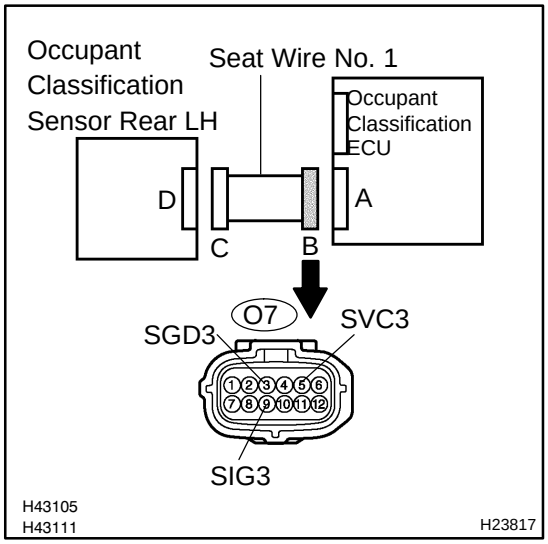
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check seat wire No. 1 (short to B+).



PREPARATION:

(a) Disconnect the connectors from the occupant classification ECU and the occupant classification sensor rear LH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

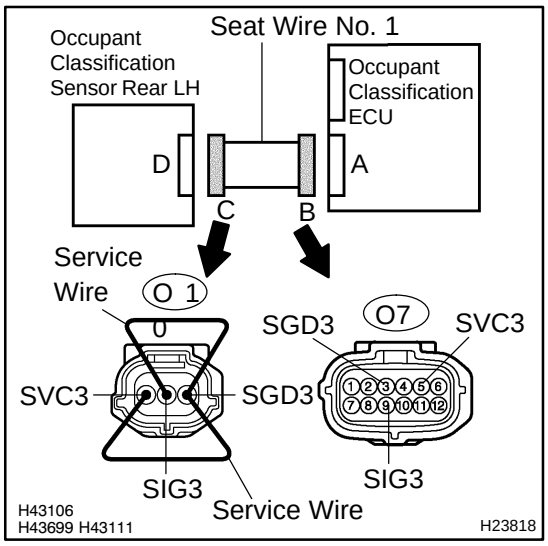
Tester Connection	Condition	Specified Condition
O7–3 (SGD3) – Body ground	Ignition switch ON	Below 1 V
O7–5 (SVC3) – Body ground	Ignition switch ON	Below 1 V
O7–9 (SIG3) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace seat wire No. 1.**

OK

Dardoor.com

4	Check seat wire No. 1 (open).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect O10–1 (SVC3) and O10–3 (SGD3), O10–2 (SIG3) and O10–3 (SGD3) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–5 (SVC3) – O7–3 (SGD3)	Always	Below 1 Ω
O7–9 (SIG3) – O7–3 (SGD3)	Always	Below 1 Ω

NG	Repair or replace seat wire No. 1.

OK

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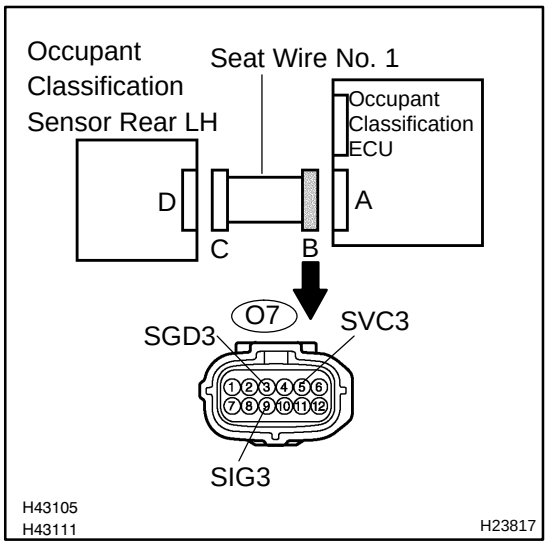
5	Check seat wire No. 1 (short).



PREPARATION:

Disconnect the service wire from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

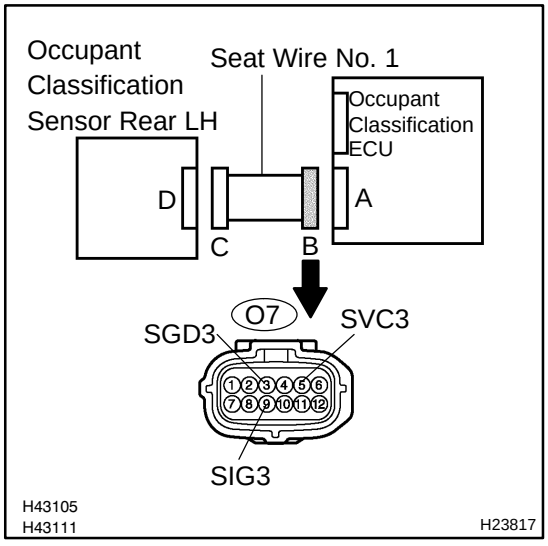
OK:

Tester Connection	Condition	Specified Condition
O7–9 (SIG3) – O7–3 (SGD3)	Always	1 MΩ or higher
O7–5 (SVC3) – O7–3 (SGD3)	Always	1 MΩ or higher
O7–9 (SIG3) – O7–5 (SVC3)	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

6	Check seat wire No. 1 (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–9 (SIG3) – Body ground	Always	1 MΩ or higher
O7–5 (SVC3) – Body ground	Always	1 MΩ or higher
O7–3 (SGD3) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

Dardoor.com

7	**Check DTC.**

PREPARATION:

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor rear LH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1782 is not output.

HINT:

Codes other than DTC B1782 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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8	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 12.**

OK

10	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12.**

OK

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11	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1782 is not output.

HINT:

Codes other than DTC B1782 may be output at this time, but they are not related to this check.

NG → **Go to step 12.**

OK ↓

END

Dardoor.com

12	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

NEXT

13	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

14	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Dardoor.com

DIDH8–01

DTC	B1783	Occupant Classification Sensor Rear RH Circuit Malfunction

CIRCUIT DESCRIPTION

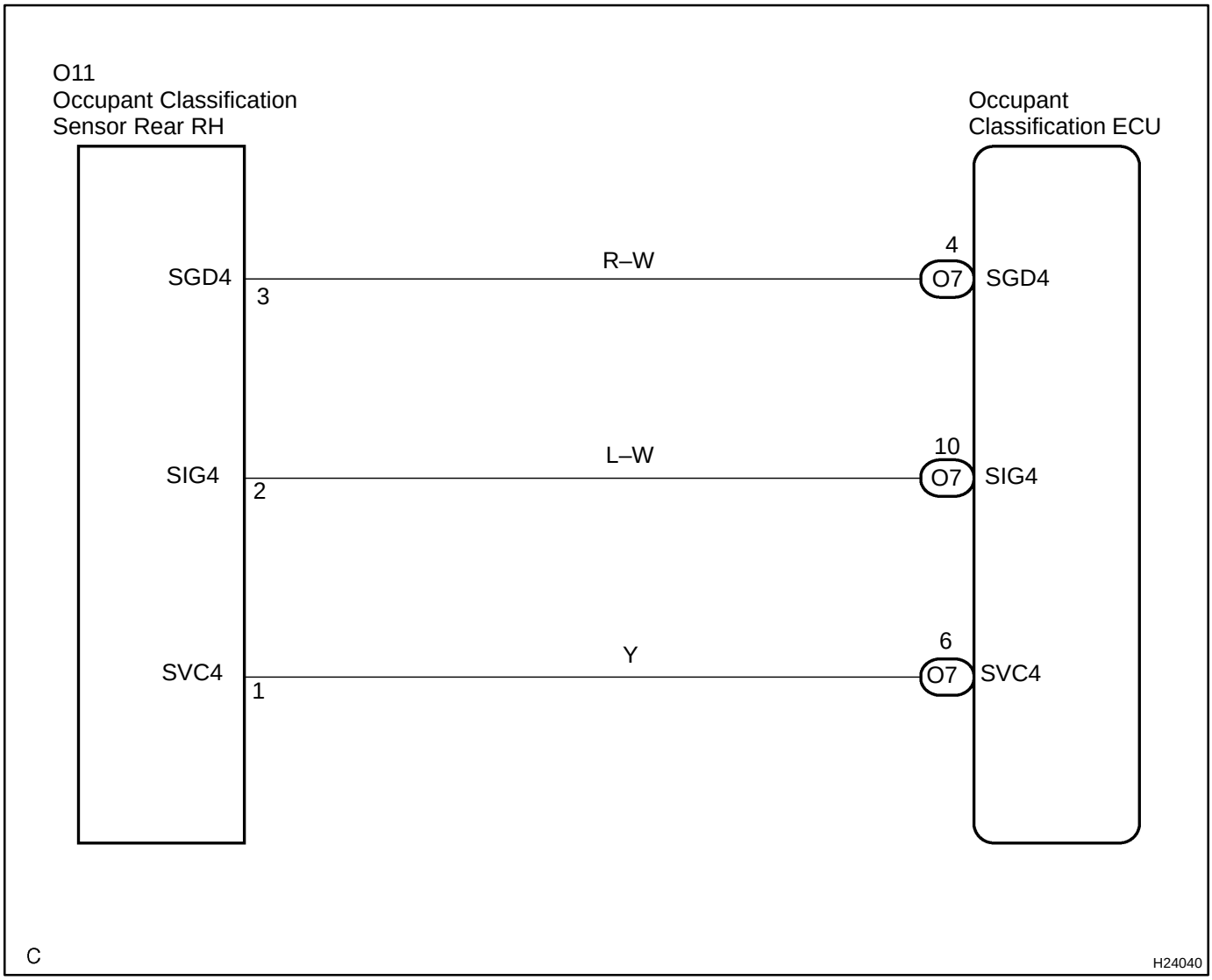
The occupant classification sensor rear RH circuit consists of the occupant classification ECU and the occupant classification sensor rear RH.
DTC B1783 is recorded when a malfunction is detected in the occupant classification sensor rear RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1783	▶The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification sensor rear RH circuit for 2 seconds. ▶Occupant classification sensor rear RH malfunction ▶Occupant classification ECU malfunction	▶Front seat assembly RH (Occupant classification sensor rear RH) ▶Occupant classification ECU ▶Seat wire No. 1

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1783 is output, perform troubleshooting for the DTC.

Dardoor.com

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

HINT:

- ▶ If troubleshooting (wire harness inspection) is difficult to perform, remove the passenger seat installation bolts to see the under surface of seat cushion.
- ▶ In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1783 is not output.

HINT:

Codes other than DTC B1783 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

Dardoor.com

2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensor rear RH.

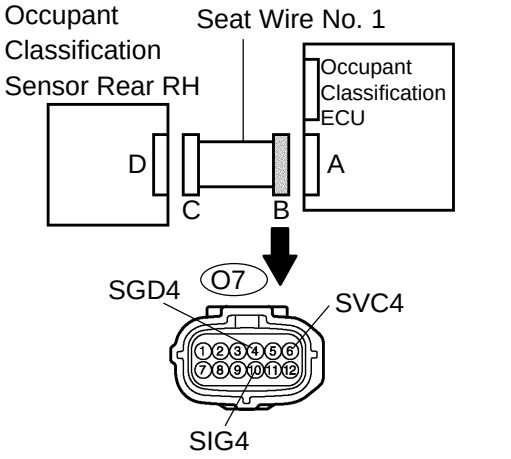
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check seat wire No. 1 (short to B+).



PREPARATION:

(a) Disconnect the connectors from the occupant classification ECU and the occupant classification sensor rear RH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

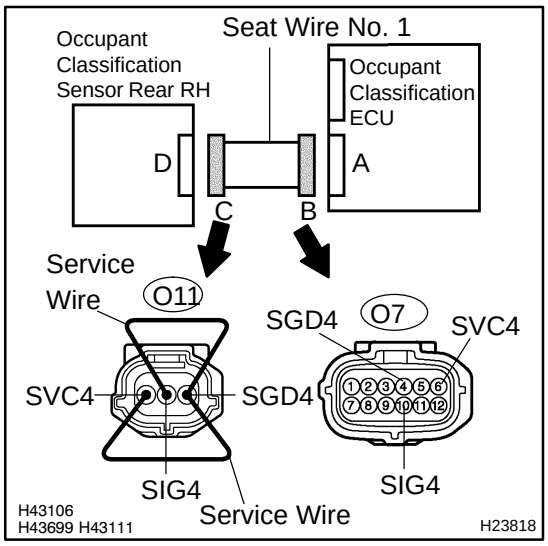
Tester Connection	Condition	Specified Condition
O7–4 (SGD4) – Body ground	Ignition switch ON	Below 1 V
O7–6 (SVC4) – Body ground	Ignition switch ON	Below 1 V
O7–10 (SIG4) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace seat wire No. 1.**

OK

Dardoor.com

4	Check seat wire No. 1 (open).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect O11–1 (SVC4) and O11–3 (SGD4), O11–2 (SIG4) and O11–3 (SGD4) of connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

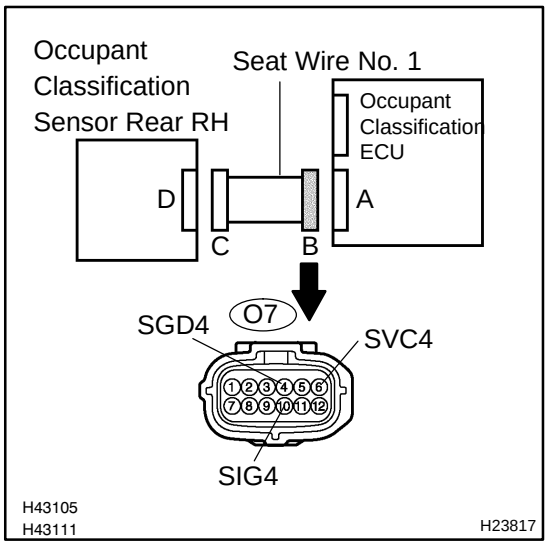
Tester Connection	Condition	Specified Condition
O7–6 (SVC4) – O7–4 (SGD4)	Always	Below 1 Ω
O7–10 (SIG4) – O7–4 (SGD4)	Always	Below 1 Ω

NG	Repair or replace seat wire No. 1.

OK

Dardoor.com

5	Check seat wire No. 1 (short).



PREPARATION:

Disconnect the service wire from connector "C".

CHECK:

Measure the resistance according to the value(s) in the table below.

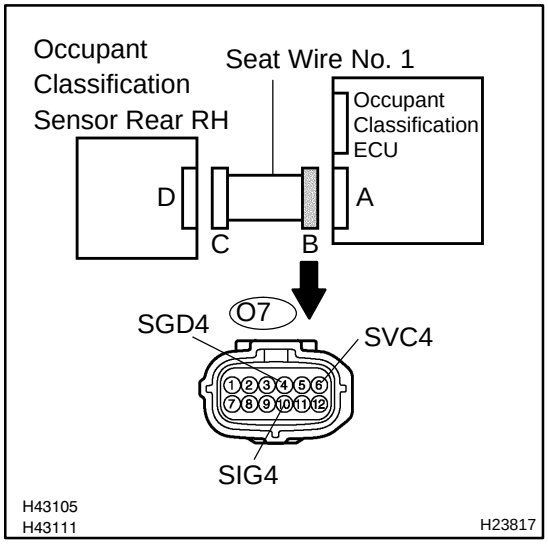
OK:

Tester Connection	Condition	Specified Condition
O7–10 (SIG4) – O7–4 (SGD4)	Always	1 MΩ or higher
O7–6 (SVC4) – O7–4 (SGD4)	Always	1 MΩ or higher
O7–10 (SIG4) – O7–6 (SVC4)	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

6	Check seat wire No. 1 (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–4 (SGD4) – Body ground	Always	1 MΩ or higher
O7–6 (SVC4) – Body ground	Always	1 MΩ or higher
O7–10 (SIG4) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

Dardoor.com

7	**Check DTC.**

PREPARATION:

(a) Connect the connectors to the occupant classification ECU and the occupant classification sensor rear RH.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1783 is not output.

HINT:

Codes other than DTC B1783 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

Dardoor.com

8	Replace occupant classification ECU.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	Perform zero point calibration.

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 12.**

OK

10	Perform sensitivity check.

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12.**

OK

Dardoor.com

11	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1783 is not output.

HINT:

Codes other than DTC B1783 may be output at this time, but they are not related to this check.

NG → **Go to step 12.**

OK ↓

END

Dardoor.com

12	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

NEXT

13	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

14	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Dardoor.com

DTC	B1785	Occupant Classification Sensor Front LH Collision Detection

CIRCUIT DESCRIPTION

DTC B1785 is output when the occupant classification ECU receives a collision detection signal sent by the occupant classification sensor front LH if an accident occurs.
DTC B1785 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1785 can be cleared by ”Zero point calibration” and ”Sensitivity check”.
Therefore, if DTC B1785 is output, first perform ”Zero point calibration” and ”Sensitivity check”.

DTC No.	DTC Detecting Condition	Trouble Area
B1785	▶Front seat assembly RH malfunction ▶Occupant classification ECU malfunction ▶Occupant classification sensor front LH detects heavy load.	▶Front seat assembly RH (Occupant classification sensor front LH) ▶Occupant classification ECU

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1785 is output, perform troubleshooting for the DTC.

WIRING DIAGRAM

See page DI–1260.

INSPECTION PROCEDURE

1	**Perform zero point calibration.**

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 4.**

OK

Dardoor.com

2	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4.**

OK ↓

3	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1785 is not output.

HINT:

Codes other than DTC B1785 may be output at this time, but they are not related to this check.

NG → **Go to step 4.**

OK ↓

END

Dardoor.com

4	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 8.**

OK

6	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8.**

OK

Dardoor.com

7	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1785 is not output.

HINT:

Codes other than DTC B1785 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK ↓

END

Dardoor.com

8	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

NEXT

9	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

10	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Dardoor.com

DTC	B1786	Occupant Classification Sensor Front RH Collision Detection

CIRCUIT DESCRIPTION

DTC B1786 is output when the occupant classification ECU receives a collision detection signal sent by the occupant classification sensor front RH if an accident occurs.
DTC B1786 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1786 can be cleared by ”Zero point calibration” and ”Sensitivity check”.
Therefore, if DTC B1786 is output, first perform ”Zero point calibration” and ”Sensitivity check”.

DTC No.	DTC Detecting Condition	Trouble Area
B1786	▶Front seat assembly RH malfunction ▶Occupant classification ECU malfunction ▶Occupant classification sensor front RH detects heavy load.	▶Front seat assembly RH (Occupant classification sensor front RH) ▶Occupant classification ECU

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1786 is output, perform troubleshooting for the DTC.

WIRING DIAGRAM

See page DI–1270.

INSPECTION PROCEDURE

1	**Perform zero point calibration.**

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 4.**

OK

Dardoor.com

2	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4.**

OK ↓

3	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1786 is not output.

HINT:

Codes other than DTC B1786 may be output at this time, but they are not related to this check.

NG → **Go to step 4.**

OK ↓

END

Dardoor.com

4	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 8.**

OK

6	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8.**

OK

Dardoor.com

7	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1786 is not output.

HINT:

Codes other than DTC B1786 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK ↓

END

Dardoor.com

8	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

NEXT

9	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

10	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Dardoor.com

DTC	B1787	Occupant Classification Sensor Rear LH Collision Detection

CIRCUIT DESCRIPTION

DTC B1787 is output when the occupant classification ECU receives a collision detection signal sent by the occupant classification sensor rear LH if an accident occurs.
DTC B1787 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1787 can be cleared by ”Zero point calibration” and ”Sensitivity check”.
Therefore, if DTC B1787 is output, first perform ”Zero point calibration” and ”Sensitivity check”.

DTC No.	DTC Detecting Condition	Trouble Area
B1787	▶Front seat assembly RH malfunction ▶Occupant classification ECU malfunction ▶Occupant classification sensor rear LH detects heavy load.	▶Front seat assembly RH (Occupant classification sensor rear LH) ▶Occupant classification ECU

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1787 is output, perform troubleshooting for the DTC.

WIRING DIAGRAM

See page DI–1280.

INSPECTION PROCEDURE

1	**Perform zero point calibration.**

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1147).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 4.**

OK

Dardoor.com

2	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1147).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4.**

OK ↓

3	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1787 is not output.

HINT:

Codes other than DTC B1787 may be output at this time, but they are not related to this check.

NG → **Go to step 4.**

OK ↓

END

Dardoor.com

4	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 8.**

OK

6	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8.**

OK

Dardoor.com

7	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1787 is not output.

HINT:

Codes other than DTC B1787 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK ↓

END

Dardoor.com

8	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

NEXT

9	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

10	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Dardoor.com

DTC	B1788	Occupant Classification Sensor Rear RH Collision Detection

CIRCUIT DESCRIPTION

DTC B1788 is output when the occupant classification ECU receives a collision detection signal sent by the occupant classification sensor rear RH if an accident occurs.
DTC B1788 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1788 can be cleared by ”Zero point calibration” and ”Sensitivity check”.
Therefore, if DTC B1788 is output, first perform ”Zero point calibration” and ”Sensitivity check”.

DTC No.	DTC Detecting Condition	Trouble Area
B1788	▶Front seat assembly RH malfunction ▶Occupant classification ECU malfunction ▶Occupant classification sensor rear RH detects heavy load.	▶Front seat assembly RH (Occupant classification sensor rear RH) ▶Occupant classification ECU

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1788 is output, perform troubleshooting for the DTC.

WIRING DIAGRAM

See page DI–1290.

INSPECTION PROCEDURE

1	**Perform zero point calibration.**

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 4.**

OK

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2	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4.**

OK ↓

3	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1788 is not output.

HINT:

Codes other than DTC B1788 may be output at this time, but they are not related to this check.

NG → **Go to step 4.**

OK ↓

END

Dardoor.com

4	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

5	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 8.**

OK

6	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8.**

OK

Dardoor.com

7	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1788 is not output.

HINT:

Codes other than DTC B1788 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK ↓

END

Dardoor.com

8	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

NEXT

9	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

10	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Dardoor.com

DTC	B1790	Airbag Sensor Assembly Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The airbag sensor assembly communication circuit consists of the occupant classification ECU and the airbag sensor assembly.

DTC B1790 is recorded when a malfunction is detected in the airbag sensor assembly communication circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1790	▶The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the airbag sensor assembly communication circuit for 2 seconds. ▶Airbag sensor assembly malfunction ▶Occupant classification ECU malfunction	▶Occupant classification ECU ▶Airbag sensor assembly ▶Floor wire ▶Seat wire No. 1

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1790 is output, perform troubleshooting for the DTC.

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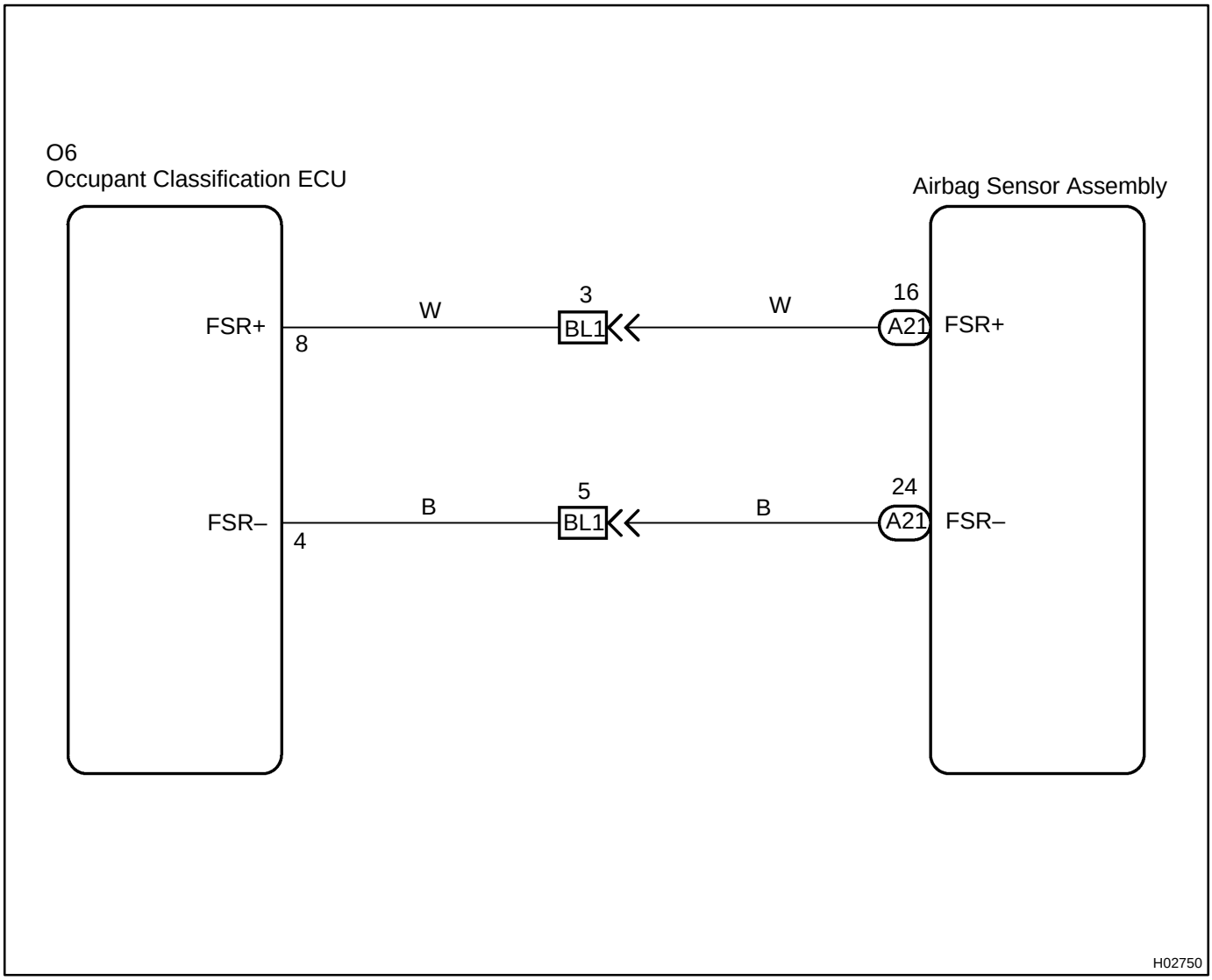
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If troubleshooting (wire harness inspection) is difficult to perform, remove the passenger seat installation bolts to see the under surface of seat cushion.
- ▶ In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	**Check connection of connectors.**

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the occupant classification ECU and the airbag sensor assembly.

OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	**Prepare for inspection.**

PREPARATION:

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Disconnect the connectors from the airbag sensor assembly.

(b) Disconnect the connectors from the steering wheel pad.

(c) Disconnect the connectors from the front passenger airbag assembly.

(d) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.

(e) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.

(f) Disconnect the connectors from the front seat outer belt LH and RH.

NEXT

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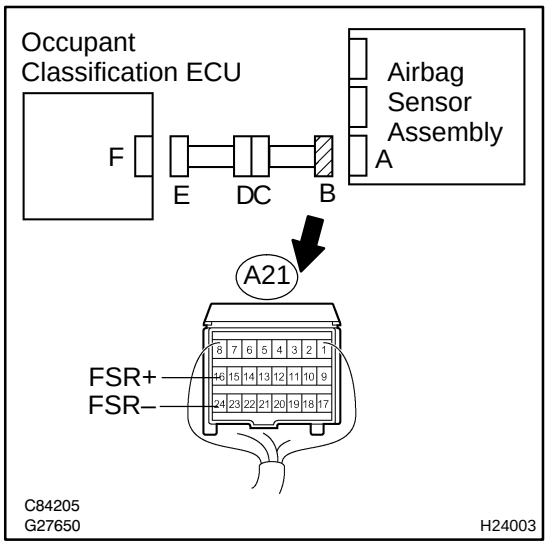
4	Check airbag sensor assembly communication circuit (short to B+).



PREPARATION:

(a) Disconnect the connector from the occupant classification ECU.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

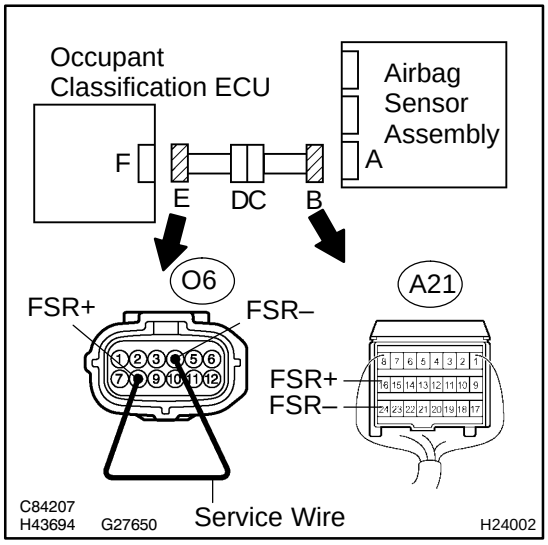
OK:

Tester Connection	Condition	Specified Condition
A21–16 (FSR+) – Body ground	Ignition switch ON	Below 1 V
A21–24 (FSR–) – Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 13.**

OK

5	Check airbag sensor assembly communication circuit (open).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect O6–8 (FSR+) and O6–4 (FSR–) of connector "E".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A21–16 (FSR+) – A21–24 (FSR–)	Always	Below 1 Ω

NG → **Go to step 14.**

OK

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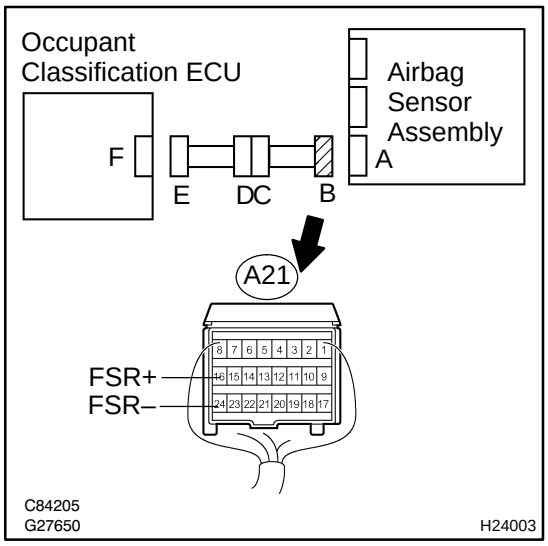
6	Check airbag sensor assembly communication circuit (short).



PREPARATION:

Disconnect the service wire from connector "E".

CHECK:

Measure the resistance according to the value(s) in the table below.

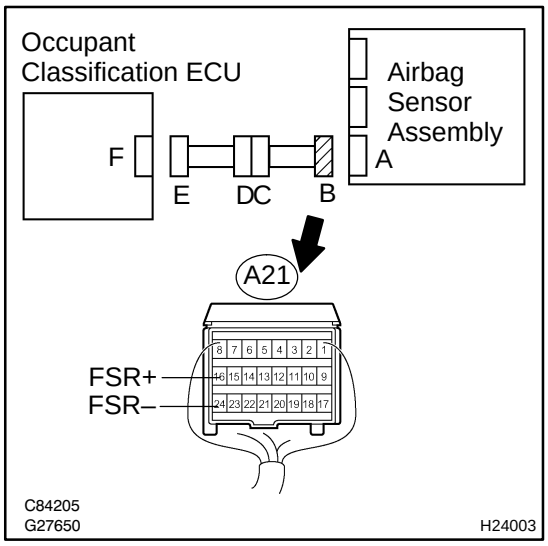
OK:

Tester Connection	Condition	Specified Condition
A21–16 (FSR+) – A21–24 (FSR–)	Always	1 MΩ or higher

NG → **Go to step 15.**

OK

7	Check airbag sensor assembly communication circuit (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A21–16 (FSR+) – Body ground	Always	1 MΩ or higher
A21–24 (FSR–) – Body ground	Always	1 MΩ or higher

NG → **Go to step 16.**

OK

Dardoor.com

8	**Check DTC.**

PREPARATION:

(a) Connect the connectors to the occupant classification ECU and the airbag sensor assembly.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG → **Go to step 9.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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9	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

10	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

11	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

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12	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK ↓

END

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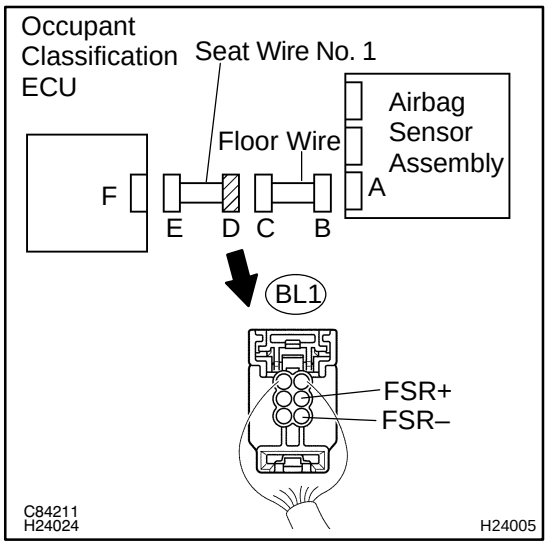
13	Check seat wire No. 1 (short to B+).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least for 90 seconds.
(c) Disconnect the seat wire No. 1 connector from the floor wire.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
BL1–3 (FSR+) – Body ground	Ignition switch ON	Below 1 V
BL1–5 (FSR–) – Body ground	Ignition switch ON	Below 1 V

NG	Repair or replace seat wire No. 1.

OK

Repair or replace floor wire.

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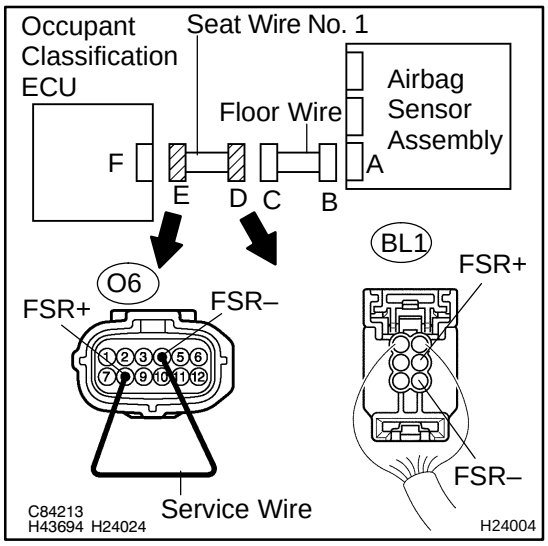
14	Check seat wire No. 1 (open).



PREPARATION:

Disconnect the seat wire No. 1 connector from the floor wire.

HINT:

The service wire has already been inserted into connector "E".

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

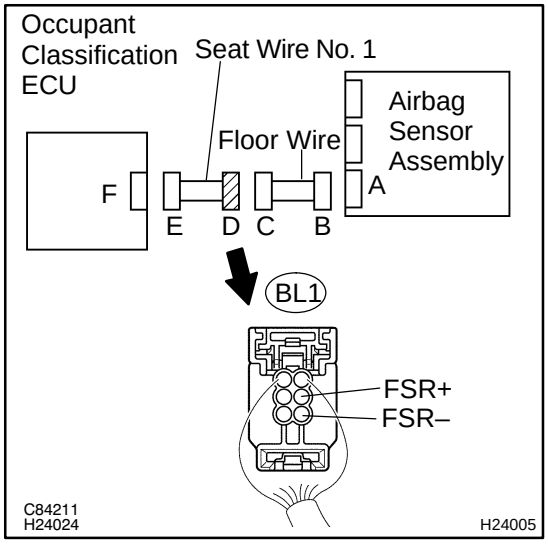
Tester Connection	Condition	Specified Condition
BL1–3 (FSR+) – BL1–5 (FSR–)	Always	Below 1 Ω

NG → **Repair or replace seat wire No. 1.**

OK

Repair or replace floor wire.

15	Check seat wire No. 1 (short).



PREPARATION:

Disconnect the seat wire No. 1 connector from the floor wire.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
BL1–3 (FSR+) – BL1–5 (FSR–)	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

Repair or replace floor wire.

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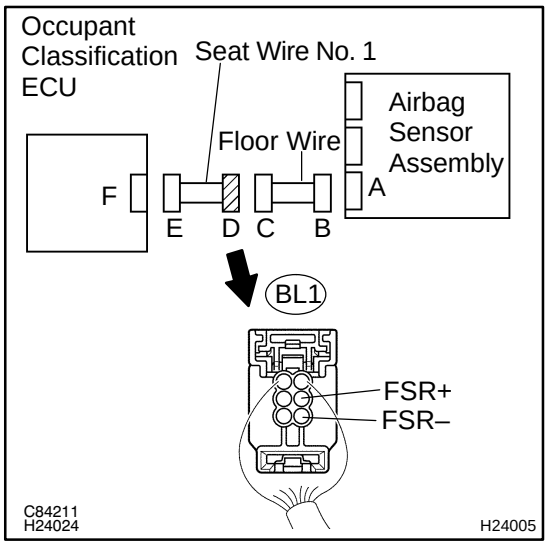
16	Check seat wire No. 1 (short to ground).



PREPARATION:

Disconnect the seat wire No. 1 connector from the floor wire.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
BL1–3 (FSR+) – Body ground	Always	1 MΩ or higher
BL1–5 (FSR–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

Repair or replace floor wire.

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DTC	B1793	Occupant Classification Sensor Power Supply Circuit Malfunction

CIRCUIT DESCRIPTION

The occupant classification sensor power supply circuit consists of the occupant classification ECU and the occupant classification sensors.
DTC B1793 is recorded when a malfunction is detected in the occupant classification sensor power supply circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1793	▶The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the . ▶Occupant classification ECU malfunction	▶Front seat assembly RH (Occupant classification sensors) ▶Occupant classification ECU ▶Seat wire No. 1

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1793 is output, perform troubleshooting for the DTC.

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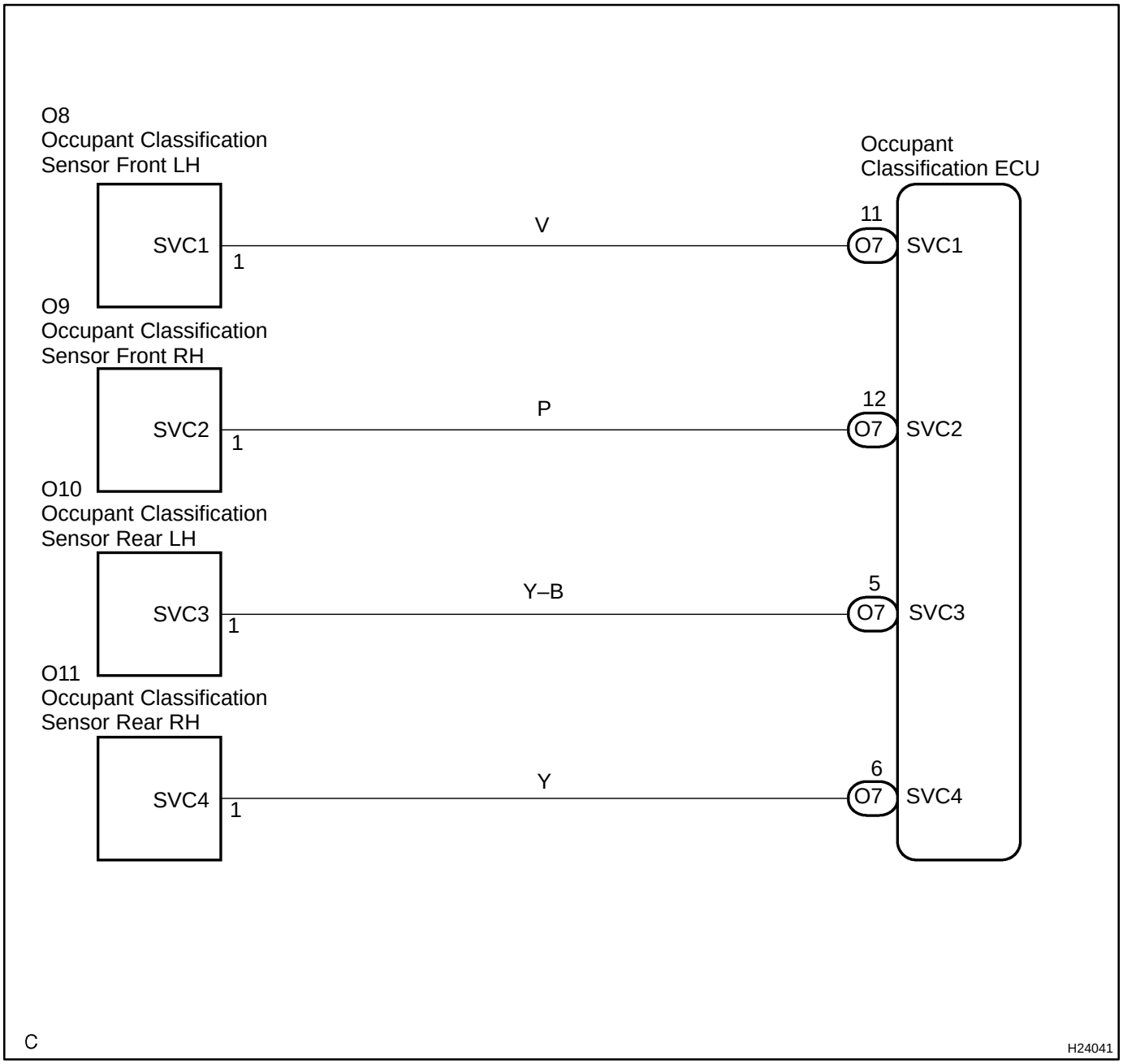
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- ▶ If troubleshooting (wire harness inspection) is difficult to perform, remove the passenger seat installation bolts to see the under surface of seat cushion.
- ▶ In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1793 is not output.

HINT:

Codes other than DTC B1793 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	Check connection of connectors.

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensors.

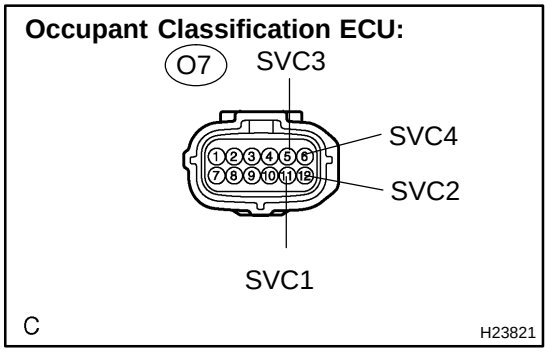
OK:

The connectors are connected securely.

NG → **Connect connectors, then go to step 1.**

OK

3	Check seat wire No. 1 (short to B+).



PREPARATION:

(a) Disconnect the connector from the occupant classification ECU and the 4 occupant classification sensors.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–5 (SVC3) – Body ground	Ignition switch ON	Below 1 V
O7–6 (SVC4) – Body ground	Ignition switch ON	Below 1 V
O7–11 (SVC1) – Body ground	Ignition switch ON	Below 1 V
O7–12 (SVC2) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace seat wire No. 1.**

OK

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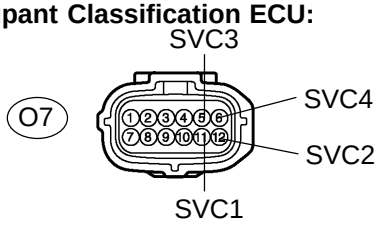
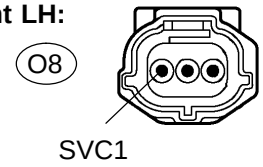
4	Check seat wire No. 1 (open).

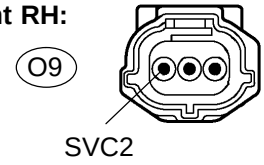
Occupant Classification ECU:



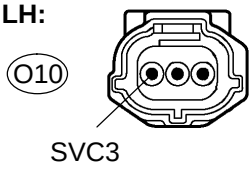
Occupant Classification Sensor Front LH:



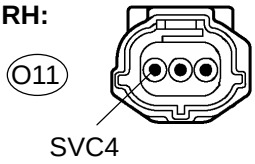
Occupant Classification Sensor Front RH:



Occupant Classification Sensor Rear LH:



Occupant Classification Sensor Rear RH:



H23821
H43699

H24595

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O8–1 (SVC1) – O7–11 (SVC1)	Always	Below 1 Ω
O9–1 (SVC2) – O7–12 (SVC2)	Always	Below 1 Ω
O10–1 (SVC3) – O7–5 (SVC3)	Always	Below 1 Ω
O11–1 (SVC4) – O7–6 (SVC4)	Always	Below 1 Ω

NG → **Repair or replace seat wire No. 1.**

OK

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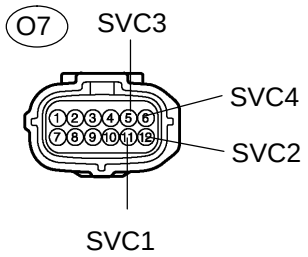
5	Check seat wire No. 1 (short).

Occupant Classification ECU:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

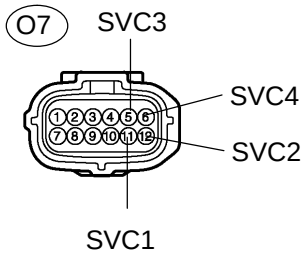
Tester Connection	Condition	Specified Condition
O7–5 (SVC3) – O7–6 (SVC4)	Always	1 MΩ or higher
O7–6 (SVC4) – O7–11 (SVC1)	Always	1 MΩ or higher
O7–11 (SVC1) – O7–12 (SVC2)	Always	1 MΩ or higher
O7–12 (SVC2) – O7–5 (SVC3)	Always	1 MΩ or higher
O7–12 (SVC2) – O7–6 (SVC4)	Always	1 MΩ or higher
O7–11 (SVC1) – O7–5 (SVC3)	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

6	Check seat wire No. 1 (short to ground).

Occupant Classification ECU:



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O7–5 (SVC3) – Body ground	Always	1 MΩ or higher
O7–6 (SVC4) – Body ground	Always	1 MΩ or higher
O7–11 (SVC1) – Body ground	Always	1 MΩ or higher
O7–12 (SVC2) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace seat wire No. 1.**

OK

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7	**Check DTC.**

PREPARATION:

(a) Connect the connectors to the occupant classification ECU and the 4 occupant classification sensors.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1793 is not output.

HINT:

Codes other than DTC B1793 may be output at this time, but they are not related to this check.

NG → **Go to step 8.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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8	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NG → **Go to step 12.**

OK

10	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12.**

OK

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11	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position.

(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1793 is not output.

HINT:

Codes other than DTC B1793 may be output at this time, but they are not related to this check.

NG → **Go to step 12.**

OK ↓

END

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12	**Replace front seat assembly RH.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat assembly RH (see page BO–112, BO–126).

NEXT

13	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

14	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

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DIDHF–01

DTC	B1794	Occupant Classification ECU Battery Positive Line Open

CIRCUIT DESCRIPTION

This circuit consists of the occupant classification ECU and the power source circuit (battery, fuse, wire harness).
DTC B1794 is recorded when a malfunction is detected in the occupant classification ECU or the power source circuit.
HINT:
When DTC B1794 is output after switching the ignition switch LOCK–ON–LOCK 50 times in a row when a malfunction occurs in the power source circuit for the occupant classification system, the DTC is output again when a malfunction is detected even once after being cleared, unless the normal system code is input.

DTC No.	DTC Detecting Condition	Trouble Area
B1794	▶The ignition switch is turned from LOCK to ON, hold for 10 seconds or more, and back to LOCK again 50 times in a row when a malfunction occurs in the power source circuit for the occupant classification system. ▶Occupant classification ECU malfunction	▶Battery ▶ECU–B Fuse ▶Floor wire ▶Seat wire No. 1 ▶Occupant classification ECU

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1794 is output, perform troubleshooting for the DTC.

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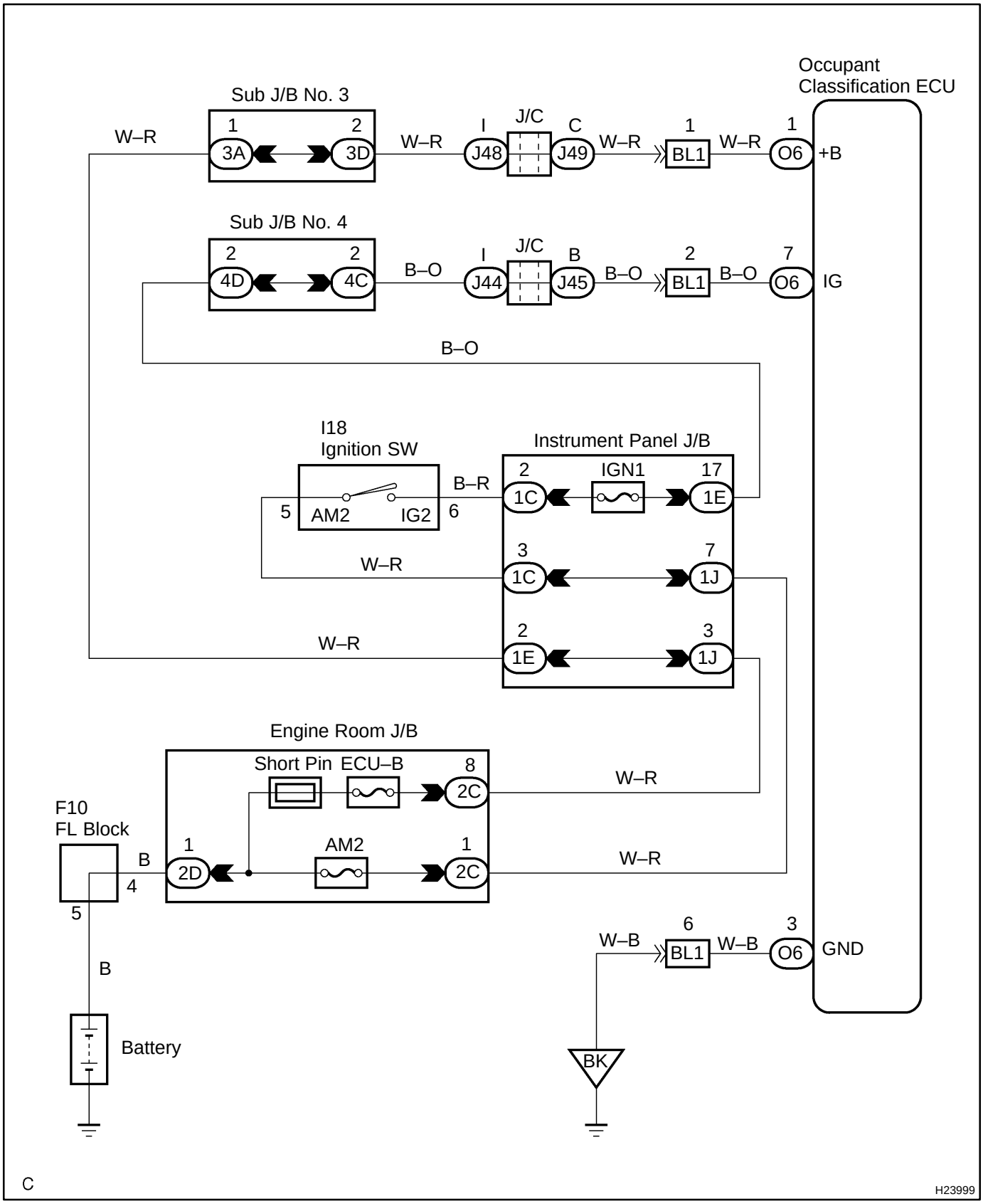
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check battery.**

CHECK:

Measure the voltage of the battery.

OK:

Voltage: 11 to 14 V

NG → **Replace battery.**

OK

2	**Check fuse.**

CHECK:

Check the ECU–B fuse.

OK:

Resistance: Below 1 Ω

NG → **Replace fuse.**

OK

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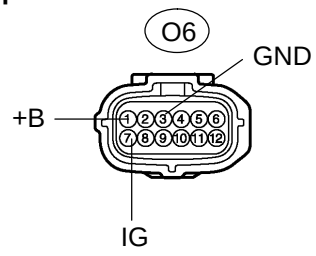
3	Check seat wire No. 1 (source voltage).

Occupant Classification ECU:



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the occupant classification ECU.
(d) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage and resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
O6–1 (+B) – Body ground	Ignition switch ON	10 to 14 V
O6–3 (GND) – Body ground	Always	Below 1 Ω
O6–7 (IG) – Body ground	Ignition switch ON	10 to 14 V

NG → **Repair or replace seat wire No. 1.**

OK

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4	**Check DTC.**

PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the occupant classification ECU.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Clear the DTCs stored in memory (see page DI–1147).

HINT:

First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.

(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 10 seconds.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1794 is not output.

HINT:

Codes other than DTC B1794 may be output at this time, but they are not related to this check.

NG → **Go to step 5.**

OK

From the results of the above inspection, the malfunctioning part can not be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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5	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle is possible.

NEXT

6	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform the ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

7	**Perform sensitivity check.**

Using the hand–held tester, perform the ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

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DTC	B1795	Occupant Classification ECU Circuit Malfunction

CIRCUIT DESCRIPTION

DTC B1795 is recorded when a malfunction is detected in the occupant classification ECU.
Troubleshoot DTC B1771 first when the DTC B1771 and B1795 are output simultaneously.

DTC No.	DTC Detecting Condition	Trouble Area
B1795	▶Occupant classification ECU circuit malfunction ▶The occupant classification ECU receives a short circuit to ground signal in the passenger side buckle switch circuit for 2 seconds. ▶Occupant classification ECU malfunction	▶Occupant classification ECU ▶Front seat inner belt RH ▶Seat wire No. 1

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1795 is output, perform troubleshooting for the DTC.

INSPECTION PROCEDURE

HINT:

- ▶ If troubleshooting (wire harness inspection) is difficult to perform, remove the passenger seat installation bolts to see the under surface of seat cushion.
- ▶ In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	**Check DTC.**

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 10 seconds.
(b) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

RESULT:

A: DTC B1795 is output.
B: DTC B1771 and B1795 are output.

HINT:
Codes other than DTC B1771 and B1795 may be output at this time, but they are not related to this check.

B	**Go to DTC B1771 (see page DI–1251).**

A

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2	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

3	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

4	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

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DTC	B1796	Sleep Operation Failure Of Occupant Classification ECU

CIRCUIT DESCRIPTION

During sleep mode, the occupant classification ECU reads the condition of each sensor while the ignition switch is off.
In this mode, if occupant classification ECU detects an internal malfunction, DTC B1796 is output.

DTC No.	DTC Detecting Condition	Trouble Area
B1796	▶Occupant classification ECU malfunction	▶Occupant classification ECU

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for the supplemental restraint system, check the DTCs stored in the occupant classification ECU. When DTC B1796 is output, perform troubleshooting for the DTC.

INSPECTION PROCEDURE

1	Check DTC.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 10 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
HINT:
First clear DTCs stored in the occupant classification ECU and then in the airbag sensor assembly.
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position.
(e) Using the hand–held tester, check the DTCs of the occupant classification ECU (see page DI–1147).

OK:

DTC B1796 is not output.

HINT:
Codes other than DTC B1796 may be output at this time, but they are not related to this check.

NG → **Go to step 2.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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2	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

3	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed.

NEXT

4	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

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DIDHI–01

DTC	B1800/51	Short in D Squib Circuit

DTC	B1801/51	Open in D Squib Circuit

DTC	B1802/51	Short in D Squib Circuit (to Ground)

DTC	B1803/51	Short in D Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad. The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the D squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1800/51	▶The airbag sensor assembly receives a line short circuit signal 5 times in the D squib circuit during primary check. ▶Spiral cable malfunction ▶D squib malfunction ▶Airbag sensor assembly malfunction	▶Steering wheel pad (D squib) ▶Airbag sensor assembly ▶Spiral cable ▶Cowl wire
B1801/51	▶The airbag sensor assembly receives an open circuit signal in the D squib circuit for 2 seconds. ▶Spiral cable malfunction ▶D squib malfunction ▶Airbag sensor assembly malfunction	▶Steering wheel pad (D squib) ▶Airbag sensor assembly ▶Spiral cable ▶Cowl wire
B1802/51	▶The airbag sensor assembly receives a short circuit to ground signal in the D squib circuit for 0.5 seconds. ▶Spiral cable malfunction ▶D squib malfunction ▶Airbag sensor assembly malfunction	▶Steering wheel pad (D squib) ▶Airbag sensor assembly ▶Spiral cable ▶Cowl wire
B1803/51	▶The airbag sensor assembly receive a short to B+ circuit signal in the D squib circuit for 0.5 seconds. ▶Spiral cable malfunction ▶D squib malfunction ▶Airbag sensor assembly malfunction	▶Steering wheel pad (D squib) ▶Airbag sensor assembly ▶Spiral cable ▶Cowl wire

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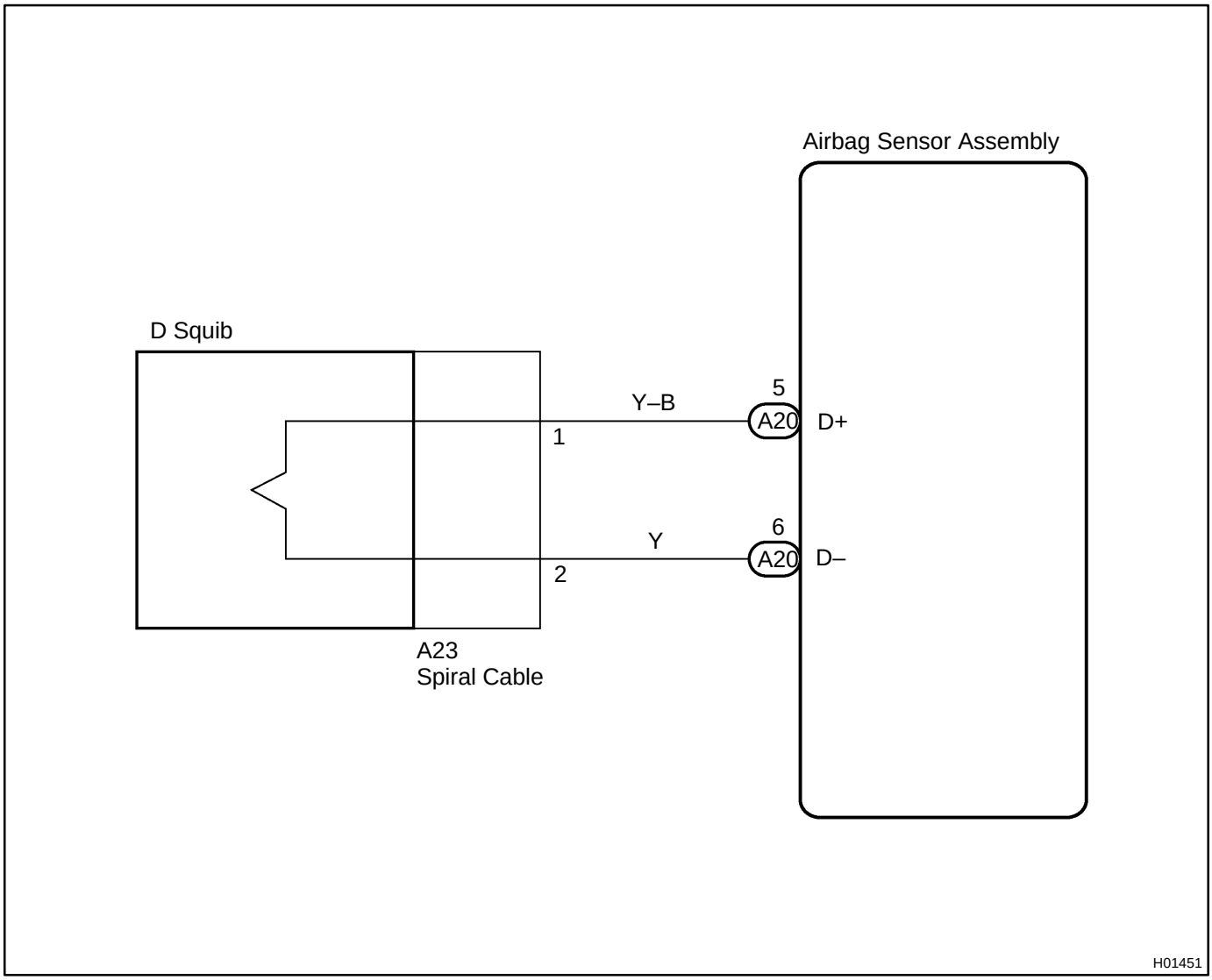
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

Proceed to each step according to how to read DTC.

(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1800 is output.	A
DTC B1801 is output.	B
DTC B1802 is output.	C
DTC B1803 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 51 is output.	E

HINT:

Codes other than DTC B1800, B1801, B1802, B1803 and DTC 51 may be output at this time, but they are not related to this check.

B	**Go to step 4.**
C	**Go to step 5.**
D	**Go to step 6.**
E	**Go to step 7.**

A

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2	Check connector.

CHECK:

Check that the spiral cable connectors (on the steering wheel pad side) are not damaged.

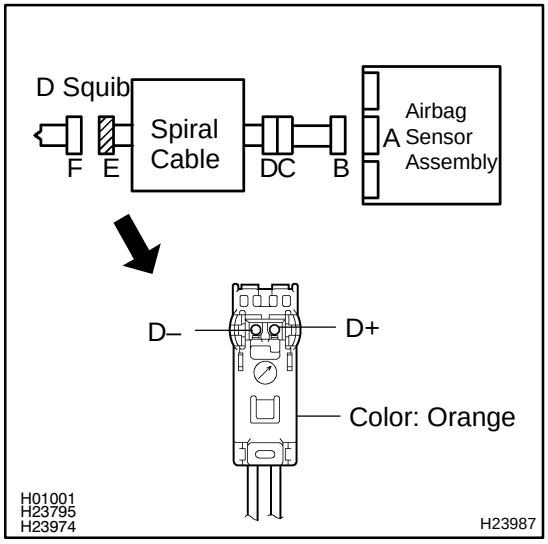
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Replace spiral cable (see page RS–21).**

OK

3	Check D squib circuit (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – D–	Always	1 MΩ or higher

NG → **Go to step 13.**

OK

Go to step 10.

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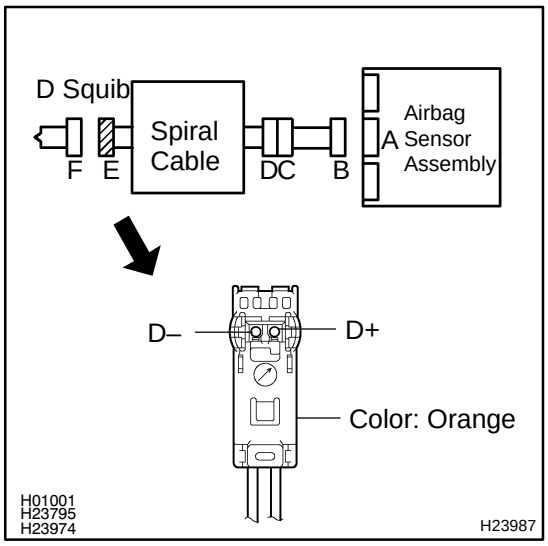
4	Check D squib circuit (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

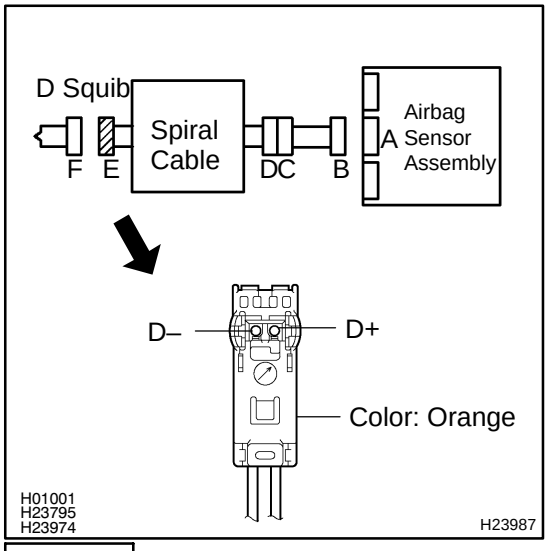
Tester Connection	Condition	Specified Condition
D+ – D–	Always	Below 1 Ω

NG → **Go to step 15.**

OK

Go to step 11.

5	Check D squib circuit (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – Body ground	Always	1 MΩ or higher
D– – Body ground	Always	1 MΩ or higher

NG → **Go to step 17.**

OK

Go to step 11.

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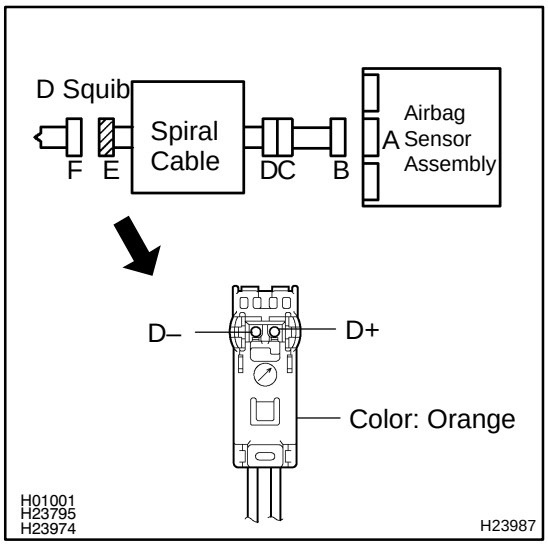
6	Check D squib (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – Body ground	Ignition switch ON	Below 1 V
D– – Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 19.**

OK

Go to step 11.

7	Check connector.

CHECK:

Check that the spiral cable connectors (on the steering wheel pad side) are not damaged.

OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Replace spiral cable (see page RS–21).**

OK

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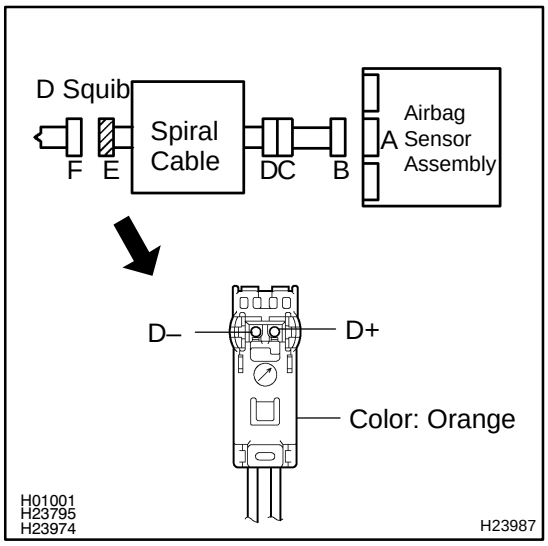
8	Check D squib circuit.



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – Body ground	Ignition switch ON	Below 1 V
D– – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – D–	Always	Below 1 Ω
D+ – Body ground	Always	1 MΩ or higher
D– – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into the connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – D–	Always	1 MΩ or higher

NG → **Go to step 21.**

OK

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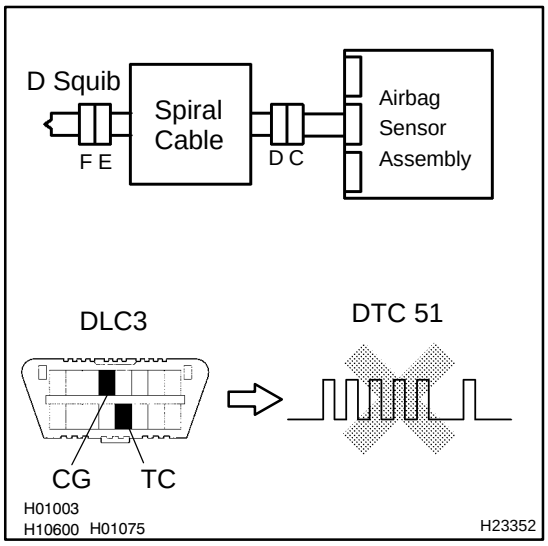
9	**Replace steering wheel pad (D squib).**



PREPARATION:

(a) Replace the steering wheel pad (see page RS–21).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 51 is not output.

HINT:

Codes other than DTC 51 may be output at this time, but they are not related to this check.

NG	**Replace airbag sensor assembly (see page RS–82).**

OK

END

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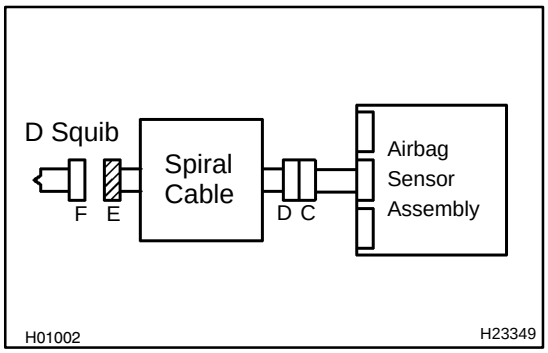
10	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1800 is not output.

HINT:

Codes other than DTC B1800 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page DI–1137).**

OK →

Go to step 12.

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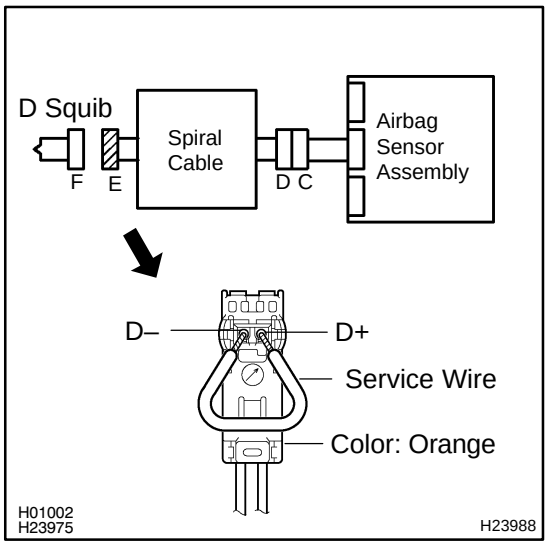
11	Check airbag sensor assembly.



PREPARATION:

(a) From the step 6:
Turn the ignition switch to the LOCK position.

(b) From the step 6:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag sensor assembly.

(d) Using a service wire, connect D+ and D– of the connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1801, B1802 or B1803 is not output.

HINT:

Codes other than DTC B1801, B1802 and B1803 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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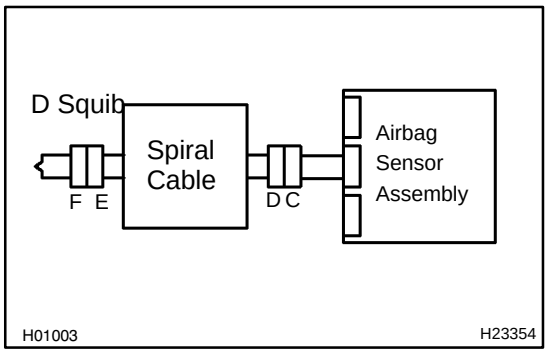
12	Check steering wheel pad (D squib).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 11:
Disconnect the service wire from connector "E".
(d) Connect the connectors to the steering wheel pad.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1800, B1801, B1802 or B1803 is not output.

HINT:
Codes other than DTC B1800, B1801, B1802 and B1803 may be output at this time, but they are not related to this check.

NG → **Replace steering wheel pad (see page RS–82).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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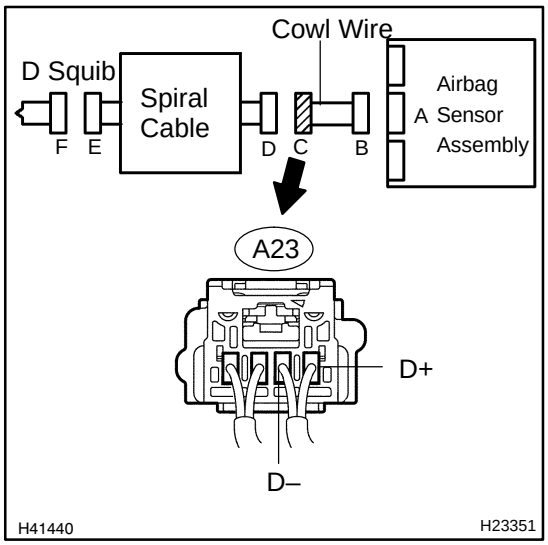
13	Check cowl wire (short).



PREPARATION:

Disconnect the cowl wire connector from the spiral cable.

HINT:

The activation prevention mechanism of connector "B" has already been released.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–1 (D+) – A23–2 (D–)	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

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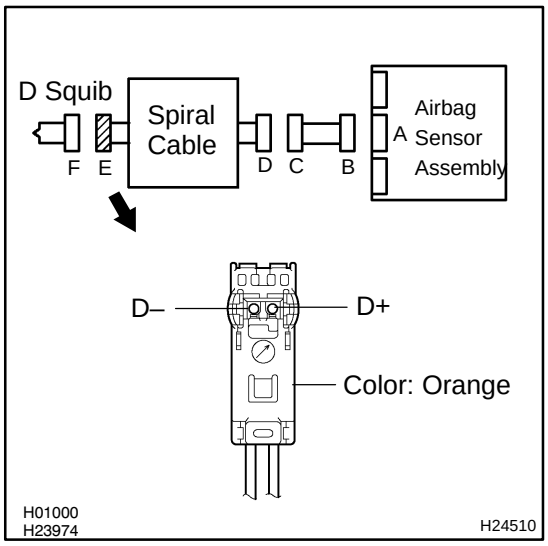
14	Check spiral cable (short).



PREPARATION:

Release the activation prevention mechanism built into connector ”D” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – D–	Always	1 MΩ or higher

NG → **Replace spiral cable (see page RS–21).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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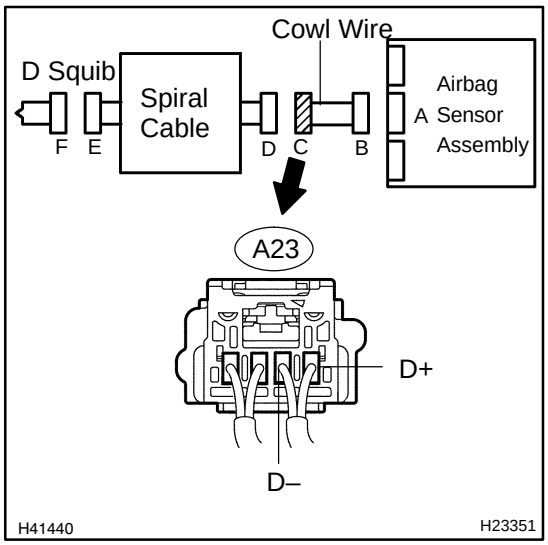
15	Check cowl wire (open).



PREPARATION:

Disconnect the cowl wire connector from the spiral cable.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–1 (D+) – A23–2 (D–)	Always	Below 1 Ω

NG → **Repair or replace cowl wire.**

OK

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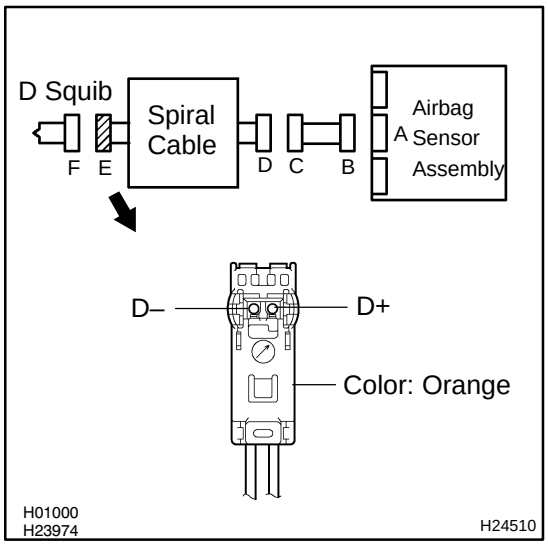
16	Check spiral cable (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – D–	Always	Below 1 Ω

NG → **Replace spiral cable (see page RS–21).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page DI–1151).

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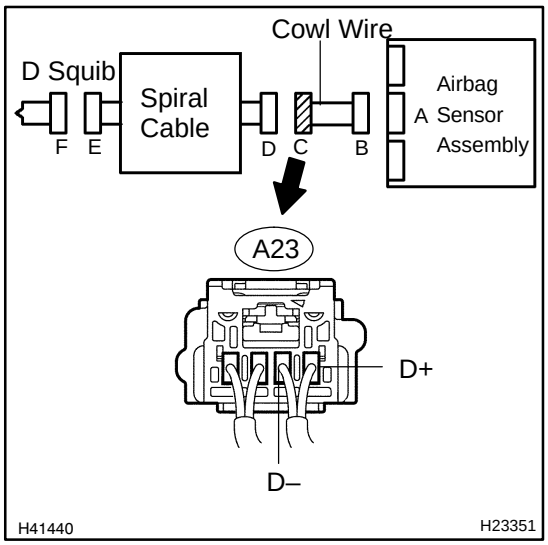
17	Check cowl wire (short to ground).



PREPARATION:

Disconnect the cowl wire connector from the spiral cable.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–1 (D+) – Body ground	Always	1 MΩ or higher
A23–2 (D–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

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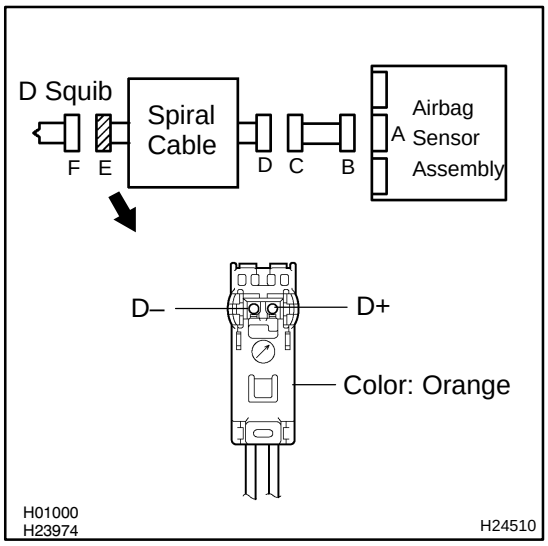
18	Check spiral cable (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – Body ground	Always	1 MΩ or higher
D– – Body ground	Always	1 MΩ or higher

NG → **Replace spiral cable (see page RS–21).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page DI–1151).

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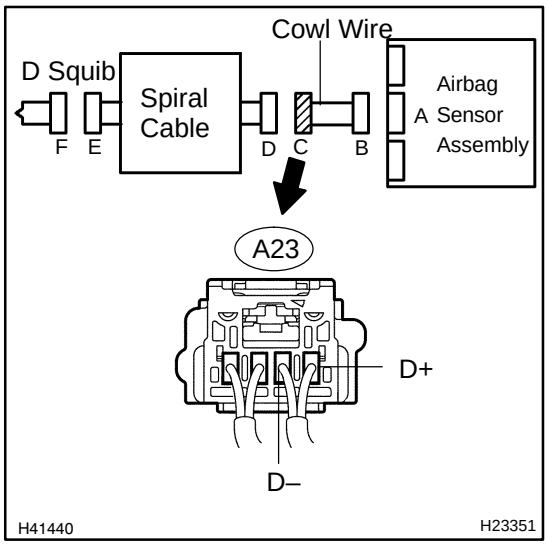
19	Check cowl wire (short to B+).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the cowl wire connector from the spiral cable.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–1 (D+) – Body ground	Ignition switch ON	Below 1 V
A23–2 (D–) – Body ground	Ignition switch ON	Below 1 V

NG	Repair or replace cowl wire.

OK

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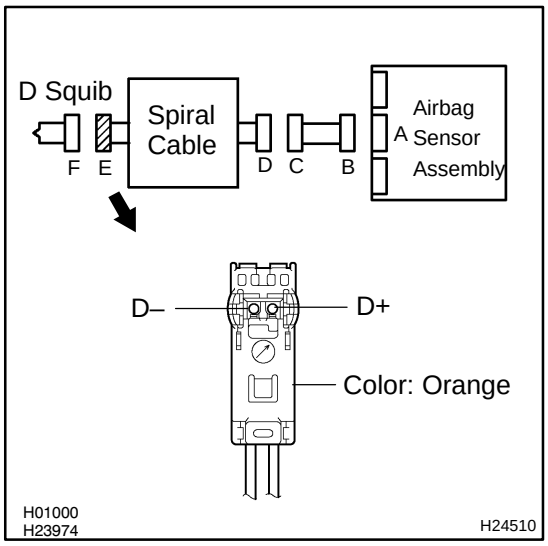
20	Check spiral cable (short to B+).



CHECK:

Measure the voltage according to the value(s) in the table below when the ignition switch is in the ON position.

OK:

Tester Connection	Condition	Specified Condition
D+ – Body ground	Ignition switch ON	Below 1 V
D– – Body ground	Ignition switch ON	Below 1 V

NG → **Replace spiral cable (see page RS–21).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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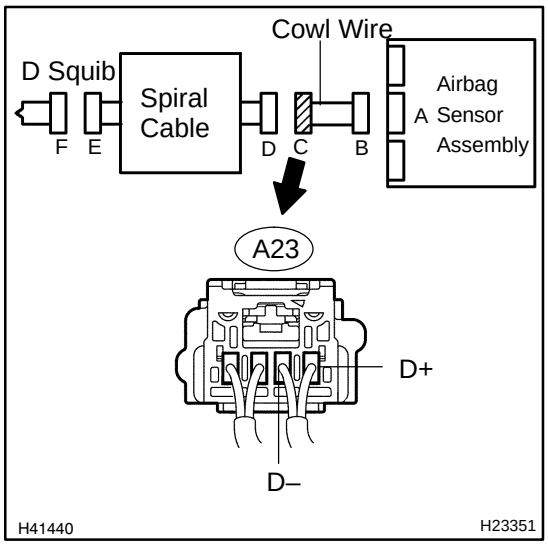
21	Check cowl wire.



PREPARATION:

(a) Restore the released activation prevention mechanism of connector "B" to the original condition.

(b) Disconnect the the cowl wire connector from the spiral cable.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–1 (D+) – Body ground	Ignition switch ON	Below 1 V
A23–2 (D–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–1 (D+) – A23–2 (D–)	Always	Below 1 Ω
A23–1 (D+) – Body ground	Always	1 MΩ or higher
A23–2 (D–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–1 (D+) – A23–2 (D–)	Always	1 MΩ or higher

NG	Repair or replace cowl wire.

OK

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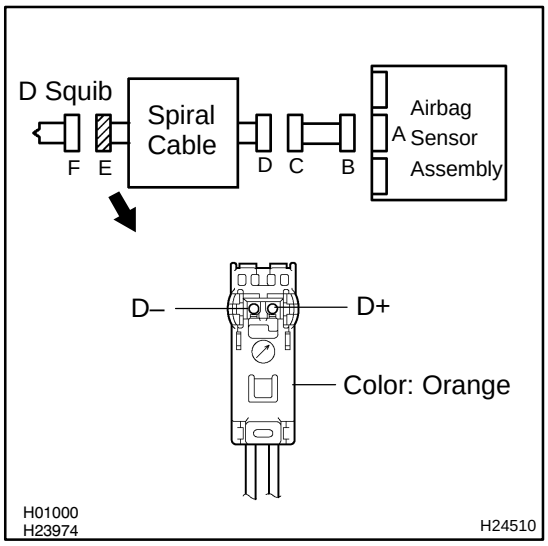
22	Check spiral cable.



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – Body ground	Ignition switch ON	Below 1 V
D– – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – D–	Always	Below 1 Ω
D+ – Body ground	Always	1 MΩ or higher
D– – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”D” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D+ – D–	Always	1 MΩ or higher

NG → **Replace spiral cable (see page RS–21).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page DI–1151).

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DIDHJ–01

DTC	B1805/52	Short in P Squib Circuit

DTC	B1806/52	Open in P Squib Circuit

DTC	B1807/52	Short in P Squib Circuit (to Ground)

DTC	B1808/52	Short in P Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the P squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1805/52	▶The airbag sensor assembly receives a line short circuit signal 5 times in the P squib circuit during primary check. ▶P squib malfunction ▶Airbag sensor assembly malfunction	▶Front passenger airbag assembly (P squib) ▶Airbag sensor assembly ▶Cowl wire
B1806/52	▶The airbag sensor assembly receives an open circuit signal in the P squib circuit for 2 seconds. ▶P squib malfunction ▶Airbag sensor assembly malfunction	▶Front passenger airbag assembly (P squib) ▶Airbag sensor assembly ▶Cowl wire
B1807/52	▶The airbag sensor assembly receives a short circuit to ground signal in the P squib circuit for 0.5 seconds. ▶P squib malfunction ▶Airbag sensor assembly malfunction	▶Front passenger airbag assembly (P squib) ▶Airbag sensor assembly ▶Cowl wire
B1808/52	▶The airbag sensor assembly receives a short to B+ circuit signal in the P squib circuit for 0.5 seconds. ▶P squib malfunction ▶Airbag sensor assembly malfunction	▶Front passenger airbag assembly (P squib) ▶Airbag sensor assembly ▶Cowl wire

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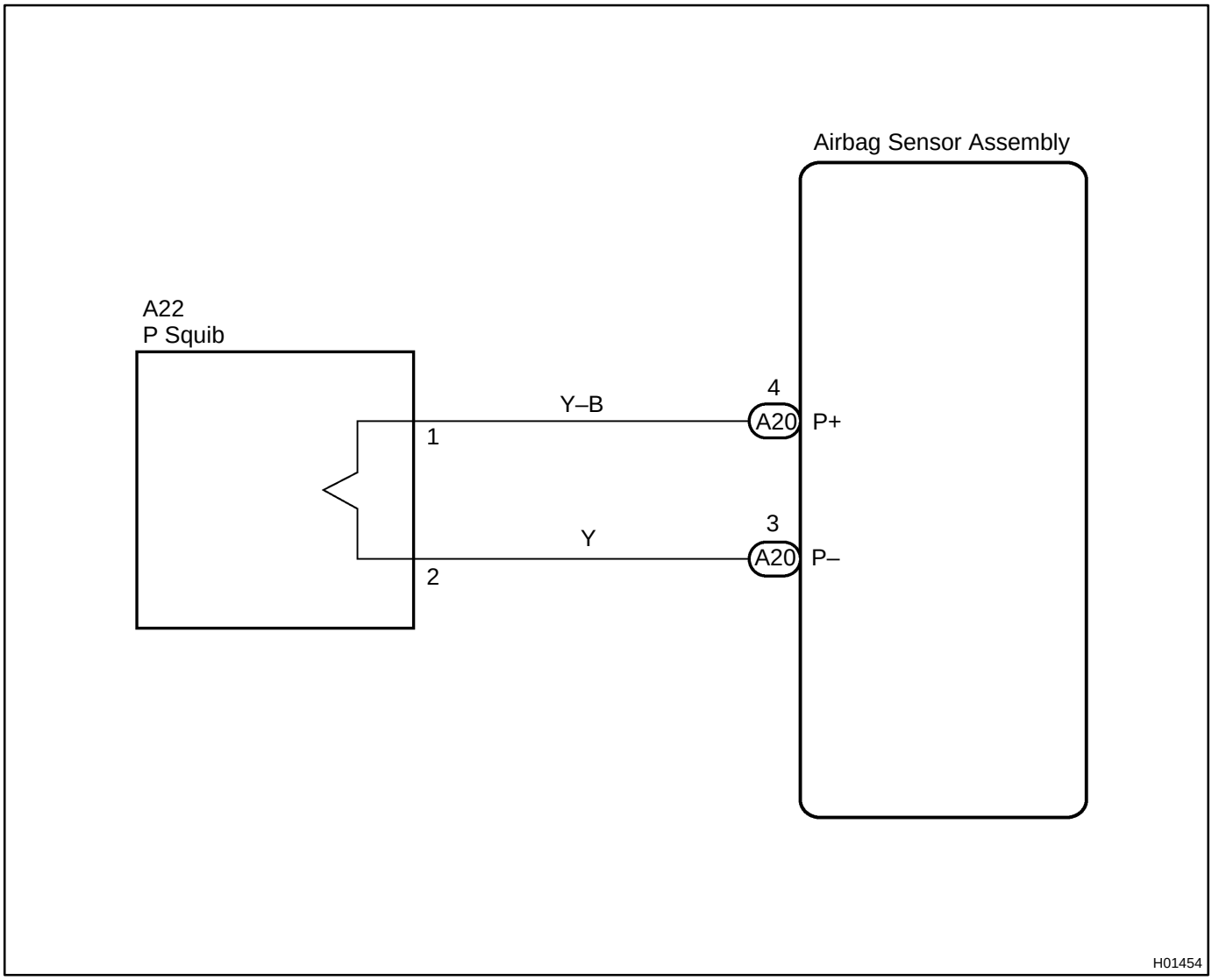
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1805 is output.	A
DTC B1806 is output.	B
DTC B1807 is output.	C
DTC B1808 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 52 is output.	E

HINT:

Codes other than DTC B1805, B1806, B1807, B1808 and DTC 52 may be output at this time, but they are not related to this check.

B	**Go to step 3.**
C	**Go to step 4.**
D	**Go to step 5.**
E	**Go to step 6.**

A

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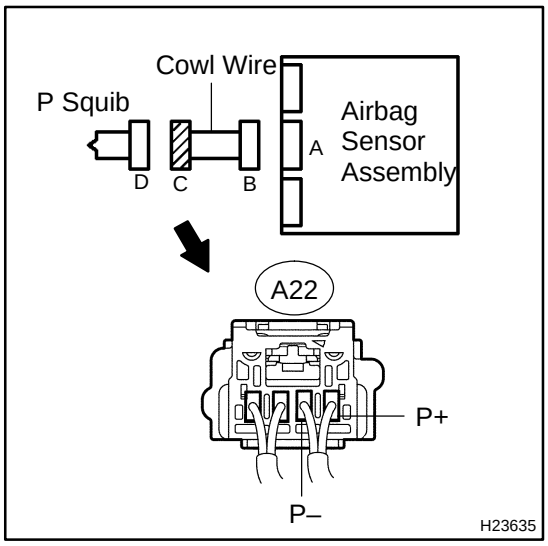
2	Check cowl wire (short).



PREPARATION:

Release the activation prevention mechanism built into connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

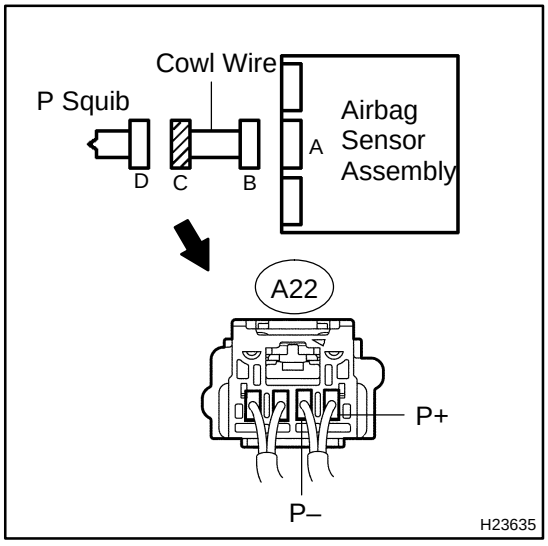
Tester Connection	Condition	Specified Condition
A22–1 (P+) – A22–2 (P–)	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

Go to step 8.

3	Check cowl wire (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–1 (P+) – A22–2 (P–)	Always	Below 1 Ω

NG → **Repair or replace cowl wire.**

OK

Go to step 9.

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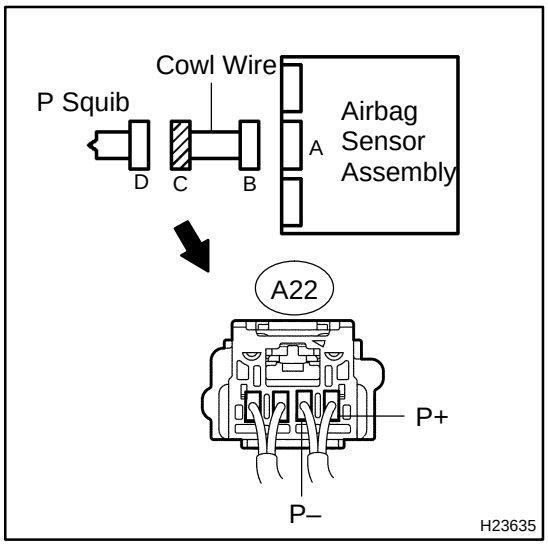
4	Check cowl wire (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

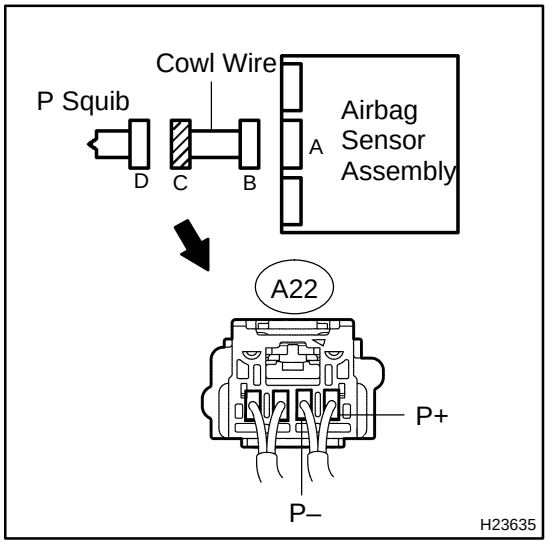
Tester Connection	Condition	Specified Condition
A22–1 (P+) – Body ground	Always	1 MΩ or higher
A22–2 (P–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

Go to step 9.

5	Check cowl wire (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–1 (P+) – Body ground	Ignition switch ON	Below 1 V
A22–2 (P–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace cowl wire.**

OK

Go to step 9.

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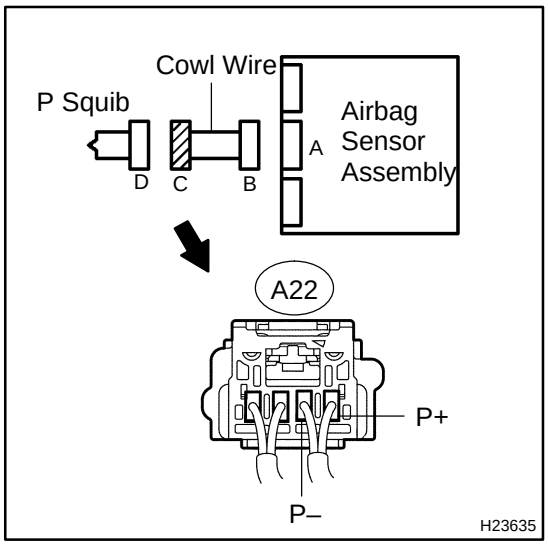
6	Check cowl wire (P squib circuit).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–1 (P+) – Body ground	Ignition switch ON	Below 1 V
A22–2 (P–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–1 (P+) – A22–2 (P–)	Always	Below 1 Ω
A22–1 (P+) – Body ground	Always	1 MΩ or higher
A22–2 (P–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–1 (P+) – A22–2 (P–)	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

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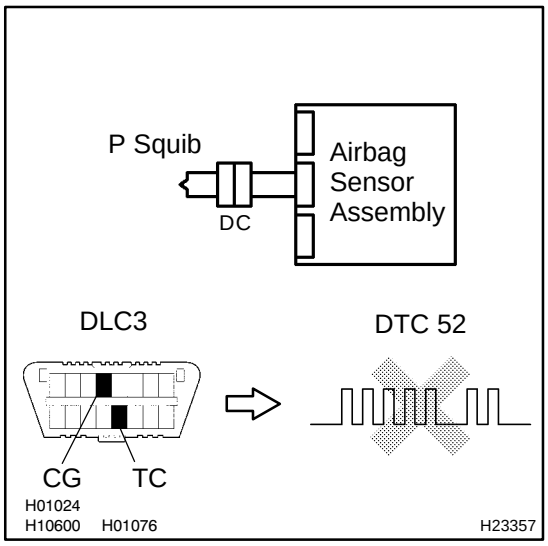
7	Replace front passenger airbag assembly (P squib).



PREPARATION:

(a) Replace the front passenger airbag assembly (see page RS–33).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 52 is not output.

HINT:

Codes other than DTC 52 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

END

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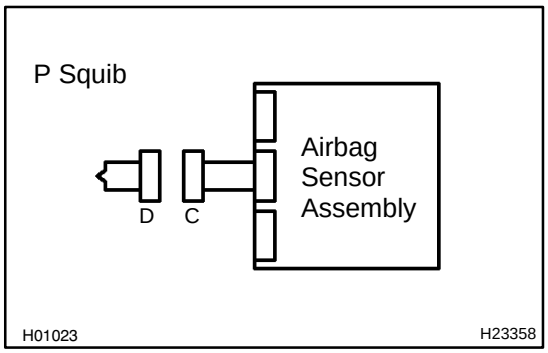
8	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1805 is not output.

HINT:

Codes other than DTC B1805 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 10.

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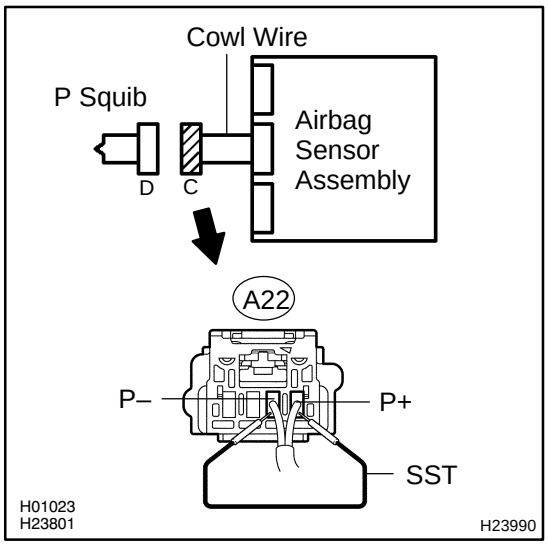
9	Check airbag sensor assembly.



PREPARATION:

(a) From the step 5:
Turn the ignition switch to the LOCK position.

(b) From the step 5:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag sensor assembly.

(d) Using SST, connect A22–1 (P+) and A22–2 (P–) of connector ”C”.
SST 09843–18040

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1806, B1807 or B1808 is not output.

HINT:

Codes other than DTC B1806, B1807 and B1808 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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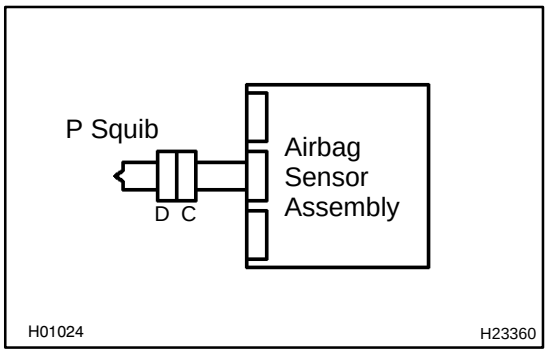
10	Check front passenger airbag assembly (P squib).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 9:
Disconnect the SST from connector "C".
(d) Connect the connector to the front passenger airbag assembly.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1805, B1806, B1807 or B1808 is not output.

HINT:
Codes other than DTC B1805, B1806, B1807 and B1808 may be output at this time, but they are not related to this check.

NG → **Replace front passenger airbag assembly (see page DI–1137).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:
- ▶ Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- ▶ After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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DTC	B1810/53	Short in D Squib (Dual stage – 2nd step) Circuit

DTC	B1811/53	Open in D Squib (Dual stage – 2nd step) Circuit

DTC	B1812/53	Short in D Squib (Dual stage – 2nd step) Circuit (to Ground)

DTC	B1813/53	Short in D Squib (Dual stage – 2nd step) Circuit (to B+)

CIRCUIT DESCRIPTION

The D squib (Dual stage – 2nd step) circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the D squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1810/53	▶The airbag sensor assembly receives a line short circuit signal 5 times in the D squib (Dual stage – 2nd step) circuit during primary check. ▶Spiral cable malfunction ▶D squib malfunction ▶Airbag sensor assembly malfunction	▶Steering wheel pad (D squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Spiral cable ▶Cowl wire
B1811/53	▶The airbag sensor assembly receives an open circuit signal in the D squib (Dual stage – 2nd step) circuit for 2 seconds. ▶Spiral cable malfunction ▶D squib malfunction ▶Airbag sensor assembly malfunction	▶Steering wheel pad (D squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Spiral cable ▶Cowl wire
B1812/53	▶The airbag sensor assembly receives a short circuit to ground signal in the D squib (Dual stage – 2nd step) circuit for 0.5 seconds. ▶Spiral cable malfunction ▶D squib malfunction ▶Airbag sensor assembly malfunction	▶Steering wheel pad (D squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Spiral cable ▶Cowl wire
B1813/53	▶The airbag sensor assembly receives a short to B+ circuit signal in the D squib (Dual stage – 2nd step) circuit for 0.5 seconds. ▶Spiral cable malfunction ▶D squib malfunction ▶Airbag sensor assembly malfunction	▶Steering wheel pad (D squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Spiral cable ▶Cowl wire

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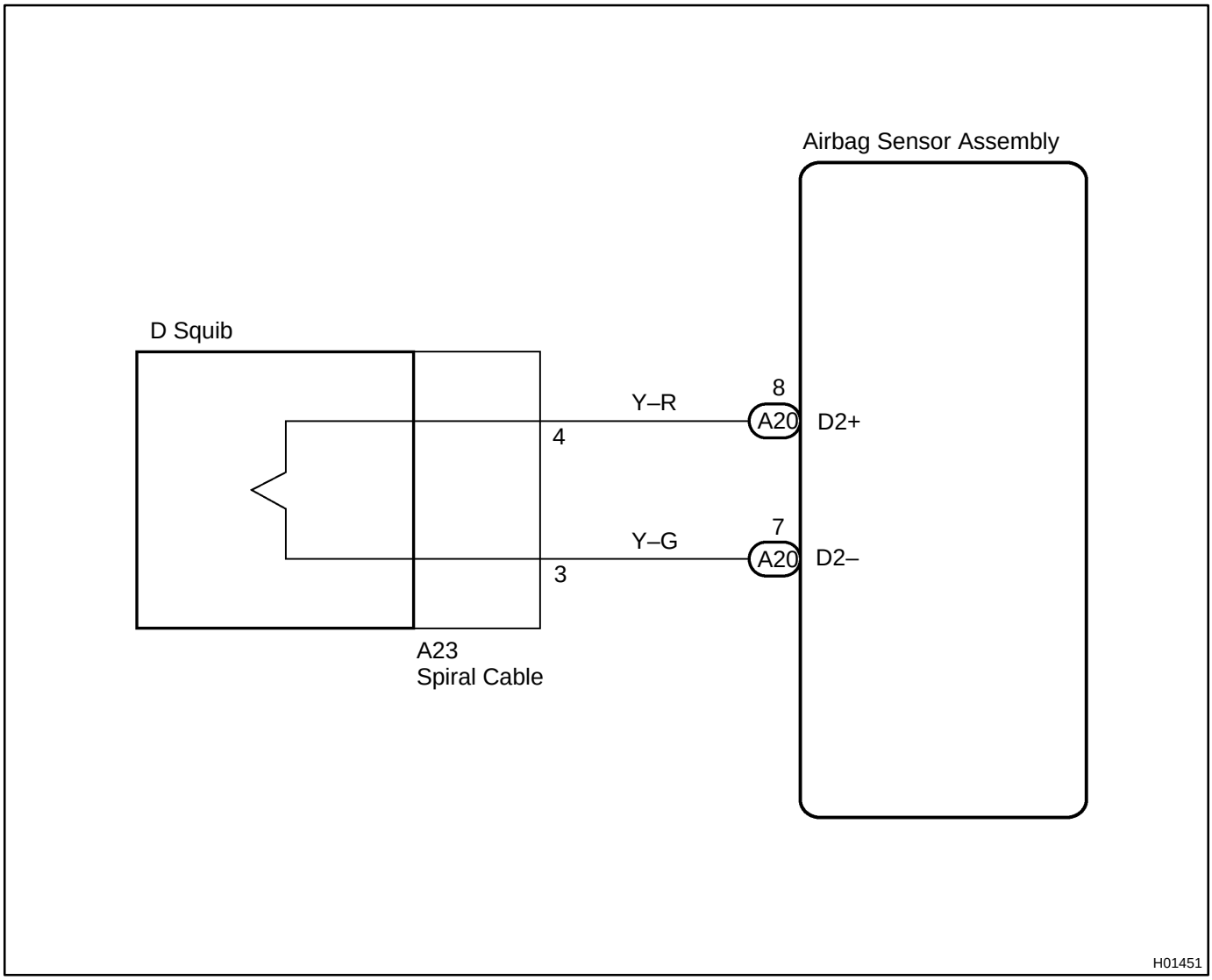
WIRING DIAGRAM



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INSPECTION PROCEDURE

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1810 is output.	A
DTC B1811 is output.	B
DTC B1812 is output.	C
DTC B1813 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 53 is output.	E

HINT:
Codes other than DTC B1810, B1811, B1812, B1813 and DTC 53 may be output at this time, but they are not related to this check.

B	**Go to step 4.**
C	**Go to step 5.**
D	**Go to step 6.**
E	**Go to step 7.**

A

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2	Check connector.

CHECK:

Check that the spiral cable connectors (on the steering wheel pad side) are not damaged.

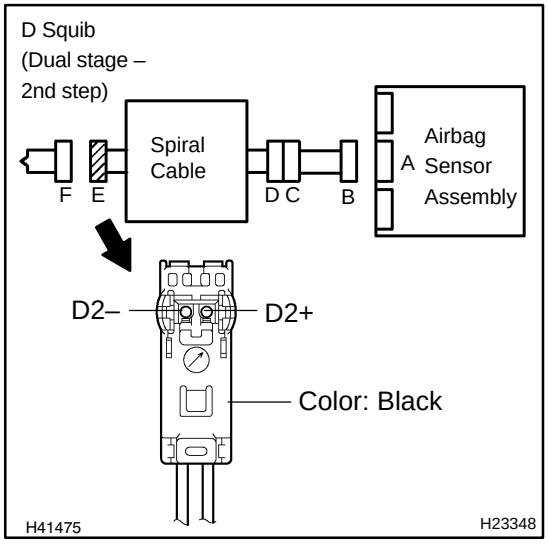
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Replace spiral cable (see page RS–21).**

OK

3	Check D squib (dual stage – 2nd step) circuit (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – D2–	Always	1 MΩ or higher

NG → **Go to step 13.**

OK

Go to step 10.

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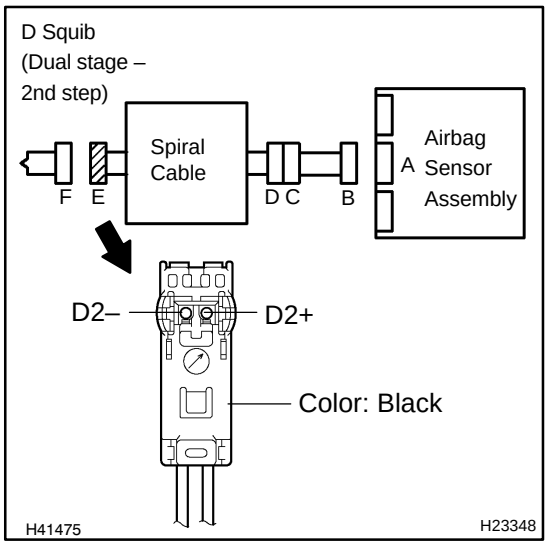
4	Check D squib (dual stage – 2nd step) circuit (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

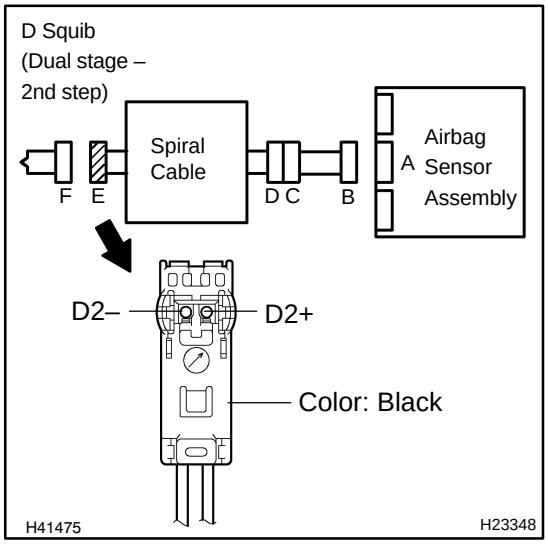
Tester Connection	Condition	Specified Condition
D2+ – D2–	Always	Below 1 Ω

NG → **Go to step 15.**

OK

Go to step 11.

5	Check D squib (dual stage – 2nd step) circuit (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – Body ground	Always	1 MΩ or higher
D2– – Body ground	Always	1 MΩ or higher

NG → **Go to step 17.**

OK

Go to step 11.

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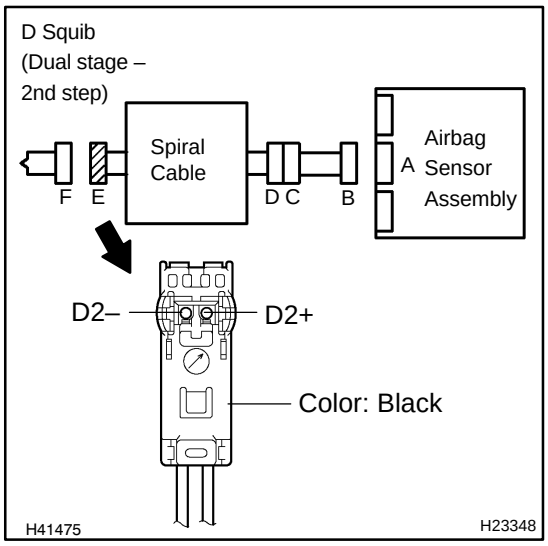
6	Check D squib (dual stage – 2nd step) circuit (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – Body ground	Ignition switch ON	Below 1 V
D2– – Body ground	Ignition switch ON	Below 1 V

NG → **Go to step 19.**

OK

Go to step 11.

7	Check connector.

CHECK:

Check that the spiral cable connectors (on the steering wheel pad side) are not damaged.

OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Replace spiral cable (see page RS–21).**

OK

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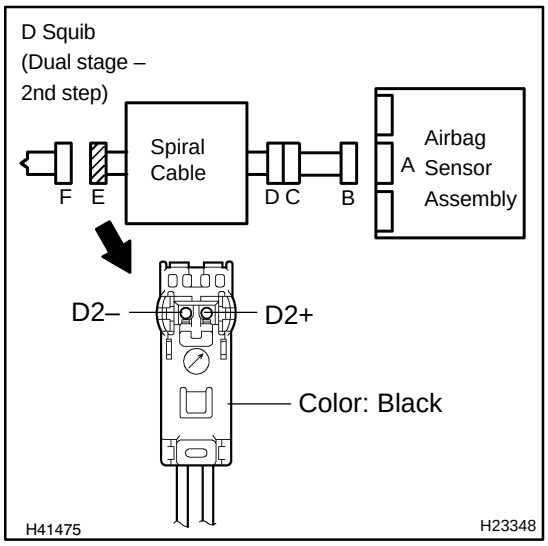
8	Check D squib (dual stage – 2nd step) circuit.



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – Body ground	Ignition switch ON	Below 1 V
D2– – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – D2–	Always	Below 1 Ω
D2+ – Body ground	Always	1 MΩ or higher
D2– – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – D2–	Always	1 MΩ or higher

NG → **Go to step 21.**

OK

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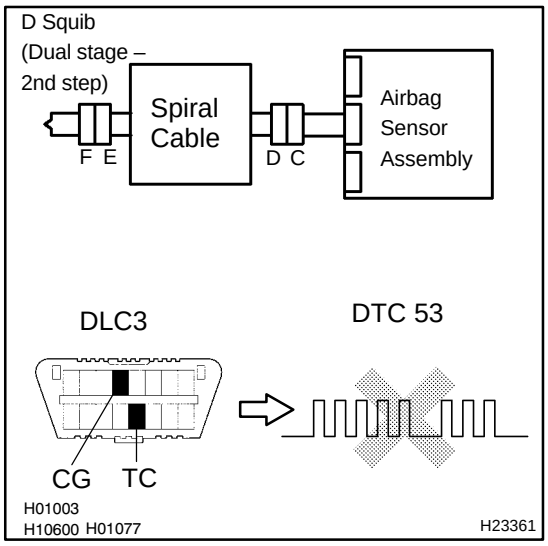
9	Replace steering wheel pad (D squib, dual stage – 2nd step).



PREPARATION:

(a) Replace the steering wheel pad (see page RS–21).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 53 is not output.

HINT:

Codes other than DTC 53 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

END

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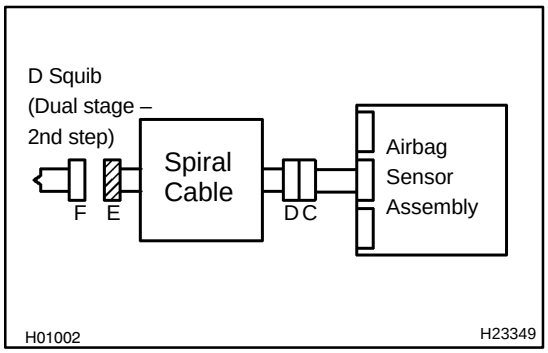
10	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.

(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1810 is not output.

HINT:

Codes other than DTC B1810 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 12.

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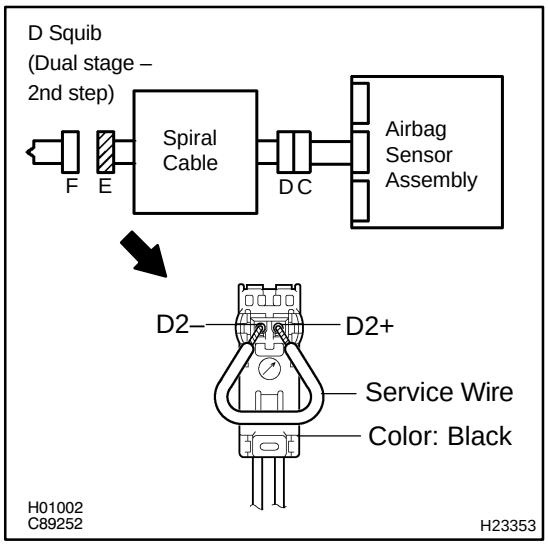
11	Check airbag sensor assembly.



PREPARATION:

(a) From the step 6:
Turn the ignition switch to the LOCK position.

(b) From the step 6:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag sensor assembly.

(d) Using a service wire, connect D2+ and D2– of connector "E".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1811, B1812 or B1813 is not output.

HINT:

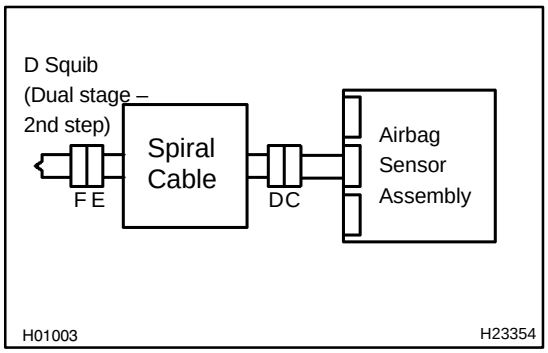
Codes other than DTC B1811, B1812 and B1813 may be output at this time, but they are not related to this check.

NG	Replace airbag sensor assembly (see page RS–82).

OK

Dardoor.com

12	Check steering wheel pad (D squib, dual stage – 2nd step).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 11:
Disconnect the service wire from connector "E".
(d) Connect the connectors to the steering wheel pad.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1810, B1811, B1812 or B1813 is not output.

HINT:
Codes other than DTC B1810, B1811, B1812 and B1813 may be output at this time, but they are not related to this check.

NG → **Replace steering wheel pad (see page RS–21).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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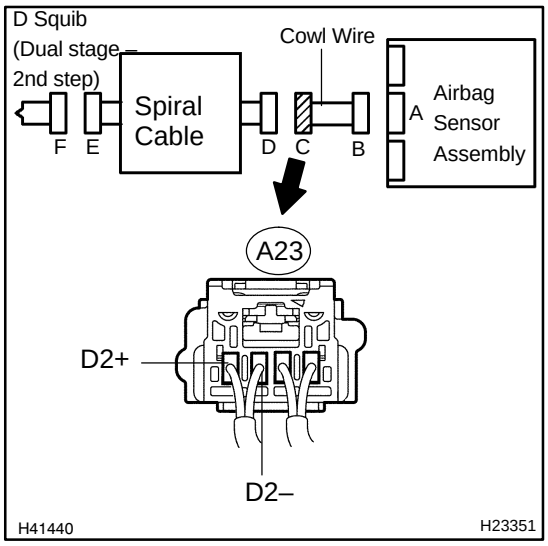
13	Check cowl wire (short).



PREPARATION:

Disconnect the cowl wire connector from the spiral cable.

HINT:

The activation prevention mechanism of connector "B" has already been released.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–4 (D2+) – A23–3 (D2–)	Always	1 MΩ or higher

NG	Repair or replace cowl wire.

OK

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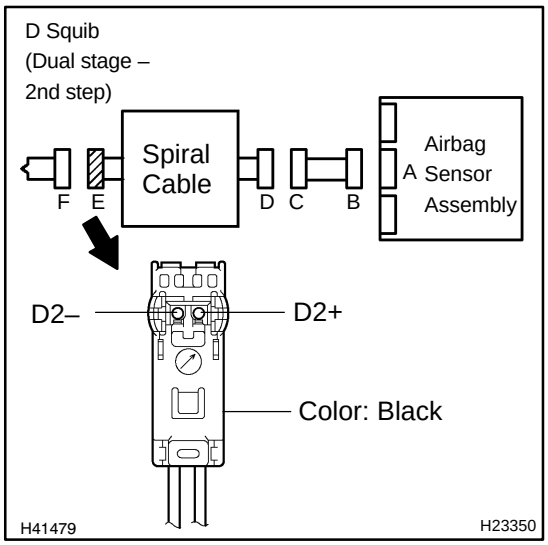
14	Check spiral cable (short).



PREPARATION:

Release the activation prevention mechanism built into connector ”D” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – D2–	Always	1 MΩ or higher

NG → **Replace spiral cable (see page RS–21).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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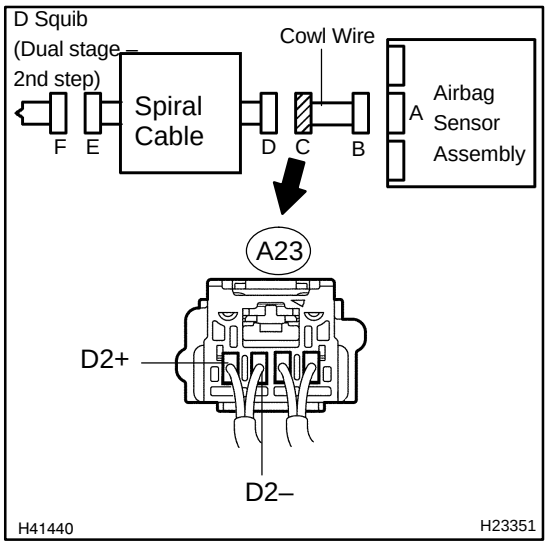
15	Check cowl wire (open).



PREPARATION:

Disconnect the cowl wire connector from the spiral cable.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–4 (D2+) – A23–3 (D2–)	Always	Below 1 Ω

NG → **Repair or replace cowl wire.**

OK

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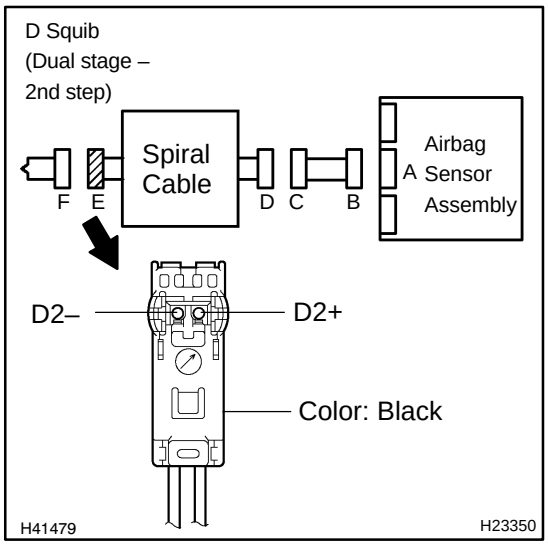
16	Check spiral cable (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – D2–	Always	Below 1 Ω

NG → **Replace spiral cable (see page RS–21).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page DI–1151).

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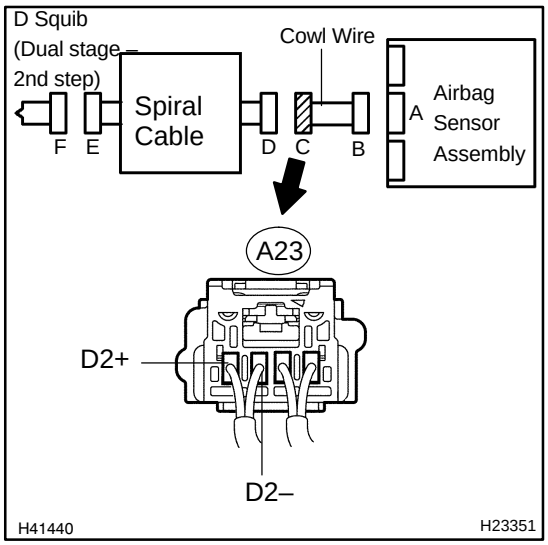
17	Check cowl wire (short to ground).



PREPARATION:

Disconnect the cowl wire connector from the spiral cable.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–4 (D2+) – Body ground	Always	1 MΩ or higher
A23–3 (D2–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

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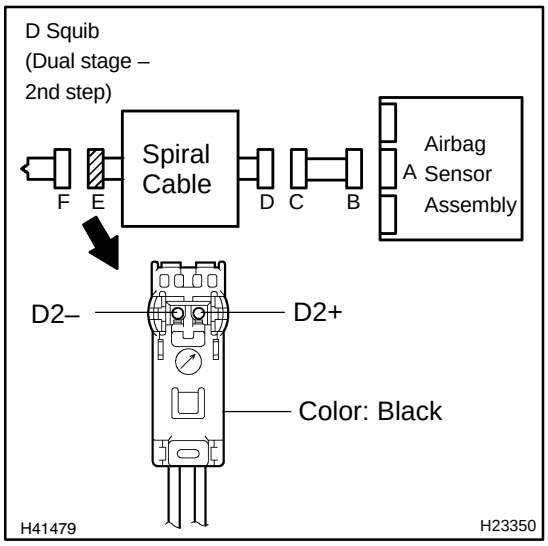
18	Check spiral cable (short to ground).



CHECK:

(a) Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – Body ground	Always	1 MΩ or higher
D2– – Body ground	Always	1 MΩ or higher

NG → **Replace spiral cable (see page RS–21).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page DI–1151).

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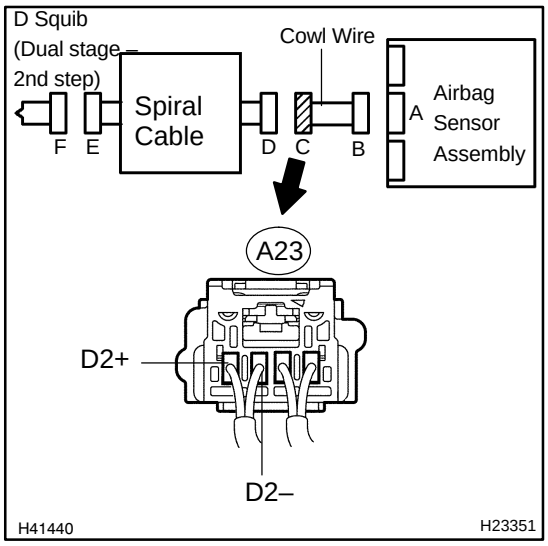
19	Check cowl wire (short to B+).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the cowl wire connector from the spiral cable.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–4 (D2+) – Body ground	Ignition switch ON	Below 1 V
A23–3 (D2–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace cowl wire.**

OK

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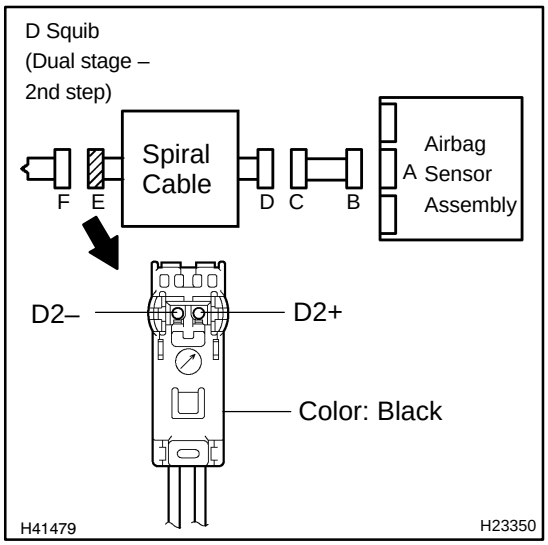
20	Check spiral cable (short to B+).



CHECK:

Measure the voltage according to the value(s) in the table below when the ignition switch is in the ON position.

OK:

Tester Connection	Condition	Specified Condition
D2+ – Body ground	Ignition switch ON	Below 1 V
D2– – Body ground	Ignition switch ON	Below 1 V

NG → **Replace spiral cable (see page RS–21).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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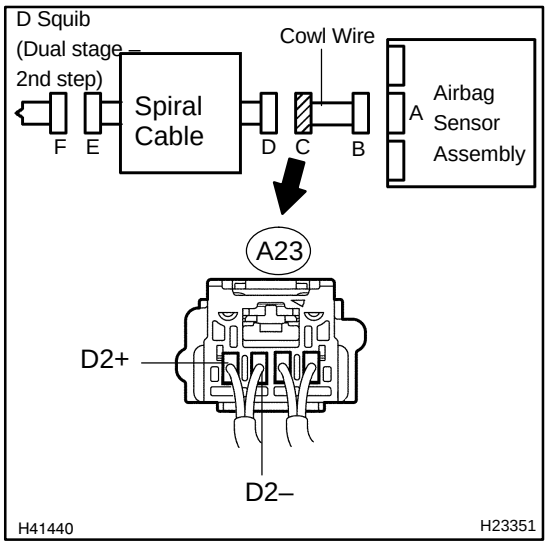
21	Check cowl wire.



PREPARATION:

(a) Restore the released activation prevention mechanism of connector "B" to the original condition.
(b) Disconnect the cowl wire connector from the spiral cable.
(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–4 (D2+) – Body ground	Ignition switch ON	Below 1 V
A23–3 (D2–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–4 (D2+) – A23–3 (D2–)	Always	Below 1 Ω
A23–4 (D2+) – Body ground	Always	1 MΩ or higher
A23–3 (D2–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A23–4 (D2+) – A23–3 (D2–)	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

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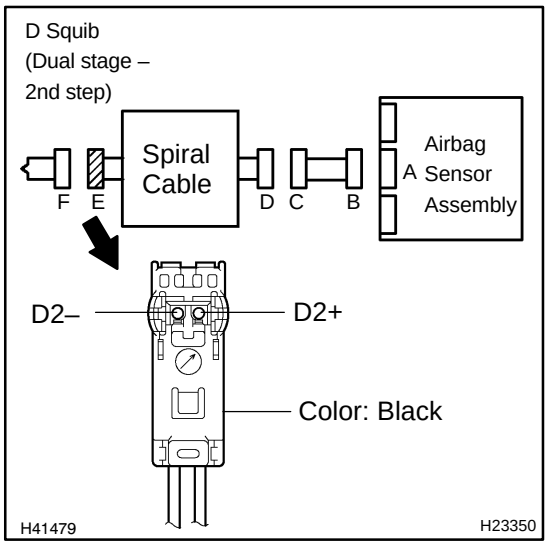
22	Check spiral cable.



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – Body ground	Ignition switch ON	Below 1 V
D2– – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – D2–	Always	Below 1 Ω
D2+ – Body ground	Always	1 MΩ or higher
D2– – body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”D” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D2+ – D2–	Always	1 MΩ or higher

NG → **Replace spiral cable (see page RS–21).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

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HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the air-bag system or driving the vehicle on a city or rough road (see page DI–1151).

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DTC	B1815/54	Short in P Squib (Dual stage – 2nd step) Circuit

DTC	B1816/54	Open in P Squib (Dual stage – 2nd step) Circuit

DTC	B1817/54	Short in P Squib (Dual stage – 2nd step) Circuit (to Ground)

DTC	B1818/54	Short in P Squib (Dual stage – 2nd step) Circuit (to B+)

CIRCUIT DESCRIPTION

The P squib (Dual stage – 2nd step) circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the P squib (Dual stage – 2nd step) circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1815/54	▶The airbag sensor assembly receives a line short circuit signal 5 times in the P squib (Dual stage – 2nd step) circuit during primary check. ▶P squib malfunction ▶Airbag sensor assembly malfunction	▶Front passenger airbag assembly (P squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Cowl wire
B1816/54	▶The airbag sensor assembly receives an open circuit signal in the P squib (Dual stage – 2nd step) circuit for 2 seconds. ▶P squib malfunction ▶Airbag sensor assembly malfunction	▶Front passenger airbag assembly (P squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Cowl wire
B1817/54	▶The airbag sensor assembly receives a short circuit to ground signal in the P squib (Dual stage – 2nd step) circuit for 0.5 seconds. ▶P squib malfunction ▶Airbag sensor assembly malfunction	▶Front passenger airbag assembly (P squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Cowl wire
B1818/54	▶The airbag sensor assembly receives a short to B+ circuit signal in the P squib (Dual stage – 2nd step) circuit for 0.5 seconds. ▶P squib malfunction ▶Airbag sensor assembly malfunction	▶Front passenger airbag assembly (P squib, Dual stage – 2nd step) ▶Airbag sensor assembly ▶Cowl wire

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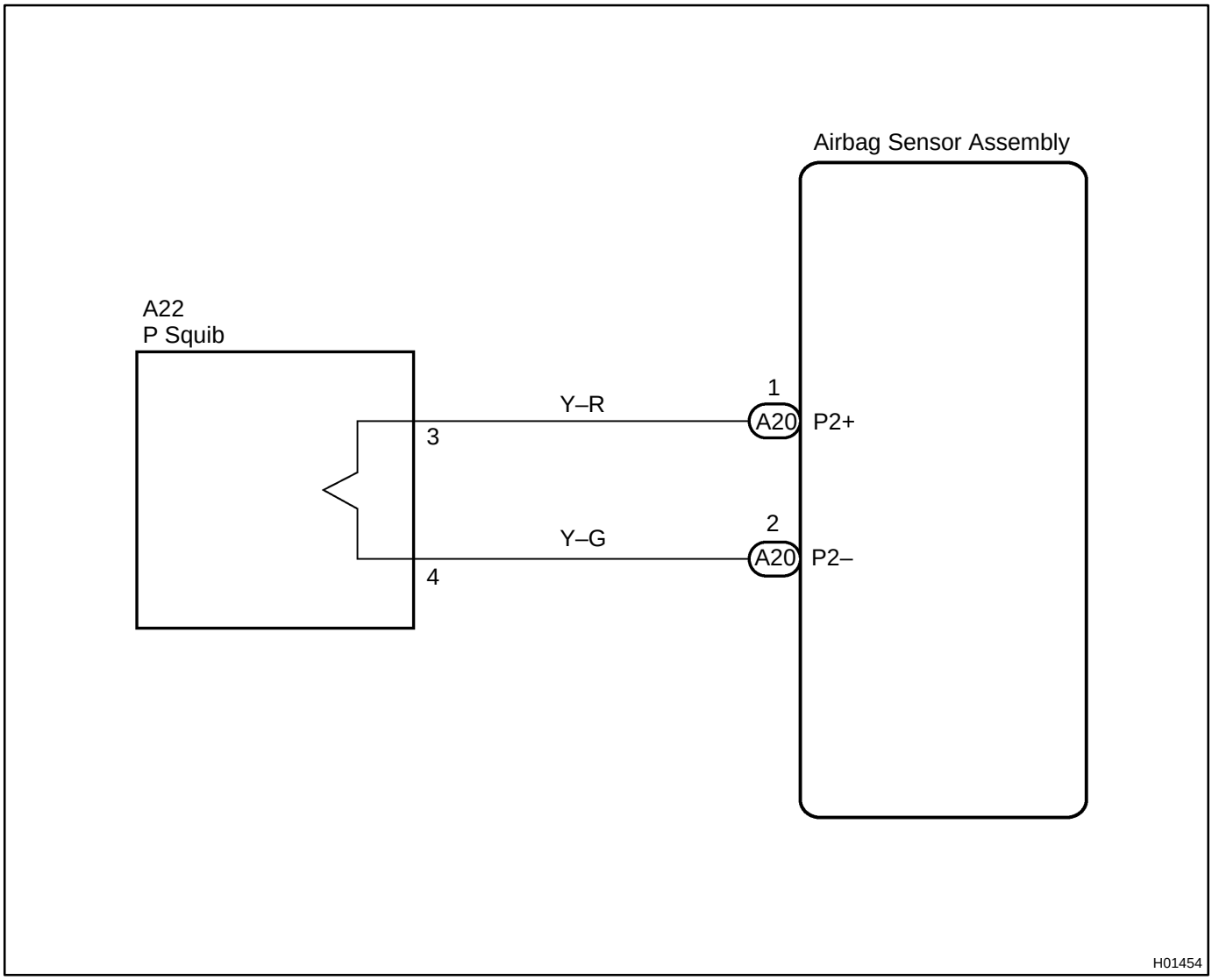
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1815 is output.	A
DTC B1816 is output.	B
DTC B1817 is output.	C
DTC B1818 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 54 is output.	E

HINT:

Codes other than DTC B1815, B1816, B1817, B1818 and DTC 54 may be output at this time, but they are not related to this check.

B	**Go to step 3.**
C	**Go to step 4.**
D	**Go to step 5.**
E	**Go to step 6.**

A

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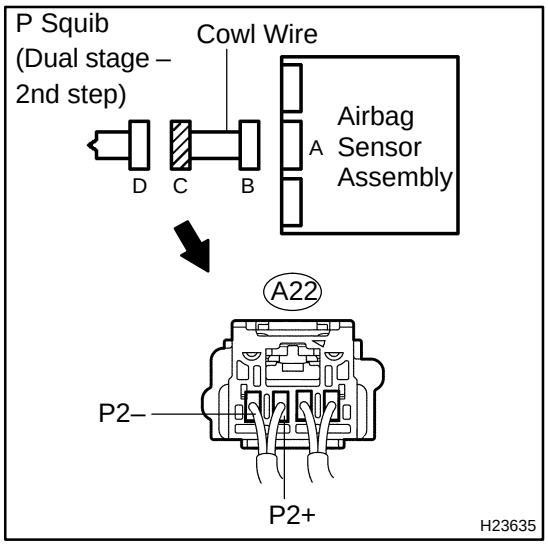
2	Check cowl wire (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

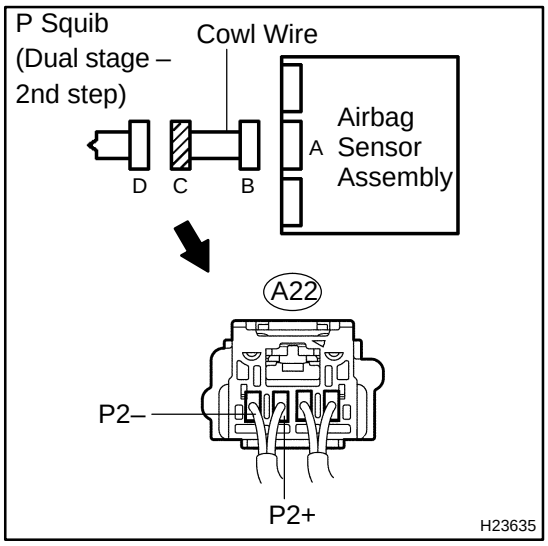
Tester Connection	Condition	Specified Condition
A22–3 (P2+) – A22–4 (P2–)	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

Go to step 8.

3	Check cowl wire (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–3 (P2+) – A22–4 (P2–)	Always	Below 1 Ω

NG → **Repair or replace cowl wire.**

OK

Go to step 9.

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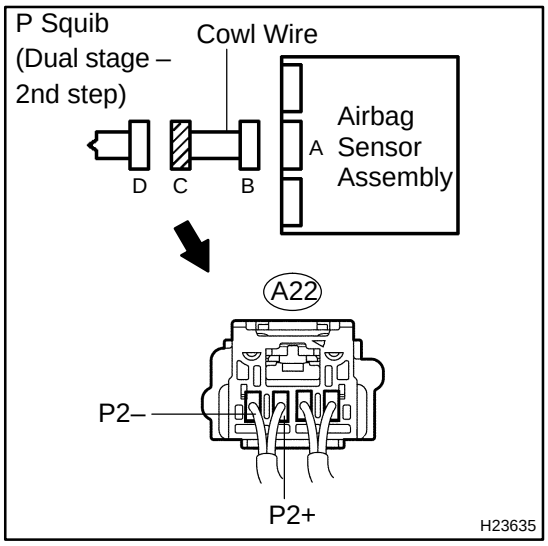
4	Check cowl wire (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

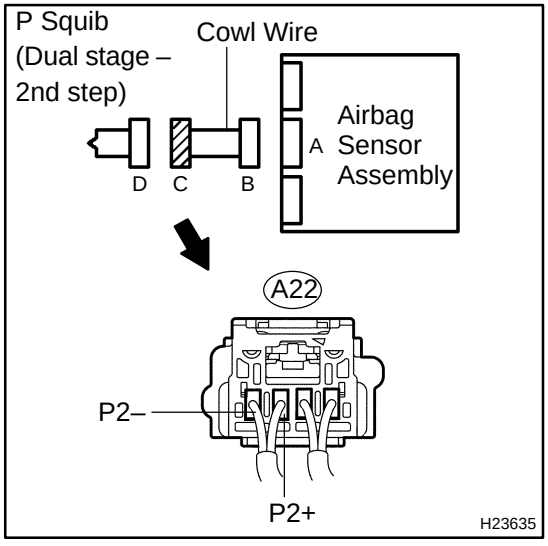
Tester Connection	Condition	Specified Condition
A22–3 (P2+) – Body ground	Always	1 MΩ or higher
A22–4 (P2–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

Go to step 9.

5	Check cowl wire (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–3 (P2+) – Body ground	Ignition switch ON	Below 1 V
A22–4 (P2–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace cowl wire.**

OK

Go to step 9.

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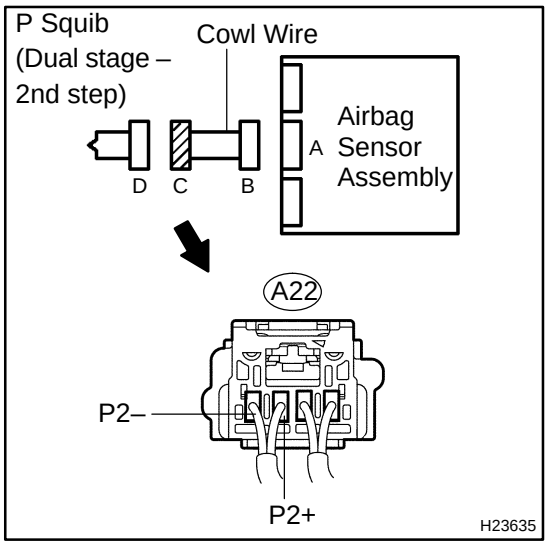
6	Check cowl wire (P squib circuit, dual stage – 2nd step).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–3 (P2+) – Body ground	Ignition switch ON	Below 1 V
A22–4 (P2–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified Condition
A22–3 (P2+) – A22–4 (P2–)	Always	Below 1 Ω
A22–3 (P2+) – Body ground	Always	1 MΩ or higher
A22–4 (P2–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A22–3 (P2+) – A22–4 (P2–)	Always	1 MΩ or higher

NG → **Repair or replace cowl wire.**

OK

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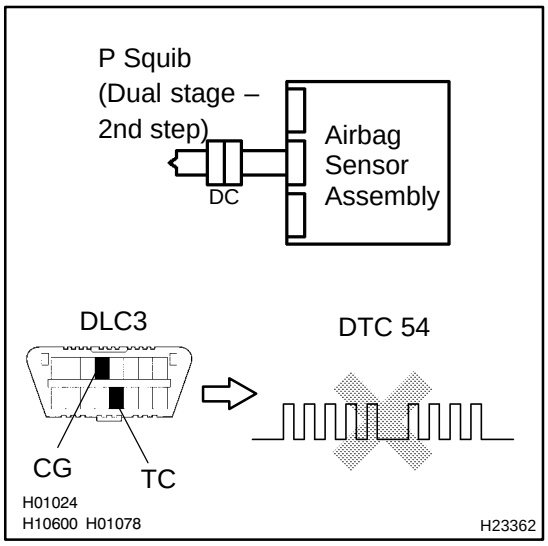
7	Replace front passenger airbag assembly (P squib, dual stage – 2nd step).



PREPARATION:

(a) Replace the front passenger airbag assembly (see page RS–33).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 54 is not output.

HINT:

Codes other than DTC 54 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

END

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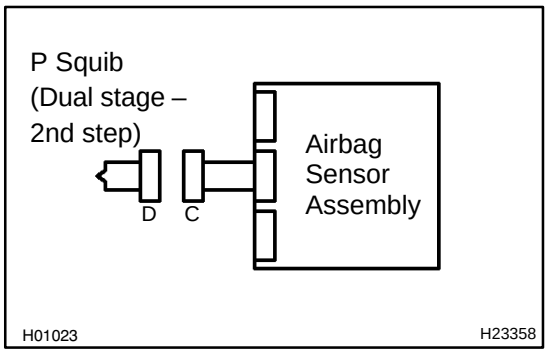
8	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1815 is not output.

HINT:

Codes other than DTC B1815 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 10.

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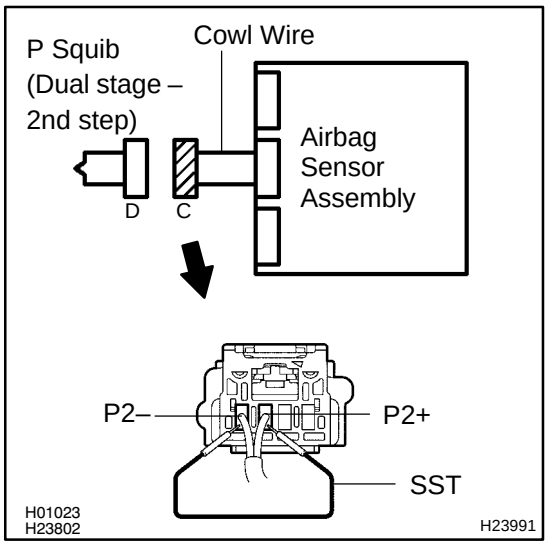
9	Check airbag sensor assembly.



PREPARATION:

(a) From the step 5:
Turn the ignition switch to the LOCK position.

(b) From the step 5:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag sensor assembly.

(d) Using SST, connect A22–3 (P2+) and A22–4 (P2–) of connector "C".
SST 09843–18040

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1816, B1817 or B1818 is not output.

HINT:

Codes other than DTC B1816, B1817 and B1818 may be output at this time, but they are not related to this check.

NG	**Replace airbag sensor assembly (see page RS–82).**

OK

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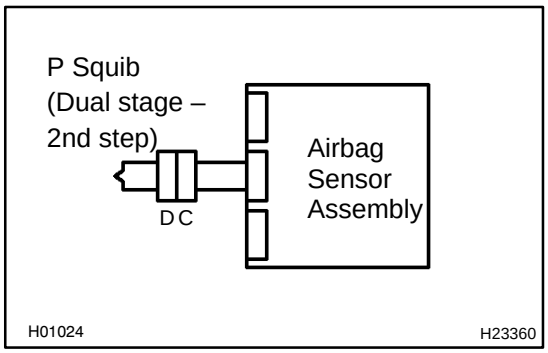
10	Check front passenger airbag assembly (P squib, dual stage – 2nd step).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 9:
Disconnect the SST from connector "C".
(d) Connect the connector to the front passenger airbag assembly.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1815, B1816, B1817 or B1818 is not output.

HINT:
Codes other than DTC B1815, B1816, B1817 and B1818 may be output at this time, but they are not related to this check.

NG → **Replace front passenger airbag assembly (see page RS–33).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:
- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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DTC	B1820/55	Short in Side Squib (RH) Circuit

DTC	B1821/55	Open in Side Squib (RH) Circuit

DTC	B1822/55	Short in Side Squib (RH) Circuit (to Ground)

DTC	B1823/55	Short in Side Squib (RH) Circuit (to B+)

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the side airbag assembly RH.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the side squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1820/55	▶The airbag sensor assembly receives a line short circuit signal 5 times in the side squib RH circuit during primary check. ▶Side squib RH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag assembly RH (Side squib RH) ▶Airbag sensor assembly ▶Floor wire
B1821/55	▶The airbag sensor assembly receives an open circuit signal in the side squib RH circuit for 2 seconds. ▶Side squib RH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag assembly RH (Side squib RH) ▶Airbag sensor assembly ▶Floor wire
B1822/55	▶The airbag sensor assembly receives a short circuit to ground signal in the side squib RH circuit for 0.5 seconds. ▶Side squib RH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag assembly RH (Side squib RH) ▶Airbag sensor assembly ▶Floor wire
B1823/55	▶The airbag sensor assembly receives a short to B+ circuit signal in the side squib RH circuit for 0.5 seconds. ▶Side squib RH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag assembly RH (Side squib RH) ▶Airbag sensor assembly ▶Floor wire

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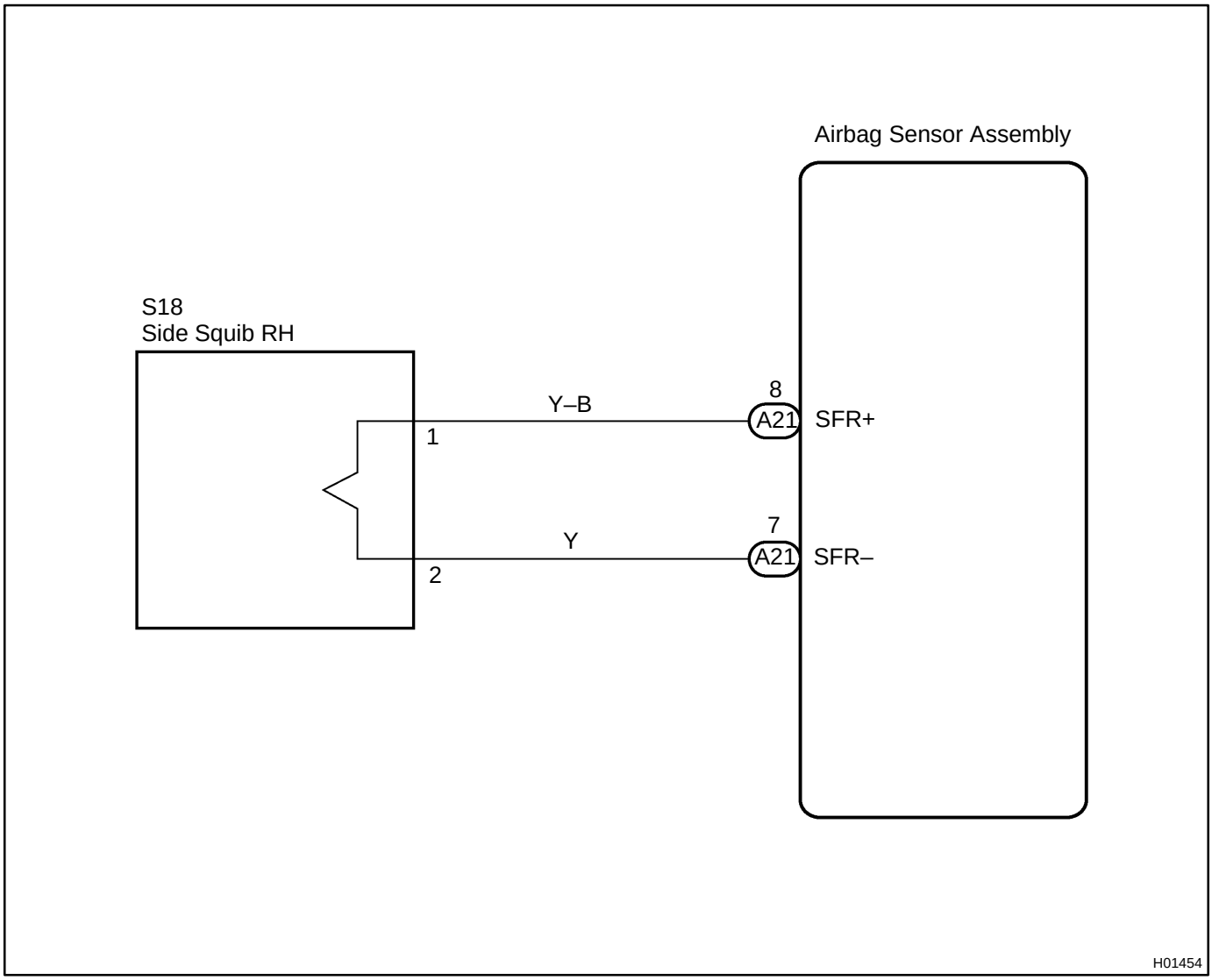
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1820 is output.	A
DTC B1821 is output.	B
DTC B1822 is output.	C
DTC B1823 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 55 is output.	E

HINT:

Codes other than DTC B1820, B1821, B1822, B1823 and DTC 55 may be output at this time, but they are not related to this check.

B	**Go to step 3.**
C	**Go to step 4.**
D	**Go to step 5.**
E	**Go to step 6.**

A

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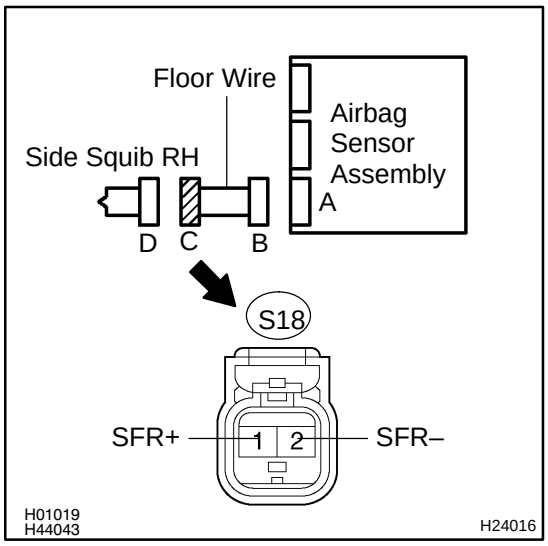
2	Check floor wire (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

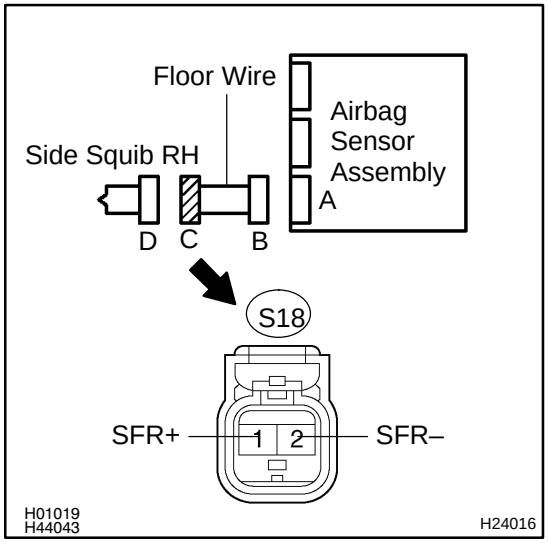
Tester Connection	Condition	Specified Condition
S18–1 (SFR+) – S18–2 (SFR–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

Go to step 8.

3	Check floor wire (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S18–1 (SFR+) – S18–2 (SFR–)	Always	Below 1 Ω

NG → **Repair or replace floor wire.**

OK

Go to step 9.

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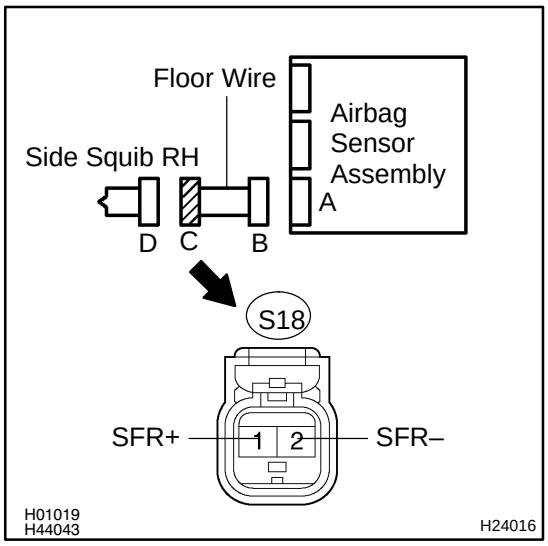
4	Check floor wire (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

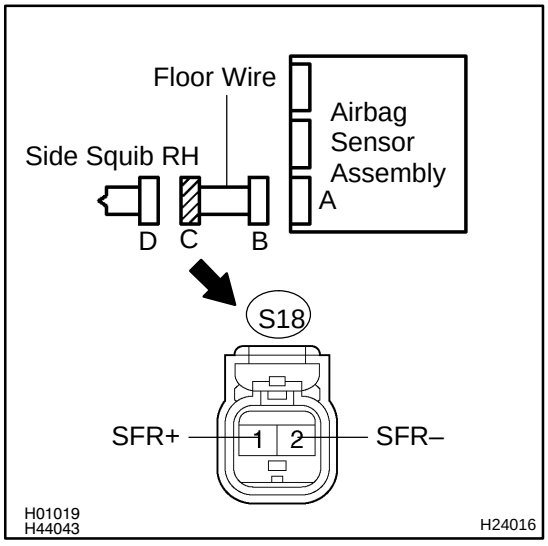
Tester Connection	Condition	Specified Condition
S18–1 (SFR+) – Body ground	Always	1 MΩ or higher
S18–2 (SFR–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

Go to step 9.

5	Check floor wire (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S18–1 (SFR+) – Body ground	Ignition switch ON	Below 1 V
S18–2 (SFR–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire.**

OK

Go to step 9.

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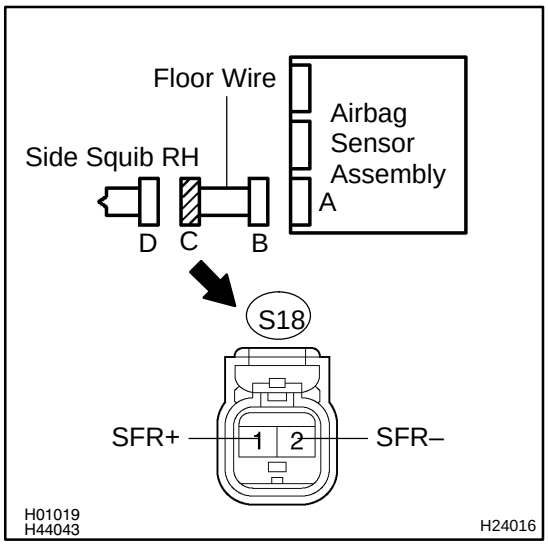
6	Check floor wire (side squib RH circuit).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S18–1 (SFR+) – Body ground	Ignition switch ON	Below 1 V
S18–2 (SFR–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S18–1 (SFR+) – S18–2 (SFR–)	Always	Below 1 Ω
S18–1 (SFR+) – Body ground	Always	1 MΩ or higher
S18–2 (SFR–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S18–1 (SFR+) – S18–2 (SFR–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

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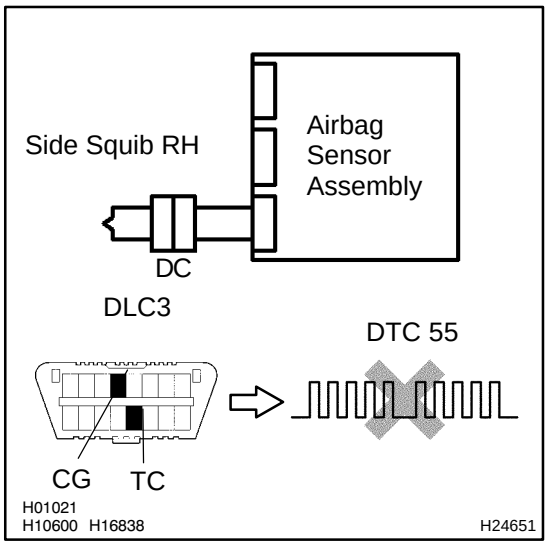
7	Replace side airbag assembly RH (side squib RH).



PREPARATION:

(a) Replace the side airbag assembly RH (see page RS–46, RS–61).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 55 is not output.

HINT:

Codes other than DTC 55 may be output at this time, but they are not related to this check.

NG	Replace airbag sensor assembly (see page RS–82).

OK

END

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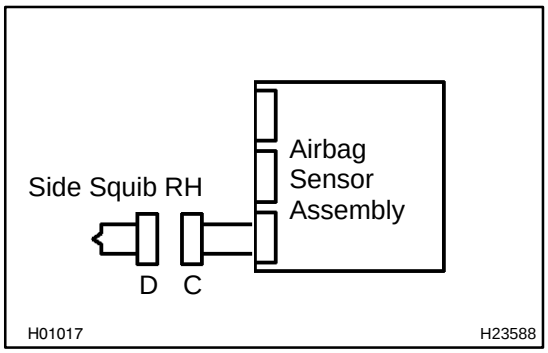
8	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1820 is not output.

HINT:

Codes other than DTC B1820 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 10.

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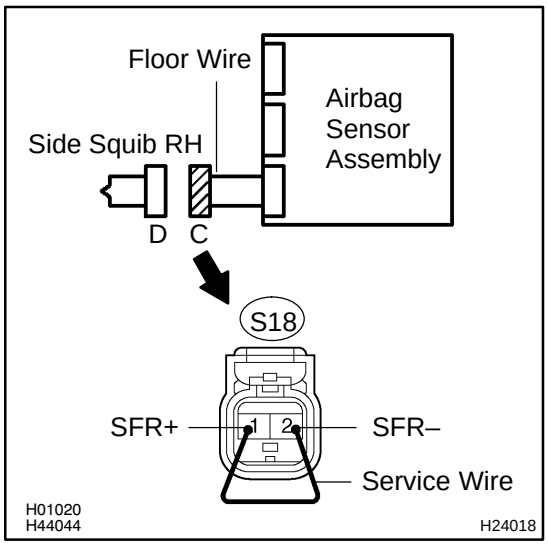
9	Check airbag sensor assembly.



PREPARATION:

(a) From the step 5:
Turn the ignition switch to the LOCK position.

(b) From the step 5:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag sensor assembly.

(d) Using a service wire, connect S18–1 (SFR+) and S18–2 (SFR–) of the connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1821, B1822 or B1823 is not output.

HINT:

Codes other than DTC B1821, B1822 and B1823 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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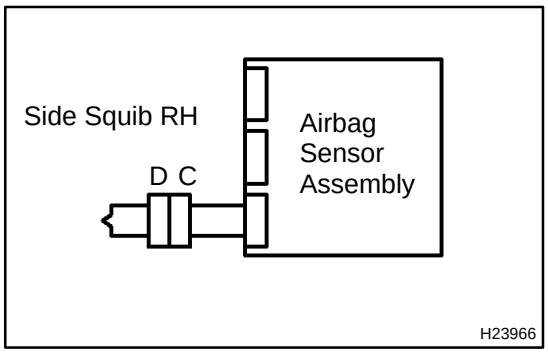
10	Check side airbag assembly RH (side squib RH).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 9:
Disconnect the service wire from connector "C".
(d) Connect the connector to the side airbag assembly RH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1820, B1821, B1822 or B1823 is not output.

HINT:
Codes other than DTC B1820, B1821, B1822 and B1823 may be output at this time, but they are not related to this check.

NG → **Replace side airbag assembly RH (see page RS–46, RS–61).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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DTC	B1825/56	Short in Side Squib (LH) Circuit

DTC	B1826/56	Open in Side Squib (LH) Circuit

DTC	B1827/56	Short in Side Squib (LH) Circuit (to Ground)

DTC	B1828/56	Short in Side Squib (LH) Circuit (to B+)

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the side airbag assembly LH.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the side squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1825/56	▶The airbag sensor assembly receives a line short circuit signal 5 times in the side squib LH circuit during primary check. ▶Side squib LH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag assembly LH (Side squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2
B1826/56	▶The airbag sensor assembly receives an open circuit signal in the side squib LH circuit for 2 seconds. ▶Side squib LH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag assembly LH (Side squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2
B1827/56	▶The airbag sensor assembly receives a short circuit to ground signal in the side squib LH circuit for 0.5 seconds. ▶Side squib LH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag assembly LH (Side squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2
B1828/56	▶The airbag sensor assembly receives a short to B+ circuit signal in the side squib LH circuit for 0.5 seconds. ▶Side squib LH malfunction ▶Airbag sensor assembly malfunction	▶Side airbag assembly LH (Side squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2

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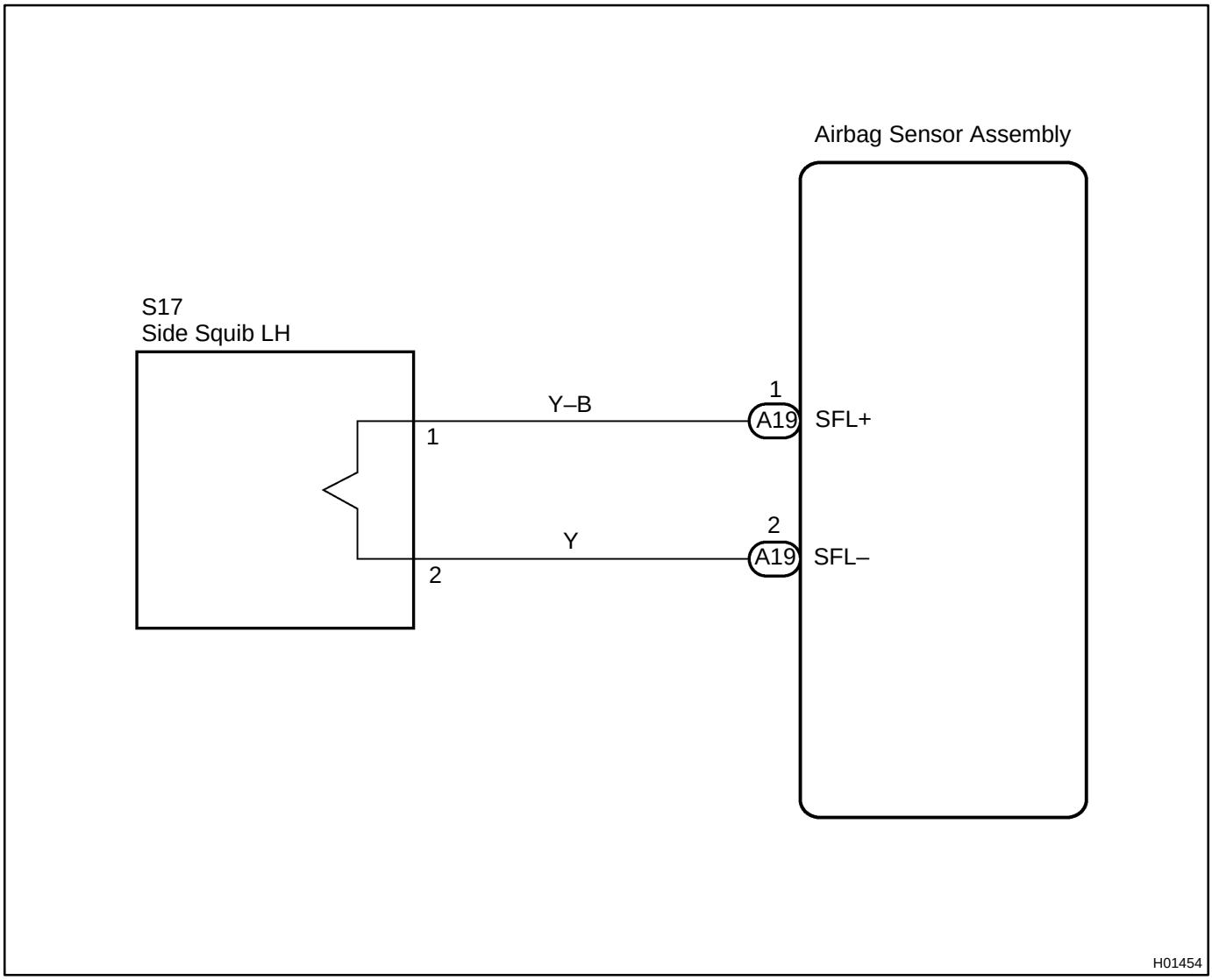
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1825 is output.	A
DTC B1826 is output.	B
DTC B1827 is output.	C
DTC B1828 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 56 is output.	E

HINT:

Codes other than DTC B1825, B1826, B1827, B1828 and DTC 56 may be output at this time, but they are not related to this check.

B	**Go to step 3.**
C	**Go to step 4.**
D	**Go to step 5.**
E	**Go to step 6.**

A

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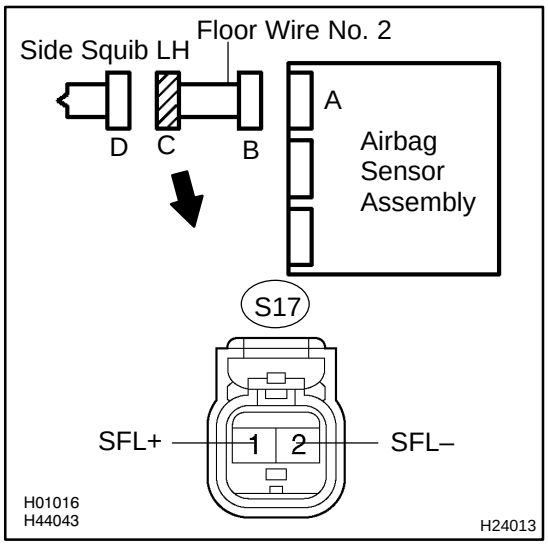
2	Check floor wire No. 2 (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

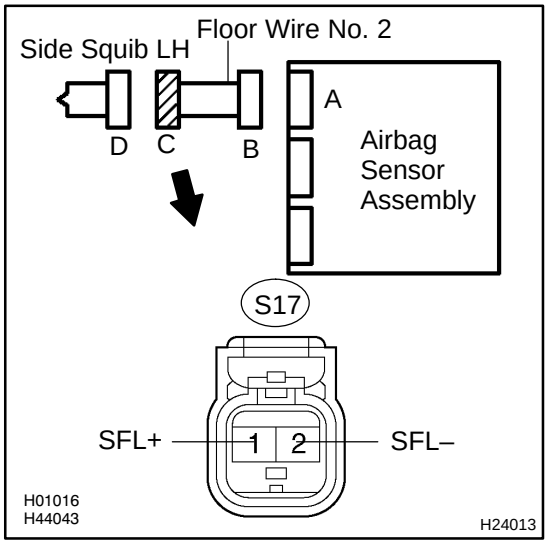
Tester Connection	Condition	Specified Condition
S17–1 (SFL+) – S17–2 (SFL–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 8.

3	Check floor wire No. 2 (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S17–1 (SFL+) – S17–2 (SFL–)	Always	Below 1 Ω

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 9.

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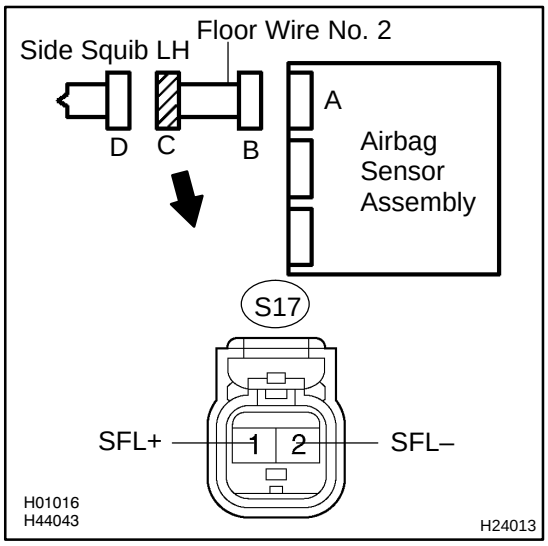
4	Check floor wire No. 2 (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

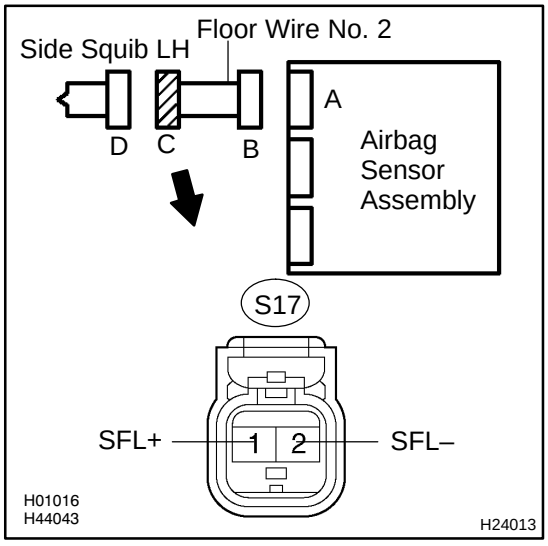
Tester Connection	Condition	Specified Condition
S17–1 (SFL+) – Body ground	Always	1 MΩ or higher
S17–2 (SFL–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 9.

5	Check floor wire No. 2 (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S17–1 (SFL+) – Body ground	Ignition switch ON	Below 1 V
S17–2 (SFL–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 9.

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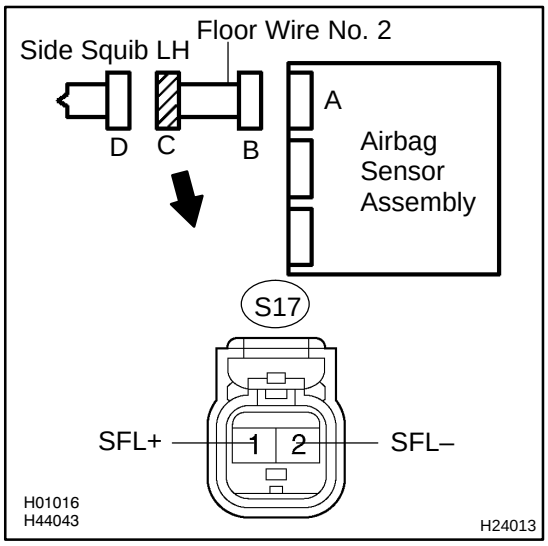
6	Check floor wire No. 2 (side squib LH circuit).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S17–1 (SFL+) – Body ground	Ignition switch ON	Below 1 V
S17–2 (SFL–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S17–1 (SFL+) – S17–2 (SFL–)	Always	Below 1 Ω
S17–1 (SFL+) – Body ground	Always	1 MΩ or higher
S17–2 (SFL–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
S17–1 (SFL+) – S17–2 (SFL–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

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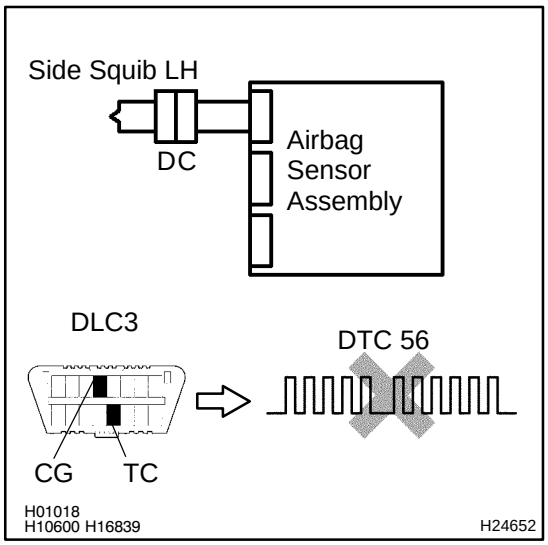
7	**Replace side airbag assembly LH (side squib LH).**



PREPARATION:

(a) Replace the side airbag assembly LH (see page RS–46, RS–61).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 56 is not output.

HINT:

Codes other than DTC 56 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

END

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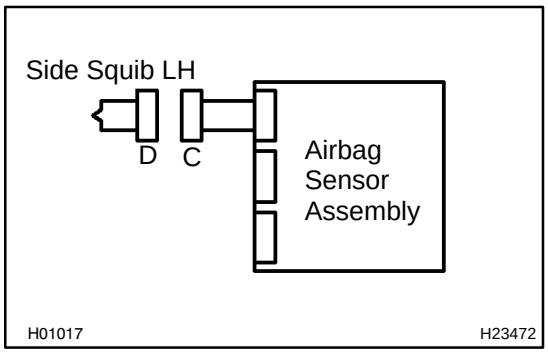
8	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1825 is not output.

HINT:

Codes other than DTC B1825 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 10.

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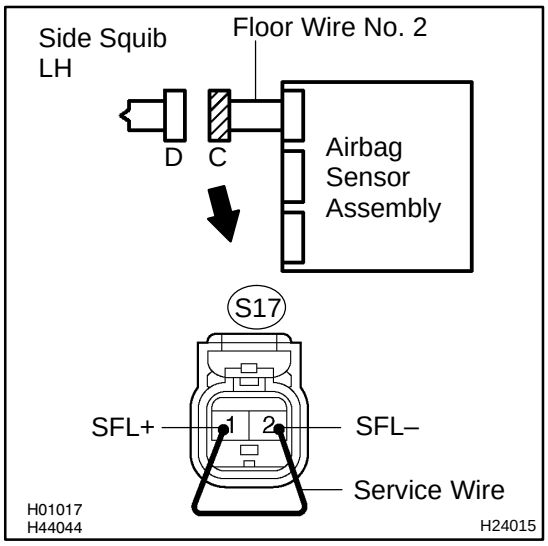
9	Check airbag sensor assembly.



PREPARATION:

(a) From the step 5:
Turn the ignition switch to the LOCK position.

(b) From the step 5:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag sensor assembly.

(d) Using a service wire, connect S17–1 (SFL+) and S17–2 (SFL–) of the connector "C".

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1826, B1827 or B1828 is not output.

HINT:

Codes other than DTC B1826, B1827 and B1828 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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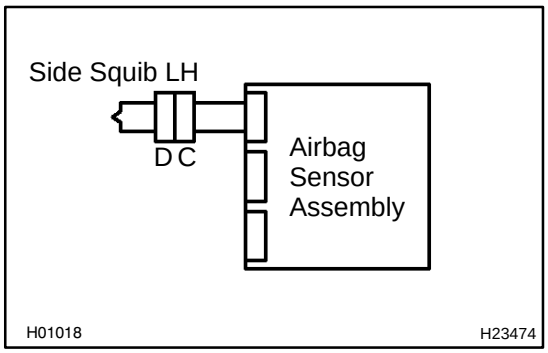
10	Check side airbag assembly LH (side squib LH).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 9:
Disconnect the service wire from connector "C".
(d) Connect the connector to the side airbag assembly LH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1825, B1826, B1827 or B1828 is not output.

HINT:
Codes other than DTC B1825, B1826, B1827 and B1828 may be output at this time, but they are not related to this check.

NG → **Replace side airbag assembly LH (see page RS–46, RS–61).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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DTC	B1830/57	Short in Curtain Shield Airbag (RH) Squib Circuit

DTC	B1831/57	Open in Curtain Shield Airbag (RH) Squib Circuit

DTC	B1832/57	Short in Curtain Shield Airbag (RH) Squib Circuit (to Ground)

DTC	B1833/57	Short in Curtain Shield Airbag (RH) Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The curtain shield airbag RH squib circuit consists of the airbag sensor assembly and the curtain shield airbag assembly RH.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the curtain shield airbag RH squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1830/57	▶The airbag sensor assembly receives a line short circuit signal 5 times in the curtain shield airbag RH squib circuit during primary check. ▶Curtain shield airbag RH squib malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag assembly RH (Curtain shield airbag RH squib) ▶Airbag sensor assembly ▶Floor wire
B1831/57	▶The airbag sensor assembly receives an open circuit signal in the curtain shield airbag RH squib circuit for 2 seconds. ▶Curtain shield airbag RH squib malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag assembly RH (curtain shield airbag RH squib) ▶Airbag sensor assembly ▶Floor wire
B1832/57	▶The airbag sensor assembly receives a short circuit to ground signal in the curtain shield airbag RH squib circuit for 0.5 seconds. ▶Curtain shield airbag RH squib malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag assembly RH (curtain shield airbag RH squib) ▶Airbag sensor assembly ▶Floor wire
B1833/57	▶The airbag sensor assembly receives a short to B+ circuit signal in the curtain shield airbag RH squib circuit for 0.5 seconds. ▶Curtain shield airbag RH squib malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag assembly RH (curtain shield airbag RH squib) ▶Airbag sensor assembly ▶Floor wire

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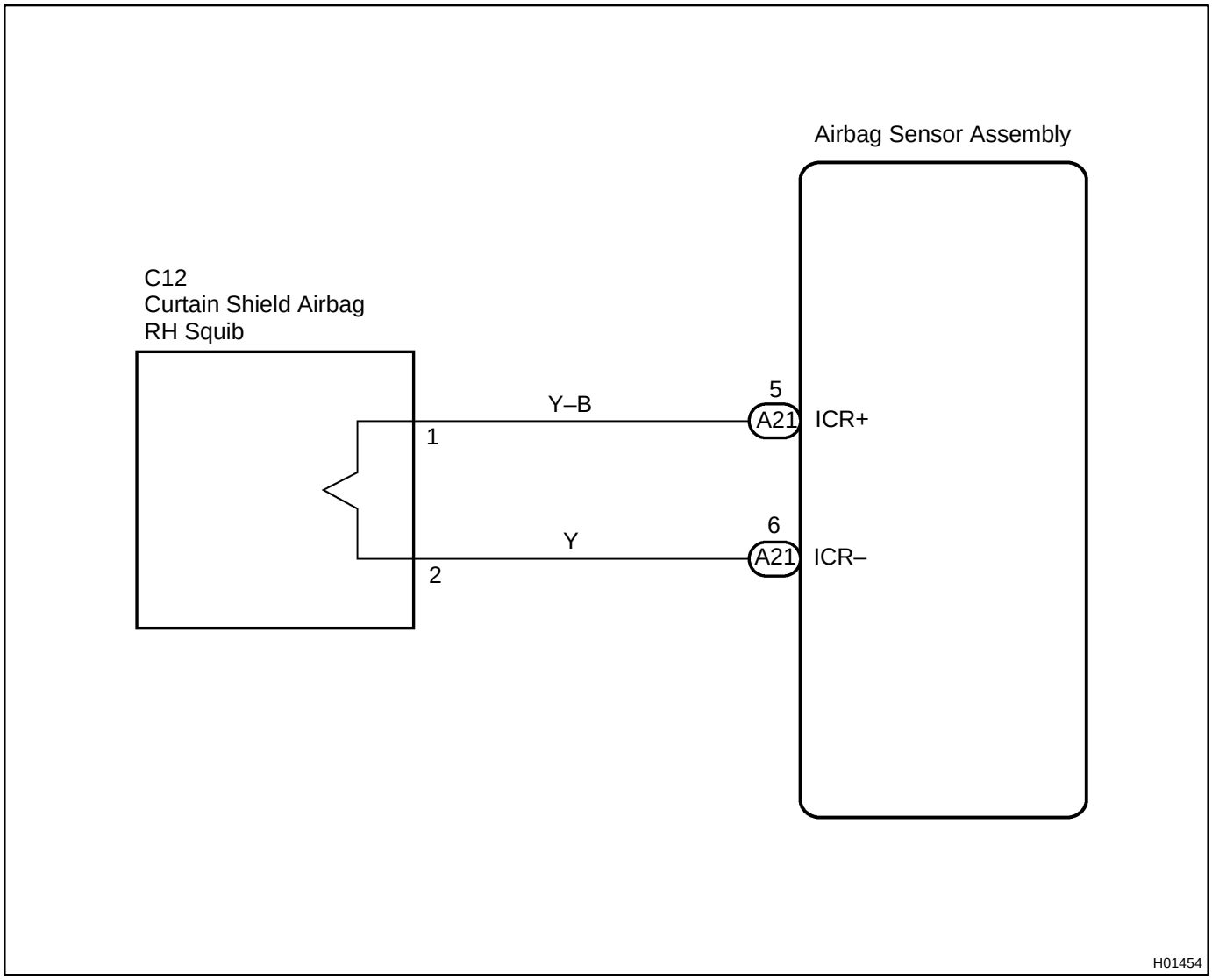
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1830 is output.	A
DTC B1831 is output.	B
DTC B1832 is output.	C
DTC B1833 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 57 is output.	E

HINT:

Codes other than DTC B1830, B1831, B1832, B1833 and DTC 57 may be output at this time, but they are not related to this check.

B	**Go to step 4.**
C	**Go to step 5.**
D	**Go to step 6.**
E	**Go to step 7.**

A

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2	Check connector.

CHECK:

Check that the floor wire connector (on the curtain shield airbag assembly RH side) is not damaged.

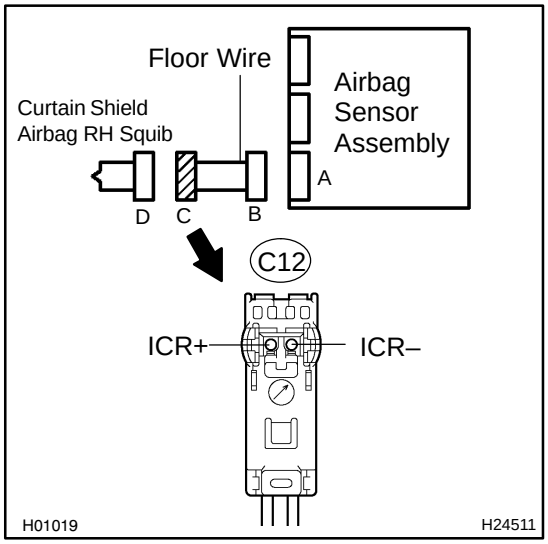
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Repair or replace floor wire.**

OK

3	Check floor wire (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C12–1 (ICR+) – C12–2 (ICR–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

Go to step 10.

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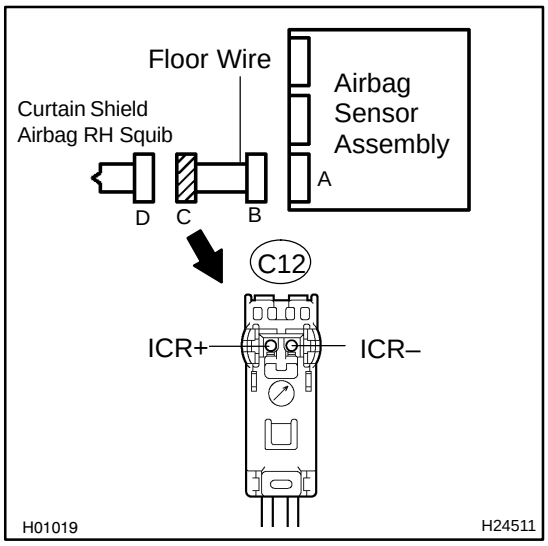
4	Check floor wire (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

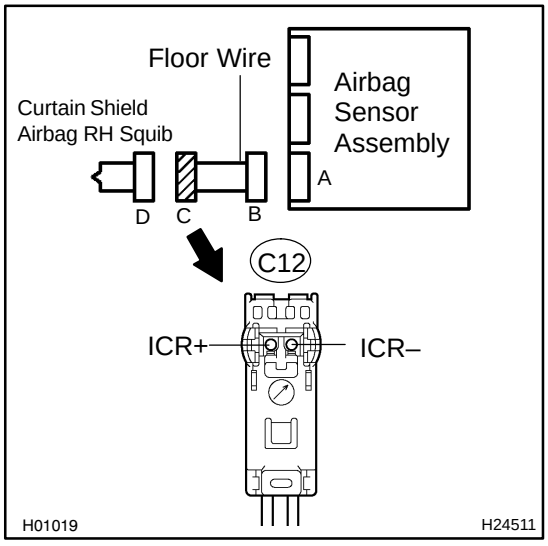
Tester Connection	Condition	Specified Condition
C12–1 (ICR+) – C12–2 (ICR–)	Always	Below 1 Ω

NG → **Repair or replace floor wire.**

OK

Go to step 11.

5	Check floor wire (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C12–1 (ICR+) – Body ground	Always	1 MΩ or higher
C12–2 (ICR–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

Go to step 11.

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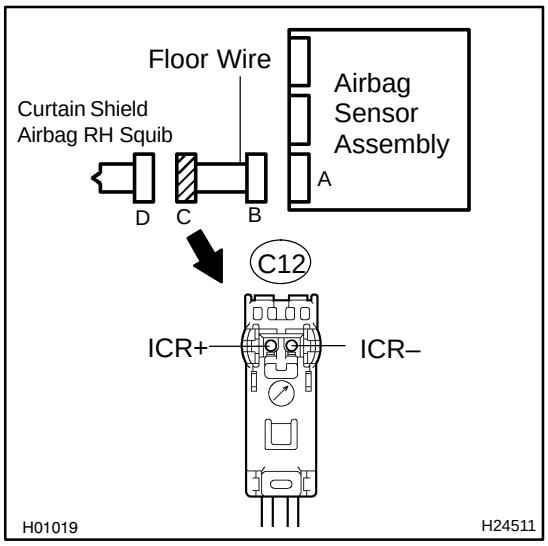
6	Check floor wire (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C12–1 (ICR+) – Body ground	Ignition switch ON	Below 1 V
C12–2 (ICR–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire.**

OK

Go to step 11.

7	Check connector.

CHECK:

Check that the floor wire connector (on the curtain shield airbag assembly RH side) is not damaged.

OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Repair or replace floor wire.**

OK

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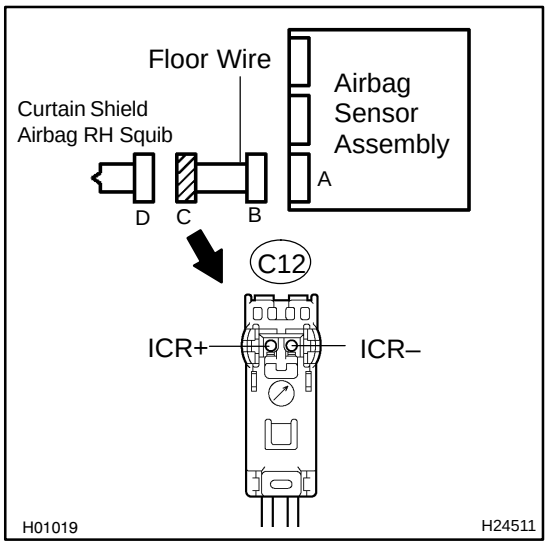
8	Check floor wire (curtain shield airbag RH squib circuit).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C12–1 (ICR+) – Body ground	Ignition switch ON	Below 1 V
C12–2 (ICR–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C12–1 (ICR+) – C12–2 (ICR–)	Always	Below 1 Ω
C12–1 (ICR+) – Body ground	Always	1 MΩ or higher
C12–2 (ICR–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C12–1 (ICR+) – C12–2 (ICR–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

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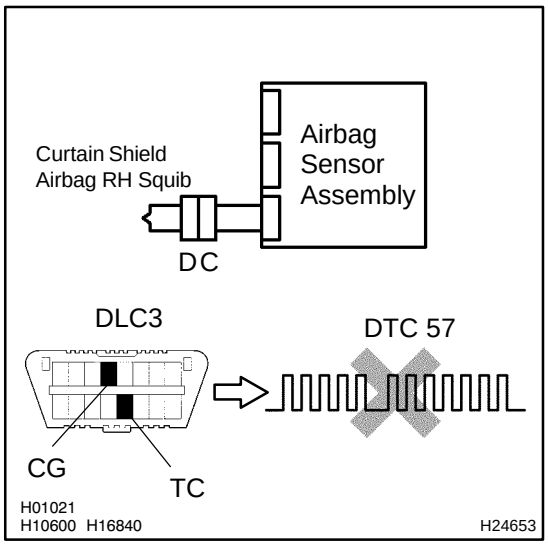
9	**Replace curtain shield airbag assembly RH (curtain shield airbag RH squib).**



PREPARATION:

(a) Replace the curtain shield airbag assembly RH (see page RS–71).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 57 is not output.

HINT:

Codes other than DTC 57 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

END

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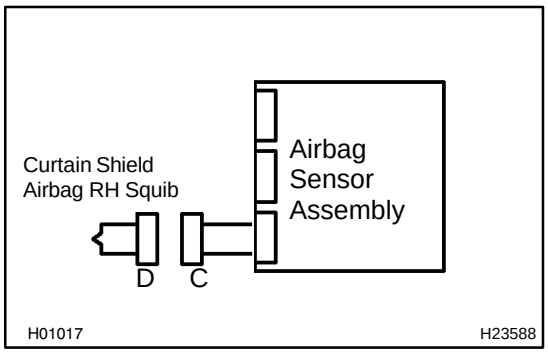
10	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1830 is not output.

HINT:

Codes other than DTC B1830 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 12.

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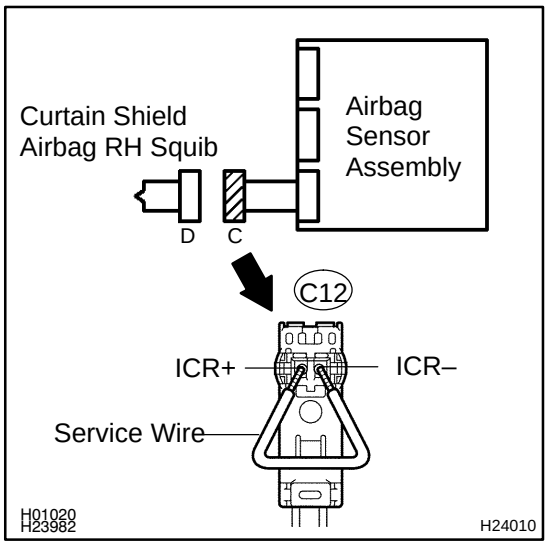
11	Check airbag sensor assembly.



PREPARATION:

(a) From the step 6:
Turn the ignition switch to the LOCK position.

(b) From the step 6:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect C12–1 (ICR+) and C12–2 (ICR–) of the connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the connectors to the airbag sensor assembly.

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1831, B1832 or B1833 is not output.

HINT:

Codes other than DTC B1831, B1832 and B1833 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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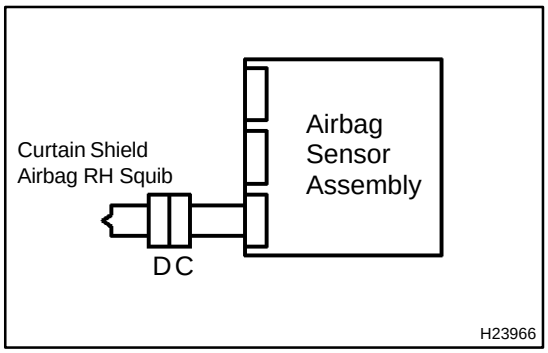
12	Check curtain shield airbag assembly RH (curtain shield airbag RH squib).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 11:
Disconnect the service wire from connector "C".
(d) Connect the connector to the curtain shield airbag assembly RH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1830, B1831, B1832 or B1833 is not output.

HINT:
Codes other than DTC B1830, B1831, B1832 and B1833 may be output at this time, but they are not related to this check.

NG → **Replace curtain shield airbag assembly RH (see page RS–71).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:
- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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DTC	B1835/58	Short in Curtain Shield Airbag (LH) Squib Circuit

DTC	B1836/58	Open in Curtain Shield Airbag (LH) Squib Circuit

DTC	B1837/58	Short in Curtain Shield Airbag (LH) Squib Circuit (to Ground)

DTC	B1838/58	Short in Curtain Shield Airbag (LH) Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The curtain shield airbag LH squib circuit consists of the airbag sensor assembly and the curtain shield airbag assembly LH.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the curtain shield airbag LH squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1835/58	▶The airbag sensor assembly receives a line short circuit signal 5 times in the curtain shield airbag LH squib circuit during primary check. ▶Curtain shield airbag LH squib malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag assembly LH (curtain shield airbag LH squib) ▶Airbag sensor assembly ▶Floor wire No. 2
B1836/58	▶The airbag sensor assembly receives an open circuit signal in the curtain shield airbag LH squib circuit for 2 seconds. ▶Curtain shield airbag LH squib malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag assembly LH (curtain shield airbag LH squib) ▶Airbag sensor assembly ▶Floor wire No. 2
B1837/58	▶The airbag sensor assembly receives a short circuit to ground signal in the curtain shield airbag LH squib circuit for 0.5 seconds. ▶Curtain shield airbag LH squib malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag assembly LH (curtain shield airbag LH squib) ▶Airbag sensor assembly ▶Floor wire No. 2
B1838/58	▶The airbag sensor assembly receives a short to B+ circuit signal in the curtain shield airbag LH squib circuit for 0.5 seconds. ▶Curtain shield airbag LH squib malfunction ▶Airbag sensor assembly malfunction	▶Curtain shield airbag assembly LH (curtain shield airbag LH squib) ▶Airbag sensor assembly ▶Floor wire No. 2

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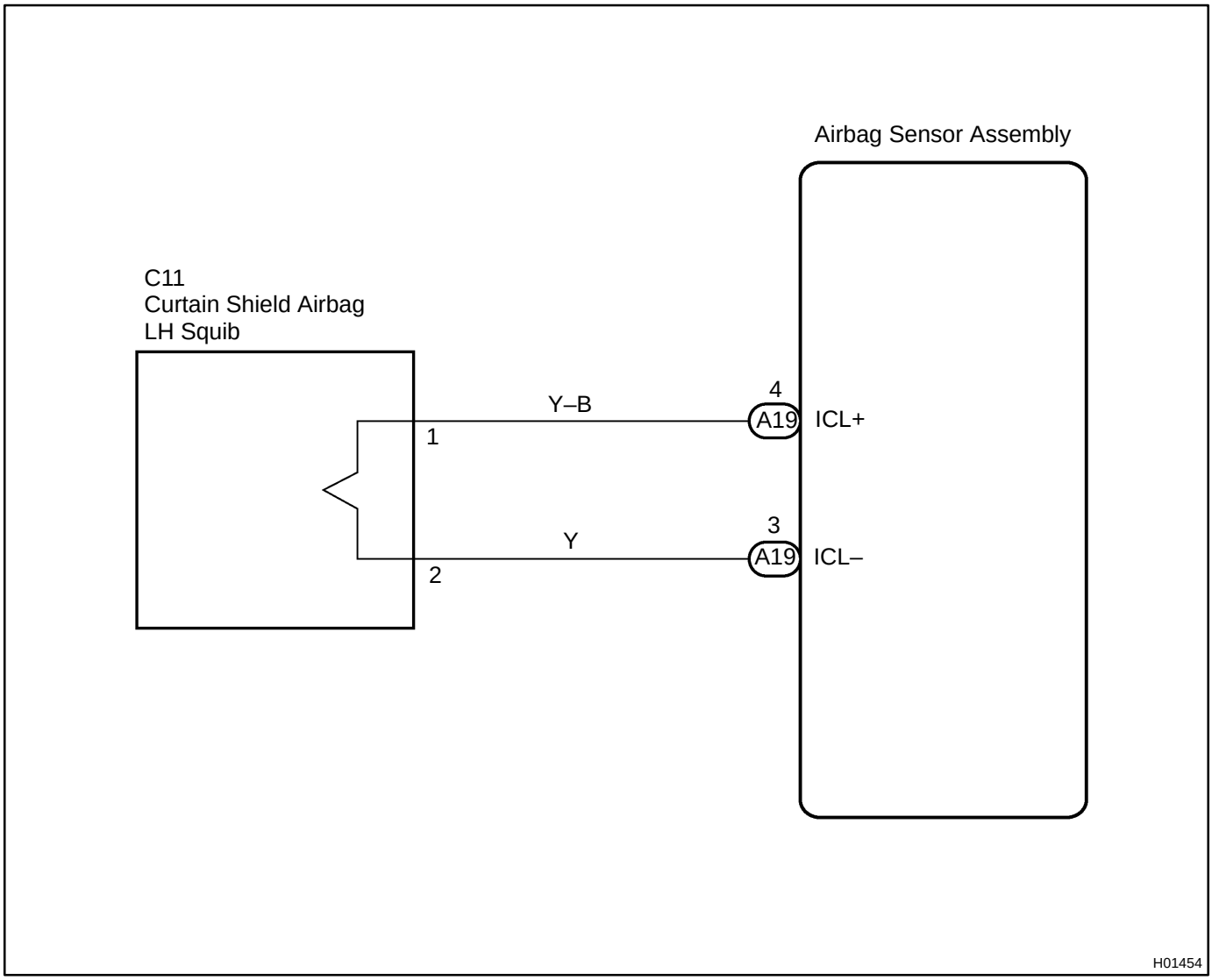
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1835 is output.	A
DTC B1836 is output.	B
DTC B1837 is output.	C
DTC B1838 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 58 is output.	E

HINT:

Codes other than DTC B1835, B1836, B1837, B1838 and DTC 58 may be output at this time, but they are not related to this check.

B	**Go to step 4.**
C	**Go to step 5.**
D	**Go to step 6.**
E	**Go to step 7.**

A

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2	Check connector.

CHECK:

Check that the floor wire No. 2 connector (on the curtain shield airbag assembly LH side) is not damaged.

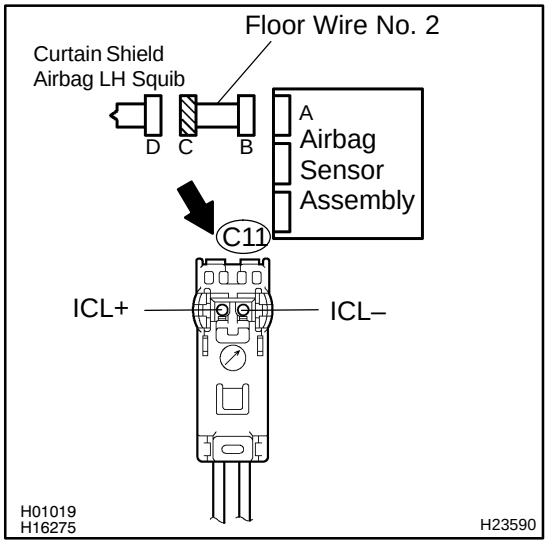
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Repair or replace floor wire No. 2.**

OK

3	Check floor wire No. 2 (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C11–1 (ICL+) – C11–2 (ICL–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 10.

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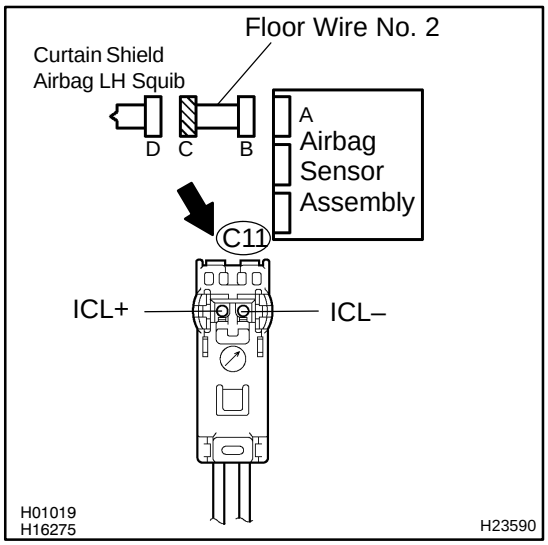
4	Check floor wire No. 2 (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

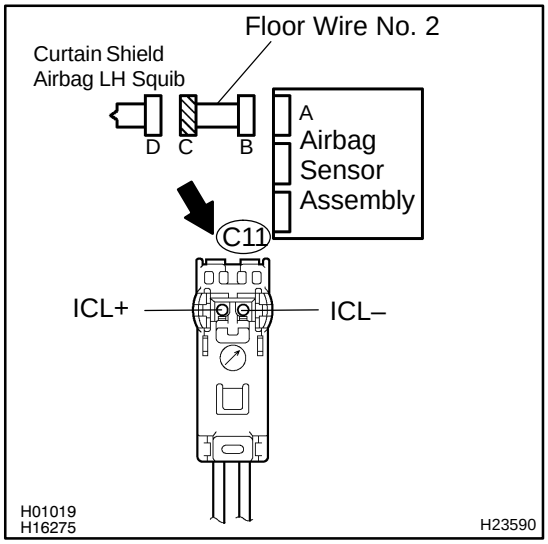
Tester Connection	Condition	Specified Condition
C11–1 (ICL+) – C11–2 (ICL–)	Always	Below 1 Ω

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 11.

5	Check floor wire No. 2 (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C11–1 (ICL+) – Body ground	Always	1 MΩ or higher
C11–2 (ICL–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 11.

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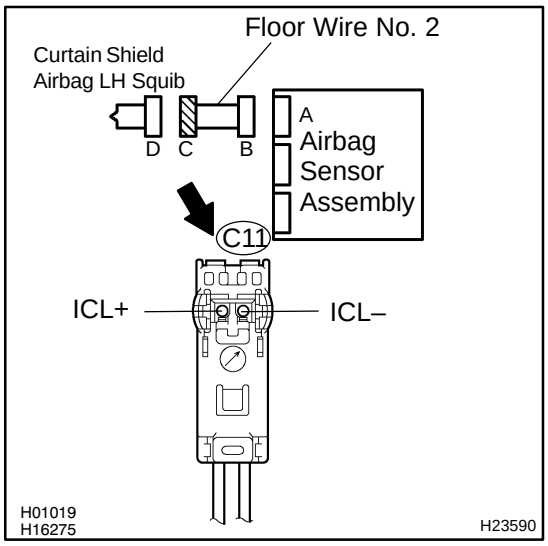
6	Check floor wire No. 2 (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C11–1 (ICL+) – Body ground	Ignition switch ON	Below 1 V
C11–2 (ICL–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 11.

7	Check connector.

CHECK:

Check that the floor wire No. 2 connector (on the curtain shield airbag assembly LH side) is not damaged.

OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Repair or replace floor wire No. 2.**

OK

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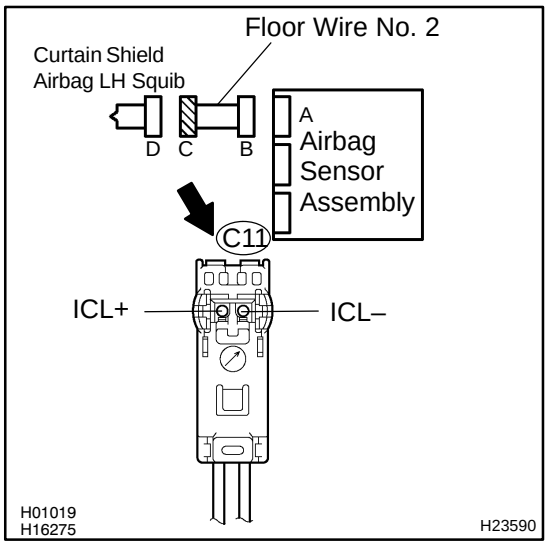
8	**Check floor wire No. 2 (curtain shield airbag LH squib circuit).**



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C11–1 (ICL+) – Body ground	Ignition switch ON	Below 1 V
C11–2 (ICL–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least for 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C11–1 (ICL+) – C11–2 (ICL–)	Always	Below 1 Ω
C11–1 (ICL+) – Body ground	Always	1 MΩ or higher
C11–2 (ICL–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into the connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
C11–1 (ICL+) – C11–2 (ICL–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

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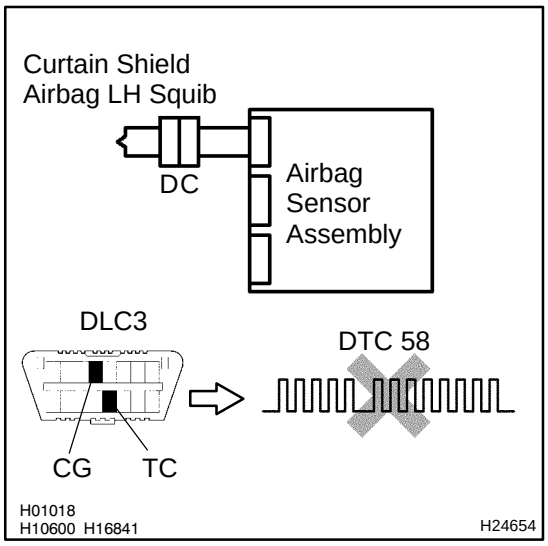
9	**Replace curtain shield airbag assembly LH (curtain shield airbag LH squib).**



PREPARATION:

(a) Replace the curtain shield airbag assembly LH (see page RS–71).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 58 is not output.

HINT:

Codes other than DTC 58 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

END

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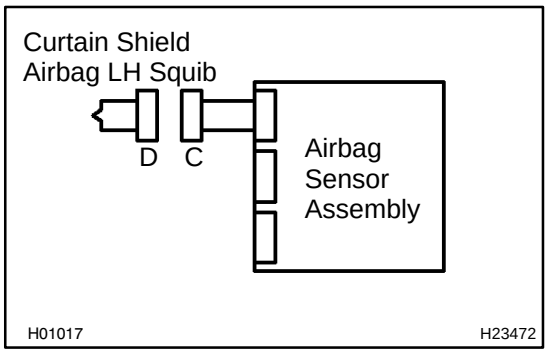
10	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1835 is not output.

HINT:

Codes other than DTC B1835 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 12.

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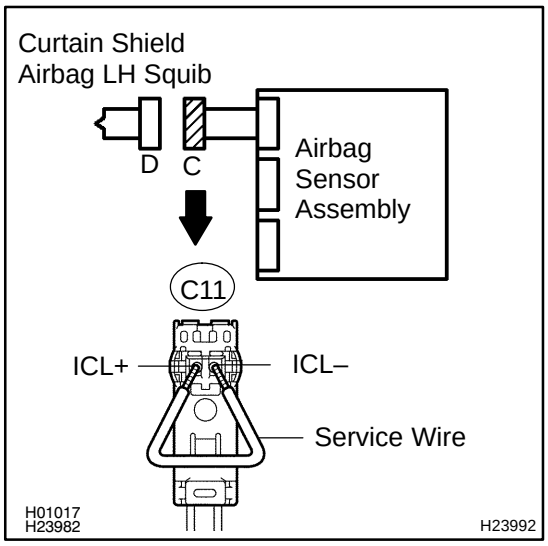
11	Check airbag sensor assembly.



PREPARATION:

(a) From the step 6:
Turn the ignition switch to the LOCK position.

(b) From the step 6:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Using a service wire, connect C11–1 (ICL+) and C11–2 (ICL–) of the connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(d) Connect the connectors to the airbag sensor assembly.

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1836, B1837 or B1838 is not output.

HINT:

Codes other than DTC B1836, B1837 and B1838 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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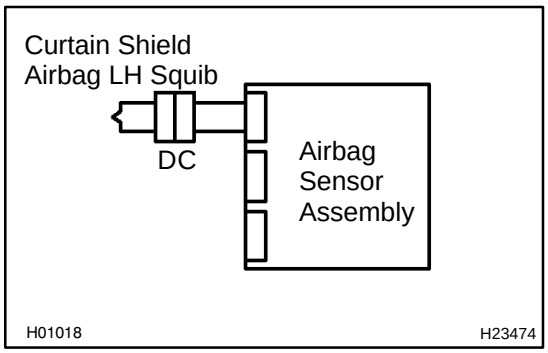
12	Check curtain shield airbag assembly LH (curtain shield airbag LH squib).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 9:
Disconnect the service wire from connector "C".
(d) Connect the connector to the curtain shield airbag assembly LH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1835, B1836, B1837 or B1838 is not output.

HINT:
Codes other than DTC B1835, B1836, B1837 and B1838 may be output at this time, but they are not related to this check.

NG → **Replace curtain shield airbag assembly LH (see page RS–71).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:
- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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DIDHQ–01

DTC	B1900/73	Short in P/T Squib (RH) Circuit

DTC	B1901/73	Open in P/T Squib (RH) Circuit

DTC	B1902/73	Short in P/T Squib (RH) Circuit (to Ground)

DTC	B1903/73	Short in P/T Squib (RH) Circuit (to B+)

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assembly and the front seat outer belt RH.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the P/T squib RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1900/73	▶The airbag sensor assembly receives a line short circuit signal 5 times in the P/T squib RH circuit during primary check. ▶P/T squib RH malfunction ▶Airbag sensor assembly malfunction	▶Front seat outer belt RH (P/T squib RH) ▶Airbag sensor assembly ▶Floor wire
B1901/73	▶The airbag sensor assembly receives an open circuit signal in the P/T squib RH circuit for 2 seconds. ▶P/T squib RH malfunction ▶Airbag sensor assembly malfunction	▶Front seat outer belt RH (P/T squib RH) ▶Airbag sensor assembly ▶Floor wire
B1902/73	▶The airbag sensor assembly receives a short circuit to ground signal in the P/T squib RH circuit for 0.5 seconds. ▶P/T squib RH malfunction ▶Airbag sensor assembly malfunction	▶Front seat outer belt RH (P/T squib RH) ▶Airbag sensor assembly ▶Floor wire
B1903/73	▶The airbag sensor assembly receives a short to B+ circuit signal in the P/T squib RH circuit for 0.5 seconds. ▶P/T squib RH malfunction ▶Airbag sensor assembly malfunction	▶Front seat outer belt RH (P/T squib RH) ▶Airbag sensor assembly ▶Floor wire

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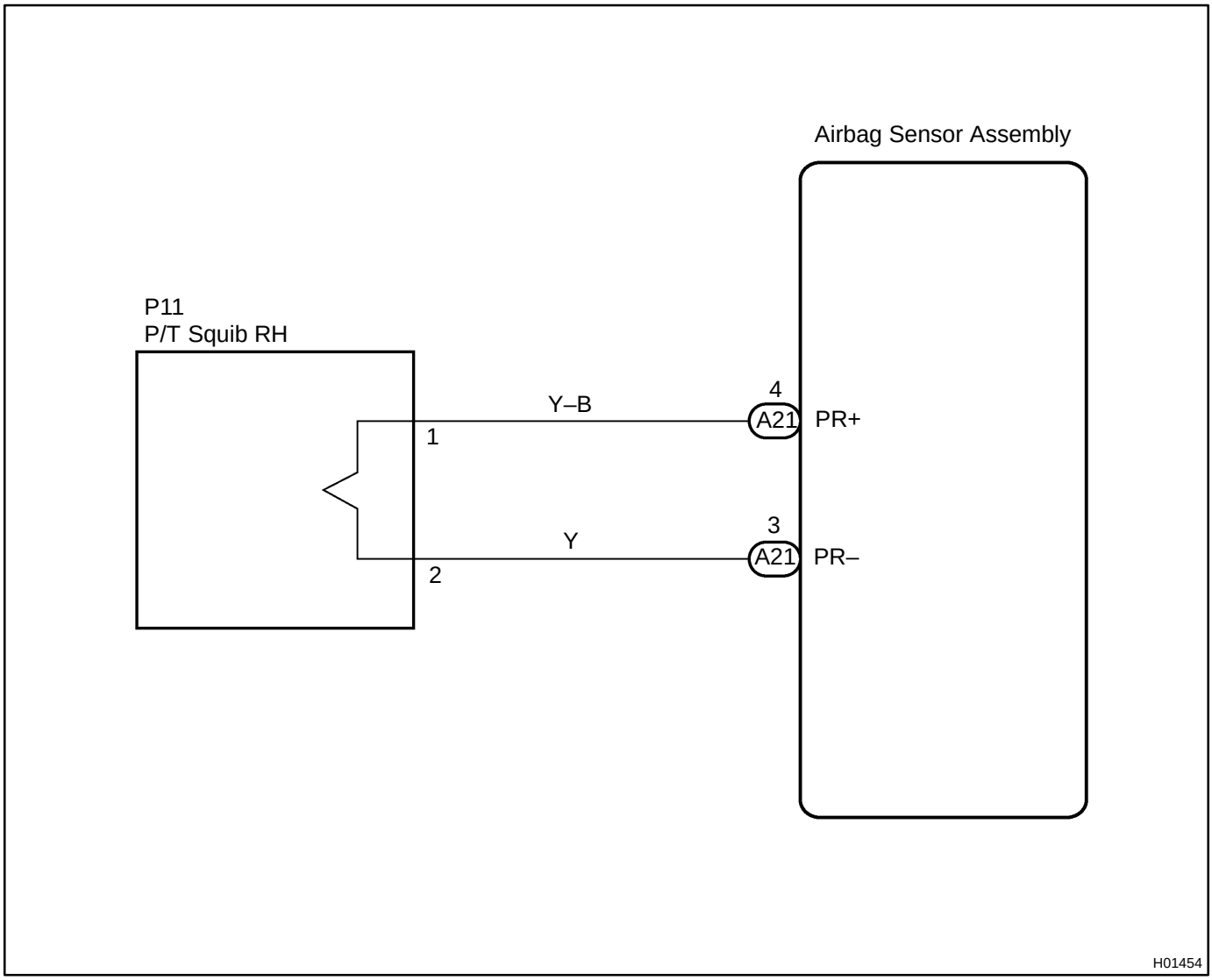
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH.
(h) Disconnect the connectors from the front seat outer belt LH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1900 is output.	A
DTC B1901 is output.	B
DTC B1902 is output.	C
DTC B1903 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 73 is output.	E

HINT:

Codes other than DTC B1900, B1901, B1902, B1903 and DTC 73 may be output at this time, but they are not related to this check.

B	**Go to step 4.**
C	**Go to step 5.**
D	**Go to step 6.**
E	**Go to step 7.**

A

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2	Check connector.

CHECK:

Check that the floor wire connector (on the front seat outer belt RH side) is not damaged.

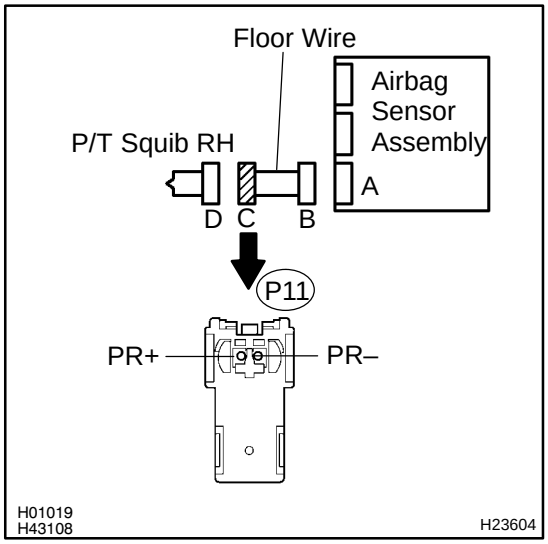
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Repair or replace floor wire.**

OK

3	Check floor wire (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P11–1 (PR+) – P11–2 (PR–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

Go to step 10.

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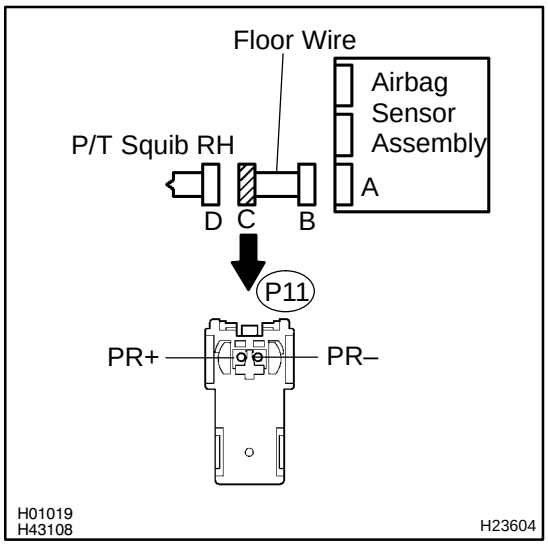
4	Check floor wire (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

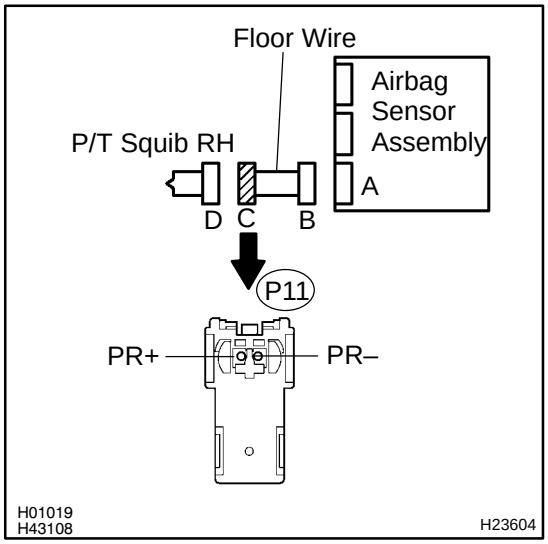
Tester Connection	Condition	Specified Condition
P11–1 (PR+) – P11–2 (PR–)	Always	Below 1 Ω

NG → **Repair or replace floor wire.**

OK

Go to step 11.

5	Check floor wire (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P11–1 (PR+) – Body ground	Always	1 MΩ or higher
P11–2 (PR–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

Go to step 11.

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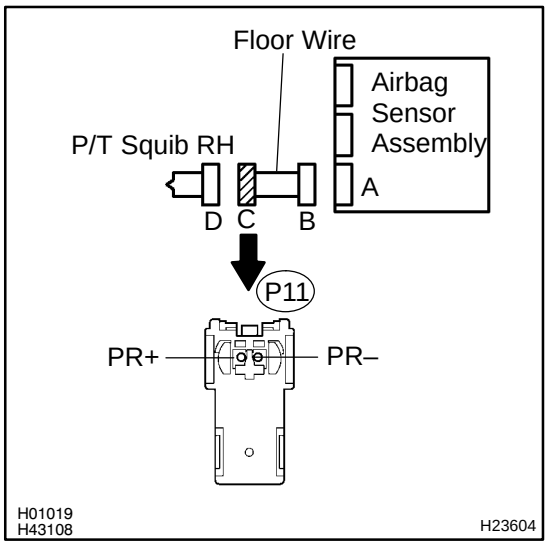
6	Check floor wire (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P11–1 (PR+) – Body ground	Ignition switch ON	Below 1 V
P11–2 (PR–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire.**

OK

Go to step 11.

7	Check connector.

CHECK:

Check that the floor wire connector (on the front seat outer belt RH side) is not damaged.

OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Repair or replace floor wire.**

OK

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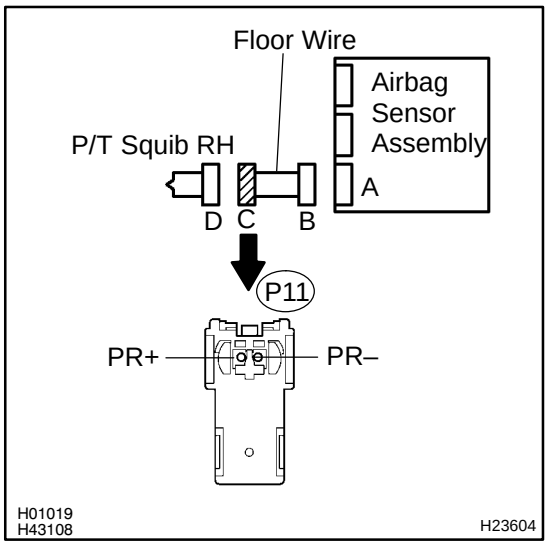
8	Check floor wire (P/T squib RH circuit).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P11–1 (PR+) – Body ground	Ignition switch ON	Below 1 V
P11–2 (PR–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P11–1 (PR+) – P11–2 (PR–)	Always	Below 1 Ω
P11–1 (PR+) – Body ground	Always	1 MΩ or higher
P11–2 (PR–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P11–1 (PR+) – P11–2 (PR–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire.**

OK

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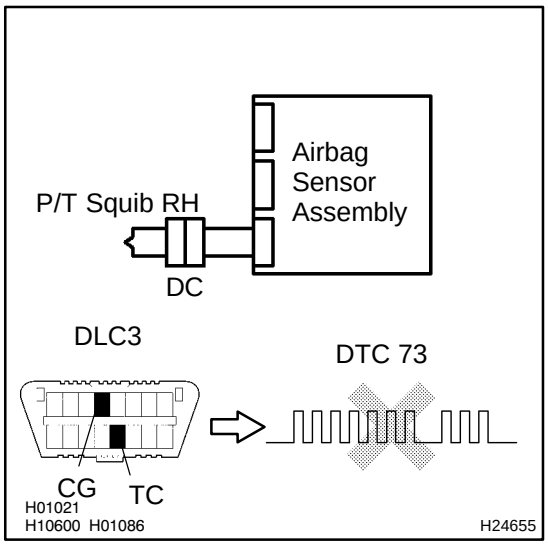
9	**Replace front seat outer belt RH (P/T squib RH).**



PREPARATION:

(a) Replace the front seat outer belt RH (see page BO–163).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 73 is not output.

HINT:

Codes other than DTC 73 may be output at this time, but they are not related to this check.

NG	**Replace airbag sensor assembly (see page RS–82).**

OK

END

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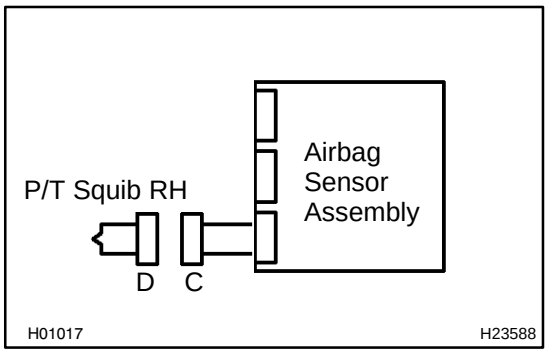
10	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1900 is not output.

HINT:

Codes other than DTC B1900 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 12.

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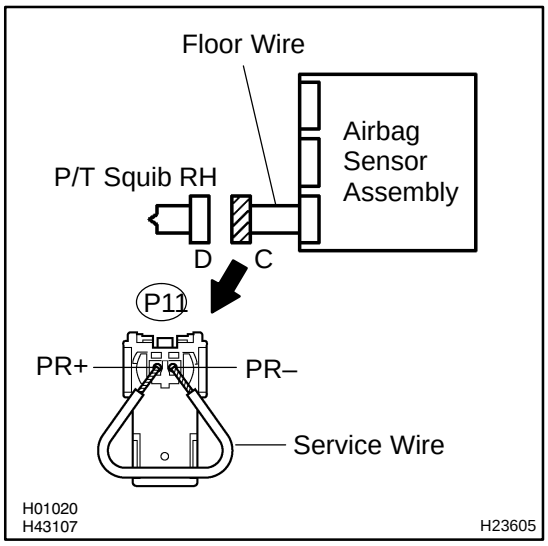
11	Check airbag sensor assembly.



PREPARATION:

(a) From the step 6:
Turn the ignition switch to the LOCK position.

(b) From the step 6:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag sensor assembly.

(d) Using a service wire, connect P11–1 (PR+) and P11–2 (PR–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1901, B1902 or B1903 is not output.

HINT:

Codes other than DTC B1901, B1902 and B1903 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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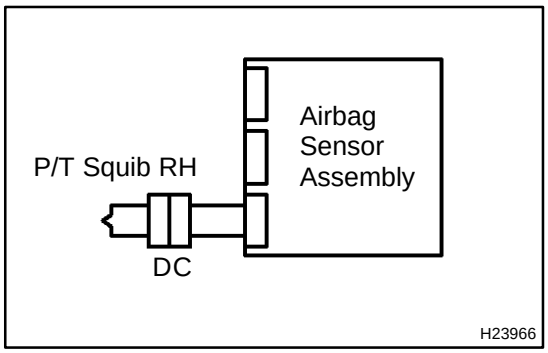
12	Check front seat outer belt RH (P/T squib RH).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) From the step 11:
Disconnect the service wire from connector "C".
(d) Connect the connector to the front seat outer belt RH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1900, B1901, B1902 or B1903 is not output.

HINT:
Codes other than DTC B1900, B1901, B1902 and B1903 may be output at this time, but they are not related to this check.

NG → **Replace front seat outer belt RH (see page BO–163).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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DIDHR–01

DTC	B1905/74	Short in P/T Squib (LH) Circuit

DTC	B1906/74	Open in P/T Squib (LH) Circuit

DTC	B1907/74	Short in P/T Squib (LH) Circuit (to Ground)

DTC	B1908/74	Short in P/T Squib (LH) Circuit (to B+)

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assembly and the front seat outer belt LH.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the P/T squib LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1905/74	▶The airbag sensor assembly receives a line short circuit signal 5 times in the P/T squib LH circuit during primary check. ▶P/T squib LH malfunction ▶Airbag sensor assembly malfunction	▶Front seat outer belt LH (P/T squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2
B1906/74	▶The airbag sensor assembly receives an open circuit signal in the P/T squib LH circuit for 2 seconds. ▶P/T squib LH malfunction ▶Airbag sensor assembly malfunction	▶Front seat outer belt LH (P/T squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2
B1907/74	▶The airbag sensor assembly receives a short circuit to ground signal in the P/T squib LH circuit for 0.5 seconds. ▶P/T squib LH malfunction ▶Airbag sensor assembly malfunction	▶Front seat outer belt LH (P/T squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2
B1908/74	▶The airbag sensor assembly receives a short to B+ circuit signal in the P/T squib LH circuit for 0.5 seconds. ▶P/T squib LH malfunction ▶Airbag sensor assembly malfunction	▶Front seat outer belt LH (P/T squib LH) ▶Airbag sensor assembly ▶Floor wire No. 2

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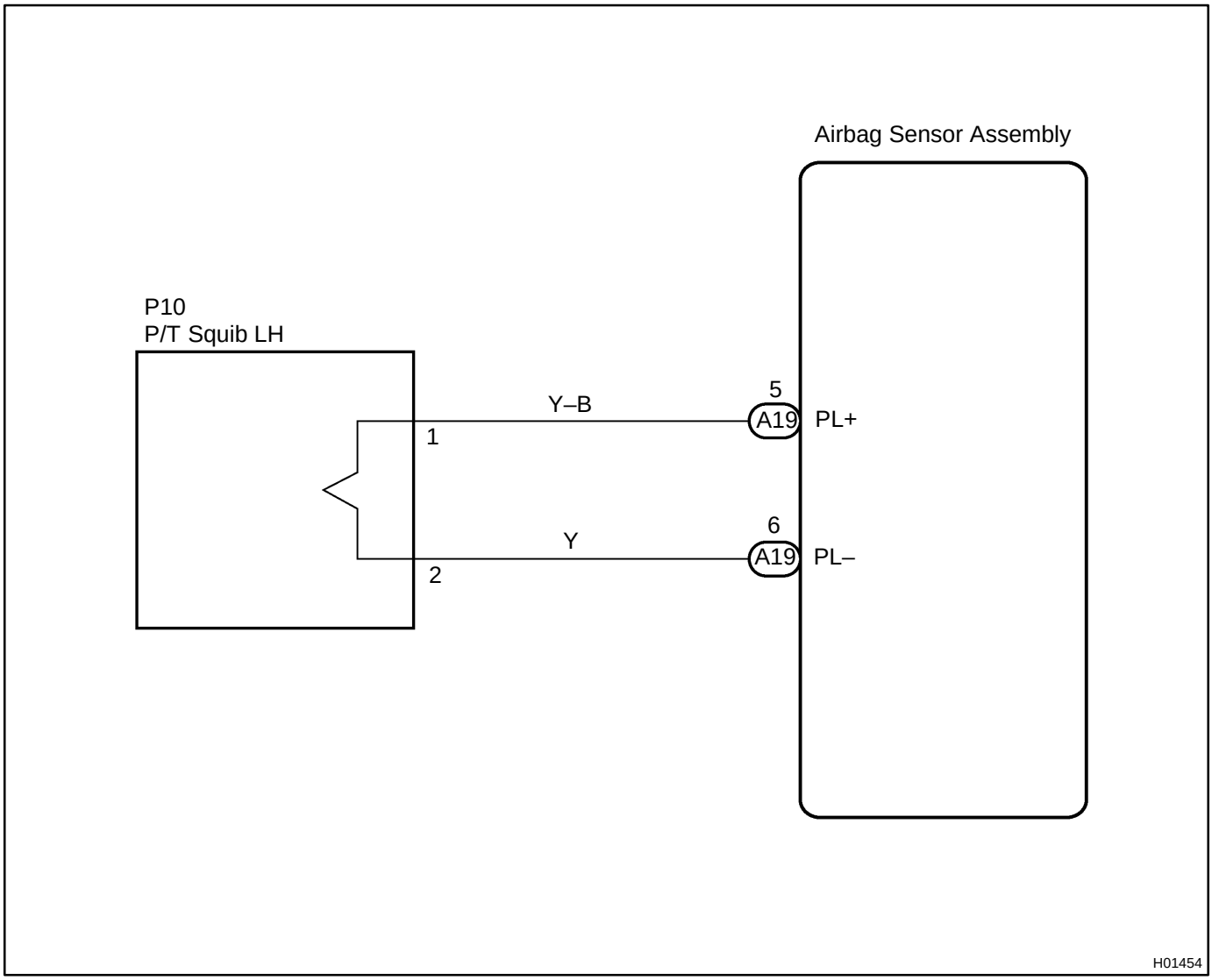
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check DTC.**

CHECK:

(a) Proceed to each step according to how to read DTC.
(1) If using the hand–held tester (read the 5–digit of DTC):
Using the hand–held tester, check the DTCs (see page DI–1147).

RESULT:

DTC B1905 is output.	A
DTC B1906 is output.	B
DTC B1907 is output.	C
DTC B1908 is output.	D

(2) If not using the hand–held tester (read the 2–digit of DTC):
Check the DTCs (see page DI–1147).

RESULT:

DTC 74 is output.	E

HINT:

Codes other than DTC B1905, B1906, B1907, B1908 and DTC 74 may be output at this time, but they are not related to this check.

B	**Go to step 4.**
C	**Go to step 5.**
D	**Go to step 6.**
E	**Go to step 7.**

A

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2	Check connector.

CHECK:

Check that the floor wire No. 2 connector (on the front seat outer belt LH side) is not damaged.

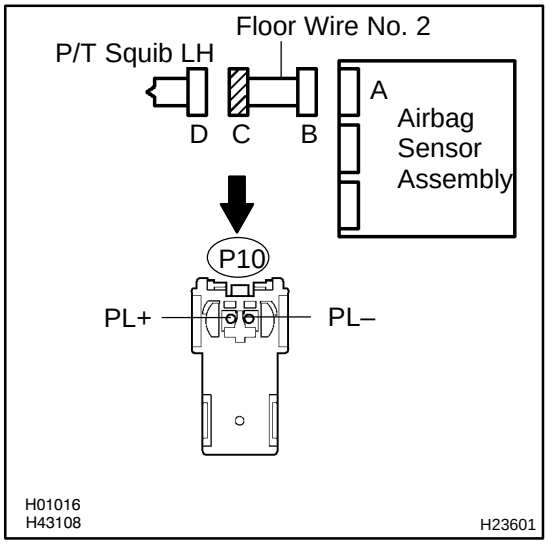
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Repair or replace floor wire No. 2.**

OK

3	Check floor wire No. 2 (short).



PREPARATION:

Release the activation prevention mechanism built into connector "B" (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P10–1 (PL+) – P10–2 (PL–)	Always	1 MΩ or Higher

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 10.

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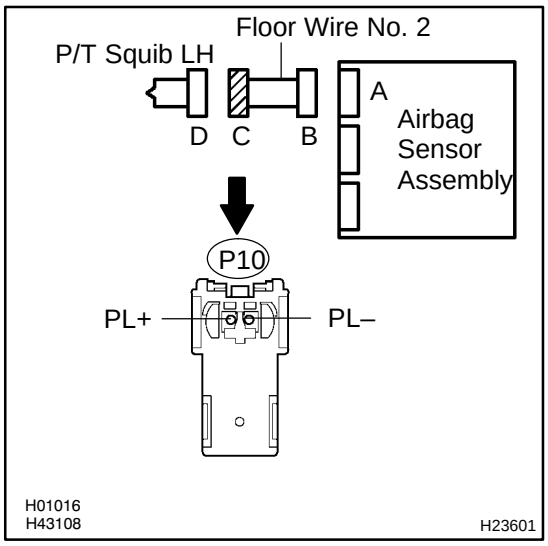
4	Check floor wire No. 2 (open).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

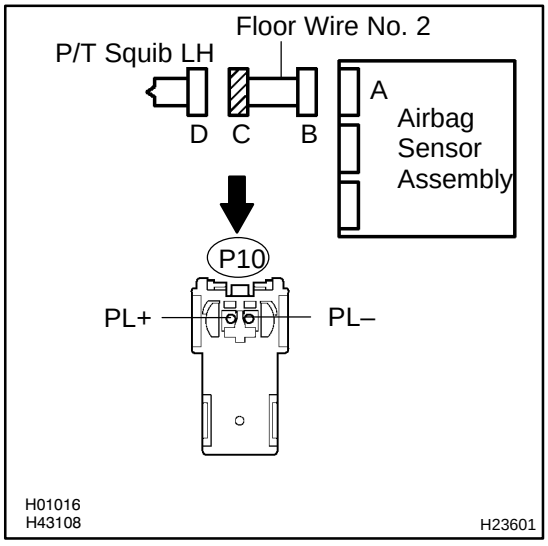
Tester Connection	Condition	Specified Condition
P10–1 (PL+) – P10–2 (PL–)	Always	Below 1 Ω

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 11.

5	Check floor wire No. 2 (short to ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P10–1 (PL+) – Body ground	Always	1 MΩ or higher
P10–2 (PL–) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 11.

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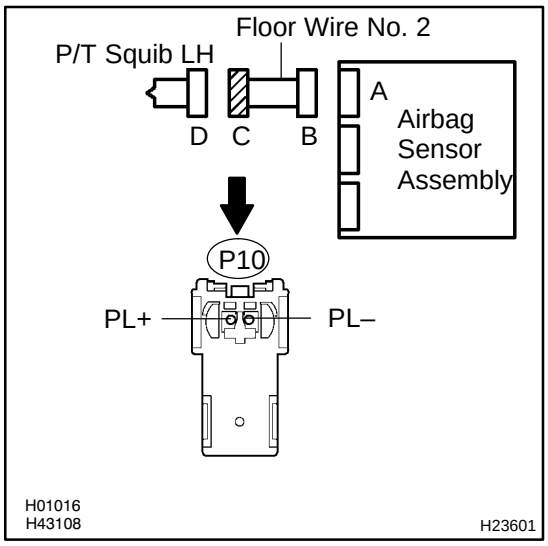
6	Check floor wire No. 2 (short to B+).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P10–1 (PL+) – Body ground	Ignition switch ON	Below 1 V
P10–2 (PL–) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace floor wire No. 2.**

OK

Go to step 11.

7	Check connector.

CHECK:

Check that the floor wire No. 2 connector (on the front seat outer belt LH side) is not damaged.

OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Repair or replace floor wire No. 2.**

OK

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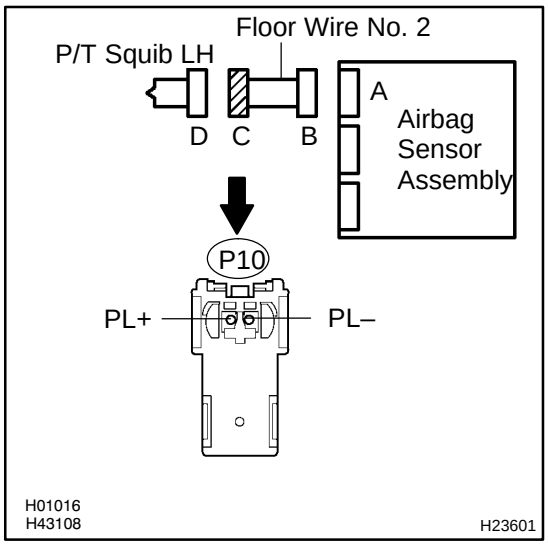
8	Check floor wire No. 2 (P/T squib LH circuit).



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P10–1 (PL+) – Body ground	Ignition switch ON	Below 1 V
P10–2 (PL–) – Body ground	Ignition switch ON	Below 1 V

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P10–1 (PL+) – P10–2 (PL–)	Always	Below 1 Ω
P10–1 (PL+) – Body ground	Always	1 MΩ or higher
P10–2 (PL–) – Body ground	Always	1 MΩ or higher

PREPARATION:

Release the activation prevention mechanism built into connector ”B” (see page DI–1137).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
P10–1 (PL+) – P10–2 (PL–)	Always	1 MΩ or higher

NG → **Repair or replace floor wire No. 2.**

OK

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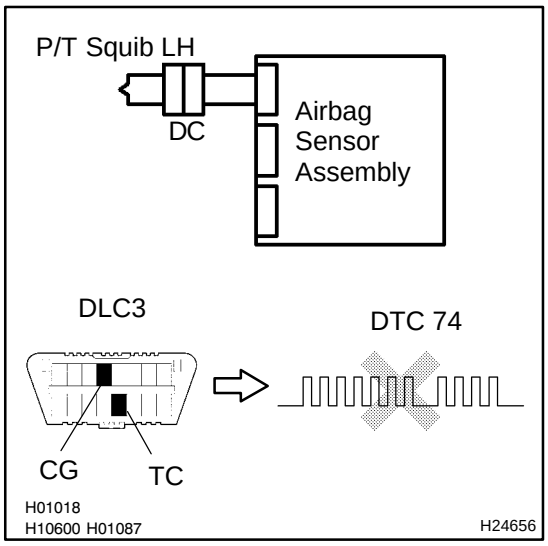
9	Replace front seat outer belt LH (P/T squib LH).



PREPARATION:

(a) Replace the front seat outer belt LH (see page BO–163).

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(b) Connect the connectors to the airbag sensor assembly.

(c) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC 74 is not output.

HINT:

Codes other than DTC 74 may be output at this time, but they are not related to this check.

NG	Replace airbag sensor assembly (see page RS–82).

OK

END

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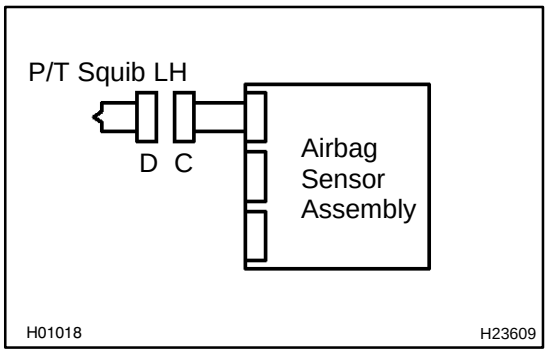
10	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1905 is not output.

HINT:

Codes other than DTC B1905 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK →

Go to step 12.

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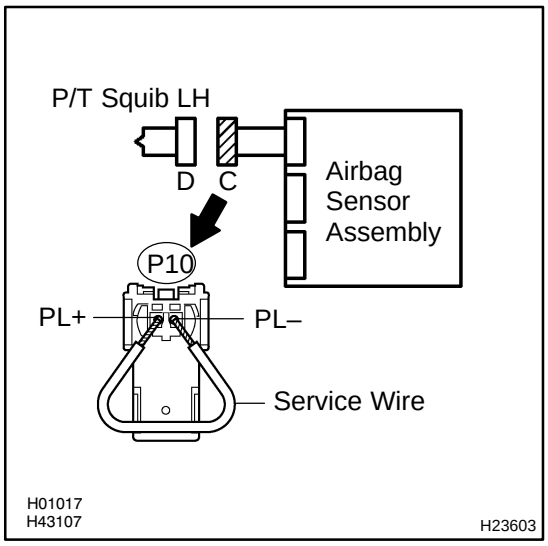
11	Check airbag sensor assembly.



PREPARATION:

(a) From the step 6:
Turn the ignition switch to the LOCK position.

(b) From the step 6:
Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

(c) Connect the connectors to the airbag sensor assembly.

(d) Using a service wire, connect P10–1 (PL+) and P10–2 (PL–) of connector "C".

NOTICE:

- **Twist the end of the service wire in order to insert it into the connector.**
- **Do not forcibly insert the twisted service wire into the terminals of the connector when connecting.**

(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC B1906, B1907 or B1908 is not output.

HINT:

Codes other than DTC B1906, B1907 and B1908 may be output at this time, but they are not related to this check.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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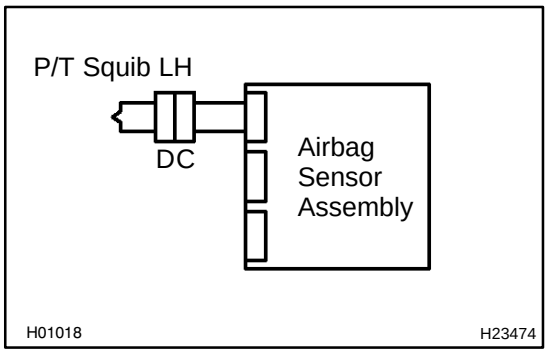
12	Check front seat outer belt LH (P/T squib LH).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) From the step 10:
Disconnect the service wire from connector "C".
(d) Connect the connector to the front seat outer belt LH.
(e) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(b) Clear the DTCs stored in memory (see page DI–1147).
(c) Turn the ignition switch to the LOCK position.
(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.
(e) Check the DTCs (see page DI–1147).

OK:

DTC B1905, B1906, B1907 or B1908 is not output.

HINT:
Codes other than DTC B1905, B1906, B1907 and B1908 may be output at this time, but they are not related to this check.

NG → **Replace front seat outer belt LH (see page BO–163).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check (see page DI–1137).

HINT:

- Perform the simulation method by selecting the check mode with the hand–held tester (see page DI–1151).
- After selecting the check mode, perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (see page DI–1151).

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DIDHS–01

DTC	Normal	Source Voltage Drop

CIRCUIT DESCRIPTION

The SRS is equipped with a voltage–increase circuit (DC–DC converter) in the airbag sensor assembly in case the source voltage drops.
When the battery voltage drops, the voltage–increase circuit (DC–DC converter) functions to increase the voltage of the SRS to normal voltage.
A malfunction in this circuit is displayed differently from other codes. The source voltage drop is indicated when the SRS warning light comes on without showing any DTCs.
A malfunction in this circuit is not recorded in the airbag sensor assembly. The SRS warning light automatically goes off when the source voltage returns to normal.

DTC No.	Detection Item
(Normal)	Source voltage drop

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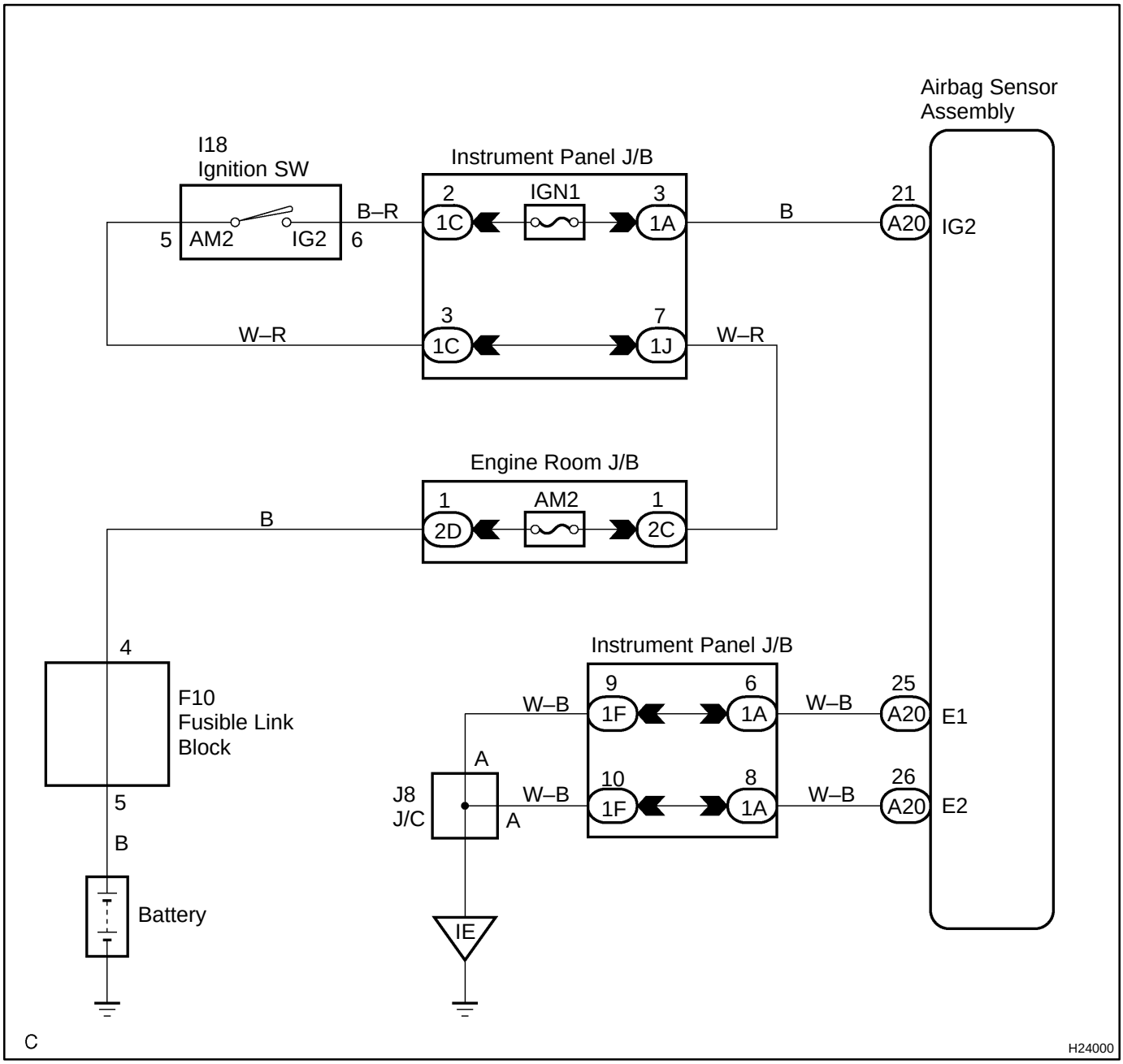
WIRING DIAGRAM



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INSPECTION PROCEDURE

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check battery.**

CHECK:

Measure the voltage of the battery.

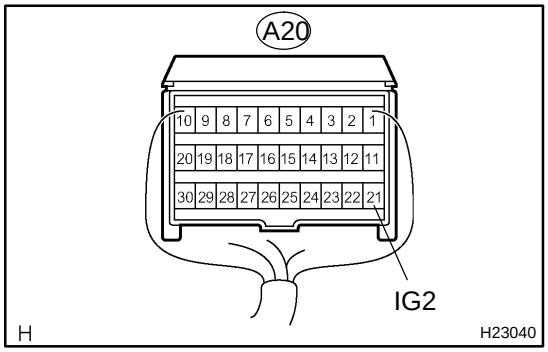
OK:

Voltage: 11 to 14 V

NG → **Replace battery.**

OK

2	**Check source voltage (power source).**



PREPARATION:

Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–21 (IG2) – Body ground	Ignition switch ON	10 to 14 V

NG → **Repair or replace wire harness (battery – airbag sensor assembly).**

OK

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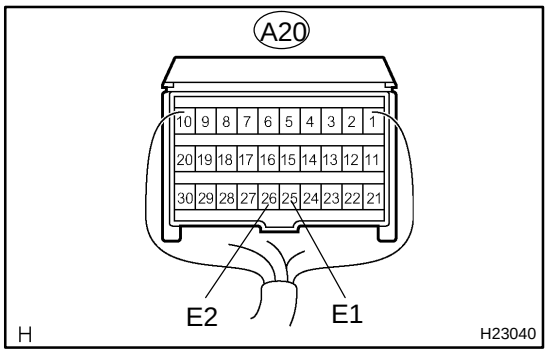
3	Check wire harness (airbag sensor assembly – body ground).



PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–25 (E1) – Body ground	Always	Below 1 Ω
A20–26 (E2) – Body ground	Always	Below 1 Ω

NG → **Repair or replace wire harness.**

OK

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4	**Check SRS warning light.**

PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the connectors to the steering wheel pad.
(c) Connect the connectors to the front passenger airbag assembly.
(d) w/ Side and curtain shield airbag:
Connect the connectors to the side airbag assembly LH and RH.
(e) w/ Side and curtain shield airbag:
Connect the connectors to the curtain shield airbag assembly LH and RH.
(f) Connect the connectors to the front seat outer belt LH and RH.
(g) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 6 seconds.
(b) Operate all components of the electrical system (defogger, wiper, headlight, heater blower, etc.) and check the SRS warning light operation.

OK:

The SRS warning light does not come on.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

END

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DIDHT–01

Trouble in Indicator of Passenger Airbag ON/OFF Indicator

CIRCUIT DESCRIPTION

The occupant classification system detects the front passenger seat condition. It then informs a passenger of the front passenger airbag assembly condition (activated/not activated) by the passenger airbag ON/OFF indicator.

The table below shows the normal indication condition of the passenger airbag ON/OFF indicator and the front passenger seat condition.

Front passenger seat condition	ON Indicator	OFF Indicator
Adult is seated.	ON	OFF
Child is seated.	OFF	ON
Vacant	OFF	OFF
Occupant classification system failure	OFF	ON

INSPECTION PROCEDURE

1	**Check SRS warning light.**

CHECK:

Turn the ignition switch to the ON position, and check the SRS warning light condition.

HINT:

If this trouble occurs, the SRS warning light is off. If it is on, a DTC is output. Troubleshoot for the output DTC.

OK:

The SRS warning light does not come on.

NG → **Check DTC (see page DI–1147).**

OK

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2	**Check passenger airbag ON/OFF indicator condition.**

PREPARATION:

Turn the ignition switch to the ON position.

CHECK:

Check if the passenger airbag ON/OFF indicator correctly indicates the front passenger seat condition.

OK:

Front passenger seat condition	ON Indicator	OFF Indicator
Adult is seated.	ON	OFF
Child is seated.	OFF	ON
Vacant	OFF	OFF
Occupant classification system failure	OFF	ON

NG → **Go to step 3.**

OK

END

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3	**Perform zero point calibration.**

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed on the tester screen.

NG → **Go to step 5.**

OK

4	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 5.**

OK

END

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5	**Retighten front seat assembly RH bolt (see page BO–111, BO–125).**

(a) Turn the ignition switch to the LOCK position.
(b) Loosen the 4 installation bolts of the front seat assembly RH.
(c) Tighten the 4 installation bolts of the front seat assembly RH to the specified torque.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

NEXT

6	**Perform zero point calibration.**

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed on the tester screen.

NG → **Go to step 8.**

OK

7	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8.**

OK

END

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8	**Check connectors.**

PREPARATION:

(a) Turn the ignition switch to the LOCK position.

(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check the connectors are properly connected to the occupant classification ECU and the 4 occupant classification sensors.

OK:

The connectors are connected.

PREPARATION:

Disconnect the connectors from the occupant classification ECU and the 4 occupant classification sensors.

CHECK:

Check the connectors are not damaged or deformed.

OK:

The connectors are normal.

NG → **Repair or replace connector, then go to step 1.**

OK

9	**Check DTC.**

PREPARATION:

(a) Connect the connectors to the occupant classification ECU and the 4 occupant classification sensors.

(b) Connect the negative (–) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(b) Clear the DTCs stored in memory (see page DI–1147).

(c) Turn the ignition switch to the LOCK position.

(d) Turn the ignition switch to the ON position, and wait for at least 60 seconds.

(e) Check the DTCs (see page DI–1147).

OK:

DTC is not output.

NG → **Replace airbag sensor assembly (see page RS–82).**

OK

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10	**Replace occupant classification ECU.**

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (see page RS–111).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

11	**Perform zero point calibration.**

(a) Connect the negative (–) terminal cable to the battery.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Using the hand–held tester, perform ”Zero point calibration” (see page DI–1128).

OK:

The ”COMPLETED” is displayed on the tester screen.

NEXT

12	**Perform sensitivity check.**

Using the hand–held tester, perform ”Sensitivity check” (see page DI–1128).

OK:

Standard value: 27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

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SRS Warning Light Circuit Malfunction (Always light up, when DTC is not output)

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light comes on for approximately 6 seconds after the ignition switch is turned from the LOCK position to ON position, and then goes off automatically.
If there is a malfunction in the SRS, the SRS warning light comes on to inform the driver of a problem.
When terminals TC and CG of the DLC3 are connected, the DTCs are displayed by blinking the SRS warning light.

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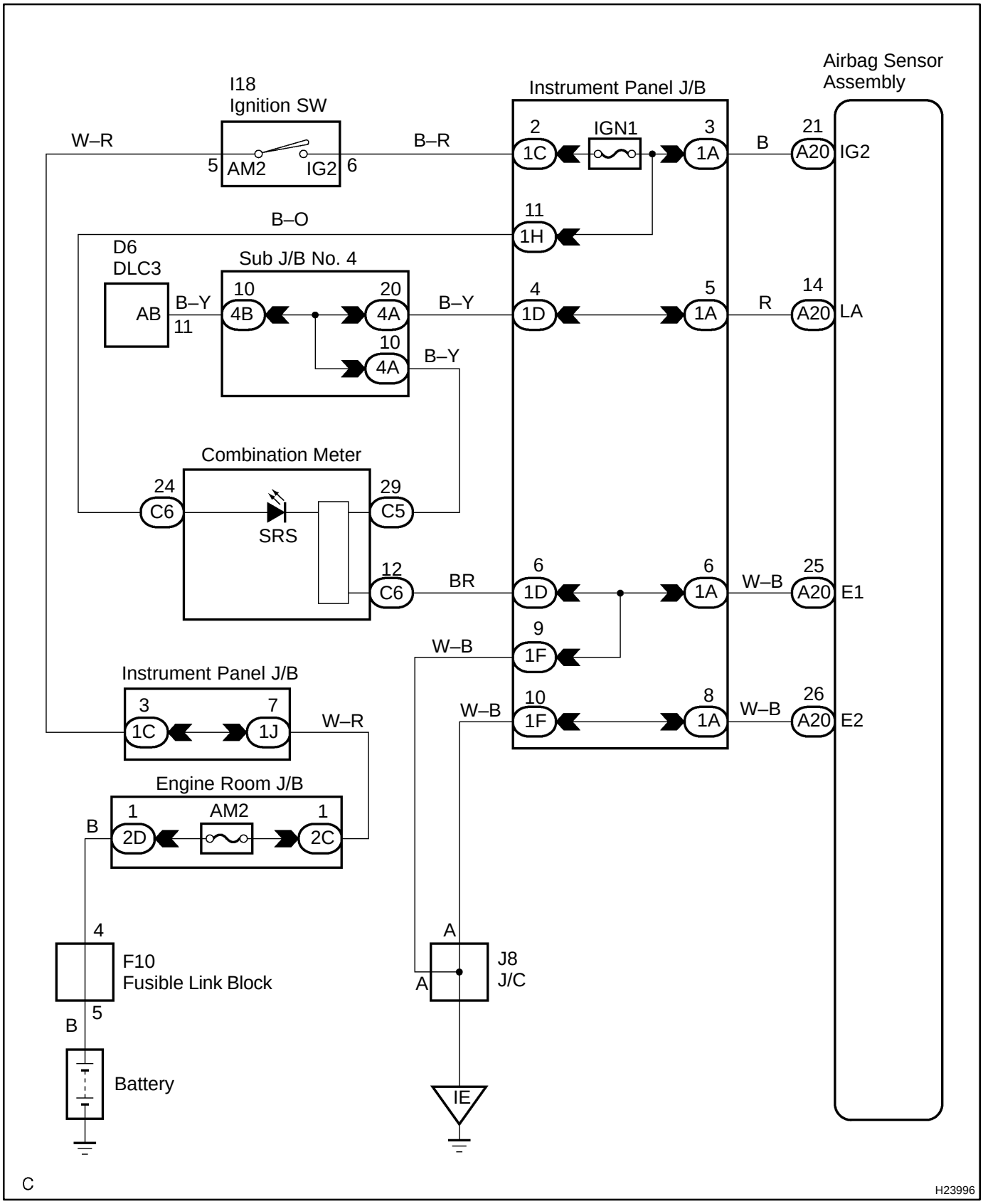
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check battery.**

CHECK:

Measure the voltage of the battery.

OK:

Voltage: 11 to 14 V

NG → **Replace battery.**

OK

2	**Check connection of connectors.**

PREPARATION:

Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.

CHECK:

Check that the connectors are properly connected to the airbag sensor assembly and combination meter.

OK:

The connectors are connected securely.

NG → **Connect connectors.**

OK

3	**Prepare for inspection.**

CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Disconnect the connectors from the airbag sensor assembly.
(b) Disconnect the connectors from the steering wheel pad.
(c) Disconnect the connectors from the front passenger airbag assembly.
(d) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(e) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(f) Disconnect the connectors from the front seat outer belt LH and RH.

NEXT

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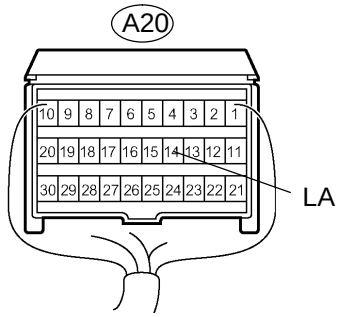
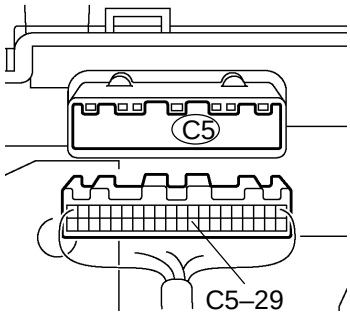
4	Check wire harness (airbag sensor assembly – combination meter).

Airbag Sensor Assembly:



Combination Meter:



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PREPARATION:

(a) Disconnect the connector from the combination meter.
(b) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage and resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–14 (LA) – C5–29	Always	Below 1 Ω
A20–14 (LA) – Body ground	Always	1 MΩ or higher
A20–14 (LA) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace wire harness.**

OK

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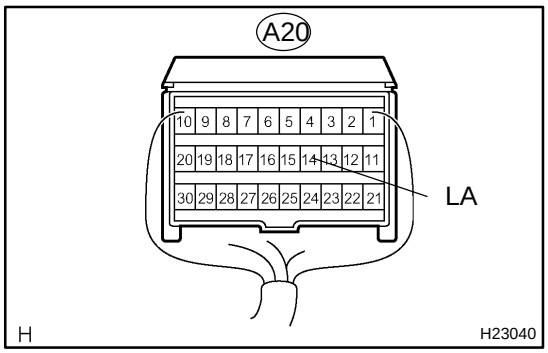
5	Check combination meter.



PREPARATION:

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the combination meter.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:

(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–14 (LA) – Body ground	Ignition switch ON	8 to 14 V

NG → **Replace combination meter (see page BO–89).**

OK →

Replace airbag sensor assembly (see page RS–82).

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SRS Warning Light Circuit Malfunction (Does not light up, when ignition switch is turned to on)

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter assembly.
When the SRS is normal, the SRS warning light comes on for approximately 6 seconds after the ignition switch is turned from the LOCK position to the ON position, and then goes off automatically.
If there is a malfunction in the SRS, the SRS warning light comes on to inform the driver of a problem.
When terminals TC and CG of the DLC3 are connected, the DTC is displayed by blinking the SRS warning light.

WIRING DIAGRAM

See page DI–1491.

INSPECTION PROCEDURE

CAUTION:
Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check battery.**

CHECK:
Measure the voltage of the battery.
OK:
Voltage: 11 to 14 V

NG → **Replace battery.**

OK

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2	**Check combination meter.**

PREPARATION:
Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.
CHECK:
Turn the ignition switch to the ON position, check the operation of the SRS warning light.
OK:

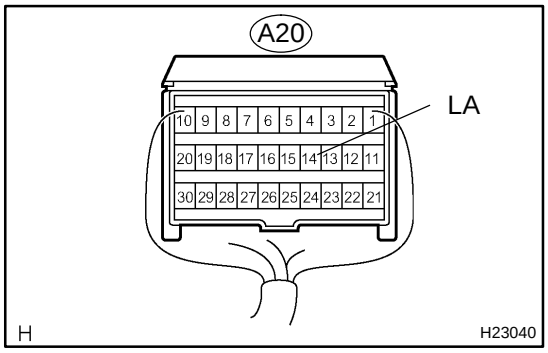
The SRS warning light comes on (goes off 6 seconds after the ignition switch is turned to the ON position).

NG → **Go to step 3.**

OK

Replace airbag sensor assembly (see page RS–82).

3	**Check wire harness (combination meter – airbag sensor assembly).**



PREPARATION:
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the combination meter.
(d) Connect the negative (–) terminal cable to the battery, and wait for at least 2 seconds.

CHECK:
(a) Turn the ignition switch to the ON position.
(b) Measure the voltage according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–14 (LA) – Body ground	Ignition switch ON	Below 1 V

NG → **Repair or replace wire harness.**

OK

Replace combination meter (see page BO–89).

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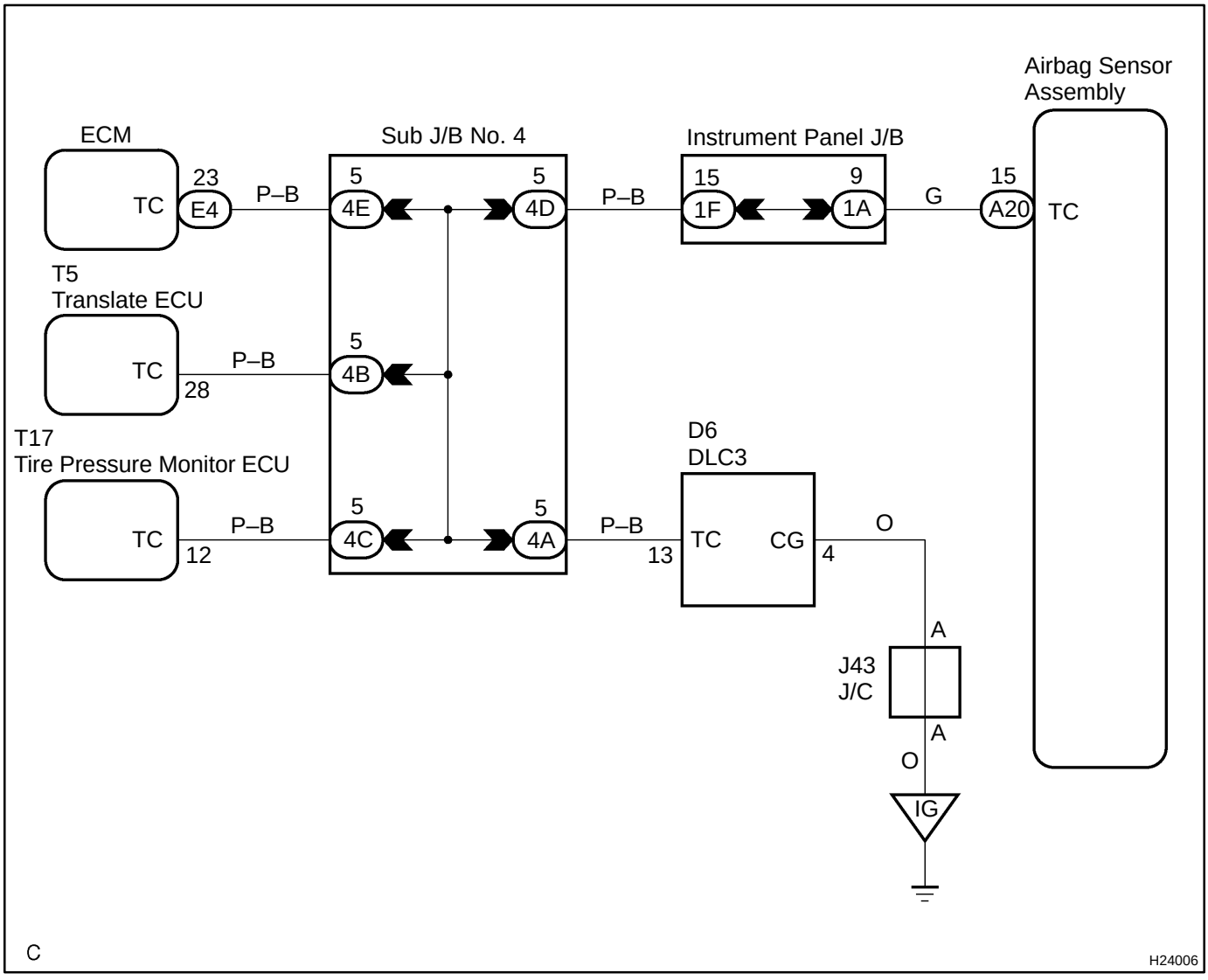
TC Terminal Circuit

CIRCUIT DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
The DTCs are displayed by blinking of the SRS warning light.

WIRING DIAGRAM



HINT:
When each warning light stays blinking, a ground short in the wiring of the terminal TC of the DLC3 or an internal ground short in each ECU is suspected.

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INSPECTION PROCEDURE

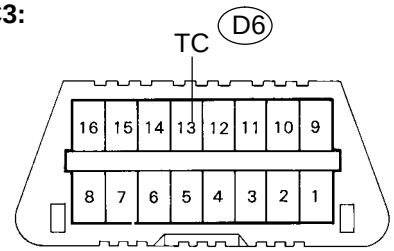
CAUTION:

Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.

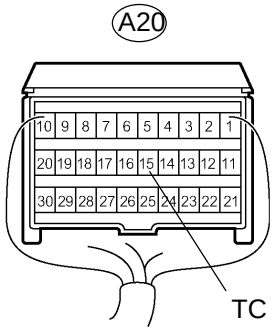
(a) Turn the ignition switch to the LOCK position.
(b) Disconnect the negative (–) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the airbag sensor assembly.
(d) Disconnect the connectors from the steering wheel pad.
(e) Disconnect the connectors from the front passenger airbag assembly.
(f) w/ Side and curtain shield airbag:
Disconnect the connectors from the side airbag assembly LH and RH.
(g) w/ Side and curtain shield airbag:
Disconnect the connectors from the curtain shield airbag assembly LH and RH.
(h) Disconnect the connectors from the front seat outer belt LH and RH.

1	**Check wire harness (DLC3 – airbag sensor assembly).**

DLC3:



Airbag Sensor Assembly:



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H23482

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
D6–13 (TC) – A20–15 (TC)	Always	Below 1 Ω

NG → **Repair or replace wire harness (TC of DLC3 – TC of airbag sensor assembly).**

OK

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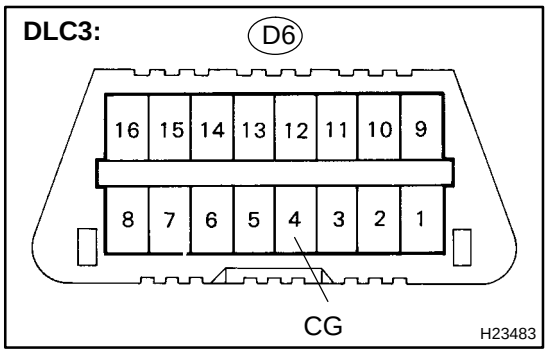
2	Check wire harness (CG of DLC3 – body ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

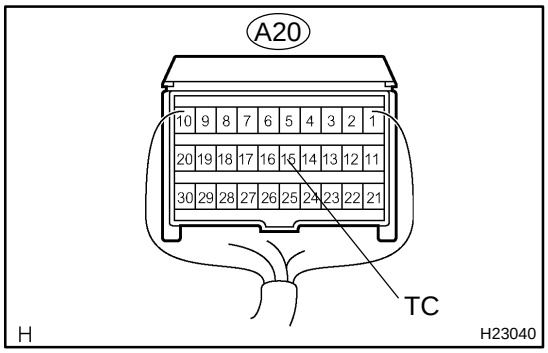
OK:

Tester Connection	Condition	Specified Condition
D6–4 (CG) – Body ground	Always	Below 1 Ω

NG → **Repair or replace wire harness (CG of DLC3 to body ground).**

OK

3	Check wire harness (TC of airbag sensor assembly – body ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Condition	Specified Condition
A20–15 (TC) – Body ground	Always	1 MΩ or higher

NG → **Repair or replace wire harness or each ECU.**

OK

Replace airbag sensor assembly (see page RS–82).

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POWER SEAT CONTROL SYSTEM (w/ Driving Position Memory)

DIDDW–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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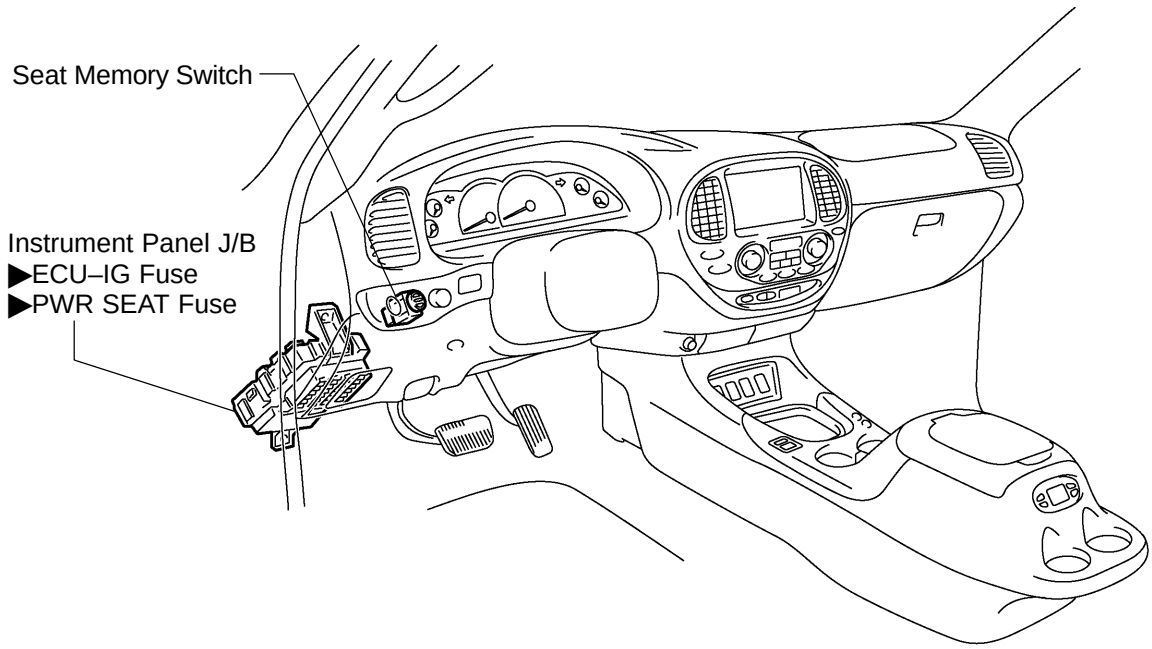
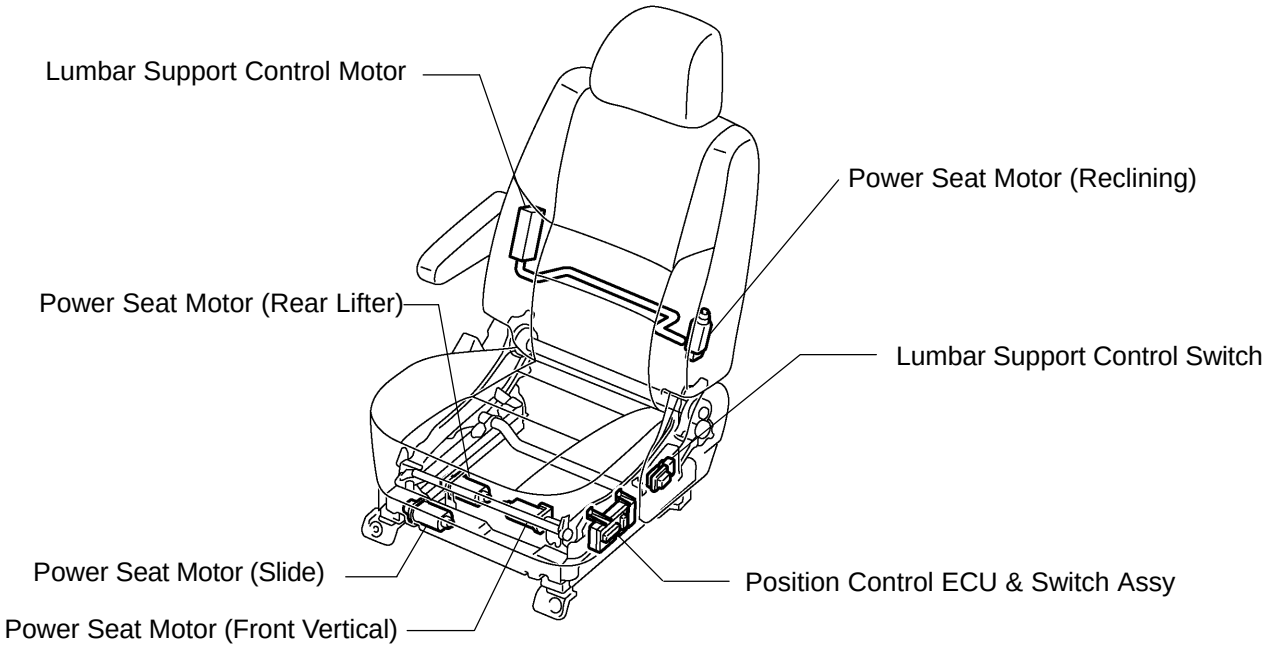
DIDDX–01

LOCATION





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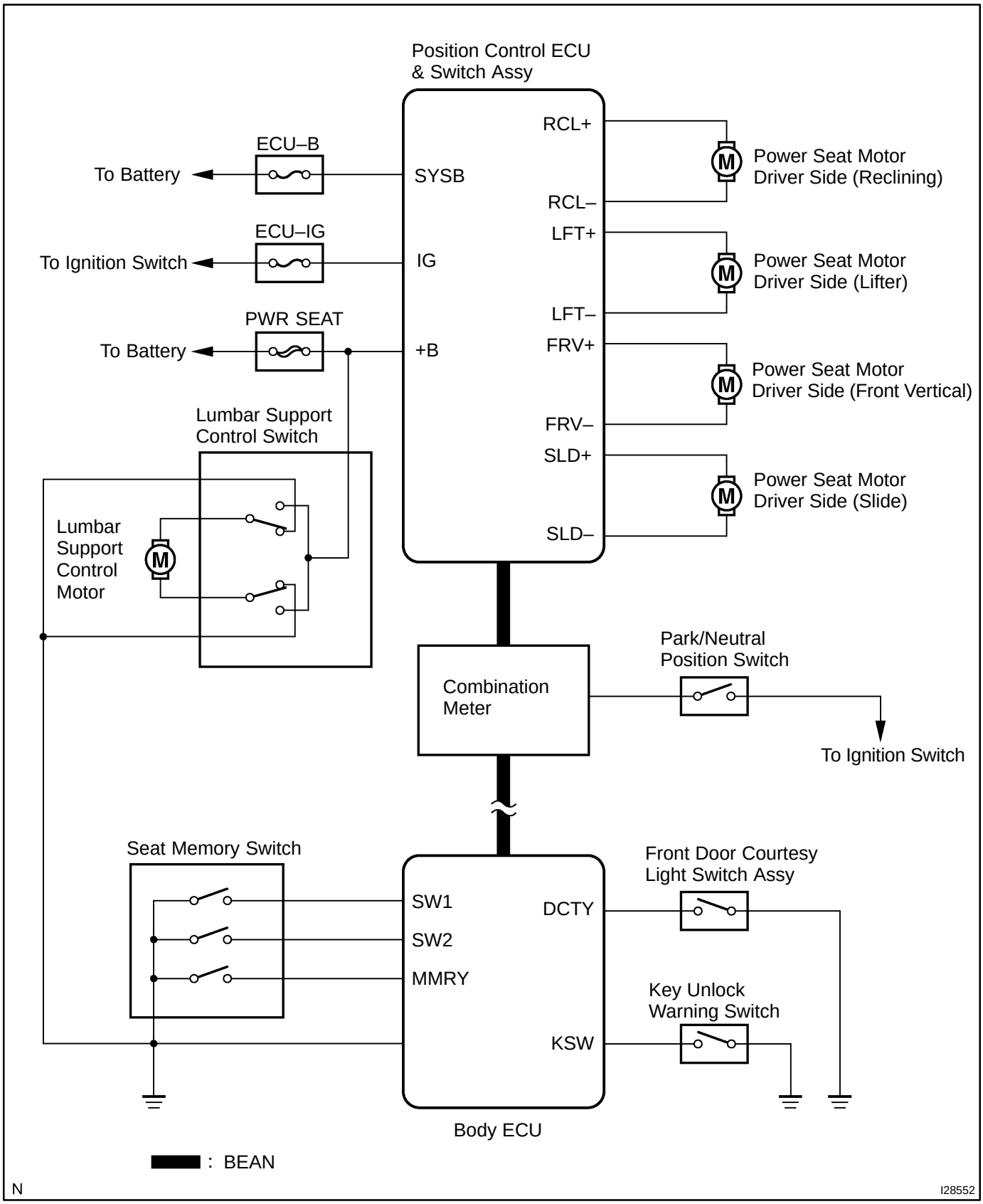
DIDDZ–01

SYSTEM DIAGRAM



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DIDE0–01

SYSTEM DESCRIPTION

The power seat control system (w/ memory) is equipped with the following functions:

- Manual operation of the driver side seat.
- Individual seat positions for two different drivers can be stored for the slide–reclining front–vertical 8–way lifter.
- Similarly, power mirror positions for two different drivers can be stored. These are stored/restored with the seat positions.
- The above operations are performed using serial communication.
- As a safety precaution, the system disallows seat position restoration unless the ignition switch is ON, and the park/neutral position switch is in the P (park) position.
- Manual adjustment of the slide reclining lumbar can be performed even when the ECU is not functional.

When the power seat control switch is operated, a command signal is sent to the position control ECU. The position control ECU then activates the appropriate seat motor as needed. This memory system does not use a seat position sensor. The seat position is detected by counting pulses that are output when the motor turns. If there is no pulse output from the motor, the motor will stop operating. The ECU is designed so that a malfunction of the seat memory system will not interfere with manual seat control. The seat memory switch also sends signals to the position control ECU to memorize a given seat position. The seat memory switch is later used to send signals to the position control ECU to return to one of the memorized positions.

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DIDE1–01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Use this procedure to troubleshoot the front power seat control system with memory function.

1	**Vehicle Brought To Workshop**

NEXT

2	**Customer Problem Analysis Check and Problem Symptom Check (See page DI–1507)**

NEXT

3	**Problem Symptom Confirmation**

- **Symptom Does Not Occur (Go to step 4)**
- **Symptom Occurs (Go to step 5)**

4	**Symptom Simulation (See page IN–24)**

NEXT

5	**Check Multiplex Communication System (See page DI–1904)**

Check if any DTCs are output.

HINT:

The position control ECU & switch assy of this system are connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.

- **Multiplex System DTC is Output (Proceed to "Multiplex Communication System")**
- **No Multiplex System DTC (Go to step 6)**

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6	**Problem Symptoms Table (See page DI–1508)**

NEXT

7	**Identification of Problem**

NEXT

8	**Adjustment, Repair or Replace**

NEXT

9	**Confirmation Test**

NEXT

End

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DIDE2–01

CUSTOMER PROBLEM ANALYSIS CHECK

POWER SEAT CONTROL SYSTEM Check Sheet

Inspector's Name: _____

Customer's Name		**VIN**	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Intermittent (times a day) ☐ Only once
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (°C (°F))

Problem Symptoms	☐ All functions do not operate.
	☐ Sliding function does not operate.
	☐ Reclining function does not operate.
	☐ Front vertical function does not operate.
	☐ Lifter function does not operate.
	☐ Seat position memory function does not operate.
	☐ Lumbar support function does not operate.
	☐ Others

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DIDE4–01

PROBLEM SYMPTOMS TABLE

HINT:

- If the cause of the problem still cannot be determined after the corresponding inspection, proceed to the next step shown in this table.
- The system uses multiplex communication. Check for DTCs for the multiplex communication system before performing the following inspection.

Symptom	Suspected Area	See Page
Power seat does not operate (manual or memorized positions).	1. Power source circuit 2. Position control ECU & switch assy	DI–1514 BO–112
One function of power seat does not operate (manual or memorized positions).	1. Power seat motor circuit 2. Position control ECU & switch assy	DI–1525 BO–112
One or all manual seat functions do not operate (memorized positions OK).	Position control ECU & switch assy	BO–112
Memory function does not operate.	1. Power source circuit 2. Power seat memory switch circuit 3. Park/neutral position switch circuit 4. Door courtesy switch circuit 5. Position control ECU & switch assy	DI–1514 DI–1518 DI–1528 DI–1533 BO–112
All memory functions do not operate or operate a little then stop (manual functions OK).	1. Power source circuit 2. Position control ECU & switch assy	DI–1514 BO–112
One memory function does not operate or operates a little then stops (manual functions OK).	1. Power seat motor circuit 2. Position control ECU & switch assy	DI–1525 BO–112
Lumbar support does not operate.	Lumbar support control switch circuit	DI–1521
The power seat control system does not control the storing and restoring of the power mirror position.	1. Multiplex communication system 2. Driving position memory switch 3. Outer mirror assy 4. Position control ECU & switch assy	DI–1904 BE–115 BE–115 BO–112

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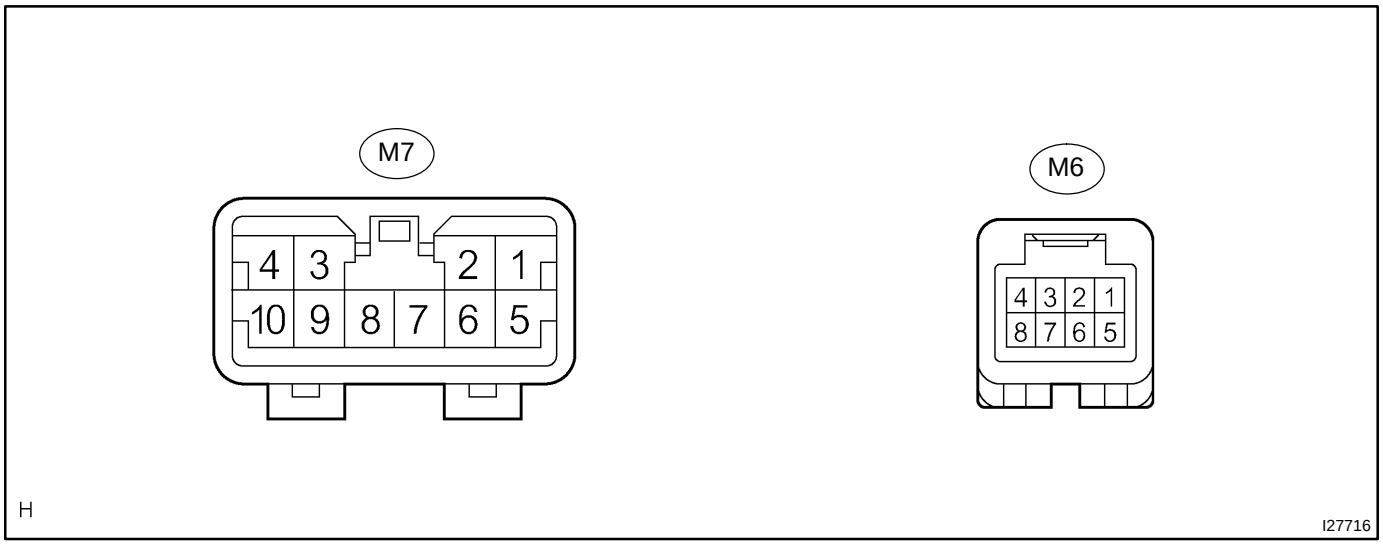
DIDE5–01

TERMINALS OF ECU

1. CHECK POSITION CONTROL ECU & SWITCH ASSY



(a) Disconnect the M6 and M7 ECU & switch connectors.

(b) Check the voltage of each terminal of the wire harness side connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (M7–1) – Body ground	W–B – Body ground	Ground	Always	Below 1 V
+B (M7–5) – GND (M7–1)	L–O – W–B	Battery	Always	10 to 14 V
SYSB (M6–8) – GND (M7–1)	W–R – W–B	Power source	Always	10 to 14 V
IG (M6–4) – GND (M7–1)	B–R – W–B	Ignition switch	Ignition switch OFF → ON	Below 1 V → 10 to 14 V
MPX1 (M6–1) – GND (M7–1)	W – W–B	Communication signal	Always	10 kΩ or higher

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the M6 and M7 ECU & switch connectors.

(d) Check the voltage of each terminal of the connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SLD+ (M7–2) – GND (M7–1)	L – W–B	Sliding motor signal (Forward)	Seat moving forward using sliding switch → Others	10 to 14 V → Below 1 V
SLD– (M7–3) – GND (M7–1)	Y – W–B	Sliding motor signal (Rearward)	Seat moving rearward using sliding switch → Others	10 to 14 V → Below 1 V
FRV+ (M7–6) – GND (M7–1)	G – W–B	Front vertical motor signal (Upward)	Seat cushion front portion raising using front vertical switch → Others	10 to 14 V → Below 1 V
FRV– (M7–4) – GND (M7–1)	B – W–B	Front vertical motor signal (Downward)	Seat cushion front portion lowering using front vertical switch → Others	10 to 14 V → Below 1 V
LFT+ (M7–7) – GND (M7–1)	W – W–B	Lifter motor signal (Upward)	Seat raising using lifter switch → Others	10 to 14 V → Below 1 V
LFT– (M7–9) – GND (M7–1)	V – W–B	Lifter motor signal (Downward)	Seat lowering using lifter switch → Others	10 to 14 V → Below 1 V

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RCL+ (M7–8) – GND (M7–1)	P – W–B	Reclining motor signal (Forward)	Seat back moving forward using reclining switch → Others	10 to 14 V → Below 1 V
RCL– (M7–10) – GND (M7–1)	BR – W–B	Reclining motor signal (Rearward)	Seat back moving rearward using reclining switch → Others	10 to 14 V → Below 1 V

If the result is not as specified, the position control ECU & switch assy may be malfunctioning.

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DIDGG–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the DATA LIST displayed on the hand–held tester, you can read the value of the switch, sensor, etc. without parts removal. Reading the DATA LIST as the first step of troubleshooting is one way to shorten the labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Read the DATA LIST according to the display on the tester.

D–SEAT:

Item	Measurement Item/ Display (Range)	Normal Condition
RECLIN SW REAR	Reclining switch signal (Rearward)/ ON or OFF	ON: Reclining switch (Rearward) is ON OFF: Reclining switch (Rearward) is OFF
RECLIN SW FRONT	Reclining switch signal (Forward)/ ON or OFF	ON: Reclining switch (Forward) is ON OFF: Reclining switch (Forward) is OFF
F VTCL SW DOWN	Front vertical switch signal (Downward)/ ON or OFF	ON: Front vertical switch (Downward) is ON OFF: Front vertical switch (Downward) is OFF
F VTCL SW UP	Front vertical switch signal (Upward)/ ON or OFF	ON: Front vertical switch (Upward) is ON OFF: Front vertical switch (Upward) is OFF
LIFTER SW DOWN	Lifter switch signal (Downward)/ ON or OFF	ON: Lifter switch (Downward) is ON OFF: Lifter switch (Downward) is OFF
LIFTER SW UP	Lifter switch signal (Upward)/ ON or OFF	ON: Lifter switch (Upward) is ON OFF: Lifter switch (Upward) is OFF
SLIDE SW REAR	Sliding switch signal (Rearward)/ ON or OFF	ON: Sliding switch (Rearward) is ON OFF: Sliding switch (Rearward) is OFF
SLIDE SW FRONT	Sliding switch signal (Forward)/ ON or OFF	ON: Sliding switch (Forward) is ON OFF: Sliding switch (Forward) is OFF
POWER VOLTAGE	Power supply for position control ECU & switch/ MIN: 0 V, MAX: 19.89 V	Within range from 11 V to 14 V
IG SW	Ignition switch status/ ON or OFF	ON Ignition switch is ON OFF: Ignition switch is OFF
KEY UNLOCK SW	Key unlock warning switch signal/ ON or OFF	ON: Key is in ignition key cylinder OFF: Key is not in ignition key cylinder
D–DOOR WARN SW	Door courtesy switch signal/ ON or OFF	ON: Driver side door is open OFF: Driver side door is closed
PNP SW	Park/neutral position switch signal/ ON or OFF	ON: Shift lever in neutral position OFF: Shift lever in any position except neutral
M2 SW	Seat memory switch M2 signal/ ON or OFF	ON: Seat memory switch M2 is ON OFF: Seat memory switch M2 is OFF
M1 SW	Seat memory switch M1 signal/ ON or OFF	ON: Seat memory switch M1 is ON OFF: Seat memory switch M1 is OFF
SET SW	Seat memory set switch signal/ ON or OFF	ON: Memory set switch is ON OFF: Memory set switch is OFF
SLIDE POS	Seat sliding position/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
RECLN POS	Seatback position/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
F VTCL POS	Seat front vertical position/ MIN: –4096 MAX: 4096	Within range from –4096 to 4096
LIFTER POS	Seat lifter position/ MIN: –4096 MAX: 4096	Within range from –4096 to 4096
MEM M1 SW	Driving position memorized with seat memory switch M1/ MEM or NOT MEM	MEM: Memorized NOT MEM: Not memorized

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MEM M2 SW	Driving position memorized with seat memory switch M2/ MEM or NOT MEM	MEM: Memorized NOT MEM: Not memorized
SEAT MEM M1	Seat position memorized with seat memory switch M1/ MEM or NOT MEM	MEM: Memorized NOT MEM: Not memorized
SEAT MEM M2	Seat position memorized with seat memory switch M2/ MEM or NOT MEM	MEM: Memorized NOT MEM: Not memorized
D–MIRR MEM1	Driver side mirror position memorized with seat memory switch M1/ MEM or NOT MEM	MEM: Memorized NOT MEM: Not memorized
D–MIRR MEM2	Driver side mirror position memorized with seat memory switch M2/ MEM or NOT MEM	MEM: Memorized NOT MEM: Not memorized
P–MIRR MEM M1	Passenger side mirror position memorized with seat memory switch M1/ MEM or NOT MEM	MEM: Memorized NOT MEM: Not memorized
P–MIRR MEM M2	Passenger side mirror position memorized with seat memory switch M2/ MEM or NOT MEM	MEM: Memorized NOT MEM: Not memorized
SLIDE MEM POS 1	Seat sliding position memorized with seat memory switch M1/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
RECLIN MEM POS 1	Seat back position memorized with seat memory switch M1/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
F VTCL MEM POS 1	Front vertical position memorized with seat memory switch M1/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
LIFTER MEM POS 1	Lifter position memorized with seat memory switch M1/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
SLIDE MEM POS 2	Seat sliding position memorized with seat memory switch M2/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
RECLIN MEM POS 2	Seatback position memorized with seat memory switch M2/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
F VTCL MEM POS 2	Front vertical position memorized with seat memory switch M2/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
LIFTER MEM POS 2	Lifter position memorized with seat memory switch M2/ MIN: –4096, MAX: 4096	Within range from –4096 to 4096
D–MIRR MEM POS 1	Driver side mirror position memorized with seat memory switch M1/ MIN: 0, MAX: 65535	Within range from 0 to 65535
P–MIRR MEM POS 1	Passenger side mirror position memorized with seat memory switch. M1/ MIN: 0, MAX: 65535	Within range from 0 to 65535
D–MIRR MEM POS 2	Driver side mirror position memorized with seat memory switch M2/ MIN: 0, MAX: 65535	Within range from 0 to 65535
P–MIRR MEM POS 2	Passenger side mirror position memorized with seat memory switch M2/ MIN: 0, MAX: 65535	Within range from 0 to 65535

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2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester allows you to operate the seat motors without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten the labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) Perform the ACTIVE TEST according to the display on the tester.

D–SEAT:

Item	Test Details	Diagnostic Note
RECLINING	Test Detail: Reclining operation FRONT/REAR/OFF Vehicle Condition: Vehicle is stopped	–
F VERTICAL	Test Detail: Front vertical operation UP/DOWN/OFF Vehicle Condition: Vehicle is stopped	–
LIFTER	Test Detail: Lifter operation UP/DOWN/OFF Vehicle Condition: Vehicle is stopped	–
SLIDE	Test Detail: Lifter operation UP/DOWN/OFF Vehicle Condition: Vehicle is stopped	–

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DIDE6–01

CIRCUIT INSPECTION

ECU power source circuit

CIRCUIT DESCRIPTION

The position control ECU is contained in the switch assy.

During manual operation, only one switch signal is accepted. If signals are input from 2 or more switches simultaneously, all of them are ignored. However, when signals are input from only the front vertical switch and lifter switch simultaneously, the signal from the lifter switch is accepted.

During automatic operation, a manual switch input overrides any other operations, i.e. automatic operations stop and the manual input operation is accepted. For example, if a manual switch input is activated, during a seat store/restore operation, the previous operation will cease and manual operation will be performed. After the manual operation is performed, the previous automatic operation will not resume. Power mirror store/restore operation is unaffected by manual switch inputs.

The position control ECU & switch assy disallows the restore operation of the power seat when the system detects that the voltage of terminal SYSB is less than 8 V for 0.3 seconds or is more than 10 V for 30 seconds.

This circuit is a power source circuit of the position control ECU & switch assy.

HINT:

Manual adjustment of the slide reclining lumbar can be performed even when the ECU is not functional if current is allowed to flow into terminals +B and SYSB.

Lumbar operation can always be performed.

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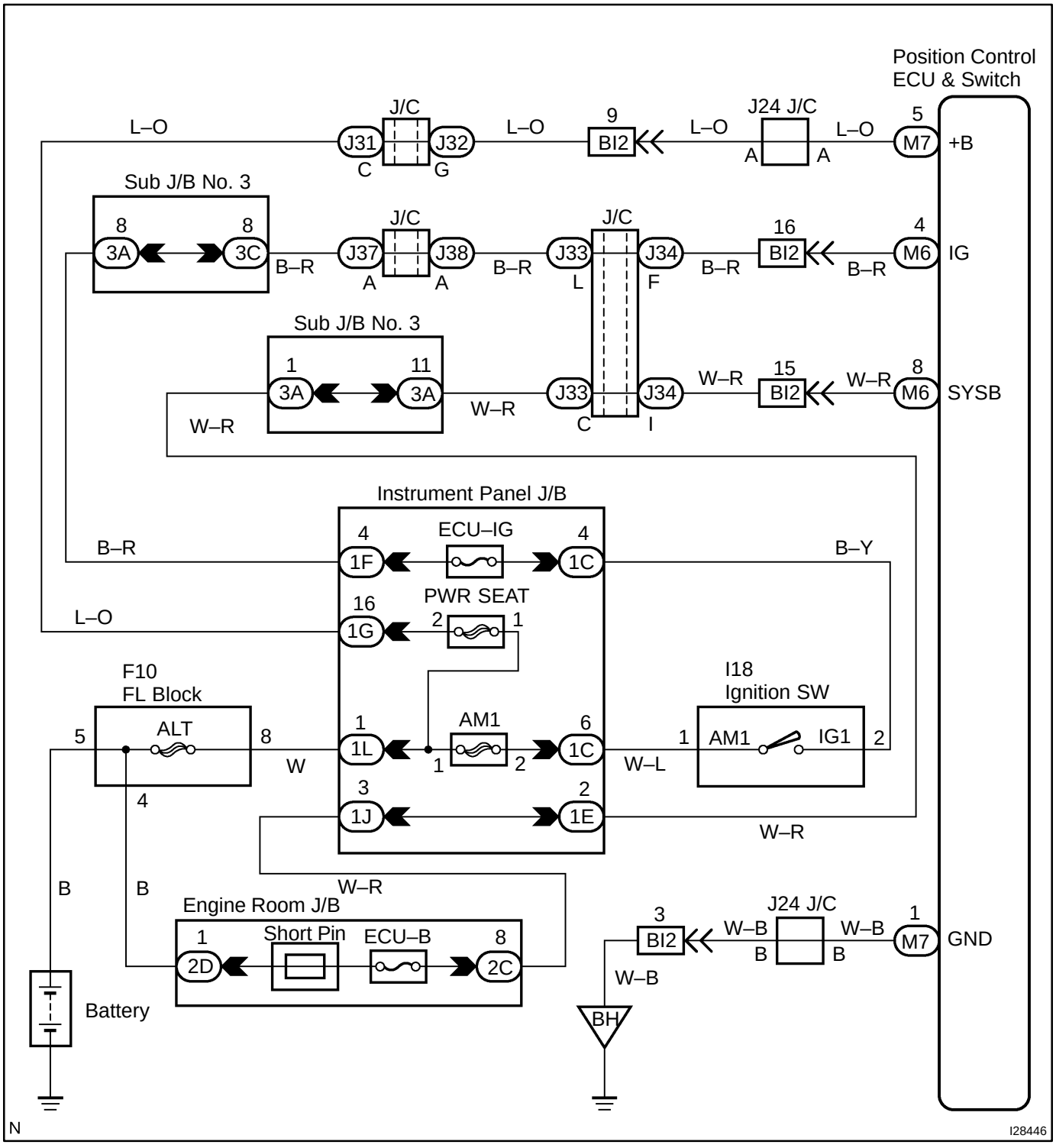
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check fuse (PWR SEAT, ECU–IG, AM1).**

PREPARATION:

Remove the PWR SEAT, ECU–IG and AM1 fuses from the instrument panel J/B.

CHECK:

Measure the resistance.

OK:

Below 1 Ω

NG → **Replace fuse.**

OK

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2	Inspect position control ECU & switch assy.

PREPARATION:

Disconnect the M6 and M7 ECU connectors.

CHECK:

(a) Measure the voltage of each terminal of the wire harness side connectors.

Position Control ECU & Switch Assy
Wire Harness Side
Connector Front View:

OK:

Tester Connection (Symbol)	Condition	Specified Condition
M7–5 (+B) – Body ground	Always	10 to 14 V
M6–8 (SYSB) – Body ground	Always	10 to 14 V
M6–4 (IG) – Body ground	Ignition switch OFF → ON	Below 1 V → 10 to 14 V

(b) Measure the resistance between the M7 ECU wire harness side connector and body ground.

OK:

Tester Connection (Symbol)	Specified Condition
M7–1 (GND) – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1508).

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DIDE8–01

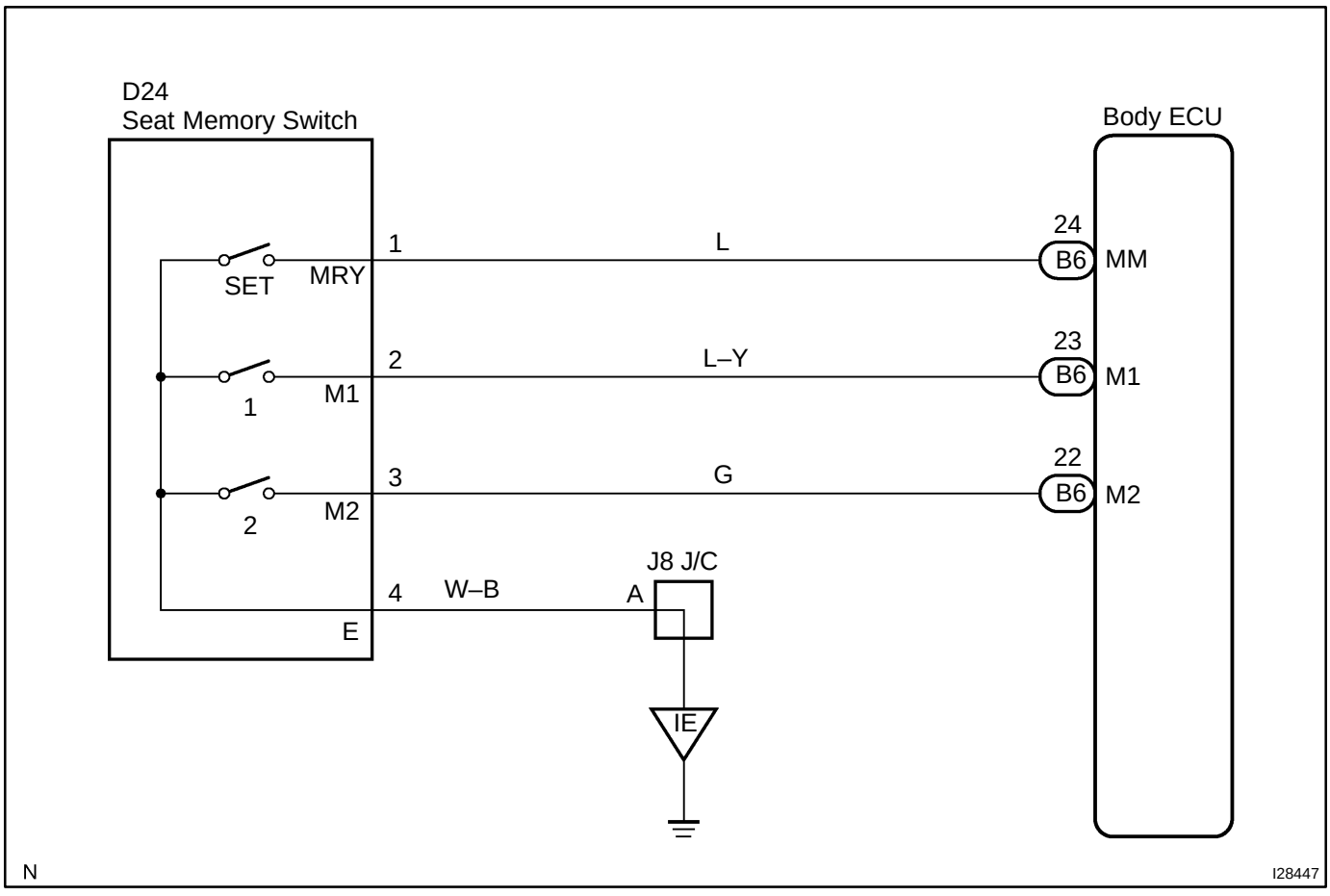
Memory switch circuit

CIRCUIT DESCRIPTION

The seat memory switch sends signals to the position control ECU & switch assy via multiplex communication to memorize a given seat position. This memory system does not use a position sensor. The seat position is detected by counting pulses that are output when the motor turns. If there is no pulse output from the motor, the motor will stop operating. The seat memory switch is later used to send signals to the position control ECU to return to one of the memorized positions.

The power seat memory operation is performed only when the ignition switch is in the ON position and the park/neutral position switch is in the P (park) position.

WIRING DIAGRAM



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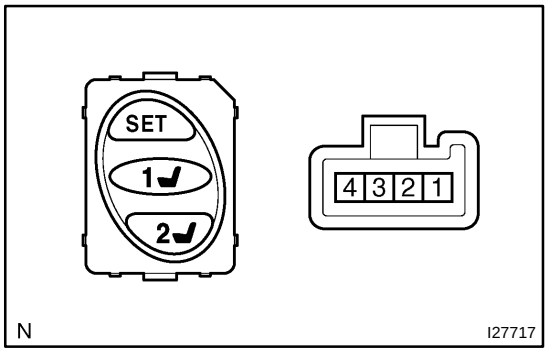
INSPECTION PROCEDURE

1	Inspect seat memory switch.



PREPARATION:

Disconnect the seat memory switch connector.

CHECK:

Measure the resistance of each terminal, as shown in the illustration and table.

OK:

Tester Connection	Switch Position	Specified Condition
1 – 4	SET switch OFF → ON	10 kΩ or higher→ Below 1 Ω
2 – 4	Memory switch 1 OFF → ON	10 kΩ or higher→ Below 1 Ω
3 – 4	Memory switch 2 OFF → ON	10 kΩ or higher→ Below 1 Ω

NG → **Replace seat memory switch.**

OK

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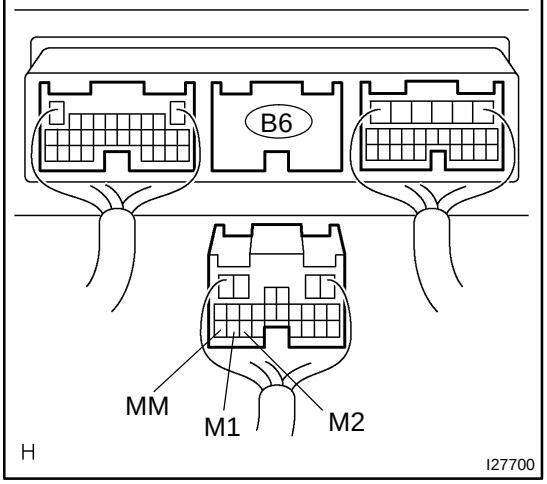
2	Check harness and connector (Body ECU & seat memory switch – body ground).

Body ECU Wire Harness View:



PREPARATION:

(a) Reconnect the seat memory switch connector.

(b) Disconnect the B6 body ECU connector.

CHECK:

Measure the resistance of each terminal, as shown in the illustration and table.

OK:

Tester Connection (Symbol)	Switch Position	Specified Condition
B6–23 (M1) – Body ground	Memory switch 1 OFF → ON	10 kΩ or higher→ Below 1 Ω
B6–24 (MM) – Body ground	SET switch OFF → ON	10 kΩ or higher→ Below 1 Ω
B6–22 (M2) – Body ground	Memory switch 2 OFF → ON	10 kΩ or higher→ Below 1 Ω

NG → **Repair or replace harness or connector.**

OK →

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1508).

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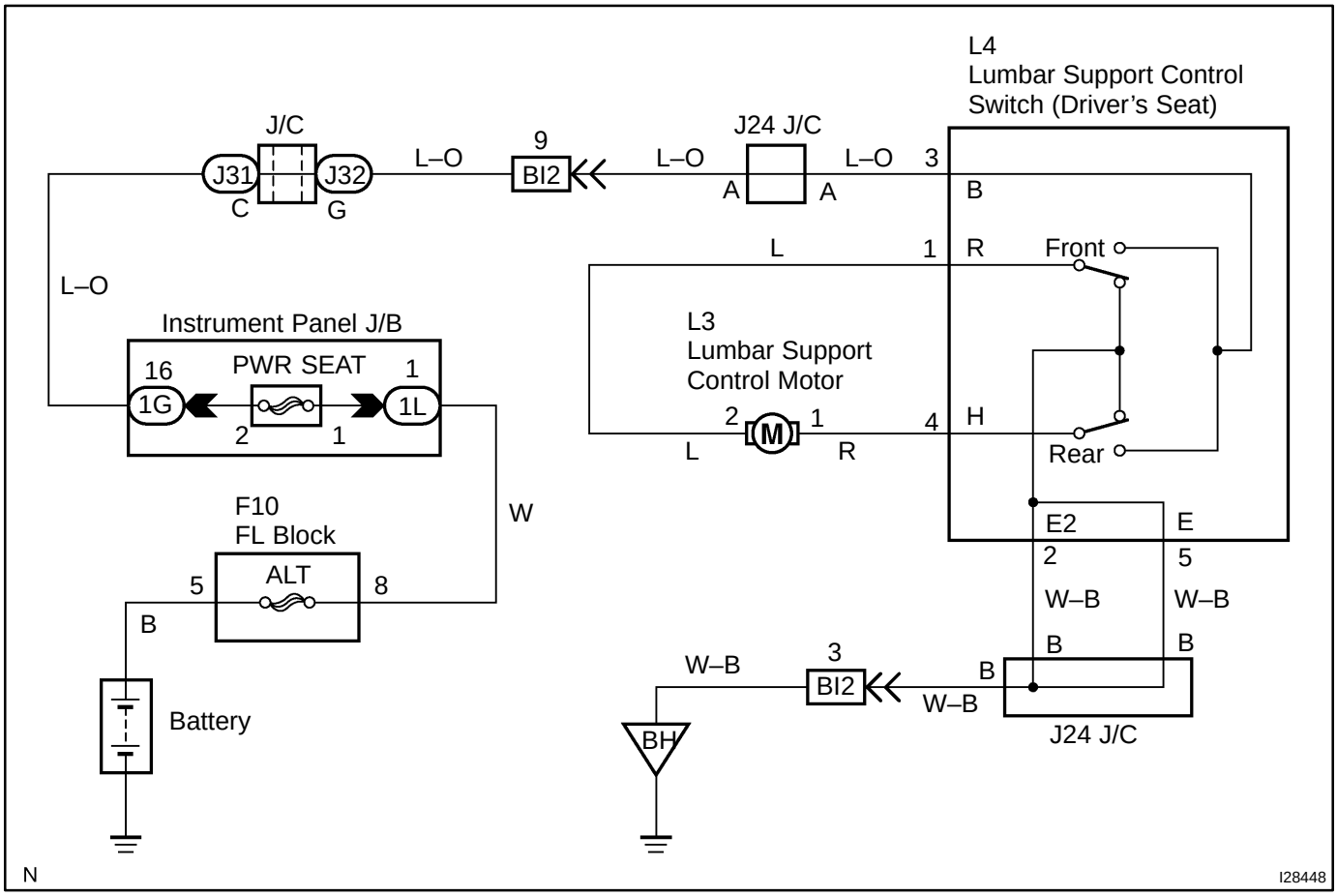
DIDE9–01

Lumbar support control switch circuit

CIRCUIT DESCRIPTION

The lumbar support control switch that controls lumbar support is connected to the lumbar support control motor via a wire harness. This circuit can freely operate regardless of the condition of the ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

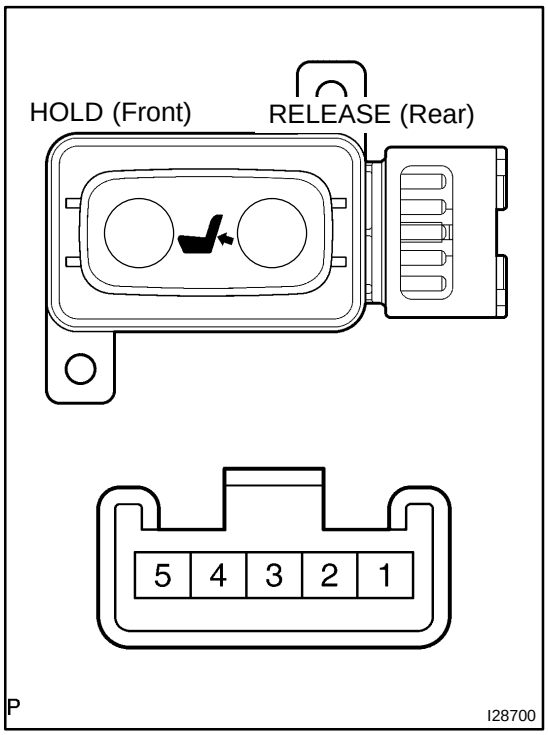
1	**Check fuse (PWR SEAT).**

PREPARATION:
Remove the PWR SEAT fuse from the instrument panel J/B.
CHECK:
Measure the resistance.
OK:
Below 1 Ω

NG → **Replace fuse.**

OK

2	**Inspect lumbar support control switch.**



PREPARATION:
Disconnect the lumbar support control switch connector.
CHECK:
Measure the resistance of each terminal, as shown in the illustration and table.
OK:

Tester Connection	Switch Position	Specified Condition
1 – 2	HOLD (Front)	Below 1 Ω
3 – 4	HOLD (Front)	Below 1 Ω
1 – 2	OFF	Below 1 Ω
4 – 5	OFF	Below 1 Ω
1 – 3	RELEASE (Rear)	Below 1 Ω
4 – 5	RELEASE (Rear)	Below 1 Ω

NG → **Replace lumbar support control switch assy (See page BO–112).**

OK

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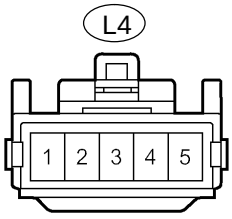
3	Check harness and connector (Power source).

Wire Harness Side:
Lumbar Support Control Switch



CHECK:

Measure the voltage of each terminal of the wire harness side connectors.

OK:

Tester Connection	Condition	Specified Condition
L4–3 – Body ground	Always	10 to 14 V

CHECK:

Measure the resistance of each terminal, as shown in the illustration and table.

OK:

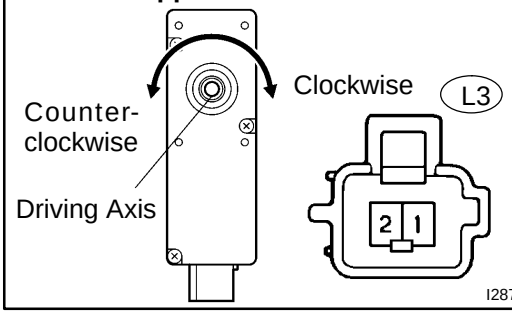
Tester Connection	Condition	Specified Condition
L4–2 – Body ground	Always	Below 1 Ω
L4–5 – Body ground	Always	Below 1 Ω

NG	Repair or replace harness or connector.

OK

4	Inspect lumbar support control motor.

Lumbar Support Control Motor



PREPARATION:

Remove the lumbar support control motor (See page BO–112).

CHECK:

Check that the motor rotates smoothly when the battery is connected to the lumbar support control motor connector terminals.

OK:

Measurement Condition	Operational Direction
Battery positive (+) → 1 Battery negative (–) → 2	Clockwise
Battery positive (+) → 2 Battery negative (–) → 1	Counterclockwise

NG	Replace lumbar support control motor (See page BO–112).

OK

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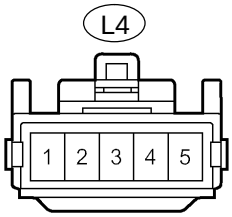
5	Check harness and connector (Lumbar support control switch – lumbar support control motor).

Wire Harness Side:
Lumbar Support Control Switch



I28701

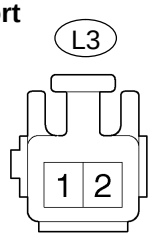
CHECK:

Measure the resistance of each terminal, as shown in the illustration and table.

OK:

Tester Connection	Condition	Specified Condition
L4–1 – L3–2	Always	Below 1 Ω
L4–4 – L3–1	Always	Below 1 Ω
L4–1 – Body ground	Always	10 kΩ or higher
L4–4 – Body ground	Always	10 kΩ or higher

Wire Harness Side:
Lumbar Support Control Motor



I28555

NG → **Repair or replace harness or connector.**

OK →

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1508).

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DIDEB–01

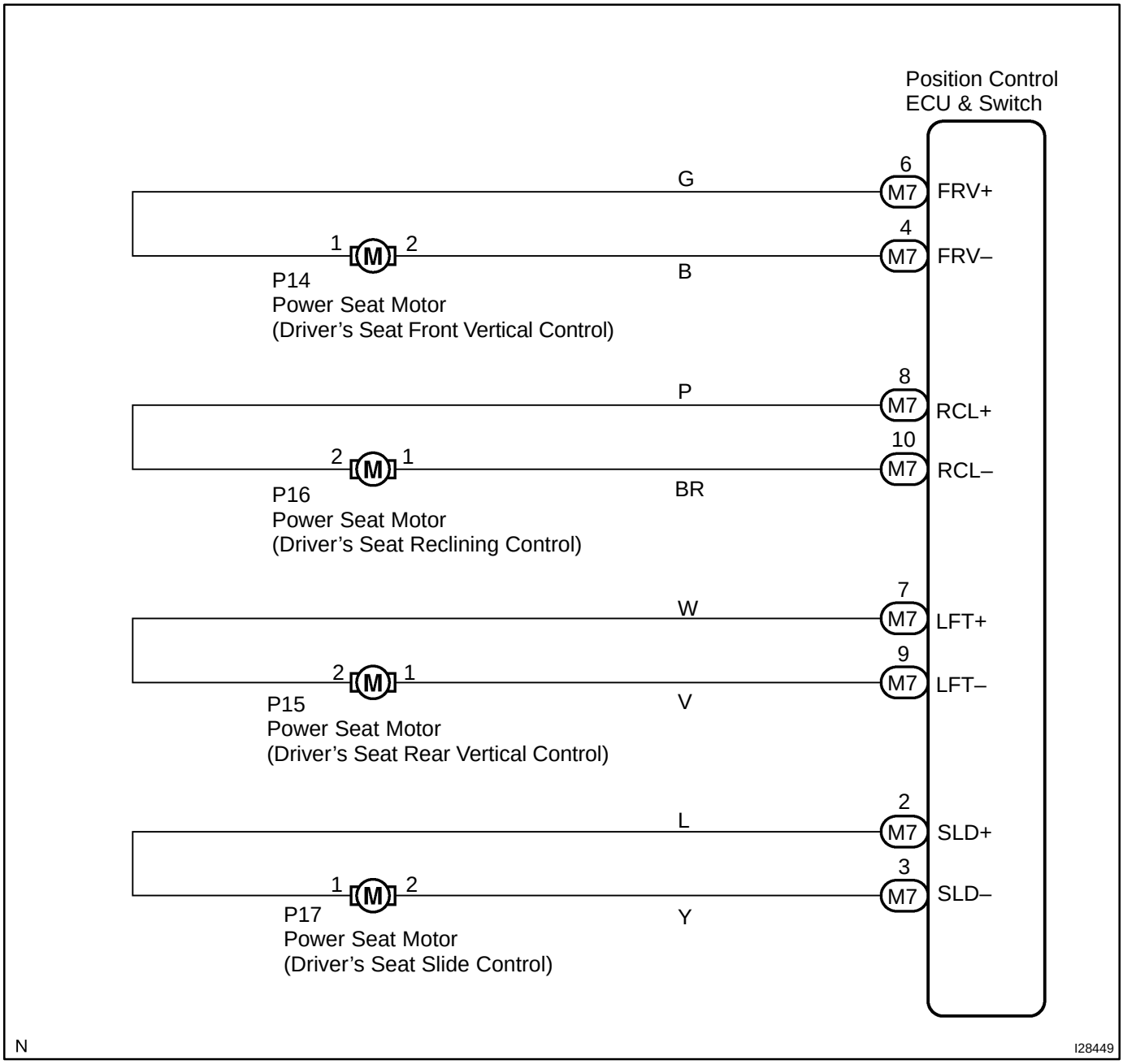
Power seat motor circuit

CIRCUIT DESCRIPTION

When the power seat control switch is operated, a command signal is sent to the position control ECU. The position control ECU then controls the appropriate seat motor as needed. This memory system does not use a seat position sensor. The seat position is detected by counting pulses that are output when the motor turns. If there is no pulse output from the motor, the motor will stop operating. The ECU is designed so that a malfunction of the seat memory system will not interfere with manual seat control.

When the position control ECU switch assy detects the low motor speed or abnormal activity, the system stops the motor. When the motor continuously operates for 120 seconds or more, the system will stop the motor until the switch is turned off.

WIRING DIAGRAM



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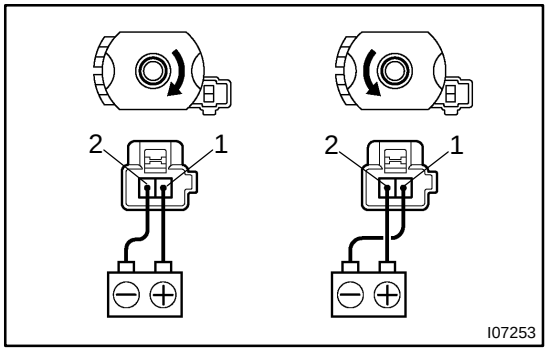
INSPECTION PROCEDURE

1	**Inspect power seat motor assy.**



PREPARATION:

Remove the power seat motor (See page BO–112).

CHECK:

Check that the motor rotates smoothly when the battery is connected to the connector terminal.

OK:

Tester Connection	Specified Condition
Battery positive voltage – 1 Battery negative voltage – 2	Counterclockwise
Battery positive voltage – 2 Battery negative voltage – 1	Clockwise

NG → **Replace power seat motor (See page BO–112).**

OK

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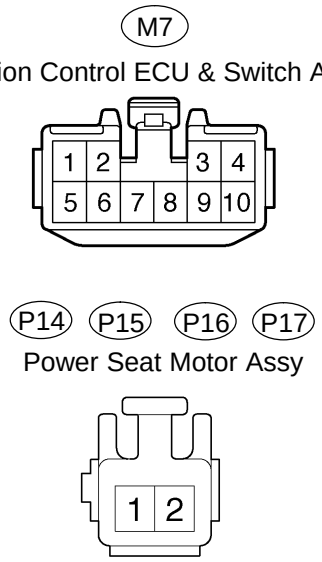
2	**Check harness and connector (Position control ECU & switch assy – power seat motor assy).**

Wire Harness Side:



PREPARATION:

Disconnect the M7 ECU and P14, P15, P16 and P17 motor connectors.

CHECK:

Measure the resistance of the wire harness side connectors.

OK:

Tester Connection	Specified Condition
M7–2 – P17–1	Below 1 Ω
M7–3 – P17–2	Below 1 Ω
M7–4 – P14–2	Below 1 Ω
M7–6 – P14–1	Below 1 Ω
M7–7 – P15–2	Below 1 Ω
M7–9 – P15–1	Below 1 Ω
M7–8 – P16–2	Below 1 Ω
M7–10 – P16–1	Below 1 Ω
M7–2 – Body ground	10 kΩ or higher
M7–3 – Body ground	10 kΩ or higher
M7–4 – Body ground	10 kΩ or higher
M7–6 – Body ground	10 kΩ or higher
M7–7 – Body ground	10 kΩ or higher
M7–8 – Body ground	10 kΩ or higher
M7–9 – Body ground	10 kΩ or higher
M7–10 – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1508).

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DIDEC–01

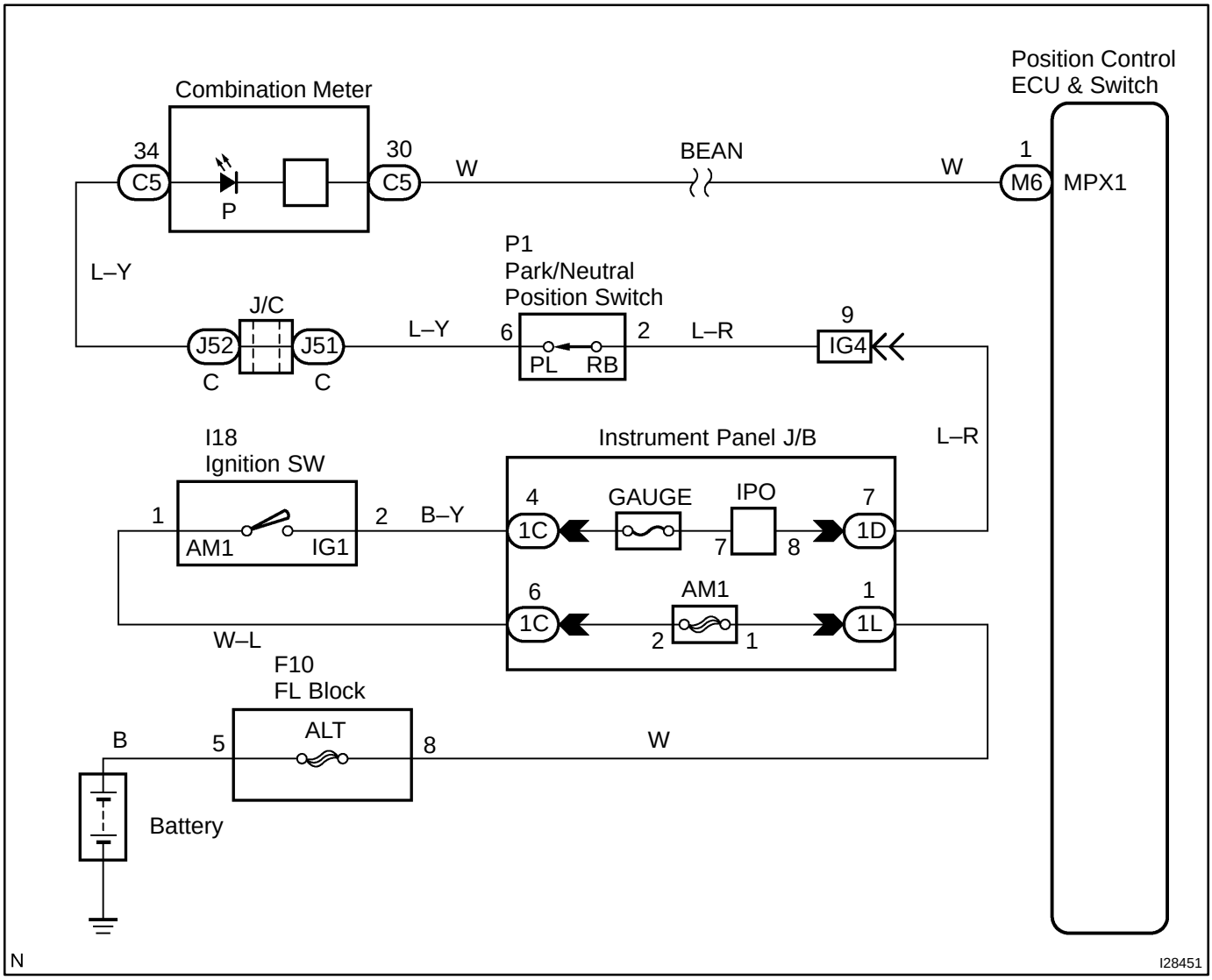
Park/neutral position switch circuit

CIRCUIT DESCRIPTION

The power seat memory system operates only when the ignition switch is in the ON position and the park/neutral position is in the P (park) position.

The position control ECU & switch assy detects the P position, via multiplex communication, through the park/neutral position switch.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check combination meter operation.**

CHECK:

Check that the ”P” indicator light in the combination meter comes on when the shift lever is moved to the P position.

OK:

The ”P” indicator light comes on.

NG → **Go to combination meter system (See page DI–1610).**

OK

2	**Check harness and connector (Combination meter).**

PREPARATION:

Disconnect the C5 combination meter connector.

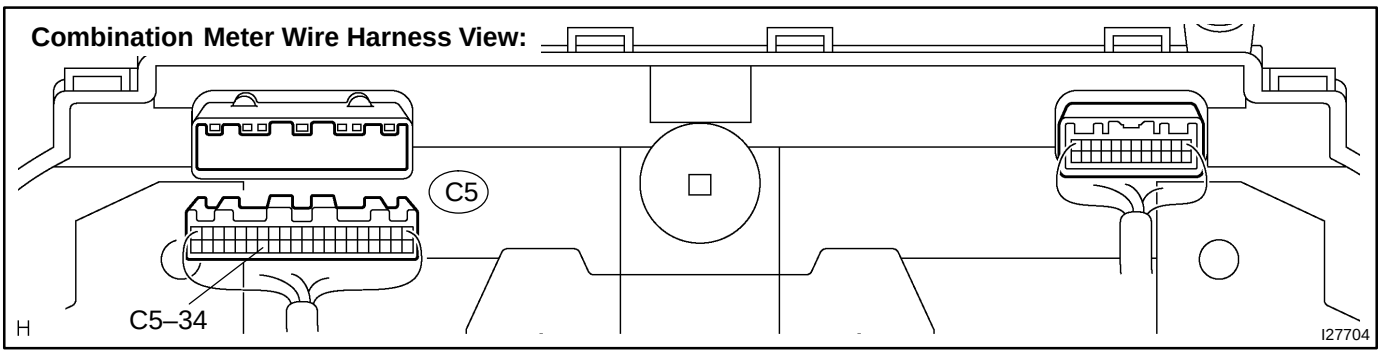
CHECK:

Measure the voltage of each terminal of the wire harness side connectors.

OK:

Tester Connection	Condition	Specified Condition
C5–34 – Body ground	Ignition switch is in ON position and shift lever is in P position	10 to 14 V

Combination Meter Wire Harness View:



OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–1508).**

NG

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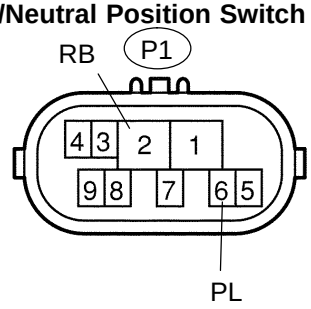
3	Inspect park/neutral position switch assy.

Park/Neutral Position Switch Assy:



PREPARATION:

Disconnect the P1 switch connector.

CHECK:

Measure the resistance of each terminal of the wire harness side connectors.

OK:

Tester Connection (Symbols)	Condition	Specified Condition
P1–2 (RB) – P1–6 (PL)	Shift lever is moved to P position	Below 1 Ω
P1–2 (RB) – P1–6 (PL)	Shift lever is moved to any position except P	10 kΩ or higher

NG → **Replace park/neutral position switch.**

OK

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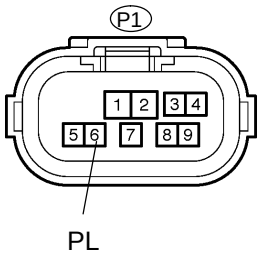
4	Check harness and connector (Combination meter – park/neutral position switch assy).

Wire Harness Side:
Park/Neutral Position Switch



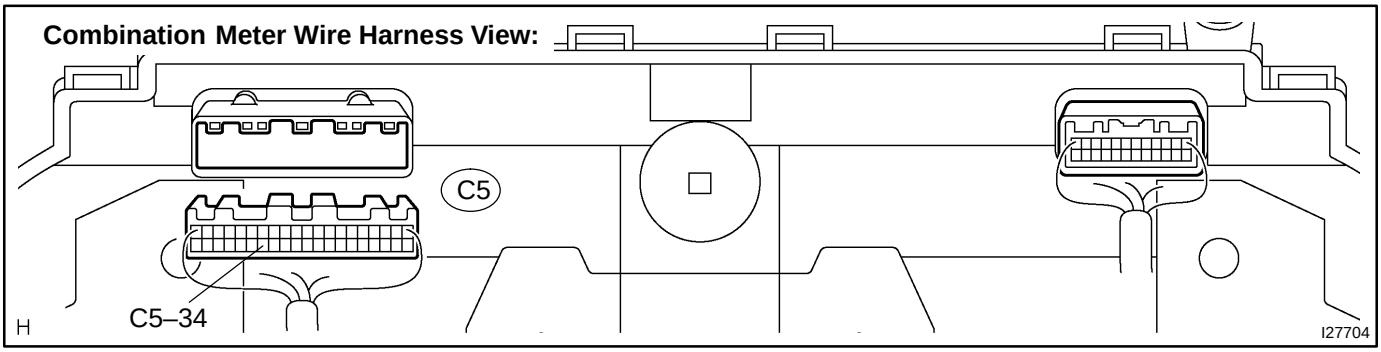
CHECK:

Measure the resistance of each terminal of the wire harness side connectors.

OK:

Tester Connection (Symbols)	Condition	Specified Condition
C5–34 – P1–6 (PL)	Always	Below 1 Ω
C5–34 – Body ground	Always	10 kΩ or higher

Combination Meter Wire Harness View:

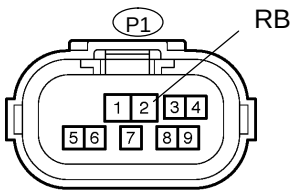


NG → **Repair or replace harness or connector.**

OK

5	Check harness and connector (Park/neutral position switch assy – battery).

Wire Harness Side:
Park/Neutral Position Switch



CHECK:

Measure the voltage of each terminal of the wire harness side connectors.

OK:

Tester Connection (Symbols)	Condition	Specified Condition
P1–2 (RB) – Body ground	Ignition switch ON	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

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Proceed to next circuit inspection shown in problem symptoms table (See page DI–1508).

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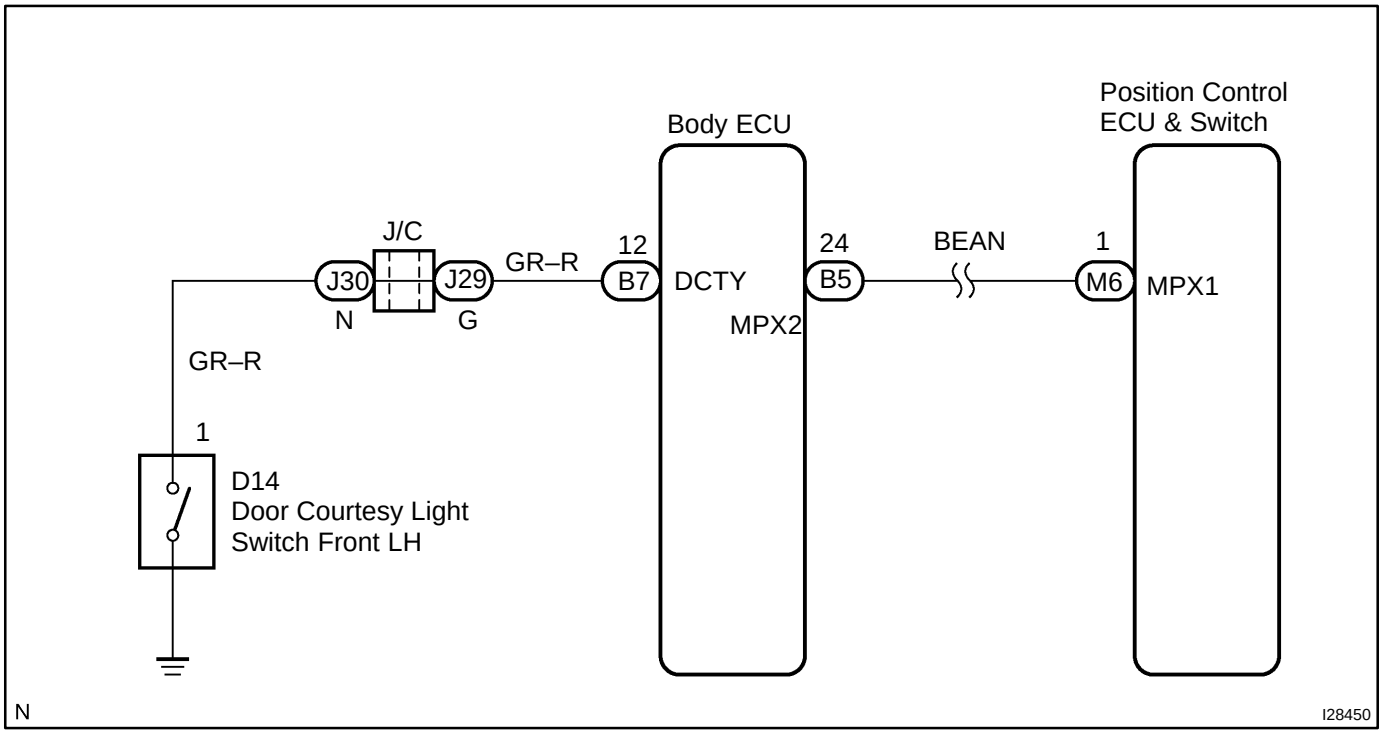
DIDEE–01

Door courtesy switch circuit

CIRCUIT DESCRIPTION

The position control ECU & switch assy detects the open/close condition of the driver's door, via multiplex communication, through the front door courtesy light switch.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check courtesy light system.**

CHECK:

Check that the door courtesy light comes on when the driver's door is opened and goes off when it is closed.

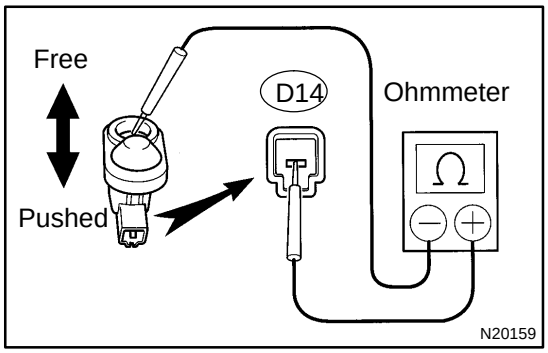
OK:

The door courtesy light operates normally.

NG → **Go to courtesy light system (See page BE–40).**

OK

2	**Inspect door courtesy light switch front LH.**



PREPARATION:

Remove the courtesy light switch assy.

CHECK:

Measure the switch resistance.

OK:

Tester Connection	Switch Position	Specified Condition
1 – Switch body	Switch pushed	10 kΩ or higher
1 – Switch body	Switch free	Below 1 Ω

NG → **Replace door courtesy light switch front LH.**

OK

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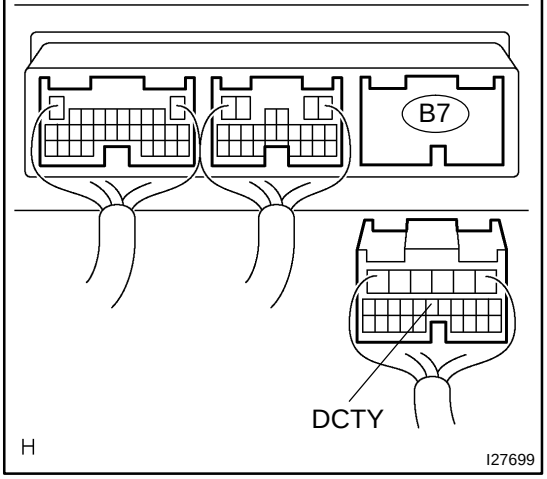
3	Check harness and connector (Body ECU – door courtesy light switch assy).

Body ECU Wire Harness View:



PREPARATION:

(a) Disconnect the B7 body ECU connector.
(b) Reinstall the courtesy light switch assy.
(c) Reconnect the courtesy light switch assy connector.

CHECK:

Measure the resistance of the wire harness side connectors.

OK:

Tester Connection (Symbol)	Condition	Specified Condition
B7–12 (DCTY) – Body ground	Courtesy light switch pushed → free	10 kΩ or higher → Below 1 Ω

NG → **Repair or replace harness or connector.**

OK →

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1508).

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CRUISE CONTROL SYSTEM

DIDEX–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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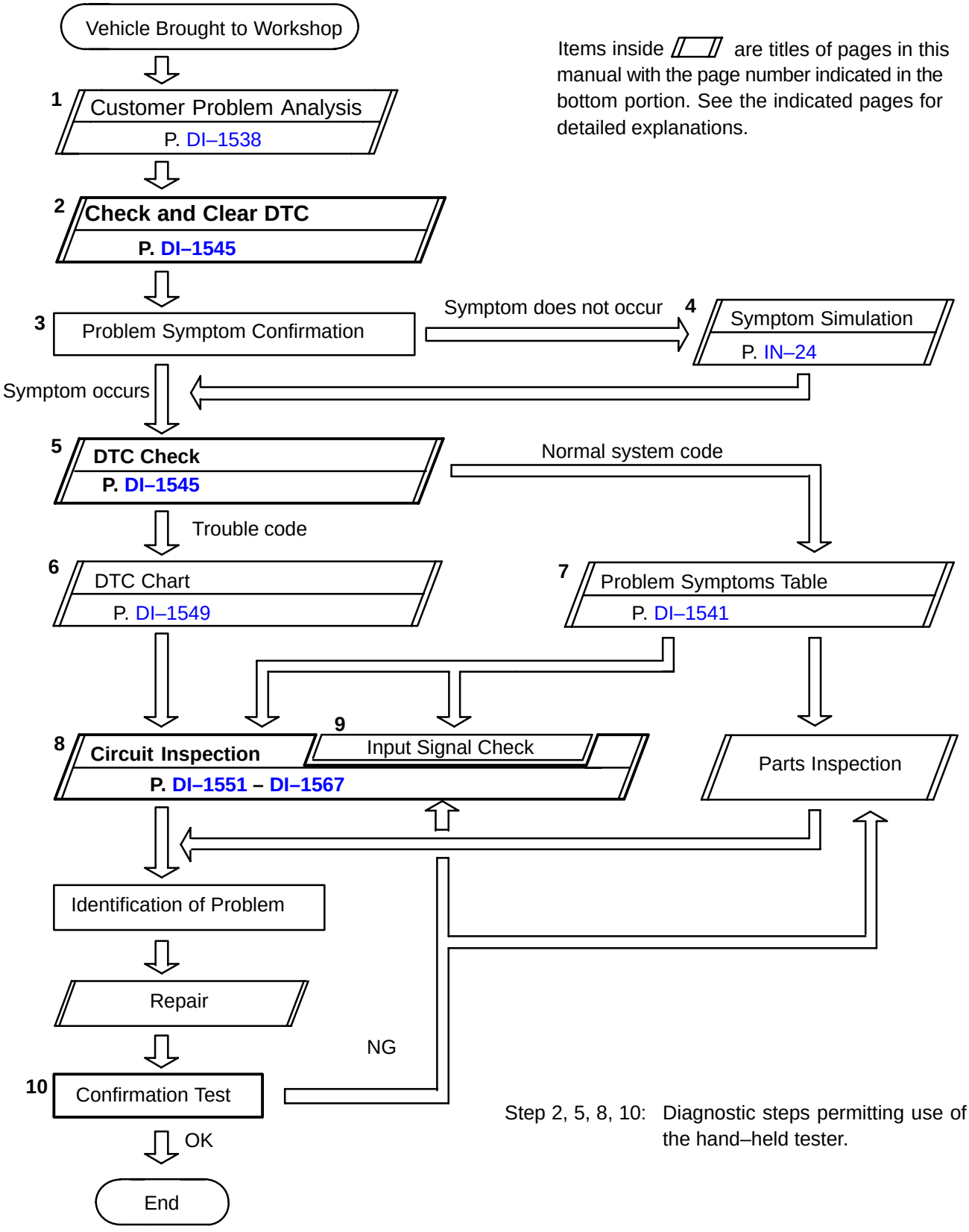
DI26R–41

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the following procedures:



Items inside ▱ are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.

Step 2, 5, 8, 10: Diagnostic steps permitting use of the hand–held tester.

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DI26S–26

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Condition of Problem Occurrence	**Date Problem Occurred**	/ /
	Frequency Problem Occurs	☐ Continuous ☐ Intermittent (Times a day)
	Vehicle Speed when Problem Occurred	**km mile**

Symptoms	☐ Auto cancel occurs	▶Driving condition ◀ City driving ◀ Freeway ◀ Uphill ◀ Downhill ▶After cancel occurred, did the driver activate cruise control again? ◀ Yes ◀ No
	◀ Cancel does not occur	◀ With brake ON ◀ Shifting into any position except D ◀ When control SW is pulled to CANCEL position
	◀ Cruise control malfunction	◀ Slip to acceleration side ◀ Slip to deceleration side ◀ Hunting occurs ◀ O/D cut–off does not occur ◀ O/D does not return
	◀ Switch malfunction	◀ SET ◀ ACCEL ◀ COAST ◀ RESUME ◀ CANCEL
	◀ CRUISE main indicator light	◀ Remains ON ◀ Does not light up ◀ Blinks

DTC Check	**1st Time**	◀ Normal System Code ◀ Trouble Code (Code)
	2nd Time	◀ Normal System Code ◀ Trouble Code (Code)

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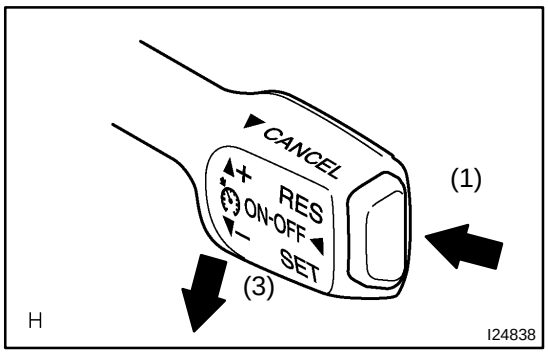
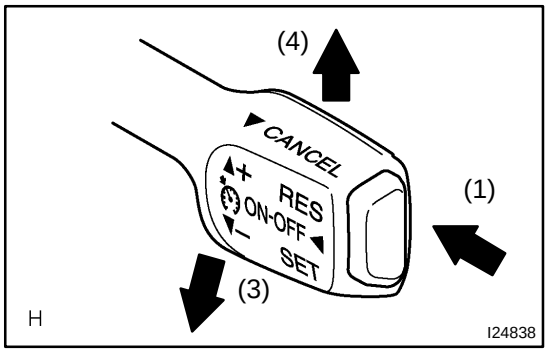
DIDEY–01

ROAD TEST

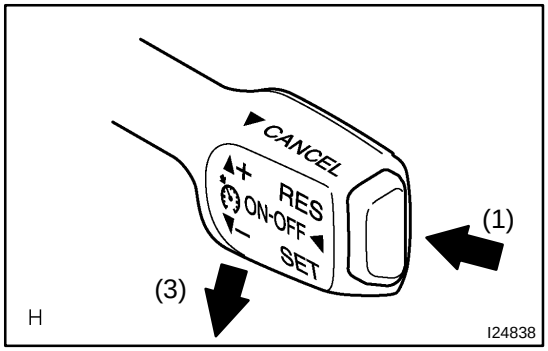


1. PROBLEM SYMPTOM CONFIRMATION

(a) Inspect the SET function.
  (1) Push the ON–OFF button on.
  (2) Drive at the required speed (40 km/h (25 mph) or higher).
  (3) Push the cruise control main switch to –/SET.
  (4) Check that the vehicle cruises at the set speed.



(b) Inspect the ACC function.
  (1) Push the ON–OFF button on.
  (2) Drive at the required speed (40 km/h (25 mph) or higher).
  (3) Push the cruise control main switch to –/SET.
  (4) Check that vehicle speed increases while the cruise control main switch is pushed to +/RES, and that the vehicle cruises at the newly set speed when the switch is released.
  (5) Momentarily push the cruise control main switch to +/RES and then immediately release it. Check that vehicle speed increases by approximately 1.6 km/h (1.0 mph) (Tap–up function).



(c) Inspect the COAST function.
  (1) Push the ON–OFF button on.
  (2) Drive at the required speed (40 km/h (25 mph) or higher).
  (3) Push the cruise control main switch to –/SET.
  (4) Check that vehicle speed decreases while the cruise control main switch is pushed to –/SET, and that the vehicle cruises at the newly set speed when the switch is released.
  (5) Momentarily push the cruise control main switch to –/SET, and then immediately release it. Check that vehicle speed decreases by approximately 1.6 km/h (1.0 mph) (Tap–down function).

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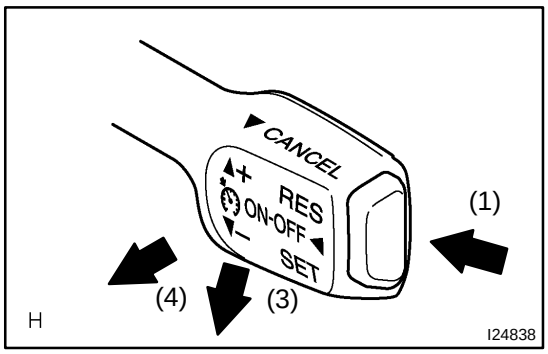
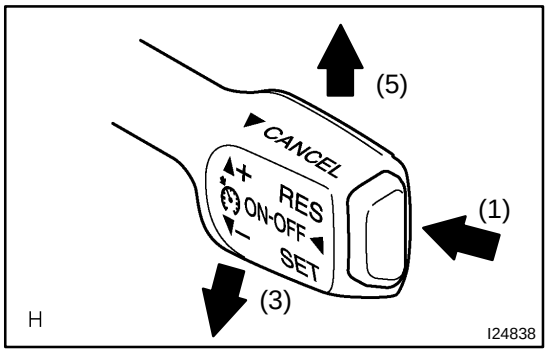


(d) Inspect the CANCEL function.
(1) Push the ON–OFF button on.
(2) Drive at the required speed (40 km/h (25 mph) or higher).
(3) Push the cruise control main switch to –/SET.
(4) When doing any one of the following, check that the cruise control system deactivates and that the normal driving mode is reset.
- Depressing the brake pedal
- Moving the shift lever to any position except D
- Pushing the ON–OFF button off
- Pulling the cruise control main switch to CANCEL

Reference: Cruise control will deactivate if VSC starts operation while driving.



(e) Inspect the RES (RESUME) function.
(1) Push the ON–OFF button on.
(2) Drive at the required speed (40 km/h (25 mph) or higher).
(3) Push the cruise control main switch to –/SET.
(4) When doing any one of the following, check that the cruise control system deactivates and that the normal driving mode is reset.
- Depressing the brake pedal
- Moving the shift lever to any position except D
- Pulling the cruise control main switch to CANCEL

(5) After pushing the cruise control main switch to +/RES while driving, check that the vehicle resumes the speed set prior to the cancellation.

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DI26X–44

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

Inspect the ”Fuse” and ”Relay” before confirming the suspected areas shown in the table below.

Inspect each suspected area in numerical order, in relation to the corresponding symptom.

If the malfunction still exists after checking and confirming that all the circuits are normal, replace the ECM.

Symptom	Suspected Area	See page
Main switch cannot be turned ON. (Cruise indicator light in combination meter does not come on.)	1. Cruise control switch circuit 2. CRUISE main indicator light circuit 3. Combination meter system 4. ECM	DI–1561 DI–1557 DI–1608 IN–35
Vehicle speed setting cannot be done. (Although indicator light in combination meter comes on when main switch is turned ON, it goes off when vehicle speed is set.)	1. Cruise control switch circuit 2. ECM	DI–1561 IN–35
Setting cannot be done. (Indicator light in combination meter comes on when main switch is turned ON and it remains ON while setting.)	1. Cruise control switch circuit 2. Vehicle speed sensor circuit (DTC P0500) 3. Stop light switch circuit (DTC P0571) 4. Park/neutral position switch circuit (DTC P0705) 5. O/D main switch circuit 6. Combination meter system 7. ECM	DI–1561 DI–278 DI–1552 DI–576 DI–688 DI–1610 IN–35
While vehicle is driven with cruise control, set control is cancelled. (Indicator light and CRUISE remain ON.)	1. Cruise control switch circuit 2. Vehicle speed sensor circuit (DTC P0500) 3. Stop light switch circuit (DTC P0571) 4. CRUISE main indicator light circuit 5. Park/neutral position switch circuit (DTC P0705) 6. Combination meter system 7. ECM	DI–1561 DI–278 DI–1552 DI–1557 DI–576 DI–1608 IN–35
Hunting (Speed is not constant.)	1. Vehicle speed sensor circuit (DTC P0500) 2. ECM	DI–278 IN–35
Setting cannot be cancelled. (When coast, acceleration, resume, or set speed change function is operated with control switch.)	1. Cruise control switch circuit 2. ECM	DI–1561 IN–35
DTC is not output, or is output when it should not be.	1. Diagnosis circuit	DI–1567
CRUISE main indicator light does not come on.	1. Cruise control switch circuit 2. CRUISE main indicator light circuit 3. Combination meter system 4. ECM	DI–1561 DI–1557 DI–1610 IN–35

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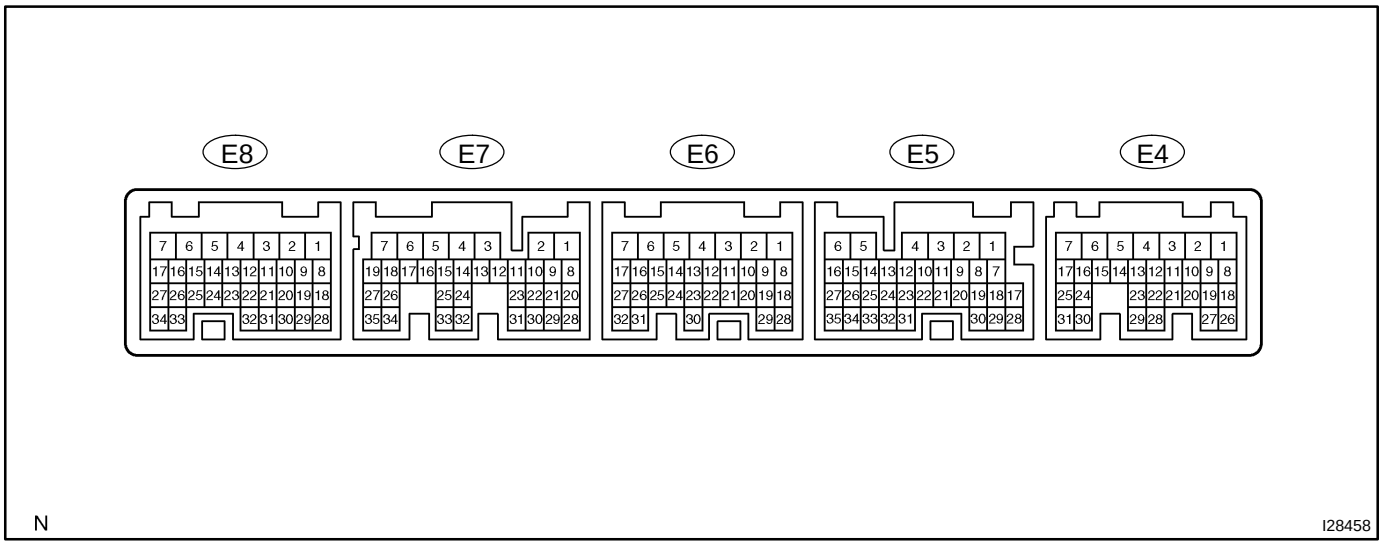
DI3CH–22

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TC (E4–23) – E1 (E6–1)	P–B – BR	DTC output signal	Ignition switch on	10 to 14 V
TC (E4–23) – E1 (E6–1)	P–B – BR	DTC output signal	Ignition switch on, connect terminals TC and CG of DLC3	Below 1 V
ST1– (E4–16) – E1 (E6–1)	L–B – BR	Cruise cancel input signal	Ignition switch on, depress brake pedal	Below 1 V
ST1– (E4–16) – E1 (E6–1)	L–B – BR	Cruise cancel input signal	Ignition switch on, release brake pedal	10 to 14 V
STP (E4–15) – E1 (E6–1)	G–Y – BR	Stop light switch input signal	Ignition switch on, depress brake pedal	10 to 14 V
STP (E4–15) – E1 (E6–1)	G–Y – BR	Stop light switch input signal	Ignition switch on, release brake pedal	Below 1 V
CCS (E5–2) – E1 (E6–1)	R–Y – BR	Cruise control main switch input circuit	Ignition switch on	10 to 14 V
CCS (E5–2) – E1 (E6–1)	R–Y – BR	Cruise control main switch input circuit	Ignition switch on, CANCEL switch held ON	6.6 to 10.1 V
CCS (E5–2) – E1 (E6–1)	R–Y – BR	Cruise control main switch input circuit	Ignition switch on, +/RES switch held ON	4.5 to 7.1 V
CCS (E5–2) – E1 (E6–1)	R–Y – BR	Cruise control main switch input circuit	Ignition switch on, –/SET switch held ON	2.3 to 4.0 V
CCS (E5–2) – E1 (E6–1)	R–Y – BR	Cruise control main switch input circuit	Ignition switch on, MAIN switch held ON	Below 1 V
SPD (E5–8) –E1 (E6–1)	G–O – BR	Speed signal	Ignition switch on, rotate driving wheel slowly	Pulse generation (see page DI–278)
D (E5–21) –E1 (E6–1)	W–R – BR	D shift position switch input signal	Ignition switch on, shift lever D position	10 to 14 V
D (E5–21) –E1 (E6–1)	W–R – BR	D shift position switch input signal	Ignition switch on, shift lever any position except D	Below 1 V
PI (E5–18) –E1 (E6–1)	LG–R – BR	Cruise indication signal	Ignition switch on, MAIN switch OFF	10 to 14 V
PI (E5–18) –E1 (E6–1)	LG–R – BR	Cruise indication signal	Ignition switch on, MAIN switch on	Below 1 V

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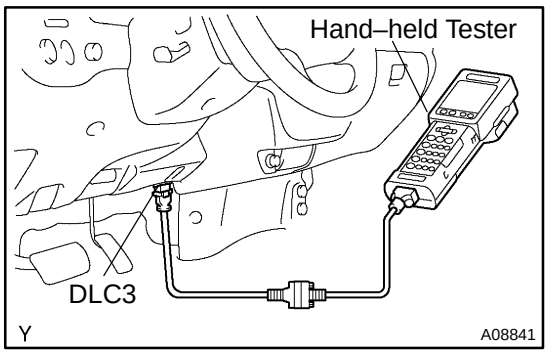
DIDEZ–01



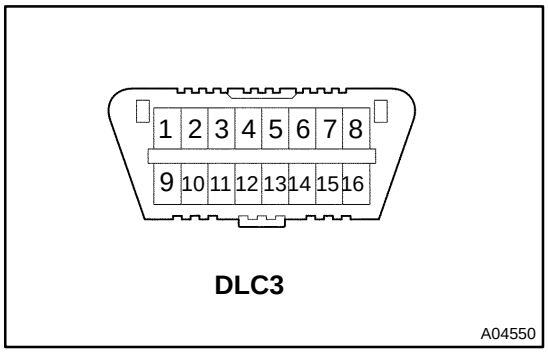
DIAGNOSIS SYSTEM

1. DESCRIPTION

The ECM controls the cruise control system of the vehicle. The data and DTCs relating to the cruise control system can be read from the DLC3 of the vehicle. If no DTCs are output when checking for DTCs, there may be a problem with the combination meter or the multiplex communication system.

Use the hand–held tester or SST to check and solve the problem.

SST 09843–18040



2. CHECK THE DLC3

The vehicle's ECM uses ISO 9141–2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL(7) – SG(5)	Bus "+" line	During transmission	Pulse generation
CG(4) – Body ground	Chassis ground	Always	Below 1 Ω
SG(5) – Body ground	Signal ground	Always	Below 1 Ω
BAT(16) – Body ground	Battery positive	Always	11 to 14 V

HINT:

If the display shows "UNABLE TO CONNECT TO VEHICLE" after connecting the hand–held tester to the DLC3, turning the ignition switch to the ON position and operating the tester, there is a problem on either the vehicle side or the tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

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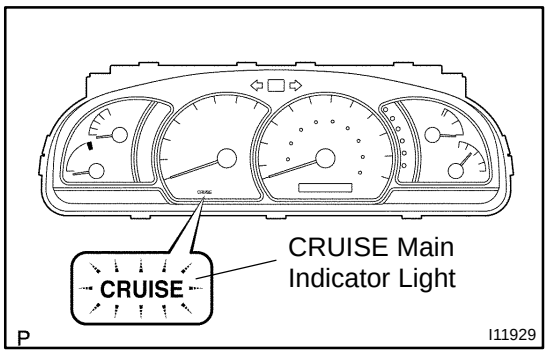


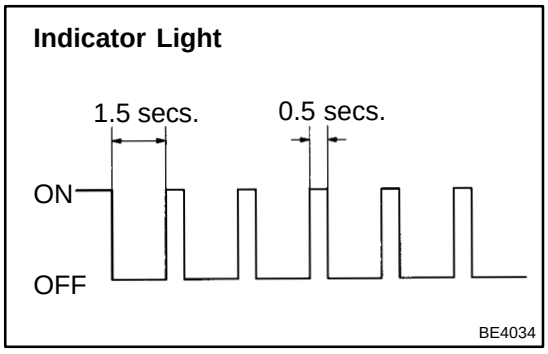
3. CHECK THE INDICATOR

(a) Turn the ignition switch to the ON position.

(b) Check that the CRUISE main indicator light comes on when the cruise control main switch ON–OFF button is pushed on, and that the indicator light goes off when the ON–OFF button is pushed off.

HINT:

If there is a problem with the indicator, inspect the cruise main indicator light circuit (see page DI–1557).



HINT:

If a malfunction occurs in the vehicle speed sensors, stop lamp switch assy, or other related parts during cruise control driving, the ECM will actuate AUTO CANCEL of the cruise control. The CRUISE main indicator light will then start to blink, informing the driver of the malfunction. At the same time, data concerning the malfunction is stored as a diagnostic trouble code (DTC).

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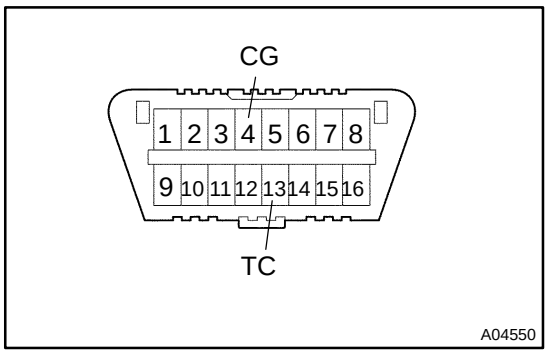
DIDF0–01

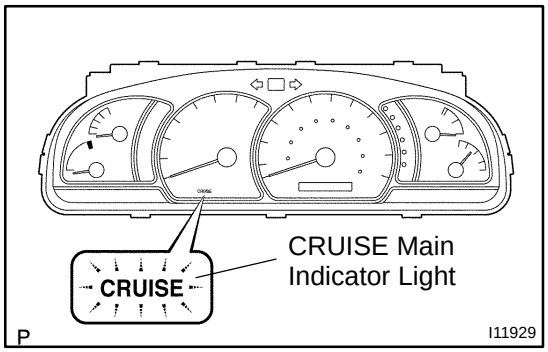
DTC CHECK / CLEAR



1. DTC CHECK (USING SST CHECK WIRE)

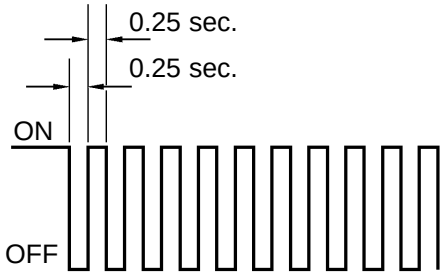
(a) Using SST check wire, connect terminals TC and CG of the DLC3.
SST 09843–18040

(b) Turn the ignition switch to the ON position.

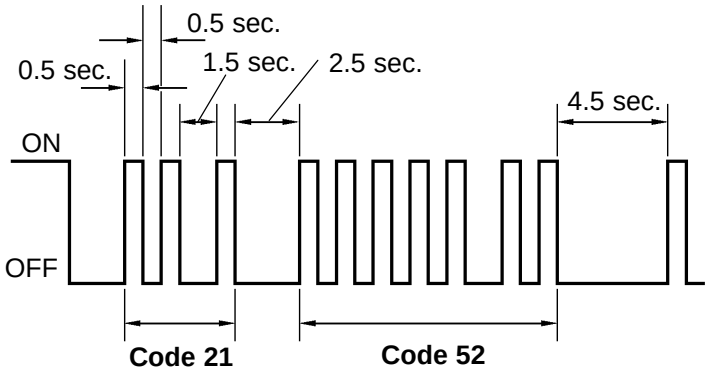


(c) Read and record DTCs from the CRUISE main indicator light on the combination meter. As examples, refer to the chart below for the blinking patterns of the normal system code, and diagnostic trouble codes 21 and 52.

Normal System Code:



Diagnostic Trouble Code:



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(d) Refer to the Diagnostic Trouble Code Chart (see page DI–1549) for DTC information.

2. DTC CLEAR (USING SST CHECK WIRE)

Remove the EFI No.1 and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.

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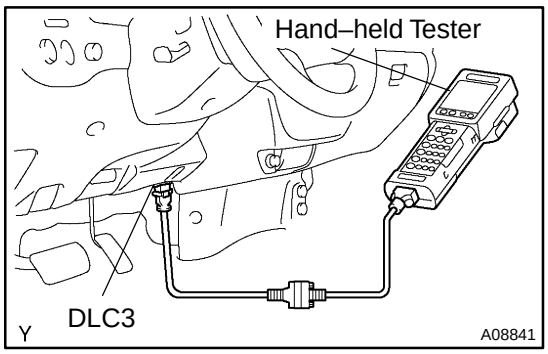

3. DTC CHECK (USING HAND–HELD TESTER)

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Read the DTCs on the tester screen.

4. DTC CLEAR (USING HAND–HELD TESTER)

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Clear the DTCs following the prompts on the tester screen.

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DIDF1–01

FAIL–SAFE CHART

If the following condition is detected while the cruise control is in operation, the system will clear the stored vehicle speed in the ECM and cancel the cruise control operation.

Vehicle Condition	Auto Cancel Condition	Re–operation Condition
The CRUISE main indicator light blinks.	▶There is an open or short in the stop light switch circuit. ▶There is a problem with the vehicle speed signal. ▶There is a problem with the throttle position sensor and motor. ▶There is a problem with the input circuit of the stop light switch circuit. ▶There is a problem with the cancel circuit.	▶Push the ON–OFF button of the cruise control main switch on again. ▶Turn the ignition switch off.

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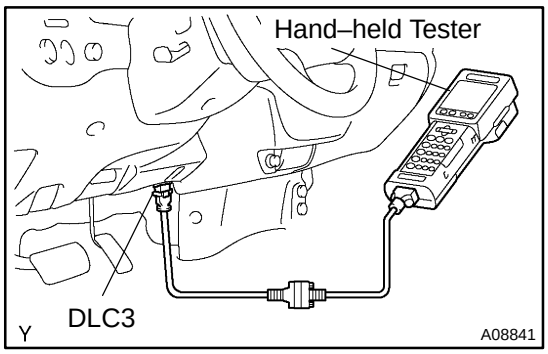
DIDF2–01



DATA LIST / ACTIVE TEST

DATA LIST

HINT:

According to the DATA LIST displayed by the the hand–held tester, you can read the values of the switches, the sensors and so on without parts removal. Reading the DATA LIST as a first step in troubleshooting is one of the methods to shorten labor time.

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) According to the display on the tester, read the ”DATA LIST”.

CCS (ECM):

Item	Measurement Item /Display (Range)	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle speed/min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	–
MEMORY SPD	Cruise control memorized speed /min.: 36 km/h (22.5 mph), max.: 200 km/h (125 mph)	Actual stored vehicle speed	–
THROTTLE	Required throttle opening angle /min.: 0▶ max.: 125▶	Actual required throttle opening angle	–
CRUISE CONTROL	Cruise control system active condition/ON or OFF	ON: Cruise control activated OFF: Cruise control inactivated	–
MAIN SW (MAIN)	Main SW signal (Main CPU) /ON or OFF	ON: Main SW ON (Pushed on) OFF: Main SW OFF (Pushed off)	–
MAIN SW (SUB)	Main SW signal (Sub CPU) /ON or OFF	ON: Main SW ON (Pushed on) OFF: Main SW OFF (Pushed off)	–
CCS INDICATOR	Cruise indicator signal (Main CPU) /ON or OFF	ON: ”CRUISE main indicator” ON OFF: ”CRUISE main indicator” OFF	–
CCS INDICATOR S	Cruise indicator signal (Sub CPU) /ON or OFF	ON: ”CRUISE main indicator” ON OFF: ”CRUISE main indicator” OFF	–
CANCEL SW	CANCEL SW signal/ON or OFF	ON: CANCEL SW ON OFF: CANCEL SW OFF	–
SET/COAST SW	–/SET SW signal/ ON or OFF	ON: –/SET SW ON OFF: –SET OFF	–
RES/ACC SW	+/RES SW signal/ON or OFF	ON: +/RES SW ON OFF: +/RES SW OFF	–
STP LIGHT SW2 M	Stop light SW signal (Main CPU) /ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–
STP LIGHT SW2 S	Stop light SW signal (Sub CPU) /ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–
STP LIGHT SW1 S	Stop light SW signal (Sub CPU) /ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–
SHIFT D POS	PNP SW signal (D position) /ON or OFF	ON: Shift position D OFF: Any shift position except D	–

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DI26U–39

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the circuit listed for that code. For details of each code, refer to the ”See page” under the respective ”DTC No.” in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
P0500/21 (DI–1551)	Vehicle Speed Sensor Circuit Malfunction	▶Vehicle speed sensor ▶Vehicle speed sensor signal circuit ▶ECM
P0503/23 (DI–1551)	Vehicle Speed Sensor Circuit Malfunction	▶Vehicle speed sensor ▶Vehicle speed sensor signal circuit ▶ECM
P0571/52 (DI–1552)	Stop Light Switch Circuit Malfunction	▶Stop light switch assy ▶Stop light switch assy circuit ▶ECM
P0607/54 (DI–1556)	Input Signal Circuit Malfunction	▶ECM

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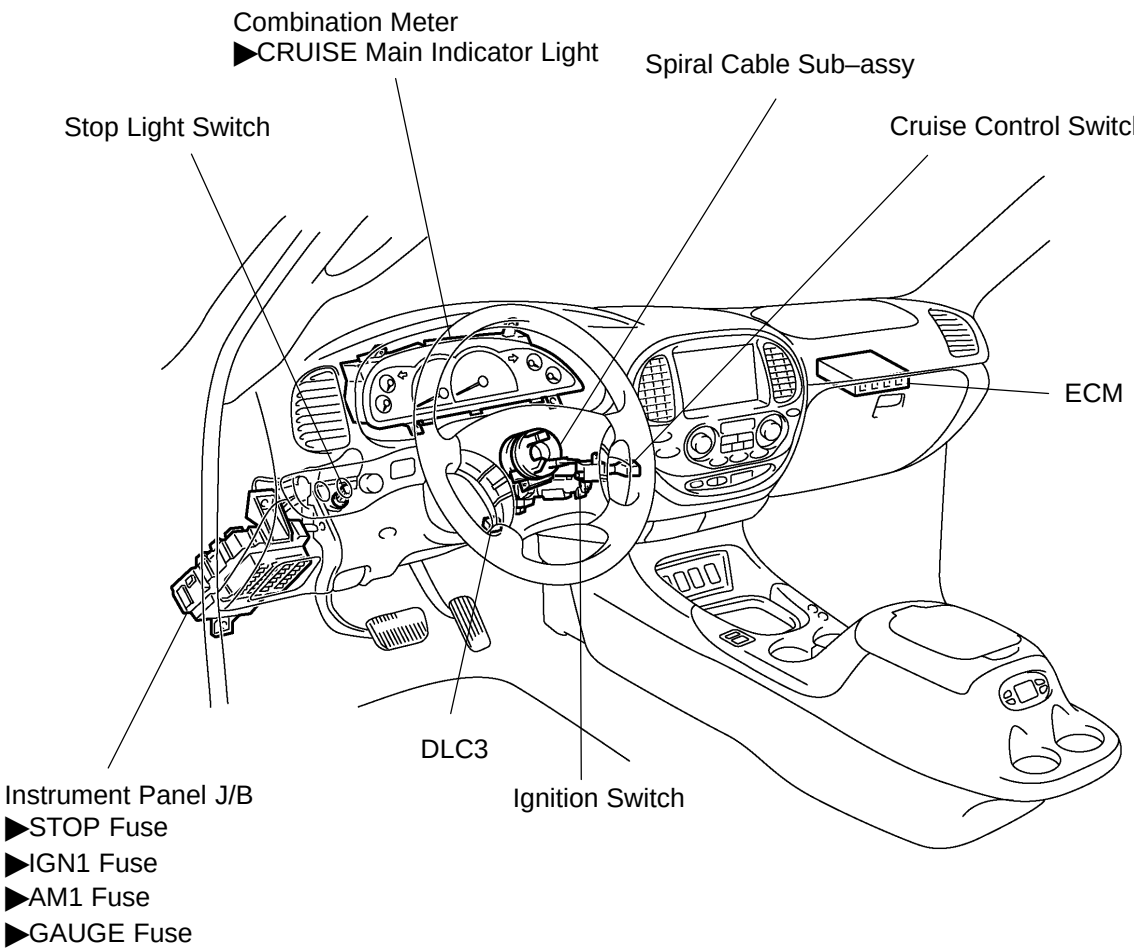
DI3CG–10

PARTS LOCATION



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DI3CI–19

CIRCUIT INSPECTION

DTC	P0500/21	Vehicle speed sensor circuit malfunction

DTC	P0503/23	Vehicle speed sensor circuit malfunction

CIRCUIT DESCRIPTION

See page DI–278.

DTC No.	DTC Detection Condition	Trouble Area
P0500/21	This trouble code is output when the vehicle speed signal from the vehicle speed sensor is cut for 0.14 sec. or more while the cruise control is in operation.	▶Vehicle speed sensor ▶Vehicle speed sensor signal circuit ▶ECM
P0503/23	Momentary interruption and noise are detected when a rapid change of vehicle speed occurs while the cruise control is in operation.	▶Vehicle speed sensor ▶Vehicle speed sensor signal circuit ▶ECM

WIRING DIAGRAM

See page DI–278.

INSPECTION PROCEDURE

See page DI–278.

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DIAB6–05

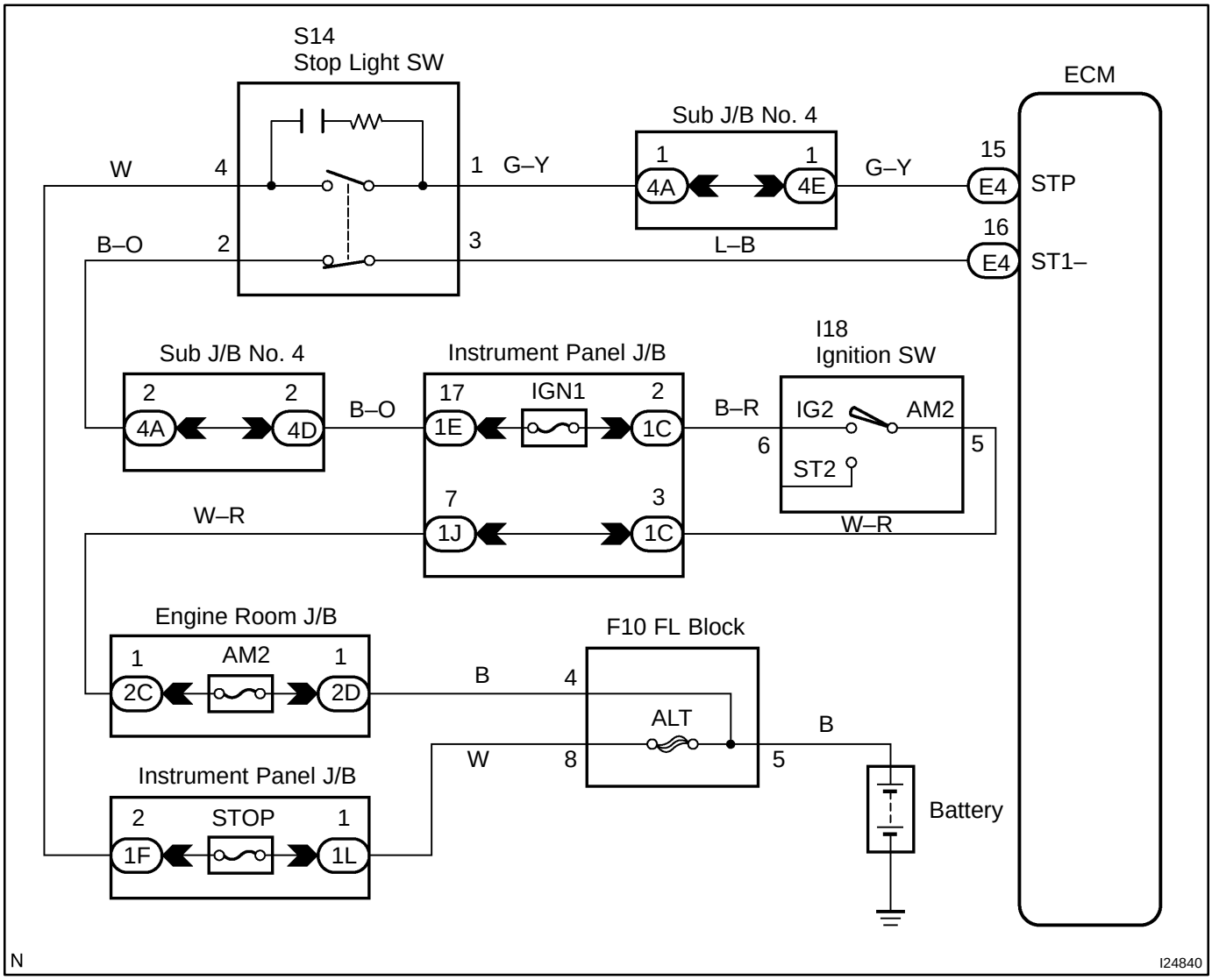
DTC	P0571/52	Stop light switch circuit malfunction

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch assy sends a signal to the ECM. When the ECM receives this signal, it cancels the cruise control.
Fail–safe function operates to enable normal driving even if there is a malfunction in the stop light signal circuit.
The cancel condition occurs when positive battery voltage is applied to terminal STP.
When the brake is applied, battery positive voltage is normally applied to terminal STP of the ECM through the STOP fuse and the stop light switch assy, and the ECM turns the cruise control off.

DTC No.	DTC Detection Condition	Trouble Area
P0571/52	Stop light switch does not turn off even once the vehicle is driven	▶Stop light switch assy ▶Stop light switch assy circuit ▶ECM

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Read value on hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position, and turn the hand–held tester main switch on.

(c) Select the item ”STP LIGHT SW2 M”, ”STP LIGHT SW2 S” and ”STP LIGHT SW1 S” in the DATA LIST, and read its value displayed on the hand–held tester.

CHECK:

Check that the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

CCS (ECM):

Item	Measurement Item /Display (Range)	Normal Condition	Diagnostic Note
STP LIGHT SW2 M	Stop light SW signal (Main CPU) /ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–
STP LIGHT SW2 S	Stop light SW signal (Sub CPU) /ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–
STP LIGHT SW1 S	Stop light SW signal (Sub CPU) /ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	–

OK:

When the brake pedal is operated, the normal conditions listed above are shown on the display.

RESULT:

NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC chart)	C

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1541).**

C → **Replace ECM (See page IN–35).**

A

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2	Check operation of stop light.

CHECK:

Check that stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

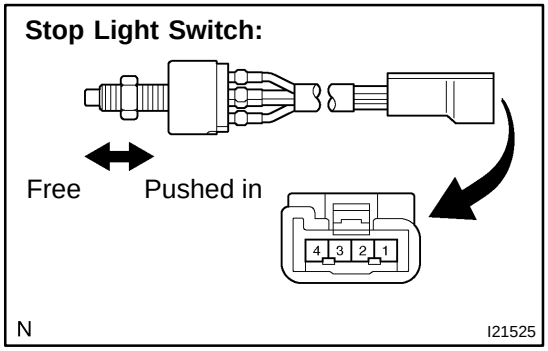
OK:

The stop lights operate normally.

OK	Go to step 5.

NG

3	Inspect stop light switch assy.



PREPARATION:

Disconnect the stop light switch assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Switch condition	Tester connection	Specified condition
Switch pin free	1 – 4	Below 1 Ω
Switch pin free	2 – 3	10 kΩ or higher
Switch pin pushed in	1 – 4	10 kΩ or higher
Switch pin pushed in	2 – 3	Below 1 Ω

NG	Replace stop light switch assy.

OK

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4	Check harness and connector (Stop light switch – battery).

CHECK:

Measure the voltage according to the value(s) in the table below.

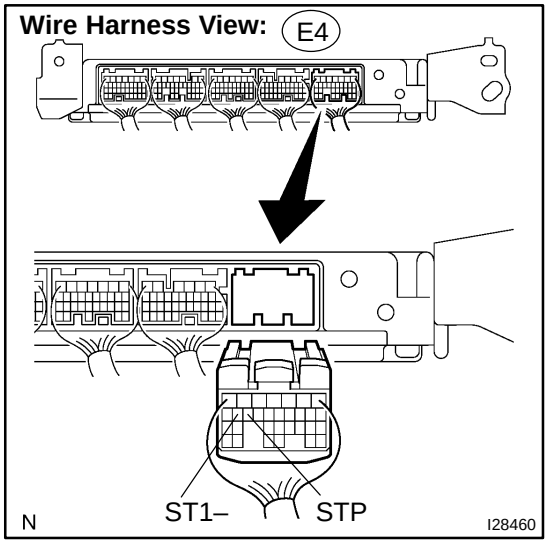
OK:

Tester connection	Condition	Specified condition
S14–4 – Body ground	Always	10 to 14 V
S14–2 – Body ground	Ignition SW ON	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

5	Check voltage between terminals STP and ST1– of ECM connector and body ground.



PREPARATION:

(a) Reconnect the stop light switch connector.
(b) Disconnect the ECM connector.
(c) Turn the ignition switch to the ON position.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
E4–15 (STP) – Body ground	Brake pedal depressed	10 to 14 V
E4–15 (STP) – Body ground	Brake pedal released	Below 1 V
E4–16 (ST1–) – Body ground	Brake pedal depressed	Below 1 V
E4–16 (ST1–) – Body ground	Brake pedal released	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page IN–35).

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DIAB7–04

DTC	P0607/54	Input signal circuit malfunction

CIRCUIT DESCRIPTION

This DTC indicates the internal abnormalities of the ECM.

DTC No.	Detection Item	Trouble Area
P0607/54	The ECM has a supervisory CPU and a control ECU inside. When each input STP signal is different for 0.15 sec. or more, this trouble code is output. This trouble code is output after 0.4 sec. has passed from the time the cruise cancel input signal (STP input) is input into the ECM.	▶ECM

HINT:
The ECM receives signals from each sensor to control all the functions of the cruise control with the micro-computer.
When a trouble code is detected, fail safe remains on until the ignition switch is turned off.

INSPECTION PROCEDURE

Replace ECM (See page IN–35).

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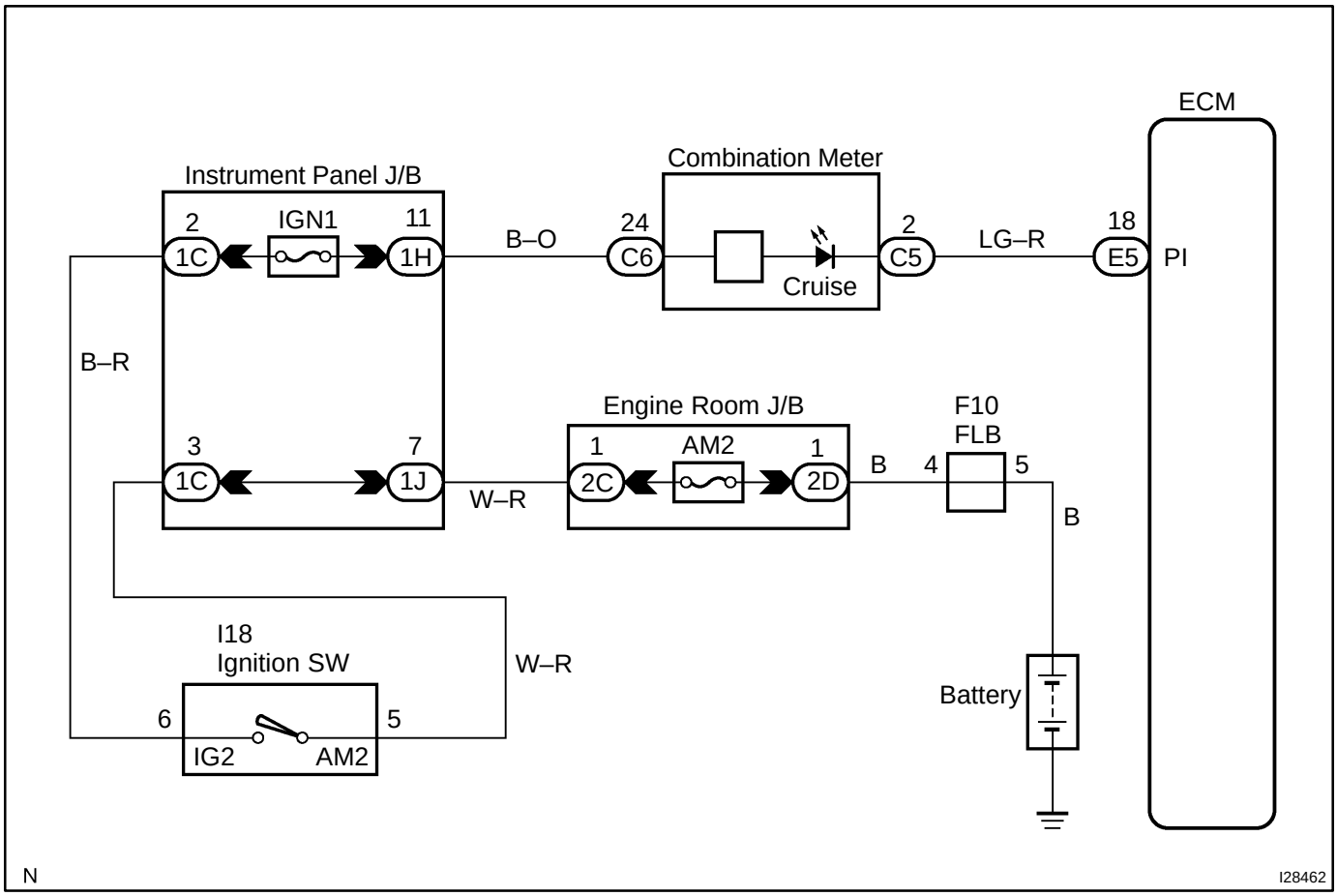
DIDF3–01

CRUISE main indicator light circuit

CIRCUIT DESCRIPTION

The CRUISE main indicator light comes on while the cruise control system is in operation and blinks when there are any problems with the system.
DTCs can be read by counting the number of times the CRUISE main indicator light blinks.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from 1 and when not using the hand–held tester, start from step 2.

1	**Read value on hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the hand–held tester main switch on.
(c) Select the item below in the ”DATA LIST”, and read the display on the hand–held tester.

CHECK:

Check that the CRUISE main indicator light comes on when the cruise main switch is ON, and goes off when the cruise main switch is OFF.

CCS (ECM):

Item	Measurement Item /Display (Range)	Normal Condition	Diagnostic Note
CCS INDICATOR	Cruise indicator signal (Main CPU) /ON or OFF	ON: ”CRUISE main indicator” ON OFF: ”CRUISE main indicator” OFF	–
CCS INDICATOR S	Cruise indicator signal (Sub CPU) /ON or OFF	ON: ”CRUISE main indicator” ON OFF: ”CRUISE main indicator” OFF	–

OK:

When the cruise control main switch is operated, the normal conditions listed above are shown on the display.

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1541).

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2	**Check combination meter assy.**

CHECK:

Check if other functions in the combination meter (speedometer, indicator, etc.) operate normally.

OK:

The other functions operate normally.

NG → **Go to combination meter system (See page DI–1610).**

OK →

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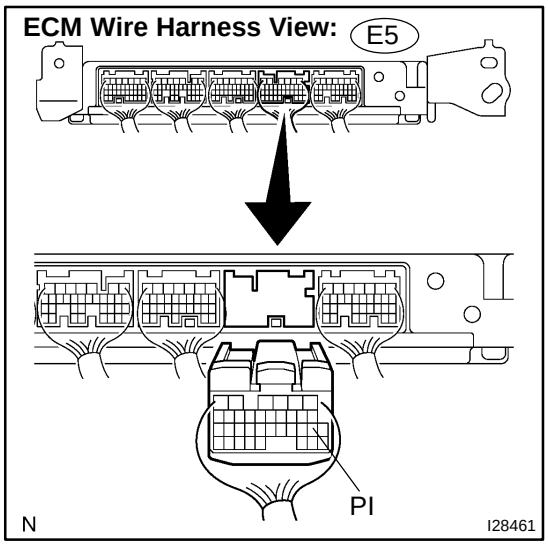
3	Check harness and connector (Combination meter assy – ECM).



PREPARATION:

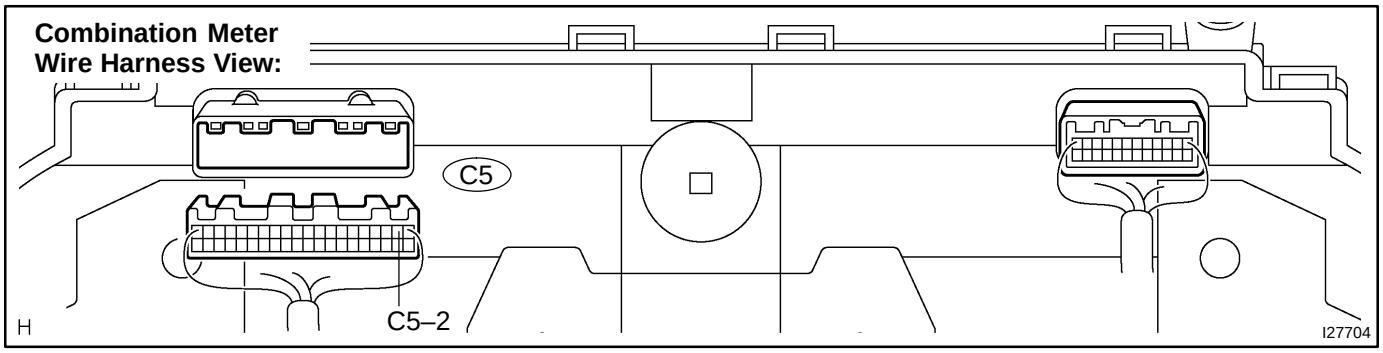
Disconnect the combination meter and ECM connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
C5–2 – E5–18 (PI)	Always	Below 1 Ω
C5–2 – Body ground	Always	10 kΩ or higher



NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1541).

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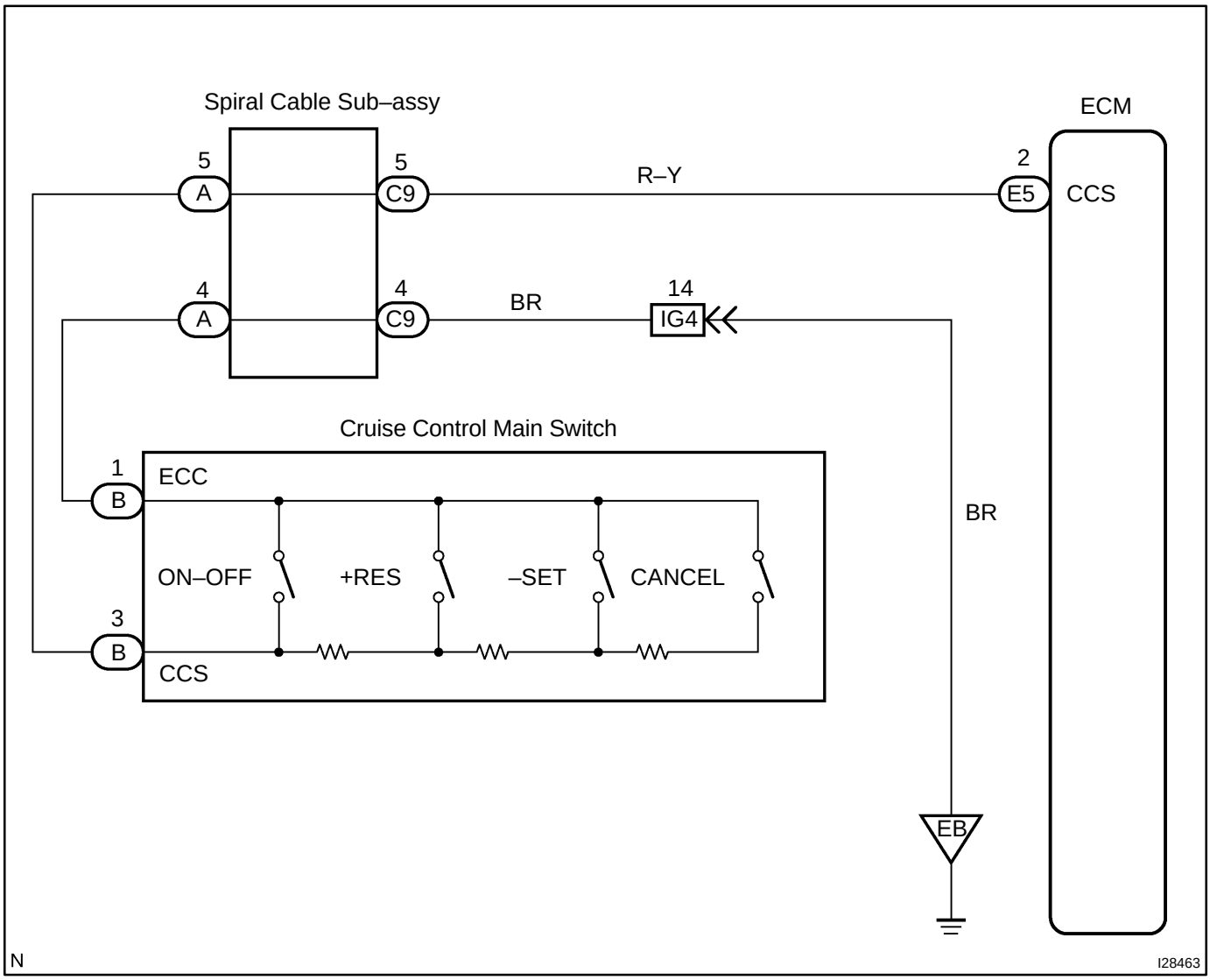
DIDF4–01

Control Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

The cruise control main switch operates seven functions: SET, COAST, TAP–DOWN, RESUME, ACCEL, TAP–UP, and CANCEL. The SET, TAP–DOWN and COAST functions, and the RESUME, ACCEL and TAP–UP functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while operating it in each arrow direction and turns off after releasing it. The internal contact point of the cruise control main switch is turned on with the switch operation. Then the ECM reads the CCS terminal voltage value that has been changed by the switch operation to control SET, COAST, RESUME, ACCEL and CANCEL.

WIRING DIAGRAM



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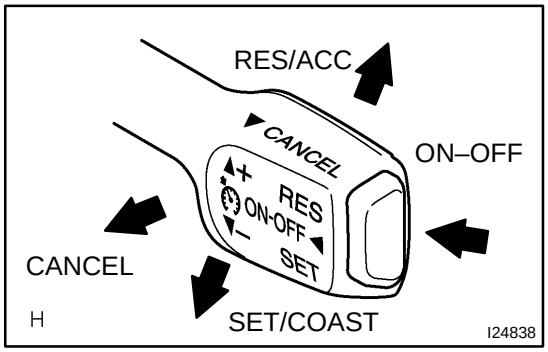
INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Read value on hand–held tester.**



PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) According to the display on the tester, read the "DATA LIST".

CCS (ECM):

Item	Measurement Item /Display (Range)	Normal Condition	Diagnostic Note
MAIN SW (MAIN)	Main SW signal (Main CPU) /ON or OFF	ON: Main SW ON (Pushed on) OFF: Main SW OFF (Pushed off)	–
MAIN SW (SUB)	Main SW signal (Sub CPU) /ON or OFF	ON: Main SW ON (Pushed on) OFF: Main SW OFF (Pushed off)	–
CANCEL SW	CANCEL SW signal /ON or OFF	ON: CANCEL SW ON OFF: CANCEL SW OFF	–
SET/COAST SW	SET/COAST SW signal /ON or OFF	ON: SET/COAST SW ON OFF: SET/COAST OFF	–
RES/ACC SW	RES/ACC SW signal /ON or OFF	ON: RES/ACC SW ON OFF: RES/ACC SW OFF	–

OK:

When the cruise control main switch is operated, the normal conditions listed above are shown on the display.

RESULT:

OK	A
NG (All items are defective.)	B
NG (One to four items are defective.)	C

B	**Go to step 2.**
C	**Replace cruise control main switch.**

A

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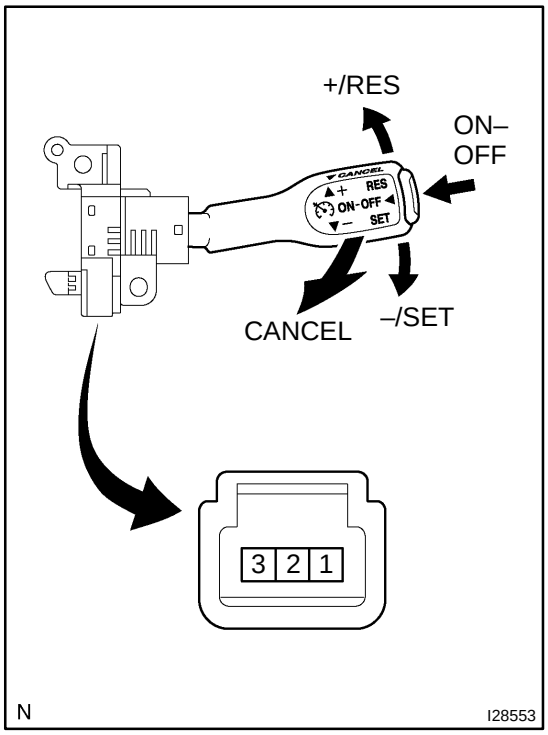
Proceed to next circuit inspection shown in problem symptoms table (See page DI–1541).

2	**Check cruise control switch continuity.**



PREPARATION:

(a) Remove the steering wheel center pad.

(b) Disconnect the cruise control switch connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Switch condition	Tester connection	Specified condition
Neutral	1 – 3	Below 1 Ω
RES/+	1 – 3	210 to 270 Ω
SET/–	1 – 3	560 to 700 Ω
CANCEL	1 – 3	1,380 to 1,700 Ω
Main Switch OFF	1 – 3	10 kΩ or higher
Main Switch ON	1 – 3	Below 1 Ω

NG → **Replace cruise control switch.**

OK

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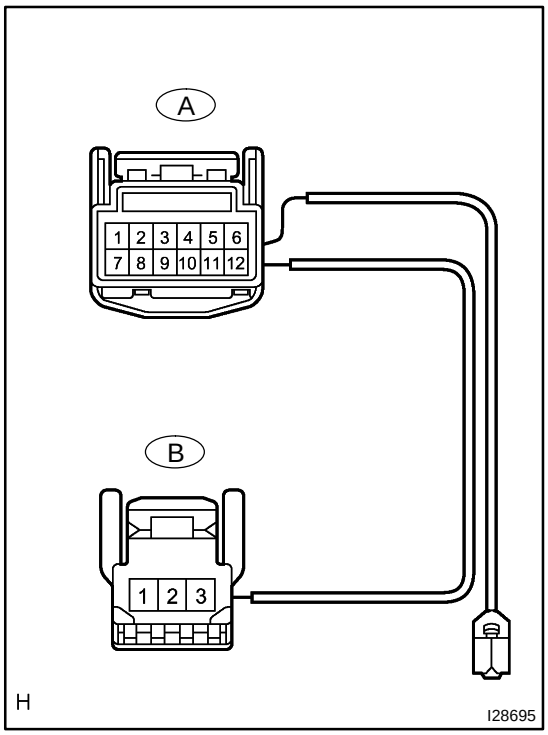
3	Check harness and connector (Cruise control switch – spiral cable sub–assy).



PREPARATION:

Disconnect the spiral cable connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
A–5 – B–3	Always	Below 1 Ω
A–4 – B–1	Always	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

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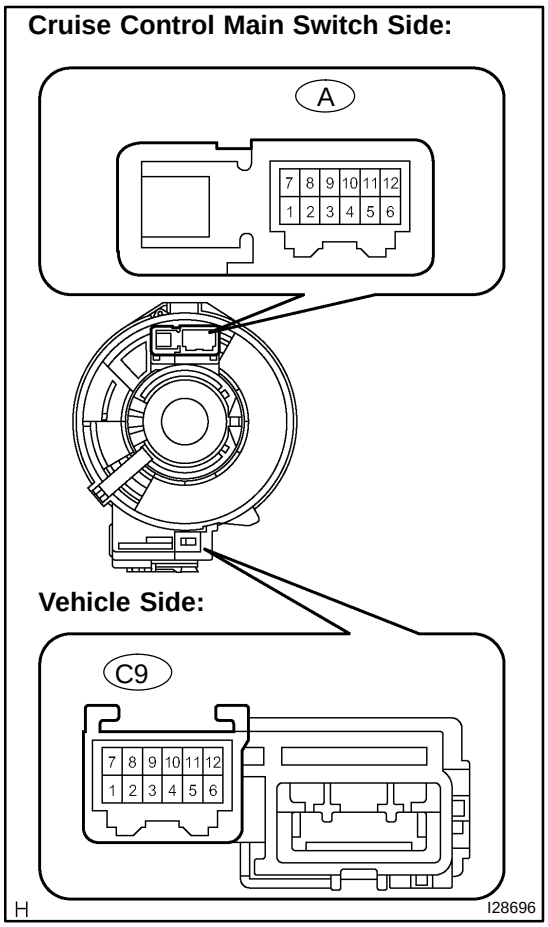
4	Inspect spiral cable sub–assy.



PREPARATION:

Disconnect the vehicle side spiral cable connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
A–5 – C9–5	Always	Below 1 Ω
A–4 – C9–4	Always	Below 1 Ω

NG → **Replace spiral cable sub–assy.**

OK

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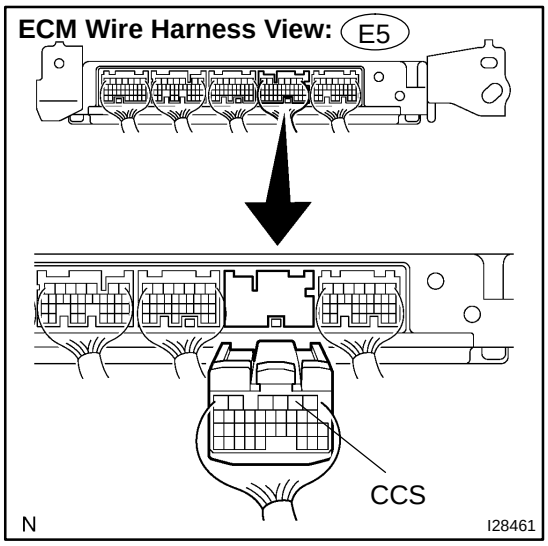
5	Check harness and connector (ECM – spiral cable sub–assy).



PREPARATION:

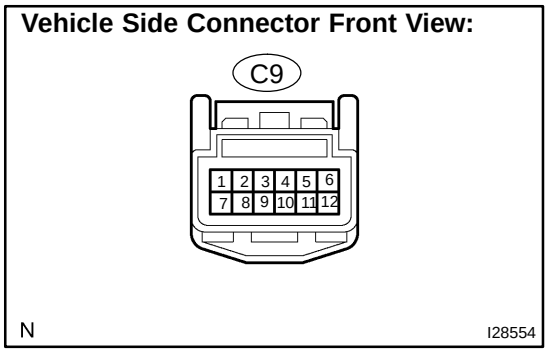
Disconnect the ECM connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specification
C9–5 – E5–2 (CCS)	Always	Below 1 Ω
C9–4 – Body ground	Always	10 kΩ or higher
C9–5 – Body ground	Always	Below 1 Ω



NG → **Repair or replace harness or connector.**

OK ↓

Replace ECM (See page IN–35).

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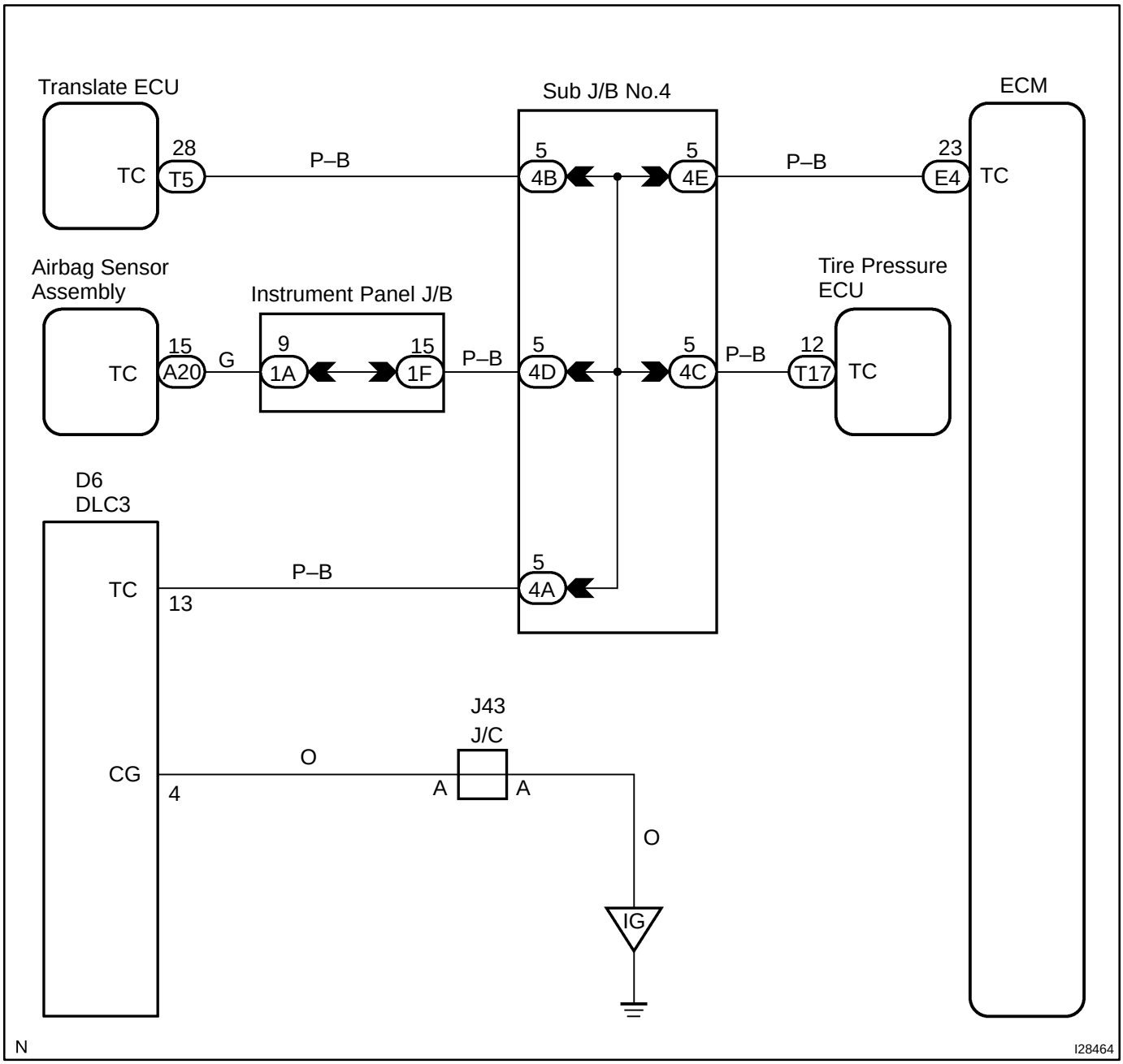
DIDF5–01

Diagnosis circuit

CIRCUIT DESCRIPTION

Making a short circuit between terminals TC and CG of the DLC3 will output DTCs from the DLC3.

WIRING DIAGRAM



HINT:

When a particular warning light stays blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in the relevant ECU is suspected.

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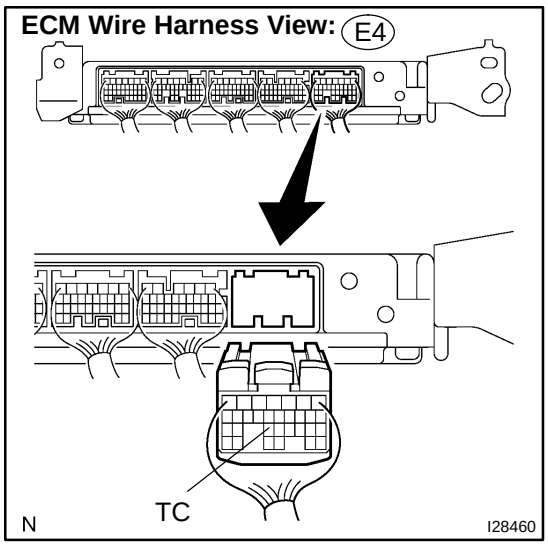
INSPECTION PROCEDURE

1	**Check harness and connector (TC of DLC3 – ECM).**



PREPARATION:

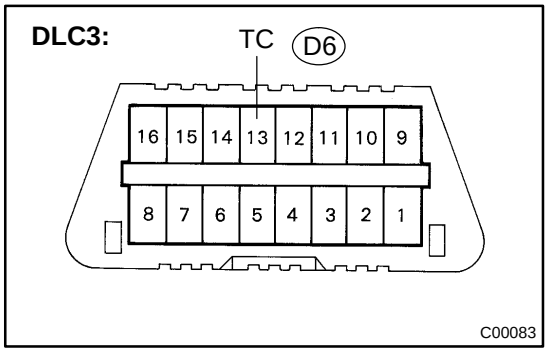
Disconnect the E4 connector from the ECM.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TC (E4–23) – TC (D6–13)	Always	Below 1 Ω



NG → **Repair or replace harness or connector.**

OK

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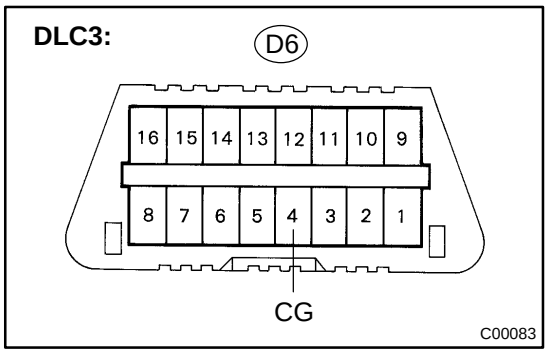
2	Check harness and connector (CG of DLC3 – Body ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

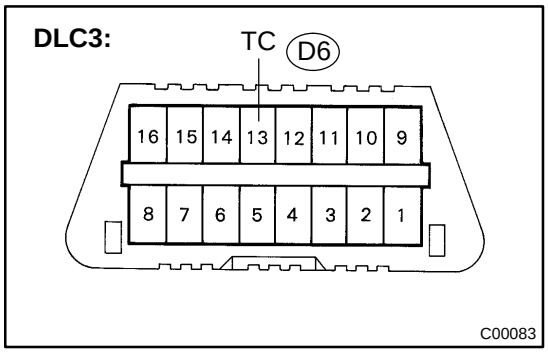
OK:

Symbol (Tester connection)	Condition	Specified condition
CG (D6–4) – Body ground	Always	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

3	Check harness and connector (TC of DLC3 – Body ground).



CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TC (D6–13) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness, connector or each ECU.**

OK

Replace ECM (See page IN–35).

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ENGINE IMMOBILISER SYSTEM

DID65–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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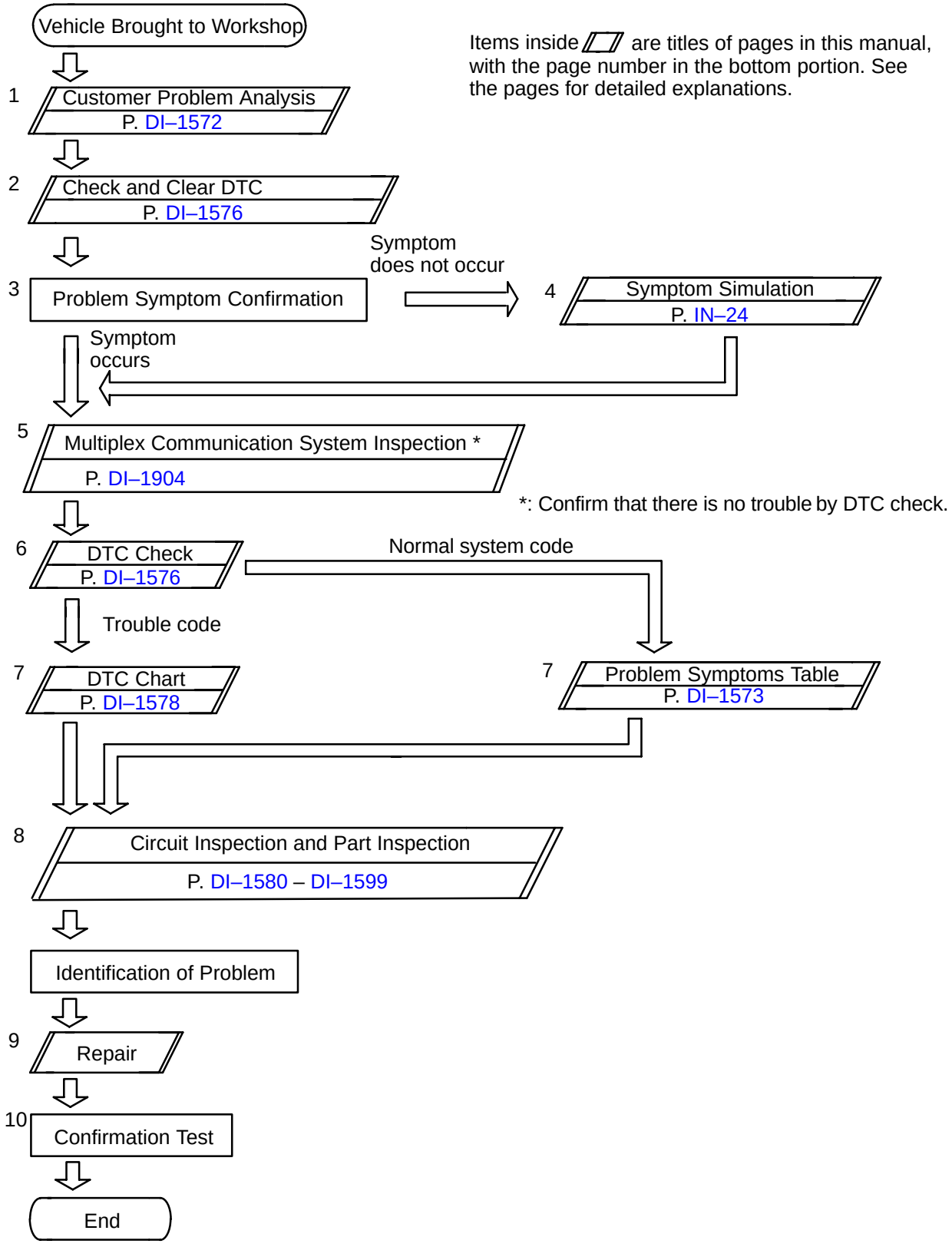
DI1AJ–49

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

The ECU of this system is connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.

Troubleshoot in accordance with the following procedures:



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DI1AK–28

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILISER Check Sheet

Inspector's Name :

Customer's Name		**VIN**	
		Licence Plate No.	/ /
		Production Date	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Immobiliser is not set. (Engine starts with key codes other than the registered key code.)
	☐ Engine does not start.
	☐ Security indicator is always ON.
	☐ Security indicator is always ON. (Although code has been registered in the automatic registration mode, indicator is not OFF.)
	☐ Security indicator is OFF. (When DTC of immobiliser is output)
	☐ Security indicator is OFF. (When DTC of immobiliser is not output)
	☐ Security indicator is abnormally blinking.
	☐ No code is output.

Check Item	**Malfunction Indicator Lamp**	☐ Normal ☐ Remains ON ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal System Code ☐ Trouble Code (Code)
	2nd Time	☐ Normal SystemCode ☐ Trouble Code (Code)

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DI1AP–40

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See page
Immobiliser is not set. (Engine starts with key codes other than the registered key code.)	1. Door courtesy light switch circuit (DTC12) 2. Transponder key ECU	DI–1585 IN–35
Engine does not start.	1. Key 2. Key unlock warning switch circuit (DTC11) 3. Transponder key coil 4. Transponder key ECU 5. ECM	*1 DI–1582 BE–143 IN–35 IN–35
Security indicator is always ON.	1. Security indicator 2. Security indicator light circuit 3. Transponder key ECU	*2 DI–1597 IN–35
Security indicator is always ON. (Although code has been registered in the automatic registration mode, indicator is not OFF.)	1. Transponder key coil 2. Transponder key ECU	BE–143 IN–35
Security indicator is OFF. (When DTC of immobiliser is output)	1. Transponder key coil 2. Transponder key ECU	BE–143 IN–35
Security indicator is OFF. (When DTC of immobiliser is not output)	1. Security indicator light circuit 2. Diagnosis circuit 3. Transponder key ECU	DI–1597 DI–1599 IN–35
Security indicator is abnormally blinking.	Transponder key ECU	IN–35
No code is output.	1. Power source circuit 2. Diagnosis circuit 3. Transponder key ECU	DI–1595 DI–1599 IN–35

*1 : Check that the key which did not start the engine has been registered, and that it is possible to start with any other already registered key.
*2 : Finish the automatic registration mode because the mode might still be set.

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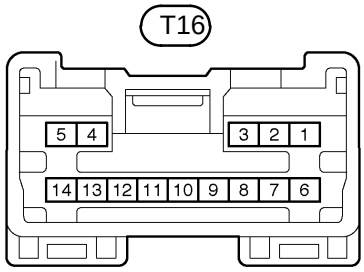
DIABB–02

TERMINALS OF ECU

Transponder Key ECU:



N

I24389

Symbols (Terminals No.)	Wiring Color	Condition	Specified condition
+B ↔ GND (T16 – 1 ↔ T16 – 14)	W–R ↔ O	Always	10 to 14 V
IG ↔ GND (T16 – 2 ↔ T16 – 14)	B–O ↔ O	Ignition switch ON	10 to 14 V
D ↔ GND (T16 – 3 ↔ T16 – 14)	W–L ↔ O	Ignition switch ON → Connect terminals OP3 and CG of DLC3	10 to 14 V → Below 2 V
CODE ↔ GND (T16 – 4 ↔ T16 – 14)	R–Y ↔ O	Ignition switch ON	10 to 14 V
RXCK ↔ GND (T16 – 5 ↔ T16 – 14)	LG ↔ O	Ignition switch ON	10 to 14 V
VC12 ↔ AGND (T16 – 6 ↔ T16 – 12)	GR–B ↔ GR–L	Always	10 to 14 V
IND ↔ GND (T16 – 7 ↔ T16 – 14)	LG–B ↔ O	Security indicator light is on. (It flashes when the immobiliser system is operating.) → Security indicator light is off.	3 to 6 V → Below 1 V
CTY ↔ GND (T16 – 8 ↔ T16 – 14)	GR–L ↔ O	Driver's door closed → Driver's door open	10 to 14 V → Below 1 V
KSW ↔ GND (T16 – 9 ↔ T16 – 14)	Y–G ↔ O	Key unlock warning switch ON (Key inserted) → Key unlock warning switch OFF (Key not inserted)	Below 1 V → 10 to 14 V
EFII ↔ GND (T16 –10 ↔ T16 – 14)	L–Y ↔ O	Ignition switch ON	10 to 14 V
EFIO ↔ GND (T16 –11 ↔ T16 – 14)	P–G ↔ O	Ignition switch ON	10 to 14 V
AGND ↔ Body ground (T16 –12 ↔ Body ground)	GR–L ↔ Body ground	Always	Below 1 V
TXCT ↔ GND (T16 – 13 ↔ T16 – 14)	Y–G ↔ O	Ignition switch ON	10 to 14 V
GND ↔ Body ground (T16 –14 ↔ Body ground)	O ↔ Body ground	Always	Below 1 V

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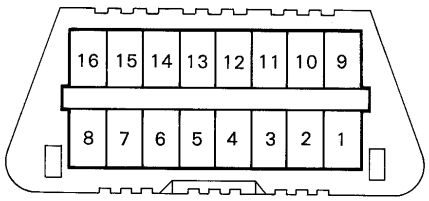
DID50–01



DLC3

C00083

DIAGNOSIS SYSTEM

1. DIAGNOSIS SYSTEM

(a) Inspect the battery voltage.

Battery voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(b) Check the DLC3.

The transponder key ECU uses ISO 9141–2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

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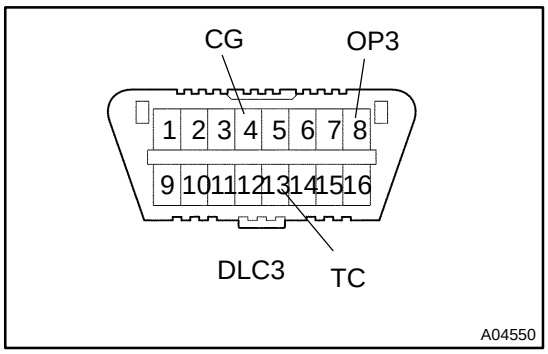
DID51–01

DTC CHECK / CLEAR



1. INSPECT DIAGNOSIS

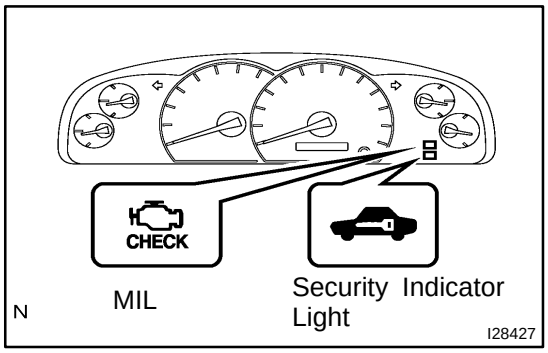
(a) Check the DTC using SST check wire.

(1) Turn the ignition switch ON, but do not start the engine.

(2) When checking DTC 99: Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

(3) When checking codes except DTC 99: Using SST, connect terminals 8 (OP3) and 4 (CG) of the DLC3.

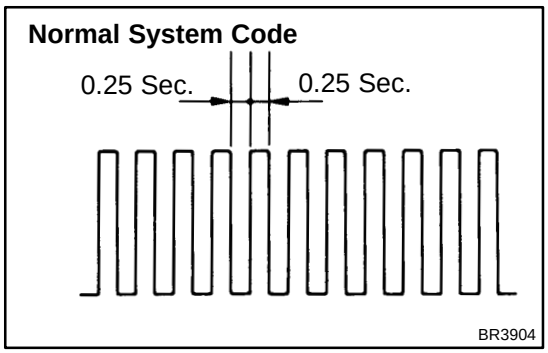
SST 09843–18040

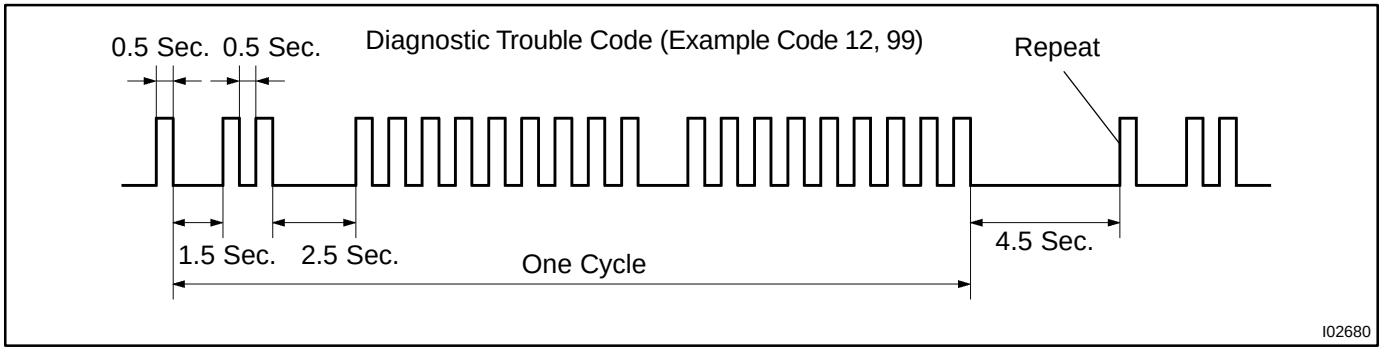


(4) Read the DTC indicated by the number of times the security indicator light or the MIL blinks.

HINT:

- If no DTC is output, inspect the diagnosis circuits (OP3 and TC) and the security indicator light circuit (See page DI–1597, DI–1567, DI–1599).
- If the system is operating normally, the light blinks twice per second.
- As an example, the blinking patterns of the normal system code and trouble codes 12 and 99 are shown on the left and below.





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(5) When DTC ”99” is output, there is a problem with the immobiliser. Start troubleshooting referring to the PROBLEM SYMPTOMS TABLE.

(6) After completing the check, disconnect terminals 8 (OP3) and 4 (CG), or terminals 13 (TC) and 4 (CG), and turn off the display.

HINT:

If 2 or more trouble codes exist, indication will begin from the lowest numbered code.

(b) Clear the DTC.

(1) When using diagnosis check wire:

▶ Remove the ECU–B fuse and EFI No. 2 fuse from the engine room J/B for 1 minute or more.

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DI1AM–35

DIAGNOSTIC TROUBLE CODE CHART

ECM DIAGNOSTIC TROUBLE CODE CHART (MIL)

DTC No. (See page)	Detection Item	Trouble Area
99 (DI–1580)	Engine immobiliser system malfunction	▶Transponder key ECU ▶ECM ▶Wire harness

TRANSPONDER KEY ECU DIAGNOSTIC TROUBLE CODE CHART (SECURITY INDICATOR LIGHT)

DTC No. (See page)	Detection Item	Trouble Area
11 (DI–1582)	Code 11 is not output	▶Unlock warning switch ▶Transponder key ECU ▶Wire harness
12 (DI–1585)	Code 12 is not output	▶Driver door courtesy lamp switch ▶Transponder key ECU ▶Body ECU ▶Wire harness
13 (DI–1587)	Code 13 is not output	▶Ignition switch ▶Transponder key ECU ▶Wire harness
21, 22 (DI–1589)	Code 21 or 22 is not output	▶Key ▶Transponder key ECU ▶Transponder key amplifier with key coil ▶Wire harness
31, 35, 36, 37 (DI–1592)	Code 31, 35, 36 or 37 is output	Key
32, 33 (DI–1593)	Code 32 or 33 is output	▶Key ▶Transponder key ECU ▶Wire harness
34	Code 34 is output	Transponder key ECU has no memory space to register another key code

HINT:

- ▶ DTCs 11, 12, 13, 21 and 22 are normal codes.
- ▶ As for the normal codes, if the corresponding DTC is not output while operating any of the components listed under ”Trouble Area”, perform the inspection described in the reference pages.
- ▶ DTCs 31, 32, 33, 34, 35, 36, 37 and 99 are abnormal codes.

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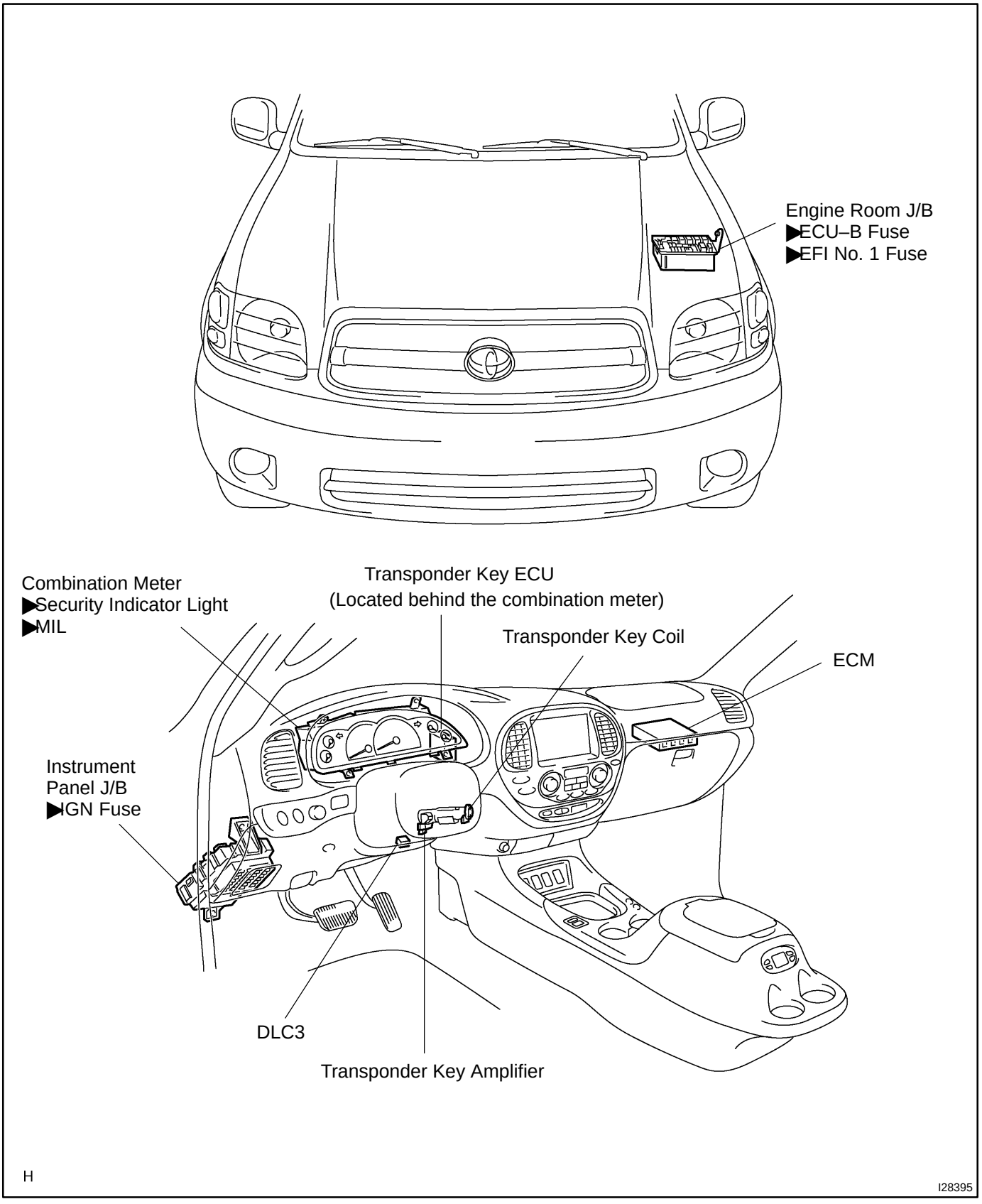
DI3DP–10

PARTS LOCATION



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DIABC–03

CIRCUIT INSPECTION

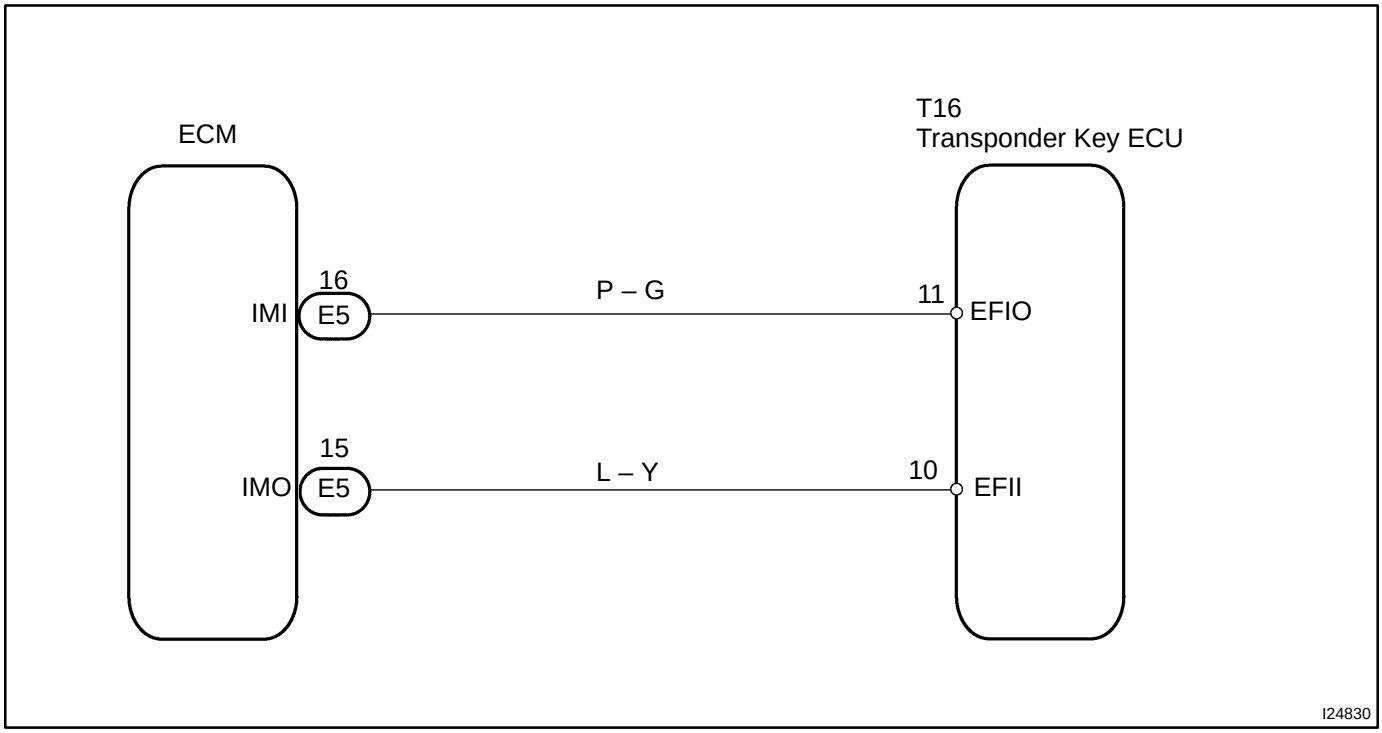
DTC	99	Engine Immobiliser System Malfunction

CIRCUIT DESCRIPTION

This DTC is indicated when a DTC is output from the transponder key ECU, or when there is an open or short circuit in the wire harness between the transponder key ECU and the ECM.
If the DTC is output after replacing the transponder key ECU or ECM, carry out the ECU communication ID registration.

DTC No.	DTC Detecting Condition	Trouble Area
99	▶Error in communication between ECM and transponder key ECU, or in communication line. ▶Communication ID is different in communication with transponder key ECU. ▶ECU communication ID has not been registered	▶Transponder key ECU ▶ECM ▶Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Has ECU communication ID registration been carried out? (See page BE–137)

NO → Carry out ECU communication ID registration again.

YES

2	Check harness and connector between transponder key ECU and ECM (See page IN–35)

NG → Repair or replace harness or connector.

OK

3	Does the system operate normally after replacement of transponder key ECU?

YES → Replace transponder key ECU.

NO

Replace ECM (See page IN–35).

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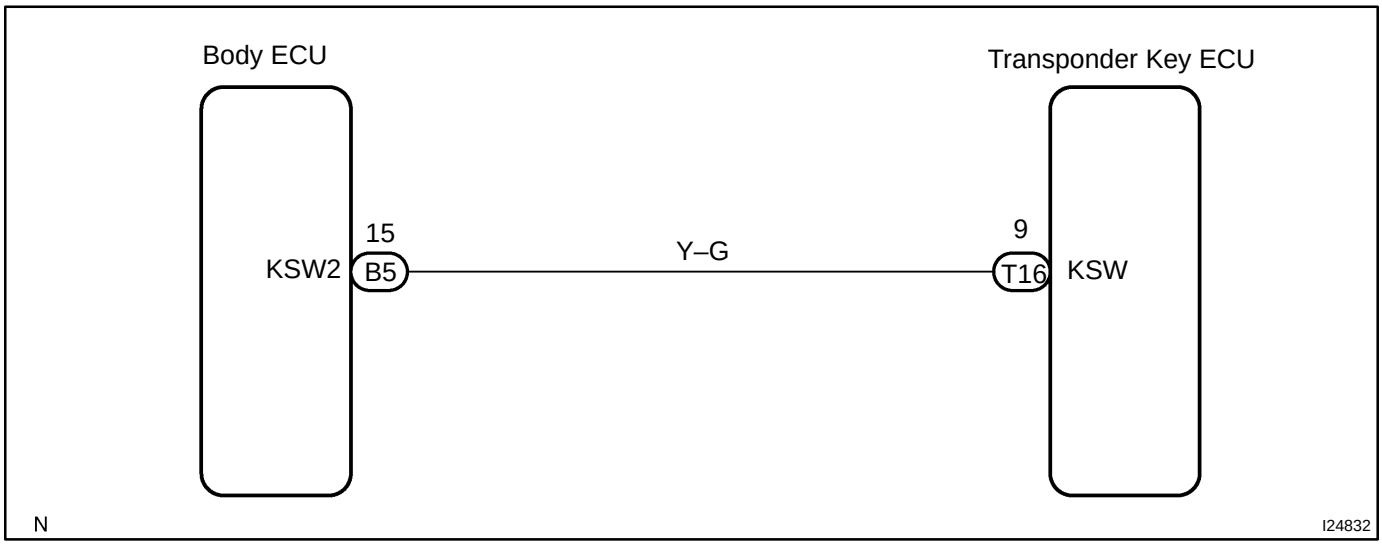
Code 11 is not output

CIRCUIT DESCRIPTION

The transponder key ECU outputs DTC 11 when the key unlock warning switch is ON (key is inserted).
HINT:
DTC 11 is a normal code.

DTC No.	DTC Detecting Condition	Trouble Area
11	Key unlock warning switch operates normally.	▶Unlock warning switch ▶Transponder key ECU ▶Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check key unlock warning buckle switch using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC 3.

CHECK:

Check the key unlock warning switch using the DATA LIST.

OK → **Go to step 4.**

NG

2	**Check key unlock warning switch (See page BE–24).**

NG → **Replace key unlock warning switch.**

OK

3	**Check wire harness and connector between key unlock warning switch and body ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

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4	**Check harness and connector between transponder key ECU and body ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace transponder key ECU (See page IN–35).

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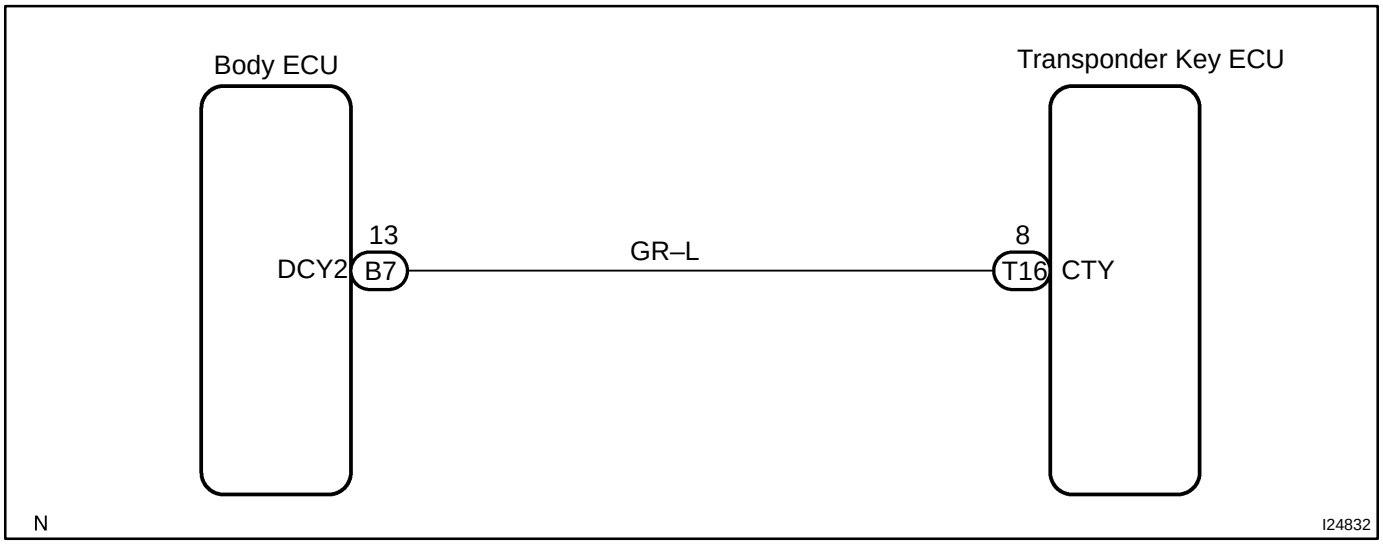
Code 12 is not output

CIRCUIT DESCRIPTION

The transponder key ECU outputs DTC 12 when the front driver's door is open.
HINT:
DTC 12 is a normal code.

DTC No	DTC Detecting Condition	Trouble Area
12	Driver door courtesy light switch operates normally.	▶Driver door courtesy light switch ▶Transponder key ECU ▶Body ECU ▶Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check operation of door courtesy light.**

CHECK:

Check that the door courtesy light comes on when the driver's door is opened, and goes off when it is closed.

OK:

The door courtesy light operates normally.

OK → **Go to step 4.**

NG

2	**Check driver courtesy light switch (See page BE–40).**

NG → **Replace driver courtesy light switch.**

OK

3	**Check harness and connector between body ECU and driver door courtesy light switch (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

4	**Check harness and connector between transponder key ECU and body ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace transponder key ECU (See page IN–35).

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DIABF–04

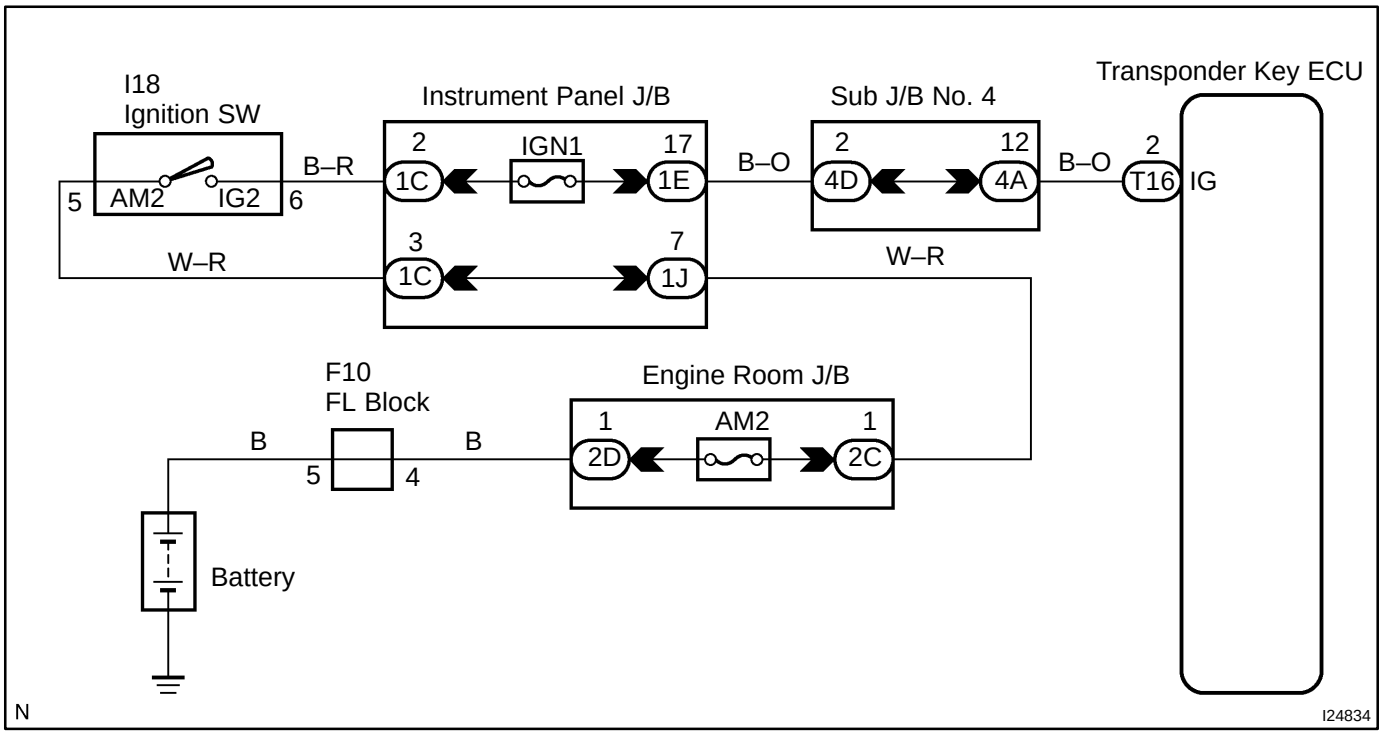
Code 13 is not output

CIRCUIT DESCRIPTION

The transponder key ECU outputs DTC 13 when the ignition switch is ON.
HINT:
DTC 13 is a normal code.

DTC No.	DTC Detecting Condition	Trouble Area
13	Ignition switch operates normally.	▶Ignition switch ▶Transponder key ECU ▶Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check ignition switch (See page BE–24).

NG → Replace ignition switch.

OK

2	Check harness and connector between ignition switch and transponder key ECU (See page IN–35).

NG → Repair or replace harness or connector.

OK

Replace transponder key ECU (See page IN–35).

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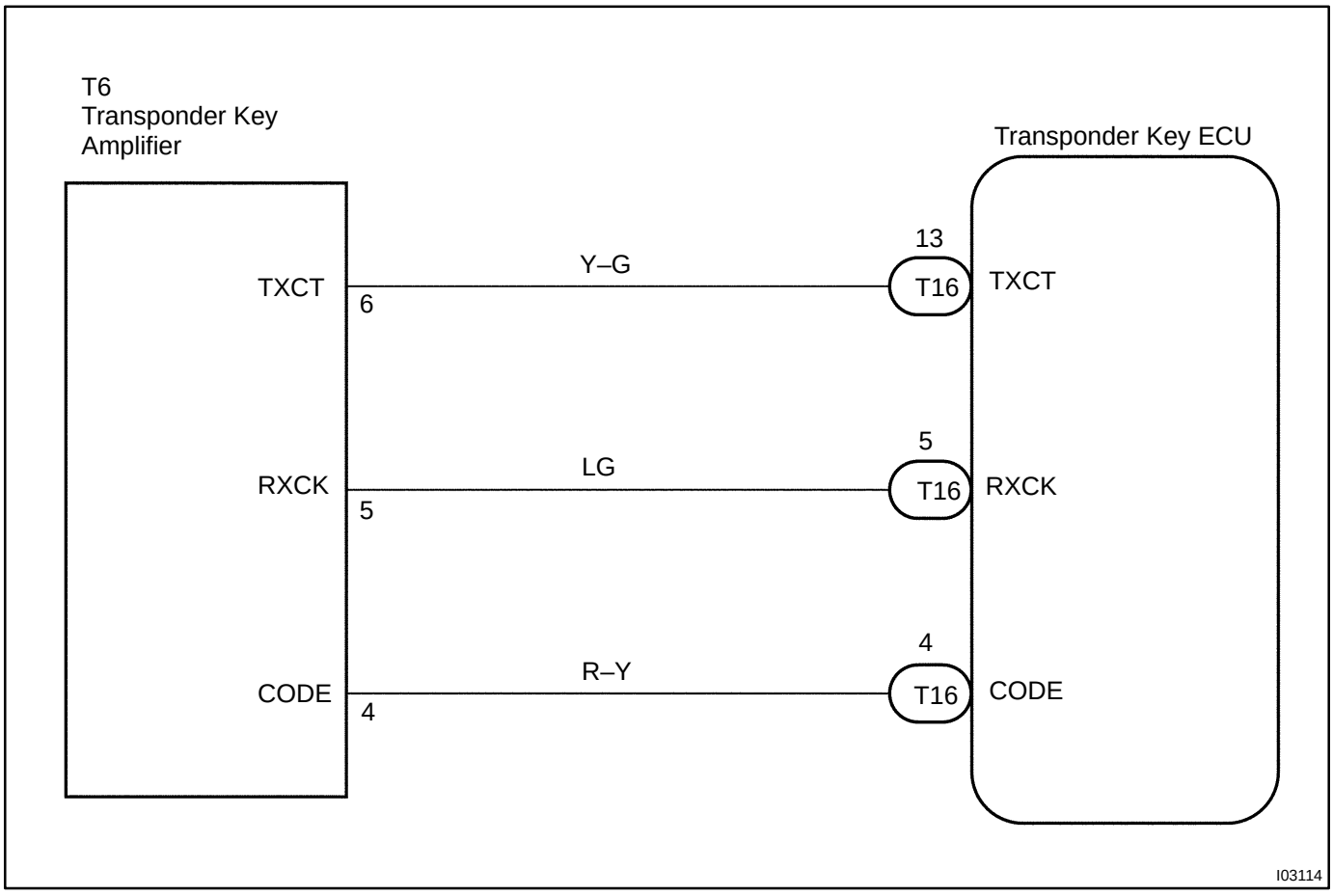
Code 21 or 22 is not output

CIRCUIT DESCRIPTION

The transponder key ECU outputs DTC 21 while the immobilizer system is deactivated by use of the master key, and outputs DTC 22 while it is deactivated by use of the sub key.
HINT:
DTCs 21 and 22 are normal codes.

DTC No. (See Page)	DTC Detecting Condition	Trouble Area
21, 22	Communication is normal.	▶Key ▶Transponder key ECU ▶Transponder key amplifier with key coil ▶Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check whether the engine can be started with the master key and sub–key for another vehicle of the same type.**

RESULT:

A	All keys start the engine.
B	A specific key does not start the engine. In this case, DTC 21 or 22 is not stored in memory.
C	All keys do not start the engine. In this case, DTC 21 and 22 are not stored in memory.

A	**No problem at this time.**

HINT:
If the result is ”A”, confirm whether or not the customer has ever inserted the key (without a transponder chip) of another vehicle into the ignition key cylinder.

B	**The transponder chip of a specific key is defective. Replace the key.**

C

2	**Check transponder key coil (See page BE–143).**

NG	**Replace transponder key coil.**

OK

3	**Check harness and connector between transponder key ECU and transponder key amplifier (See page IN–35).**

NG	**Repair or replace harness or connector.**

OK

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4	Does the system operate normally after replacement of transponder key ECU?

YES → Replace transponder key ECU.

NO → Replace ECM (See page IN–35).

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DIABH–04

Code 31, 35, 36 or 37 is output.

CIRCUIT DESCRIPTION

These DTCs are indicated when an unregistered key is inserted. When any of them is indicated, clear the DTC and insert other registed keys to check for DTCs.
When a key that outputs a DTC (31, 35, 36 or 37) is found, register this key. When a DTC (31, 35, 36 or 37) is not output, there is a possibility that the unregistered key has been inserted before. (The ECM is normal.) Ask the customer under what conditions the problem occurred to find the cause.
(Example: Another key has been inserted, etc.)

DTC No.	DTC Detecting Condition	Trouble Area
31, 35, 36, 37	Unmatched key code	Key

INSPECTION PROCEDURE

1	**Delete DTC and insert all the presently available keys to check whether the engine starts or not (See page DI–1576).**

HINT:
When inserting a key that does not start the engine, a DTC (31, 35, 36 or 37) is stored in memory.

RESULT:

OK	All keys start the engine.
NG	A specific key does not start the engine.

OK → **No problem.**

HINT:
If the result is ”OK”, confirm whether or not the customer ever inserted an unregistered key or the immobiliser key (with a transponder chip) of another vehicle into the ignition key cylinder, and find out the cause of the detection of the DTC.

NG →

Register the key that does not start the engine (See page BE–137).

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DIABI–04

Code 32 or 33 is output

CIRCUIT DESCRIPTION

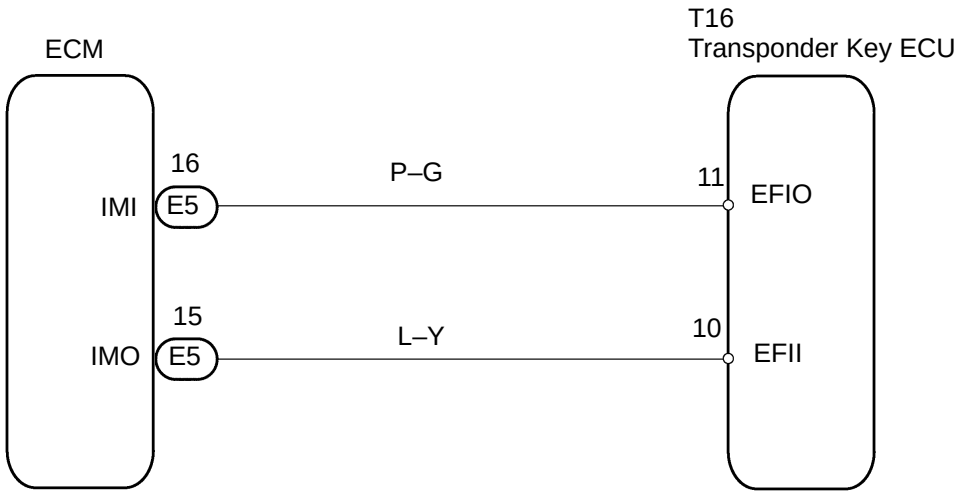
The transponder key ECU indicates DTC 32 when a key without a key code is inserted, and indicates DTC 33 when a key code cannot be identified.

HINT:

DTCs 32 and 33 are abnormal codes.

DTC No.	DTC Detecting Condition	Trouble Area
32, 33	Communication error	▶Key ▶Transponder key ECU ▶Wire harness

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check whether the engine can be started with a spare key of the same vehicle.

YES → Replace key.

NO

2	Check harness and connector between transponder key ECU and ECM (See page IN–35).

NG → Repair or replace harness or connector.

OK

3	Does the system operate normally after replacement of transponder key ECU?

YES → Replace transponder key ECU.

NO

Replace ECM (See page IN–35).

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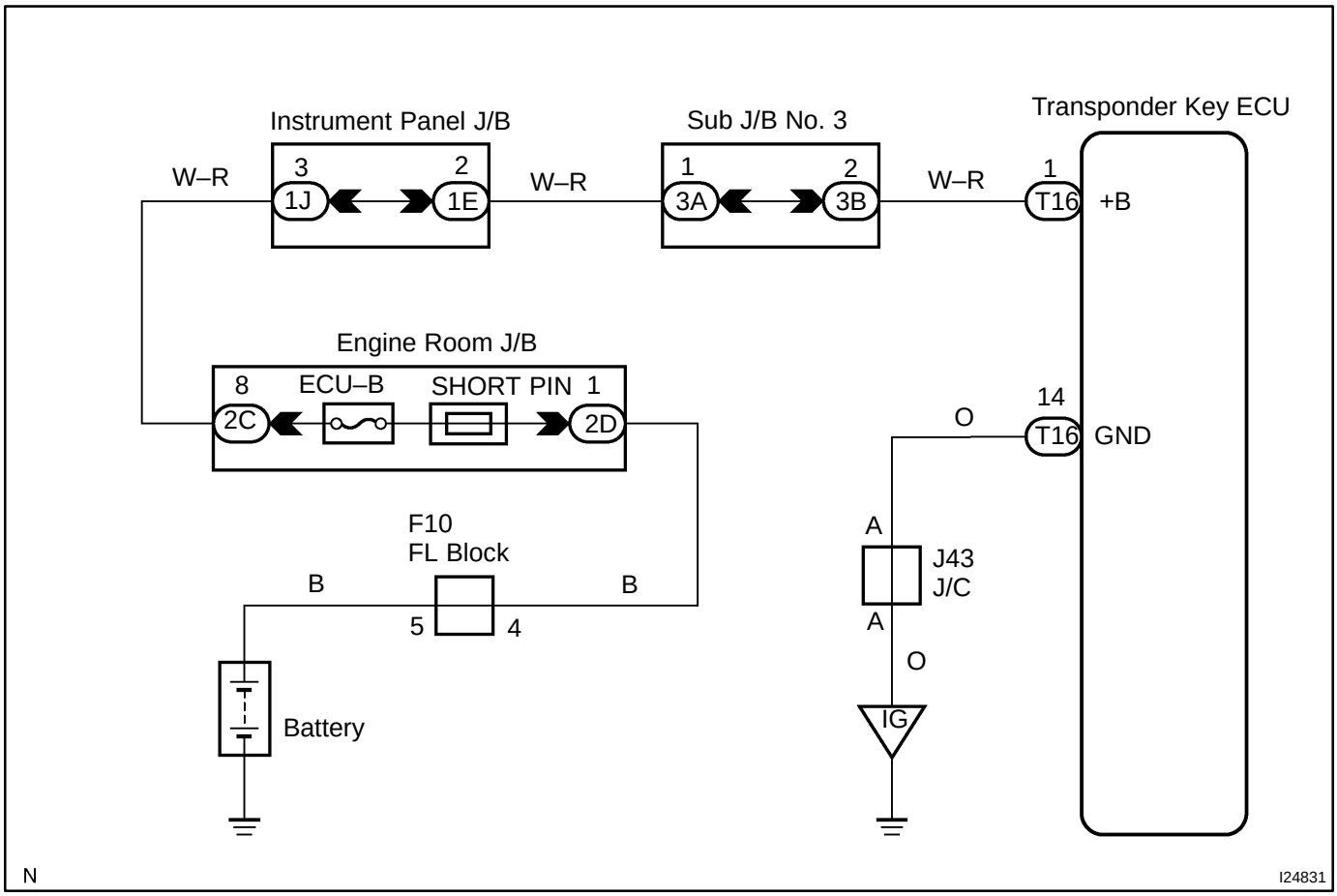
DI7TO–07

Power source circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the transponder key ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check ECU–B fuse.**

CHECK:

Check for continuity of the ECU–B fuse.

OK:

Continuity

NG → **Replace fuse.**

OK

2	**Check voltage between terminals +B and GND of transponder key ECU connector.**

PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the transponder key ECU connector.

CHECK:

Measure the voltage between terminals +B and GND.

OK:

Voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1573).**

NG

3	**Check wire harness and connector between terminal GND of transponder key ECU and body ground (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Check and repair wire harness and connector between transponder key ECU and battery.

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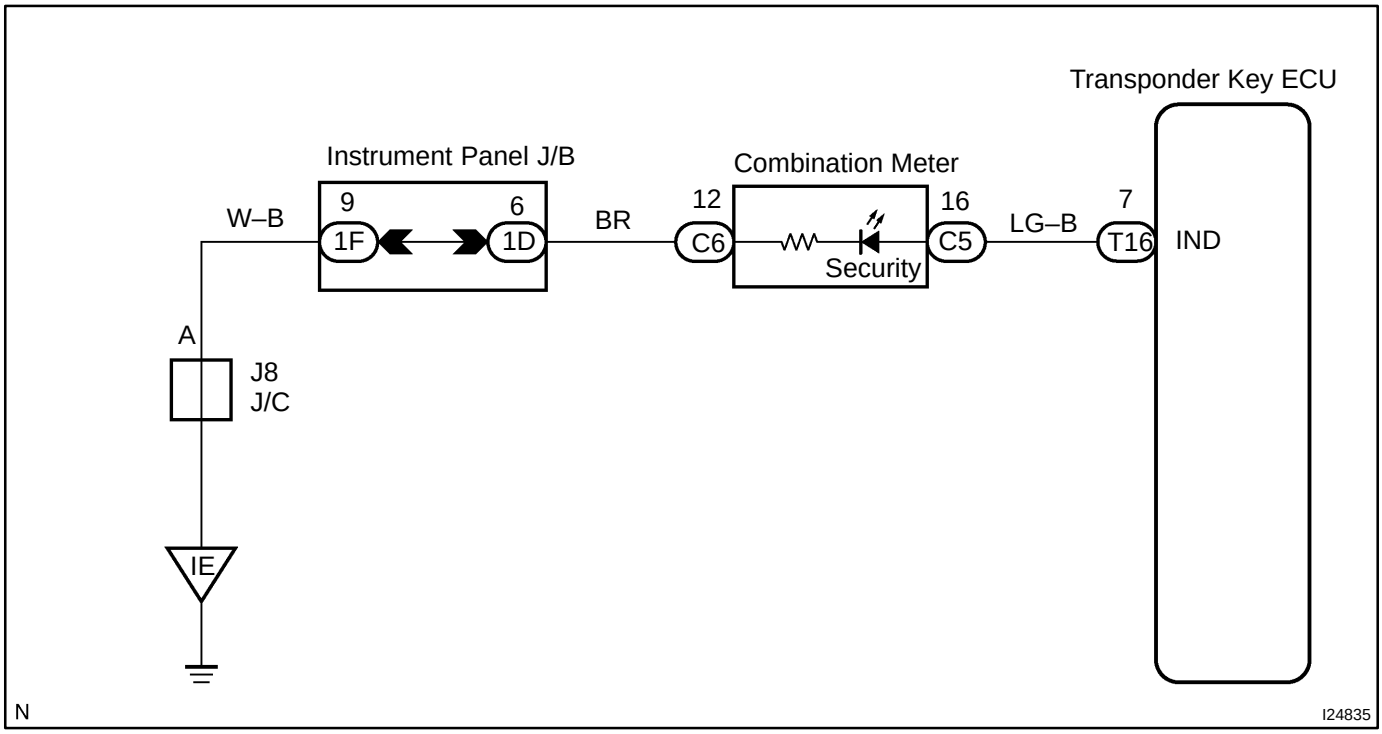
DIABJ–03

Security Indicator Light Circuit

CIRCUIT DESCRIPTION

When the transponder key is registered, the transponder key ECU outputs the key registration condition by illuminating, blinking or turning off the security indicator.

WIRING DIAGRAM



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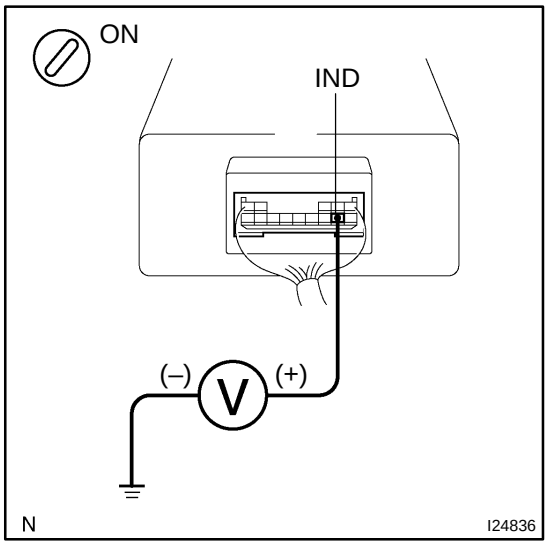
INSPECTION PROCEDURE

1	**Check voltage between terminal IND of transponder key ECU connector and body ground.**



PREPARATION:
Turn the ignition switch to the ON position and enter diagnosis mode.

CHECK:
Measure the voltage between terminal IND of the transponder key ECU connector and body ground when the security indicator light is on and when it is off.

OK:

Indicator light	Voltage
ON	3 to 6 V
OFF	Below 1 V

NG → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1573).**

OK

2	**Check combination meter (See page DI–1610).**

NG → **Replace combination meter.**

OK

Check and replace wire harness and connector (See page IN–35).

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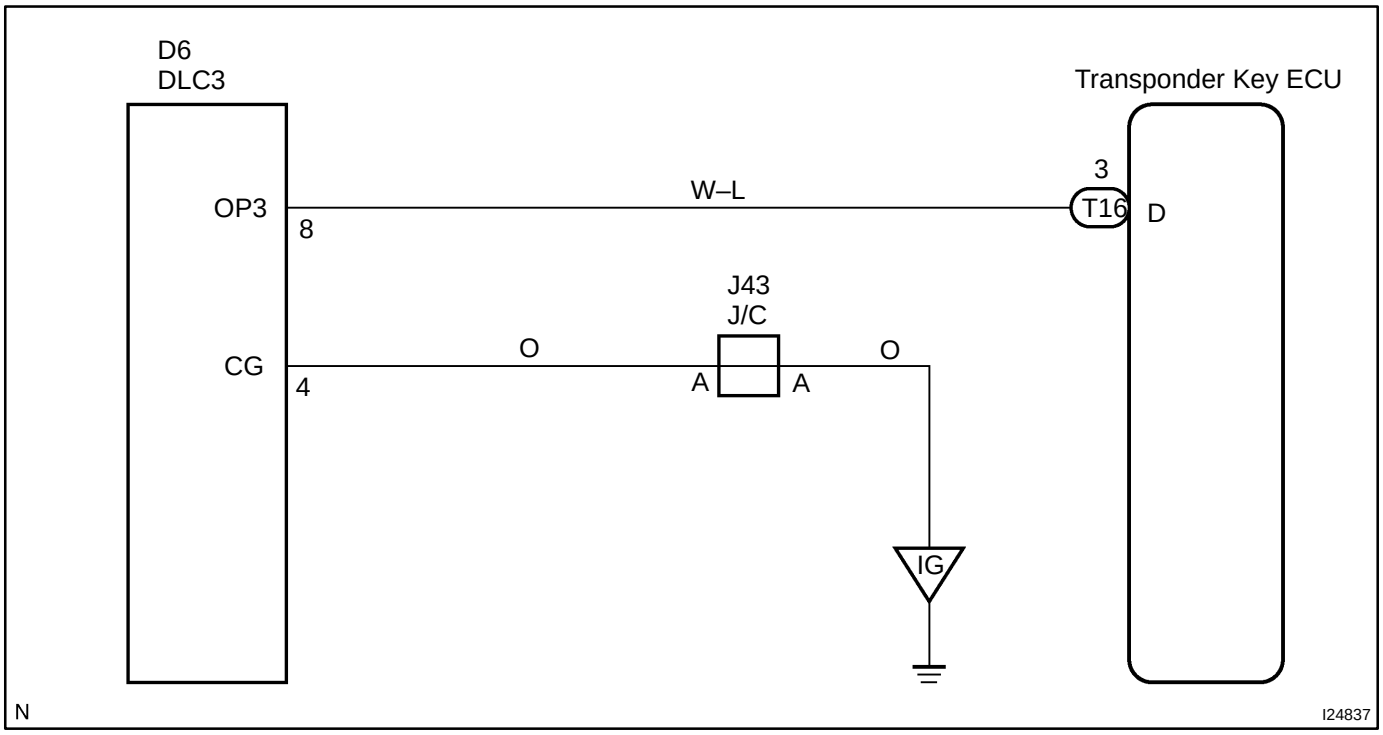
Diagnosis Circuit

CIRCUIT DESCRIPTION

This circuit sends a signal to the ECU that outputs DTCs.

WIRING DIAGRAM



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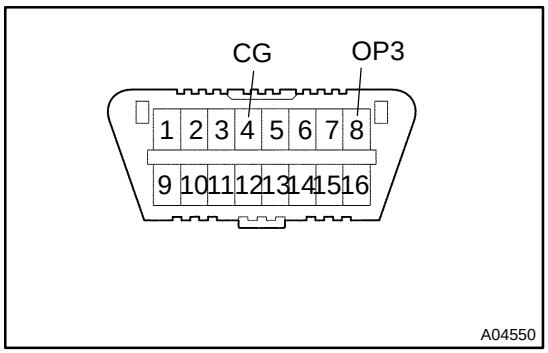
INSPECTION PROCEDURE

1	**Check voltage between terminals OP3 and CG of DLC3.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals OP3 and CG of the DLC3.
OK:
Voltage: 10 to 14 V

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–1573).**

NG

2	**Check harness and connector between transponder key ECU and DLC3, DLC3 and body ground (See page IN–35).**

NG	**Repair or replace harness or connector.**

OK

Replace transponder key ECU (See page IN–35).

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COMBINATION METER SYSTEM

DID8N–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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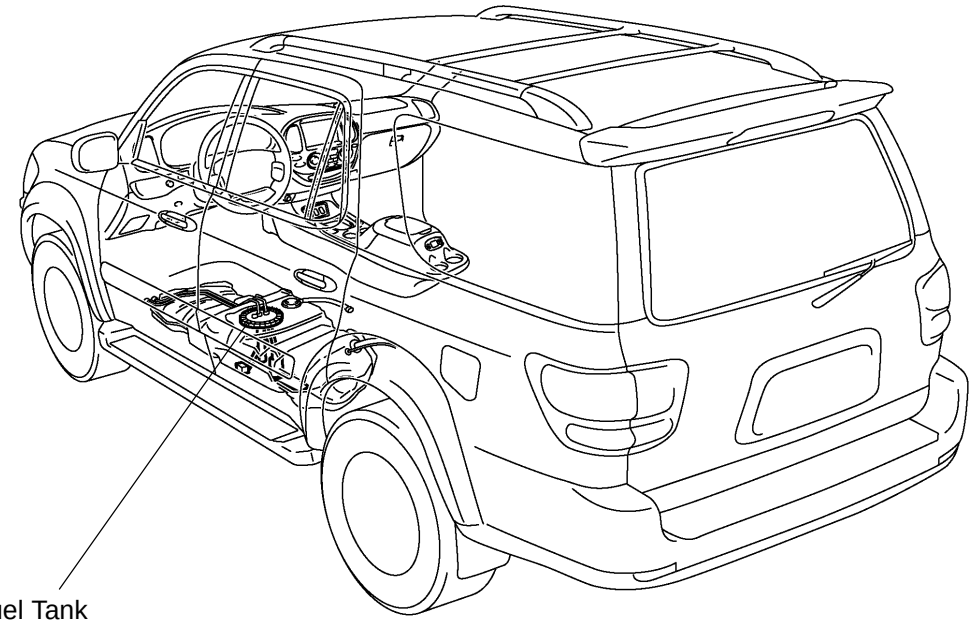
DID8O–01

LOCATION



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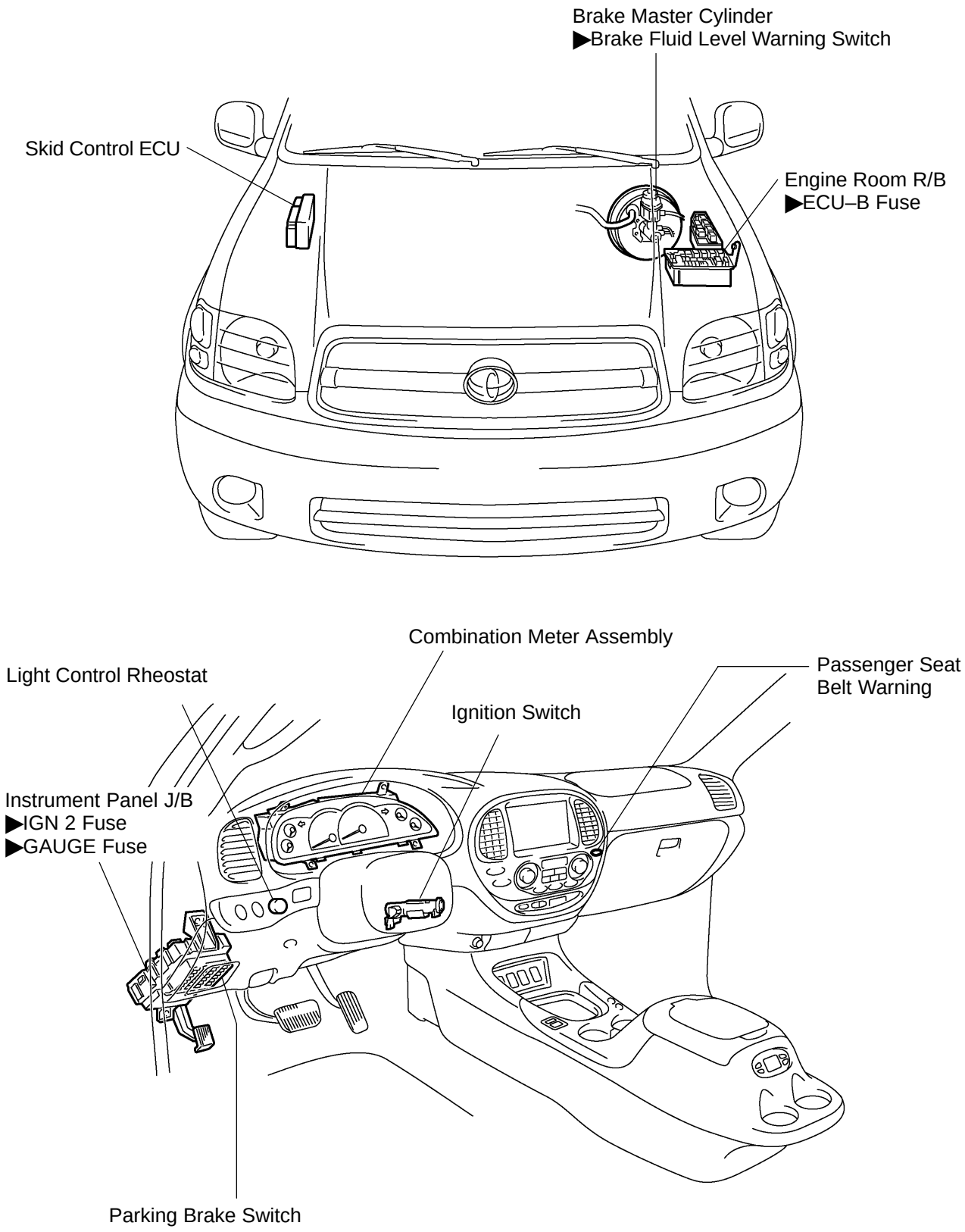
Brake Master Cylinder
▶Brake Fluid Level Warning Switch
Skid Control ECU
Engine Room R/B
▶ECU–B Fuse
Combination Meter Assembly
Light Control Rheostat
Passenger Seat
Belt Warning
Ignition Switch
Instrument Panel J/B
▶IGN 2 Fuse
▶GAUGE Fuse
Parking Brake Switch
H
I28425

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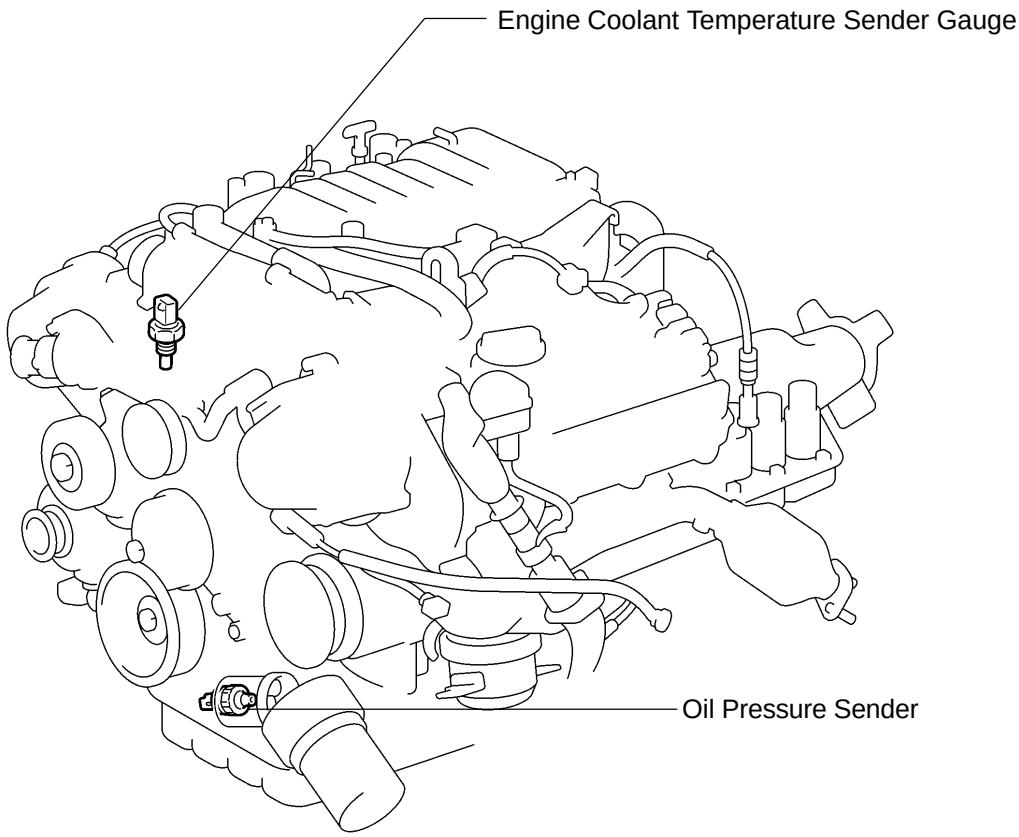

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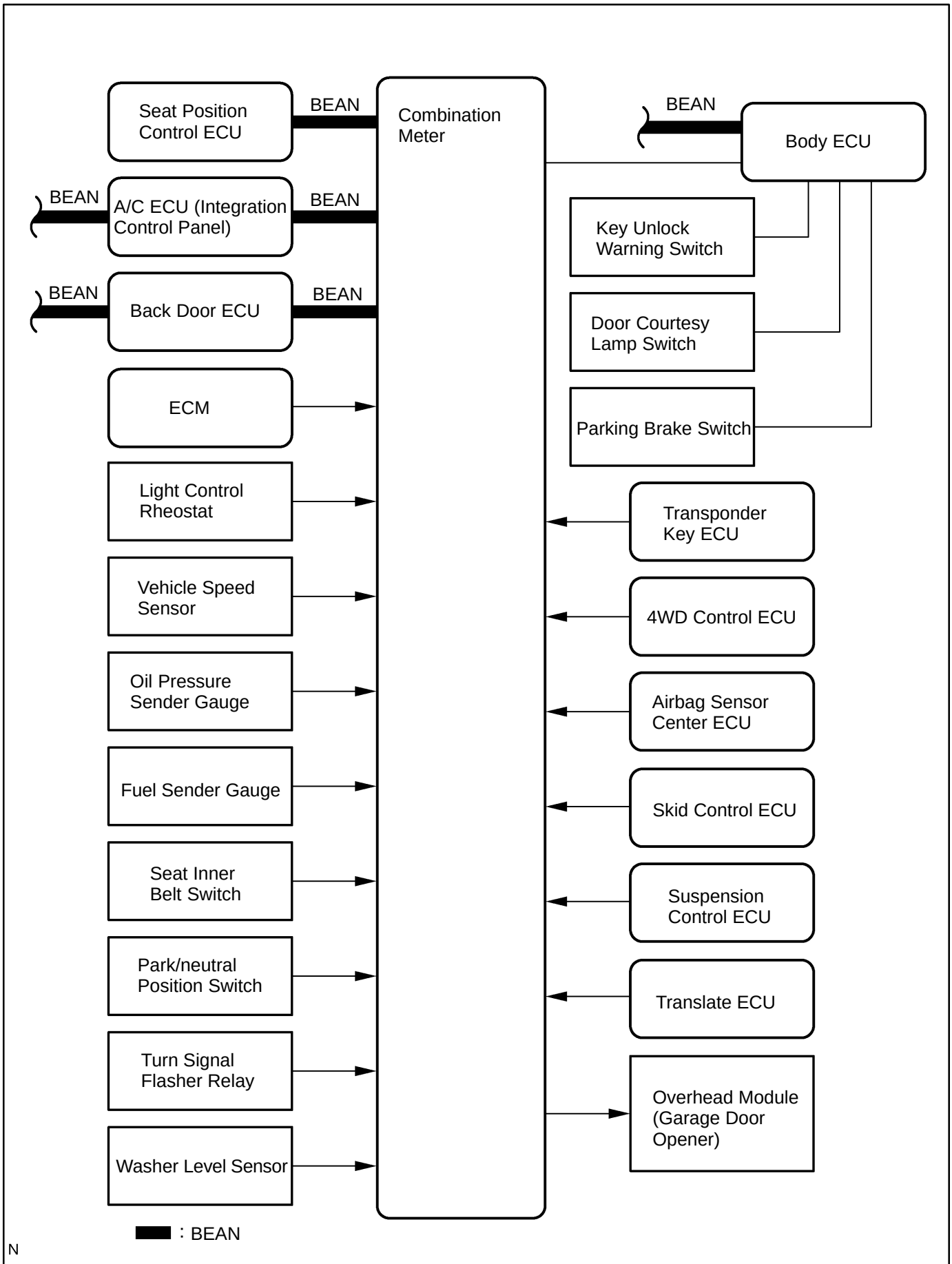
DID8P–01

SYSTEM DIAGRAM



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Input and output signals of each ECU

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
A/C ECU	▶Combination meter ▶Driver door control ECU ▶Passenger door control ECU	Temperature data	BEAN
A/C ECU	Combination meter	Engine coolant temperature data	BEAN
Combination meter	▶A/C ECU ▶Body ECU ▶Driver door control ECU ▶Passenger door control ECU ▶Back door ECU	Vehicle speed signal	BEAN
Combination meter	▶Body ECU ▶Seat control ECU	Shift position signal	BEAN
Combination meter	▶A/C ECU ▶Body ECU ▶Driver door control ECU ▶Passenger door control ECU ▶Back door ECU	Meter activation signal	BEAN
Combination meter	A/C ECU	Display unit demand signal	BEAN
Combination meter	Body ECU	Engine system signal	BEAN
Body ECU	▶A/C ECU ▶Combination meter ▶Driver door control ECU ▶Passenger door control ECU ▶Seat control ECU ▶Sliding roof control ECU ▶Back door ECU	Diagnosis tool demand signal	BEAN
Body ECU	▶A/C ECU ▶Combination meter	Body control system signal (HEAD signal, TAIL signal)	BEAN
Body ECU	▶Combination meter ▶Driver door control ECU ▶Passenger door control ECU ▶Seat control ECU ▶Sliding roof control ECU ▶Back door ECU	Body control system signal (IG signal, ACC signal, All door courtesy lamp signal, Door lock signal, Door unlock signal)	BEAN
Body ECU	▶Combination meter ▶Driver door control ECU ▶Passenger door control ECU ▶Seat control ECU ▶Sliding roof control ECU ▶Back door ECU	Body ECU activation signal	BEAN
Body ECU	▶Combination meter ▶Driver door control ECU ▶Seat control ECU	Body control system signal (KSW signal)	BEAN
Body ECU	▶Combination meter ▶Driver door control ECU ▶Passenger door control ECU ▶Seat control ECU	Door condition signal (Driver side door courtesy lamp signal, Passenger side door courtesy signal)	BEAN

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Driver door control ECU	▶Combination meter ▶Body control ECU ▶Passenger door control ECU ▶Seat control ECU ▶Sliding roof control ECU ▶Back door ECU	Driver door control ECU activation signal	BEAN
Passenger door control ECU	▶Combination meter ▶Body control ECU ▶Driver door control ECU ▶Seat control ECU ▶Sliding roof control ECU ▶Back door ECU	Passenger door control ECU activation signal	BEAN
Sliding roof control ECU	▶Combination meter ▶Body control ECU ▶Driver door control ECU ▶Passenger door control ECU ▶Back door ECU	Sliding roof control ECU activation signal	BEAN
Seat control ECU	▶Combination meter ▶Body control ECU ▶Driver door control ECU ▶Passenger door control ECU	Seat control ECU activation signal	BEAN
Back door ECU	▶Combination meter ▶Body control ECU ▶Driver door control ECU ▶Passenger door control ECU ▶Seat control ECU	Back door control ECU activation signal	BEAN
▶A/C ECU ▶Combination meter ▶Driver door control ECU ▶Passenger door control ECU ▶Seat control ECU ▶Sliding roof control ECU ▶Back door ECU	Back door ECU	Diagnosis tool answer signal	BEAN

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DID8Q–01

SYSTEM DESCRIPTION

1. METER GAUGE AND WARNING/INDICATOR

GAUGE:

Item	Detail
Speedometer	Vehicle speed sensor (Direct line).
Tachometer	ECM transmits engine speed to the meter to display.
ODO/TRIP Meter	Combination meter assy.
Fuel	Displays a fuel level according to a signal from the fuel sender gauge (Direct line).
Water Temperature	Displays engine coolant temperature according to a signal from the ECM (BEAN).
Oil Pressure	Receives a signal from the oil pressure sender (Direct line).
Volt Meter	Displays vehicle voltage according to a voltage from the IG terminal (Direct line).

WARNING/INDICATOR:

HINT:

Combination meter bulb check is performed for 3 seconds after the ignition switch is turned ON.

Item	Detail	List of indicators available for bulb check
O/D OFF	Receives a signal from the ECM (Direct line)	–
TURN	Turns signal switch ON (Direct line)	–
BEAM	Receives a signal from the body ECU (*1), Displays a signal received from the dimmer switch (*2) (Direct line)	–
SECURITY	Receives a set signal from the transponder key ECU and body ECU (Direct line)	–
CHARGE	Receives a malfunction signal from the alternator (Direct line)	◀
AIR BAG	Receives a malfunction signal from the airbag sensor center (Direct line)	◀
D SEAT BELT	Receives the driver seat belt signal (Unfastened) from the seat belt inner front LH (Direct line)	–
DOOR	Open door indicator comes on when a signal is received from the ECU (BEAN) from each door	–
A/T OIL TEMP.	Warning is displayed when the oil temperature is high (Direct line)	◀
BRAKE	Comes on when the parking brake switch is on or the brake fluid level warning switch is on (Direct line)	◀
MIL (CHECK ENGINE)	Receives a malfunction signal from the ECM (Direct line)	◀
FUEL WARNING	Receives the fuel empty signal from the fuel sender gauge (Direct line)	–
ABS	Receives a malfunction signal from the skid control ECU (Direct line)	◀
WASHER	Warning is displayed when the washer level is low (Direct line)	–
CRUISE	Receives a CRUISE on signal or malfunction signal from the ECM (Direct line)	–
VSC TRAC	Receives a malfunction signal from the skid control ECU (Direct line)	◀
VSC (TRAC) OFF	Receives a malfunction signal from the translate ECU (Direct line)	◀
SLIP	Receives a malfunction signal from the translate ECU (Direct line)	◀
4HI	Receives a 4HI signal from the 4WD control ECU (Direct line)	–
CTR DIF LOCK	Receives a DIF LOCK signal from the 4WD control ECU (Direct line)	–
A/T P	Receives a P signal from the park/neutral position switch (Direct line)	–
A/T N	Receives an N signal from the park/neutral position switch (Direct line)	–
A/T D	Receives a D signal from the park/neutral position switch (Direct line)	–
A/T 3	Receives a 3 signal from the park/neutral position switch (Direct line)	–
A/T 2	Receives a 2 signal from the park/neutral position switch (Direct line)	–
A/T L	Receives an L signal from the park/neutral position switch (Direct line)	–

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A/T R	Receives an R signal from the park/neutral position switch (Direct line)	–
TAIL/HEAD	Receives a dimmer signal from the body ECU (BEAN)	–
TIRE PRESSURE	Receives a low tire pressure signal from the tire pressure monitor ECU (Direct line)	◀
4LO	Receives a 4LO signal from the 4WD control ECU (Direct line)	–
MAIN REQD (Blinks)	Blinks when 4,500 miles have been traveled, after ODO/TRIP switch is set (Direct line)	◀
MAIN REQD (Comes on)	Blinks when 5,000 miles have been traveled, after ODO/TRIP switch is set (Direct line)	◀
RSCA OFF	Receives an RSCA OFF signal from the airbag sensor center (Direct line)	◀
HI	Receives a suspension position HI signal from the suspension control ECU (Direct line)	◀
N	Receives a suspension position N signal from the suspension control ECU (Direct line)	◀
LO	Receives a suspension position LO signal from the suspension control ECU (Direct line)	◀
AHC MAN.	Receives a suspension control manual signal from the suspension control ECU (Direct line)	◀

*1: w/ Day time running light

*2: w/o Day time running light

BUZZER:

Item	Detail
Key Reminder	Buzzer is ON: Ignition switch is OFF, key is inserted, and door is open.
Fasten Belt	Buzzer is ON: Ignition switch is ON and seat belt is unfastened.

2. COMBINATION METER IN SEQUOIA HAS THE FOLLOWING FEATURES:

(a) Built–in buzzer for the reminder system (key and seat belt)

(b) Integrated trip and odometer knobs

- ▶ Press and release knob to scroll through trip ”A”, trip ”B”, and odometer features.
- ▶ Press and hold the trip knob to reset trip meter functions.

(c) Oil maintenance indicator

- ▶ When 4,500 miles have been traveled, after the ODO/TRIP switch is set, the maintenance indicator begins to blink for 15 seconds after the ignition switch is turned to the ON position.
- ▶ When 5,000 miles have been traveled, after the ODO/TRIP switch is set, the maintenance indicator comes on.
- ▶ Press and hold the trip knob to reset the oil maintenance indicator.

(d) Rotate knob to adjust interior illumination

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DID8R–01

HOW TO PROCEED WITH TROUBLESHOOTING

1	**Vehicle Brought To Workshop**

NEXT

2	**Customer Problem Analysis (See page DI–1612)**

NEXT

3	**Check Multiplex Communication System (See page DI–1904)**

Check if any DTCs are output.

HINT:

The combination meter of this system is connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.

- **Multiplex Communication System DTC Is Output (Proceed To "MULTIPLEX COMMUNICATION SYSTEM" (See page DI–1892))**
- **No Multiplex Communication System DTC (Go to step 4)**

4	**Problem Symptom Confirmation**

- **Symptom Does Not Occur (Go to step 5)**
- **Symptom Occurs (Go to step 6)**

5	**Symptom Simulation (See page DI–1892)**

NEXT

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6	**Problem Symptoms Table (See page DI–1614)**

NEXT

7	**Circuit Inspection (See page DI–1628 to DI–1658)**

NEXT

8	**Identification of Problem**

NEXT

9	**Repair**

NEXT

10	**Confirmation Test**

NEXT

End

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DID8S–01

CUSTOMER PROBLEM ANALYSIS CHECK

COMBINATION METER SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	**km miles**

Date Problem First Occurred		/ /
Frequency Problem Occurs		◀ Constantly ◀ Sometimes (times per day, month) ◀ Once only
Weather Conditions When Problem Occurred	**Weather**	◀ Fine ◀ Cloudy ◀ Rainy ◀ Snowy ◀ Various/Others
	Outside temperature	◀ Hot ◀ Warm ◀ Cool ◀ Cold (Approx. °F (°C))

Problem Symptom	**Gauge**	▶Malfunction in speedometer
		▶Malfunction in tachometer
		▶Malfunction in engine coolant temperature receiver gauge
		▶Malfunction in fuel receiver gauge
		▶Malfunction in oil pressure receiver gauge
		▶Malfunction in volt meter
	Others	▶Entire combination meter does not operate
		▶Buzzer does not sound (Key reminder warning, Seat belt warning)
		▶Seat belt warning for driver's seat does not operate
		▶Operating light control rheostat does not change light brightness
		▶
		▶
		▶
		▶
		▶
		▶
		▶
		▶

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CUSTOMIZE PARAMETERS

HINT:

The following can be customized.

NOTICE:

- **After confirming whether the items of the customer's request are applicable or not as customized items, perform customization.**
- **Be sure to record the current value before customizing.**
- **When troubleshooting, pay attention as there is a possibility that the function has been set to SMALL through customizing (Example: In case of the symptom in which "The key reminder buzzer operation does not function" is displayed, check that the key reminder buzzer operation is not set to SMALL, then perform troubleshooting).**

METER:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
KEY REMND VOLUM (Key reminder buzzer volume)	LARGE	Function that changes the volume of key reminder buzzer.	LARGE/MEDIUM/SMALL

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DID8U–01

PROBLEM SYMPTOMS TABLE

HINT:

Inspect the related ”Fuse” and ”Relay” before confirming the suspected area as shown in the table below.

MALFUNCTION SYSTEM:

Symptom	Suspected Area	See page
Entire combination meter does not operate.	Refer to troubleshooting procedures	DI–1628
Operating light control rheostat does not change light brightness.	Refer to troubleshooting procedures	DI–1645
Seat belt warning does not operate.	Refer to troubleshooting procedures	DI–1650
Key reminder warning buzzer does not sound.	1. Multiplex communication system 2. Key unlock warning switch circuit 3. Door courtesy lamp switch circuit 4. Combination meter assy	DI–1892 DI–1715 DI–1728 IN–35

METER GAUGES:

Symptom	Suspected Area	See page
Malfunction in speedometer	Refer to troubleshooting procedures	DI–1632
Malfunction in tachometer	Refer to troubleshooting procedures	DI–1636
Malfunction in fuel receiver gauge	Refer to troubleshooting procedures	DI–1640
Malfunction in engine coolant temperature receiver gauge	Refer to troubleshooting procedures	DI–1644
Malfunction in oil pressure receiver gauge	Refer to troubleshooting procedures	DI–1654
Malfunction in volt meter	Refer to troubleshooting procedures	DI–1658

WARNING LIGHTS:

Symptom	Suspected Area	See page
Check engine warning light (MIL) does not come on.	1. ECM 2. Wire harness or connector 3. Combination meter assy	DI–9 – IN–35
Discharge warning light does not come on.	1. ECM 2. Wire harness or connector 3. Combination meter assy	DI–9 – IN–35
Brake warning light does not come on.	1. Skid control ECU 2. Wire harness or connector 3. Combination meter assy	DI–895 – IN–35
ABS warning light does not come on.	1. Skid control ECU 2. Wire harness or connector 3. Combination meter assy	DI–895 – IN–35
SRS warning light does not come on.	1. Airbag sensor assy 2. Wire harness or connector 3. Combination meter assy	DI–1126 – IN–35
Open door warning light does not come on.	1. Door courtesy light switch circuit 2. Wire harness or connector 3. Combination meter assy 4. Body ECU	DI–1728 – IN–35 IN–35
Fuel level warning light does not come on.	1. Refer to troubleshooting 2. Wire harness or connector 3. Combination meter assy	DI–1640 – IN–35
Low oil pressure warning light does not come on.	1. Low oil pressure warning switch 2. Wire harness or connector 3. Combination meter assy	BE–55 – IN–35

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Seat belt warning lamp for driver's seat does not operate.	Refer to troubleshooting procedures	DI–1650
SLIP warning light does not come on.	1. SLIP warning light circuit 2. Wire harness and connector 3. Combination meter assy 4. Skid control ECU	DI–1041 – IN–35 IN–35

INDICATOR LIGHTS:

Symptom	Suspected Area	See page
Turn indicator light does not come on.	1. Turn signal flasher relay 2. Wire harness or connector 3. Combination meter assy	BE–36 – IN–35
High beam indicator light does not come on.	1. Headlight dimmer switch (*1) Headlight dimmer switch circuit (*2) 2. Wire harness or connector 3. Combination meter assy	BE–27 DI–1755 – IN–35
Washer level indicator light does not come on.	1. Washer level warning switch 2. Wire harness or connector 3. Combination meter assy	BE–49 – IN–35
Tire pressure indicator light does not come on.	1. Tire pressure monitor ECU 2. Wire harness or connector 3. Combination meter assy	DI–873 – IN–35
CRUISE main indicator light does not come on.	1. CRUISE main indicator light circuit 2. Cruise main control switch circuit 3. Wire harness or connector 4. Combination meter assy	DI–1557 DI–1561 – IN–35
VSC OFF indicator light does not come on.	1. VSC OFF indicator light circuit 2. Combination meter assy	DI–1048 IN–35
VSC TRAC indicator light does not come on.	1. VSC TRAC indicator light circuit 2. Combination meter assy	DI–1027 IN–35
Security indicator light does not come on.	1. Security indicator light circuit 2. Combination meter assy	DI–1731 IN–35
4HI indicator light does not come on.	1. Wire harness and connector 2. Combination meter assy 3. 4WD control ECU	– IN–35 IN–35
4LO indicator light does not come on.	1. Wire harness and connector 2. Combination meter assy 3. 4WD control ECU	– IN–35 IN–35
CTR DIF LOCK indicator light does not come on.	1. Wire harness and connector 2. Combination meter assy 3. 4WD control ECU	– IN–35 IN–35
Height control indicator lamp does not come on.	1. Height control indicator lamp circuit 2. Combination meter assy	DI–785 IN–35
Height control manual indicator lamp does not come on.	1. Height control manual indicator lamp circuit 2. Combination meter assy	DI–789 IN–35
A/T indicator light does not come on.	1. Park/neutral position switch circuit 2. Wire harness and connector 3. Combination meter assy	DI–576 – IN–35

*1: w/o Day time running light
*2: w/ Day time running light

OTHERS:

Symptom	Suspected Area	See page
All buzzers (key reminder, seat belt) do not operate.	Combination meter assy	IN–35

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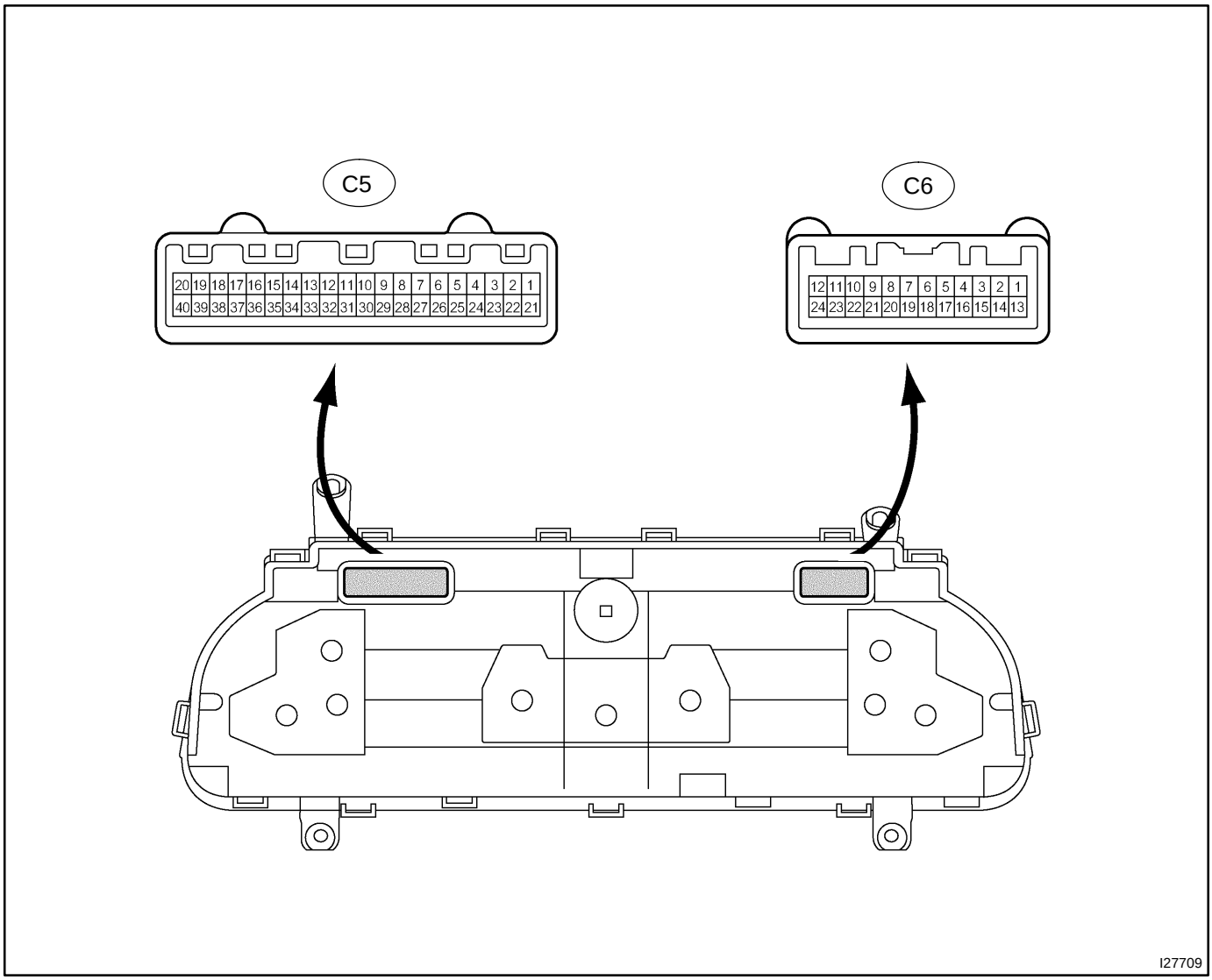
DID8V–01

TERMINALS OF ECU

COMBINATION METER ASSY



(a) Disconnect the C5 and C6 connectors.

(b) Measure the resistance of each terminal of the wire harness side connector.

Standard:

Terminals No.	Wiring Color	Terminal Description	Condition	Specified Condition
C5–5 – Body ground	L–W – Body ground	Compass and garage door opener	Always	Below 1 Ω
C5–6 – Body ground	L–R – Body ground	Compass and garage door opener communication line	Always	Below 1 Ω
C5–30 (*2) – Body ground	W – Body ground	Multiplex communication signal	Always	Below 1 Ω
C5–31 – Body ground	LG–R – Body ground	Multiplex communication signal	Always	Below 1 Ω
C5–32 – Body ground	LG–B – Body ground	Multiplex communication signal	Always	Below 1 Ω

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(c) Reconnect the C5 and C6 connectors.
(d) Measure the voltage of each terminal of the wire harness side connector.
Standard:

Terminals No.	Wiring Color	Terminal Description	Condition	Specified Condition
C5–1 – Body ground	R–B – Body ground	Parking brake signal	Parking brake warning light ON	6.7 to 12 V
C5–1 – Body ground	R–B – Body ground	Parking brake signal	Parking brake warning light OFF	Below 1 V
C5–2 – Body ground	LG–R – Body ground	CRUISE signal	CRUISE indicator light ON	Below 1 V
C5–2 – Body ground	LG–R – Body ground	CRUISE signal	CRUISE indicator light OFF	10 to 14 V
C5–3 – Body ground	B – Body ground	Ignition switch signal (Start)	Ignition switch OFF	Below 1 V
C5–3 – Body ground	B – Body ground	Ignition switch signal (Start)	Ignition switch START	10 to 14 V
C5–4 – Body ground	G–Y – Body ground	Seat belt condition signal (Driver side)	D–BELT indicator light ON	Below 1 V
C5–4 – Body ground	G–Y – Body ground	Seat belt condition signal (Driver side)	D–BELT indicator light OFF	10 to 14 V
C5–13 – Body ground	LG–R – Body ground	Washer level signal	WASH LVL indicator light ON	Below 1 V
C5–13 – Body ground	LG–R – Body ground	Washer level signal	WASH LVL indicator light OFF	10 to 14 V
C5–14 – Body ground	L–O – Body ground	O/D OFF indicator signal	O/D OFF indicator light ON	Below 1 V
C5–14 – Body ground	L–O – Body ground	O/D OFF indicator signal	O/D OFF indicator light OFF	10 to 14 V
C5–15 (*1) – Body ground	Y–R – Body ground	A/T oil temperature signal	A/T OIL TEMP. warning light ON	Below 1 V
C5–15 (*1) – Body ground	Y–R – Body ground	A/T oil temperature signal	A/T OIL TEMP. warning light OFF	10 to 14 V
C5–16 – Body ground	LG–B – Body ground	Security indicator light signal (Engine immobilizer system)	Security indicator light ON	10 to 14 V
C5–16 – Body ground	LG–B – Body ground	Security indicator light signal (Engine immobilizer system)	Security indicator light OFF	Below 1 V
C5–17 – Body ground	GR – Body ground	Security indicator light signal (Theft deterrent system)	Security indicator light ON	10 to 14 V
C5–17 – Body ground	GR – Body ground	Security indicator light signal (Theft deterrent system)	Security indicator light OFF	Below 1 V
C5–18 – Body ground	V–W – Body ground	CHECK ENGINE signal	CHECK ENGINE warning light ON	Below 1 V
C5–18 – Body ground	V–W – Body ground	CHECK ENGINE signal	CHECK ENGINE warning light OFF	10 to 14 V
C5–19 – Body ground	G–B – Body ground	A/T shift position signal (L)	A/T L indicator OFF	Below 1 V

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C5–19 – Body ground	G–B – Body ground	A/T shift position signal (L)	A/T L indicator ON	10 to 14 V
C5–20 – Body ground	GR–L – Body ground	Tire pressure signal	Tire pressure warning light ON	6.7 to 12 V
C5–20 – Body ground	GR–L – Body ground	Tire pressure signal	Tire pressure warning light OFF	Below 1 V
C5–21 – Body ground	R – Body ground	Injector signal	Ignition switch ON	Pulse generation
C5–22 – Body ground	W–G – Body ground	Illumination signal	Light control switch OFF	Below 1 V
C5–22 – Body ground	W–G – Body ground	Illumination signal	Light control switch ON	10 to 14 V
C5–23 – Body ground	Y–G – Body ground	Tachometer signal	Engine running	Pulse generation (see waveform 1)
C5–24 – Body ground	Y – Body ground	Speed signal (Input)	Ignition switch ON and turn the wheel slowly	10 to 14 V ↔ Below 1 V
C5–25 – Body ground	G–O – Body ground	Speed signal (Output)	Ignition switch ON and turn the wheel slowly	Pulse generation (see waveform 2)
C5–26 – Body ground	V – Body ground	Power source for fuel sender gauge	Ignition switch ON, fuel level is FULL	Below 1 V
C5–26 – Body ground	V – Body ground	Power source for fuel sender gauge	Ignition switch ON, fuel level is EMPTY	4 to 7 V
C5–27 – Body ground	L–B – Body ground	Oil pressure signal	Oil pressure warning light ON	Below 1 V
C5–27 – Body ground	L–B – Body ground	Oil pressure signal	Oil pressure warning light OFF	10 to 14 V
C5–28 – Body ground	B–R – Body ground	Injector power signal	Ignition switch ON	10 to 14 V
C5–29 – Body ground	B–Y – Body ground	SRS warning light signal	SRS warning light ON	Below 1 V
C5–29 – Body ground	B–Y – Body ground	SRS warning light signal	SRS warning light OFF	8 to 14 V
C5–33 – Body ground	G–Y – Body ground	Turn signal (R)	Ignition switch ON, turn signal RH indicator OFF	Below 1 V
C5–33 – Body ground	G–Y – Body ground	Turn signal (R)	Ignition switch ON, turn signal RH indicator ON	10 to 14 V
C5–34 – Body ground	L–Y – Body ground	A/T shift position signal (P)	A/T P indicator OFF	Below 1 V
C5–34 – Body ground	L–Y – Body ground	A/T shift position signal (P)	A/T P indicator ON	10 to 14 V
C5–35 – Body ground	B–Y – Body ground	A/T shift position signal (R)	A/T R indicator OFF	Below 1 V
C5–35 – Body ground	B–Y – Body ground	A/T shift position signal (R)	A/T R indicator ON	10 to 14 V
C5–36 – Body ground	G–R – Body ground	A/T shift position signal (N)	A/T N indicator OFF	Below 1 V
C5–36 – Body ground	G–R – Body ground	A/T shift position signal (N)	A/T N indicator ON	10 to 14 V
C5–37 – Body ground	W–R – Body ground	A/T shift position signal (D)	A/T D indicator OFF	Below 1 V

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C5–37 – Body ground	W–R – Body ground	A/T shift position signal (D)	A/T D indicator ON	10 to 14 V
C5–38 – Body ground	L – Body ground	A/T shift position signal (3)	A/T 3 indicator OFF	Below 1 V
C5–38 – Body ground	L – Body ground	A/T shift position signal (3)	A/T 3 indicator ON	10 to 14 V
C5–39 – Body ground	LG – Body ground	A/T shift position signal (2)	A/T 2 indicator OFF	Below 1 V
C5–39 – Body ground	LG – Body ground	A/T shift position signal (2)	A/T 2 indicator ON	10 to 14 V
C5–40 – Body ground	B–R – Body ground	RSCA OFF signal	RSCA OFF indicator light OFF	Below 1 V
C5–40 – Body ground	B–R – Body ground	RSCA OFF signal	RSCA OFF indicator light ON	8 to 14 V
C6–1 – Body ground	W–R – Body ground	SLIP signal	SLIP indicator light ON	Below 1 V
C6–1 – Body ground	W–R – Body ground	SLIP signal	SLIP indicator light OFF	10 to 14 V
C6–2 – Body ground	R–G – Body ground	VSC OFF signal (*1) TRAC OFF signal (*5)	VSC OFF indicator light ON (*1) TRAC OFF indicator light ON (*5)	Below 1 V
C6–2 – Body ground	R–G – Body ground	VSC OFF signal (*1) TRAC OFF signal (*5)	VSC OFF indicator light OFF (*1) TRAC OFF indicator light OFF (*5)	10 to 14 V
C6–3 – Body ground	P–L – Body ground	TRAC signal	VSC/TRAC indicator light ON	Below 1 V
C6–3 – Body ground	P–L – Body ground	TRAC signal	VSC/TRAC indicator light OFF	10 to 14 V
C6–4 – Body ground	BR–Y – Body ground	CTR DIFF LOCK signal	CTR DIFF LOCK indicator light ON	Below 1 V
C6–4 – Body ground	BR–Y – Body ground	CTR DIFF LOCK signal	CTR DIFF LOCK indicator light OFF	10 to 14 V
C6–5 – Body ground	Y–B – Body ground	4HI signal	4HI indicator ON	Below 1 V
C6–5 – Body ground	Y–B – Body ground	4HI signal	4HI indicator OFF	10 to 14 V
C6–6 – Body ground	G–W – Body ground	4LO signal	4LO indicator ON	Below 1 V
C6–6 – Body ground	G–W – Body ground	4LO signal	4LO indicator OFF	10 to 14 V
C6–8 – Body ground	Y – Body ground	Charge signal	Engine running	Below 1 V
C6–8 – Body ground	Y – Body ground	Charge signal	Engine stopped	10 to 14 V
C6–10 – Body ground	Y–R – Body ground	Ground (Speed)	Always	Below 1 V
C6–11 – Body ground	Y–B – Body ground	Ground (Fuel sender gauge)	Always	Below 1 V
C6–12 – Body ground	BR – Body ground	Ground	Always	Below 1 V
C6–13 – Body ground	LG – Body ground	Height control indicator lamp signal (MAN.)	Height control indicator lamp MAN. Indicator light ON	Below 1 V
C6–13 – Body ground	LG – Body ground	Height control indicator lamp signal (MAN.)	Height control indicator lamp MAN. Indicator light OFF	10 to 14 V

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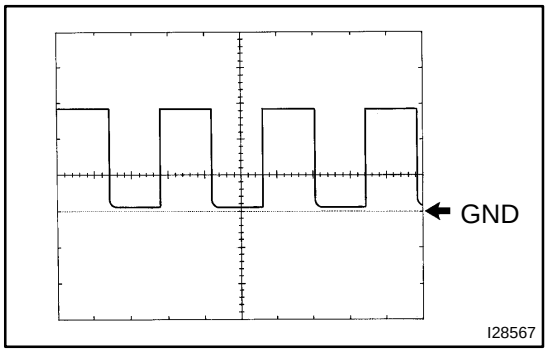
C6–14 – Body ground	P – Body ground	Height control indicator lamp signal (LO)	Height control indicator lamp LO, Indicator light ON	Below 1 V
C6–14 – Body ground	P – Body ground	Height control indicator lamp signal (LO)	Height control indicator lamp LO, Indicator light OFF	10 to 14 V
C6–15 – Body ground	B–L – Body ground	Height control indicator lamp signal (N)	Height control indicator lamp N, Indicator light ON	Below 1 V
C6–15 – Body ground	B–L – Body ground	Height control indicator lamp signal (N)	Height control indicator lamp N, Indicator light OFF	10 to 14 V
C6–16 – Body ground	GR–R – Body ground	Height control indicator lamp signal (HI)	Height control indicator lamp HI, Indicator light ON	Below 1 V
C6–16 – Body ground	GR–R – Body ground	Height control indicator lamp signal (HI)	Height control indicator lamp HI, Indicator light OFF	10 to 14 V
C6–17 (*3) – Body ground	R–G – Body ground	Hi–Beam signal	Hi–Beam OFF	Below 1 V
C6–17 (*3) – Body ground	R–G – Body ground	Hi–Beam signal	Hi–Beam ON	10 to 14 V
C6–18 (*4) – Body ground	GR–L – Body ground	Hi–Beam signal	Hi–Beam OFF	Below 1 V
C6–18 (*4) – Body ground	GR–L – Body ground	Hi–Beam signal	Hi–Beam ON	10 to 14 V
C6–19 – Body ground	G–B – Body ground	Turn signal (L)	Ignition switch ON, turn signal LH indicator OFF	Below 1 V
C6–19 – Body ground	G–B – Body ground	Turn signal (L)	Ignition switch ON, turn signal LH indicator ON	10 to 14 V
C6–21 – Body ground	R–W – Body ground	ABS signal	ABS warning light ON	6.7 to 12 V
C6–21 – Body ground	R–W – Body ground	ABS signal	ABS warning light OFF	Below 1 V
C6–23 – Body ground	W–R – Body ground	Battery	Always	10 to 14 V
C6–24 – Body ground	B–O – Body ground	Ignition switch signal (ON)	Ignition switch OFF	Below 1 V
C6–24 – Body ground	B–O – Body ground	Ignition switch signal (ON)	Ignition switch ON	10 to 14 V

*1: 4WD
*2: w/ Driving position memory
*3: w/o Daytime running light
*4: w/ Daytime running light
*5: 2WD



Waveform 1 (Reference):

Condition	Gauge set
Engine idle speed	5 V/DIV, 10 ms/DIV

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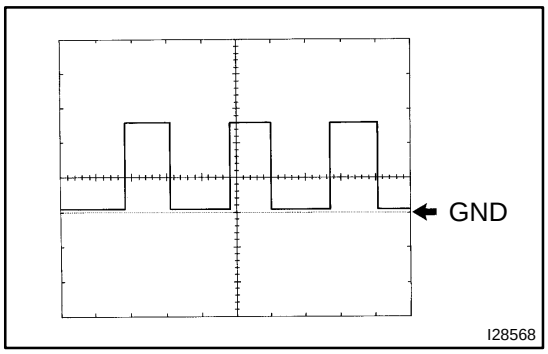

Waveform 2 (Reference):

Condition	Gauge set
Driving at approx. 20 km/h (12 mph)	5 V/DIV, 20 ms/DIV

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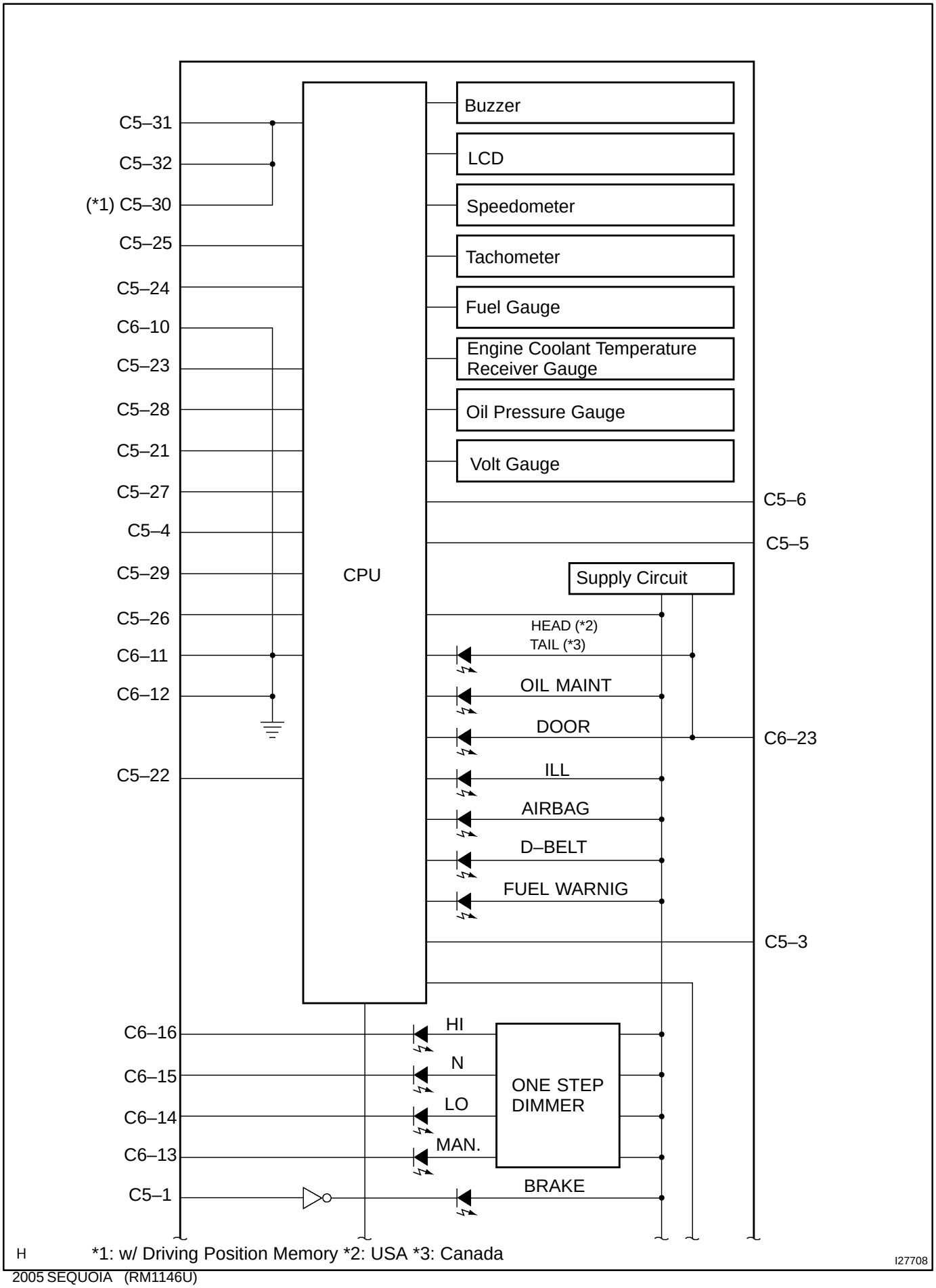
COMBINATION METER INNER CIRCUIT



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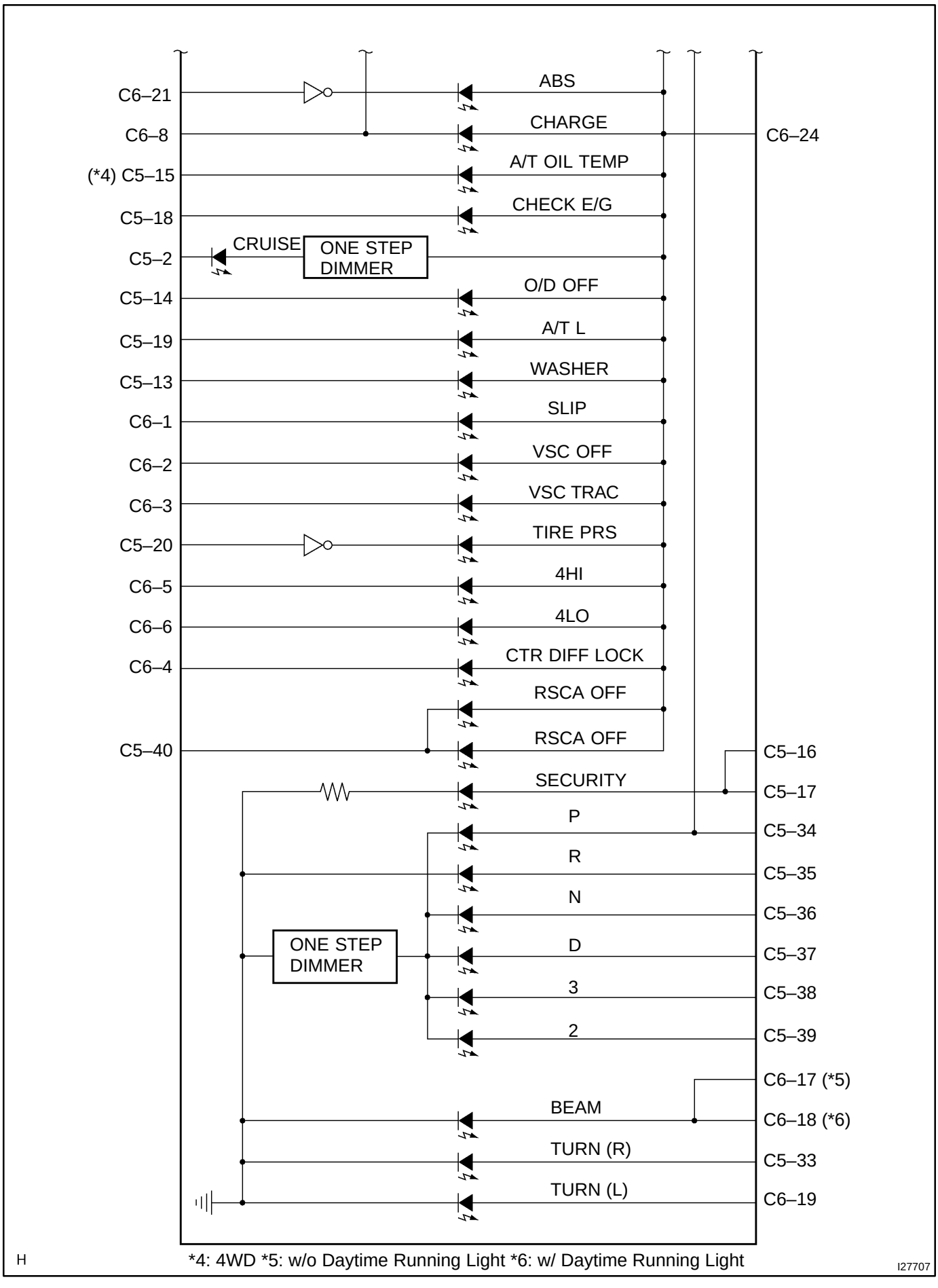

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*4: 4WD *5: w/o Daytime Running Light *6: w/ Daytime Running Light

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Connectors:

Terminal No.		Wire harness side
C5	1	Translate ECU
	2	ECM
	3	STA Fuse
	4	Front Seat Inner Belt LH (Buckle Switch)
	5	Overhead Module (Garage Door Opener)
	6	Overhead Module (Garage Door Opener)
	13	Washer Level Sensor
	14	ECM
	15	ECM (*1)
	16	Transponder Key Computer
	17	Body ECU
	18	ECM
	19	ECM
	20	Tire Pressure Monitor ECU
	21	Injector No. 1
	22	Light Control Rheostat
	23	ECM
	24	Speed Sensor
	25	4P OUT (Other Parts)
	26	Fuel Sender Gauge
	27	Oil Pressure Sender Gauge
	28	IGN Fuse
	29	Airbag Sensor Assembly
	30	Memory Seat ECU and SW (*2)
	31	Back Door ECU
	32	Integration Control and Panel
	33	Turn Signal Flasher Relay
	34	Park/Neutral Position Switch
	35	Park/Neutral Position Switch
	36	Park/Neutral Position Switch
	37	Park/Neutral Position Switch
	38	Park/Neutral Position Switch
	39	Park/Neutral Position Switch
	40	Airbag Sensor Assembly

Terminal No.		Wire harness side
C6	1	Translate ECU
	2	Translate ECU
	3	Skid Control ECU
	4	4WD Control ECU
	5	4WD Control ECU
	6	4WD Control ECU
	8	Alternator
	10	Speed Sensor
	11	Fuel Sender Gauge
	12	Ground
	13	Suspension Control ECU
	14	Suspension Control ECU
	15	Suspension Control ECU
	16	Suspension Control ECU
	17	Body ECU (*4)
	18	Body ECU (*3)
	19	Turn Signal Flasher Relay
	21	Skid Control ECU
	23	ECU–B Fuse
	24	IGN1 Fuse

*1: 4WD
*2: w/ Driving Position Memory
*3: w/ Daytime Running Light
*4: w/o Daytime Running Light

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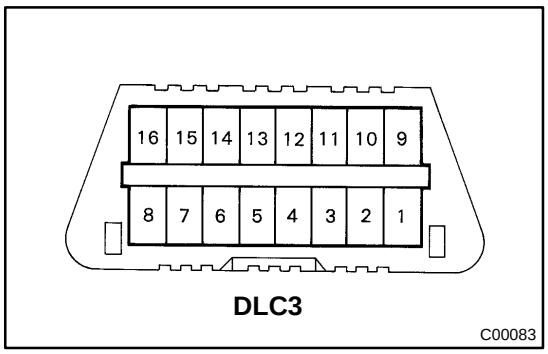
DID8W–01



DLC3

DIAGNOSIS SYSTEM

INSPECT THE DLC3

The vehicle's combination meter ECU uses ISO 9141–2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Tester connection	Condition	Specified condition
7 (Bus ≧ Line) – 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) – Body	Always	Below 1 Ω
5 (Signal Ground) – Body	Always	Below 1 Ω
16 (B+) – Body	Always	10 to 14 V

HINT:

If the display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the hand–held tester to the DLC3, turned the ignition switch to the ON position and operated the tester, there is a problem either on the vehicle side or tester side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

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DID8X–01

DATA LIST / ACTIVE TEST

DATA LIST

According to the DATA LIST displayed by the hand–held tester, you can read the values of the switches, sensors, actuators and so on without part removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand–held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Operate the hand–held tester according to the steps on the display and select ”DATA LIST”.

METER:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SPEED METER	Vehicle Speed Meter / Min.: 0 km/h (0 mph) Max.: 255 km/h (158 mph)	Almost the same as actual vehicle speed (When driving)	—
TACHO METER	Engine RPM / Min.: 0 rpm Max.: 12,750 rpm	Almost the same as actual engine speed (When engine is running)	—
FUEL GAUGE	Fuel Input / Min.: 0 Max.: 255	Tester indication changes according to the fuel receiver gauge angle.	—
LIGHT RHEOSTAT	Light Control Rheostat / Min.: 0 Max.: 255	Light control rheostat switch is Dark (0) → Bright (255)	—
OIL GAUGE	Oil Gauge / Min.: 0 Max.: 255	Tester indication changes according to the oil pressure receiver gauge angle.	—
ODO/TRIP SW	ODO / TRIP ODO/TRIP switch / ON/OFF	ON: Switch is pushed OFF: Switch is released	—

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ACTIVE TEST

Performing the ACTIVE TEST using the hand–held tester allows the meters, indicators and so on to operate without part removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

It is possible to display the DATA LIST on the hand–held tester during the ACTIVE TEST.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) From the display on the tester, perform the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
SPEED METER	Operate speedometer: 0 / 40 (24) / 80 (48) / 120 (72) / 160 (96) / 200 (120) km/h (mph)	The needle position should be within the acceptable tolerance
TACHOMETER	Operate tachometer: 0 rpm / 1,000 rpm / 2,000 rpm / 3,000 rpm / 4,000 rpm / 5,000 rpm / 6,000 rpm / 7,000 rpm	Confirm that the vehicle is stopped and engine is idling.
FUEL GAUGE	Operate fuel gauge: EMPTY, 1/2, FULL	Confirm that the vehicle is stopped and engine is idling.
COOLANT TEMP	Operate engine coolant temperature receiver gauge: HIGH / NORMAL / LOW (OFF)	Confirm that the vehicle is stopped and engine is idling.
D BELT REMIND	Operate driver’s seat belt warning light: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
OPEN DOOR WARN	Operate open door warning light: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
LOW FUEL WARN	Operate fuel level warning light: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
TAILLIGHT INDIC	Operate taillight indicator light: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
HEADLIGHT INDIC	Operate Hi–beam indicator light: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
SRS WARN	Operate SRS warning light: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
ODO/TRIP DISP	Operate ODO/TRIP display: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
KEY REMND BUZZR	Operate key reminder buzzer: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
SEAT BELT BUZZR	Operate driver’s seat belt warning buzzer: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
MAINT REQD	Operate oil maintenance indicator light: OFF / ON	Confirm that the vehicle is stopped and engine is idling.
VOLT METER	Operate volt meter: 9 V / 12 V / 15 V / 18V	Confirm that the vehicle is stopped and engine is idling.
OIL PRESS METER	Operate oil pressure meter: HIGH, 3/4, 1/2, 1/4, LOW (OFF)	Confirm that the vehicle is stopped and engine is idling.

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DID8Y–01

CIRCUIT INSPECTION

Entire combination meter does not operate

CIRCUIT DESCRIPTION

This is the power source circuit of the combination meter.
The combination meter uses BEAN to determine that the ignition switch is in the ACC position or not.
The ST terminal (C5–3) is used as an auxiliary power source to prevent voltage drop when the ignition switch is ON. When the ST terminal circuit is open or shorted, the combination meter illumination may flicker when cranking the engine.

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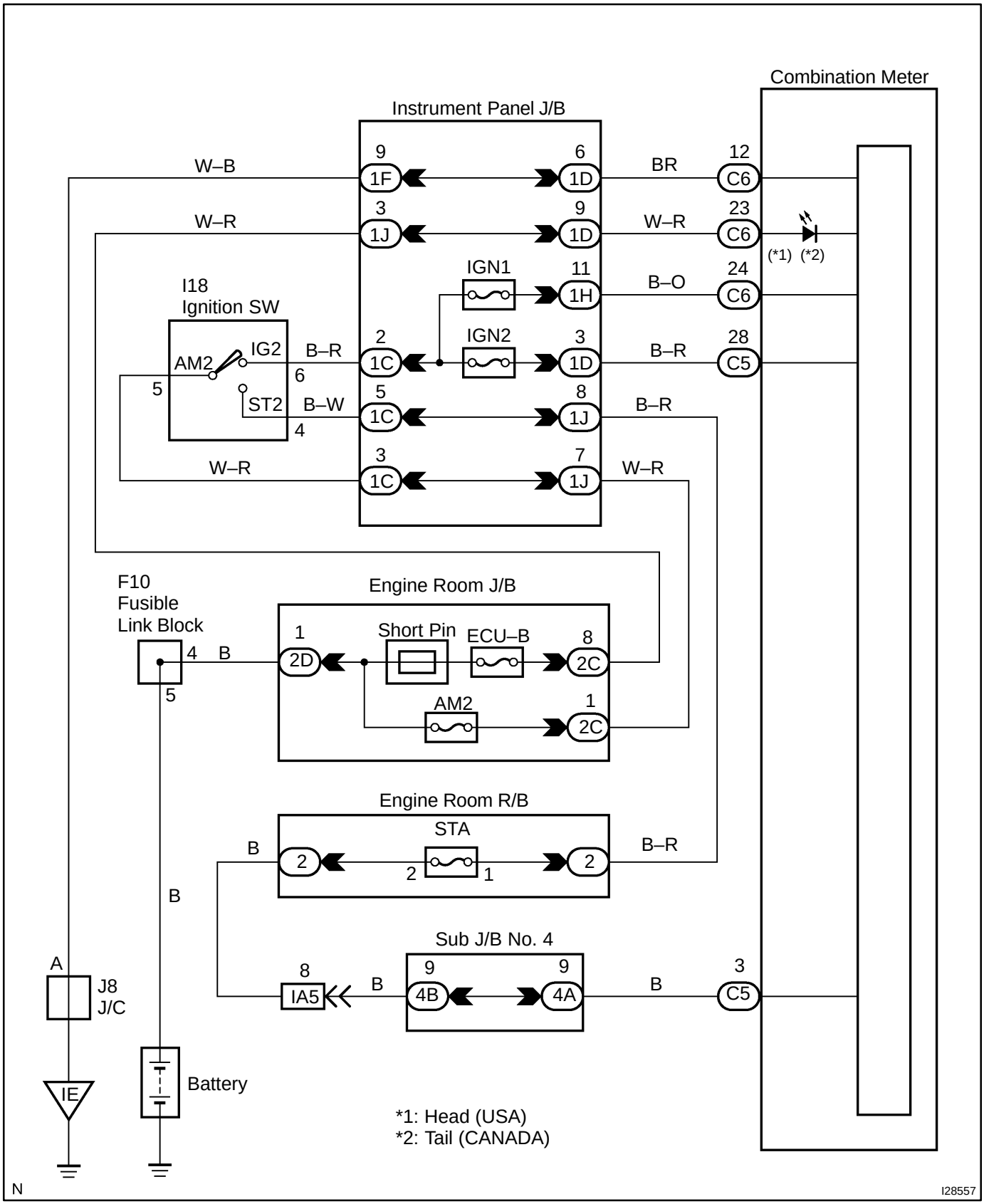
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check fuse.**

CHECK:

Measure the resistance of the IGN2 fuse and IGN1 fuse in the instrument panel J/B.

OK:

Below 1 Ω

CHECK:

Measure the resistance of the STA fuse in the engine room R/B.

OK:

Below 1 Ω

CHECK:

Measure the resistance of the ECU–B fuse and AM2 fuse in the engine room R/B.

OK:

Below 1 Ω

NG → **Inspect for short circuit in harness and all components connected to fuse.**

OK

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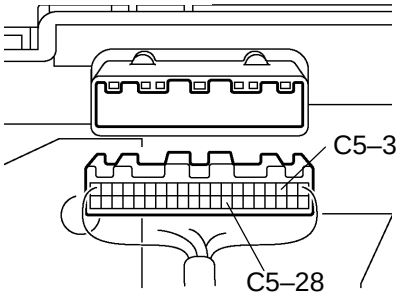
2	Inspect combination meter (Power source).

Combination Meter:



PREPARATION:

Disconnect the combination meter connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Terminal No	Condition	Specified condition
C6–12 – Body ground	Always	Below 1 Ω

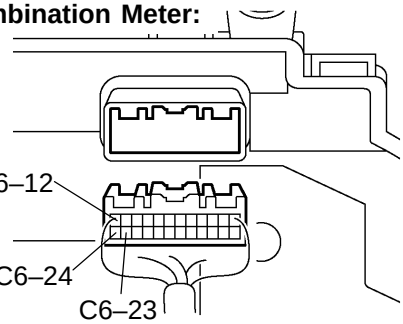
CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Terminal No	Condition	Specified condition
C6–23 – Body ground	Always	10 to 14 V
C5–28 – Body ground	Ignition switch ON	10 to 14 V
C6–24 – Body ground	Ignition switch ON	10 to 14 V
C5–3 – Body ground	Ignition switch ST	10 to 14 V

Combination Meter:



NG → **Repair or replace harness or connector.**

OK →

Replace combination meter (See page IN–35).

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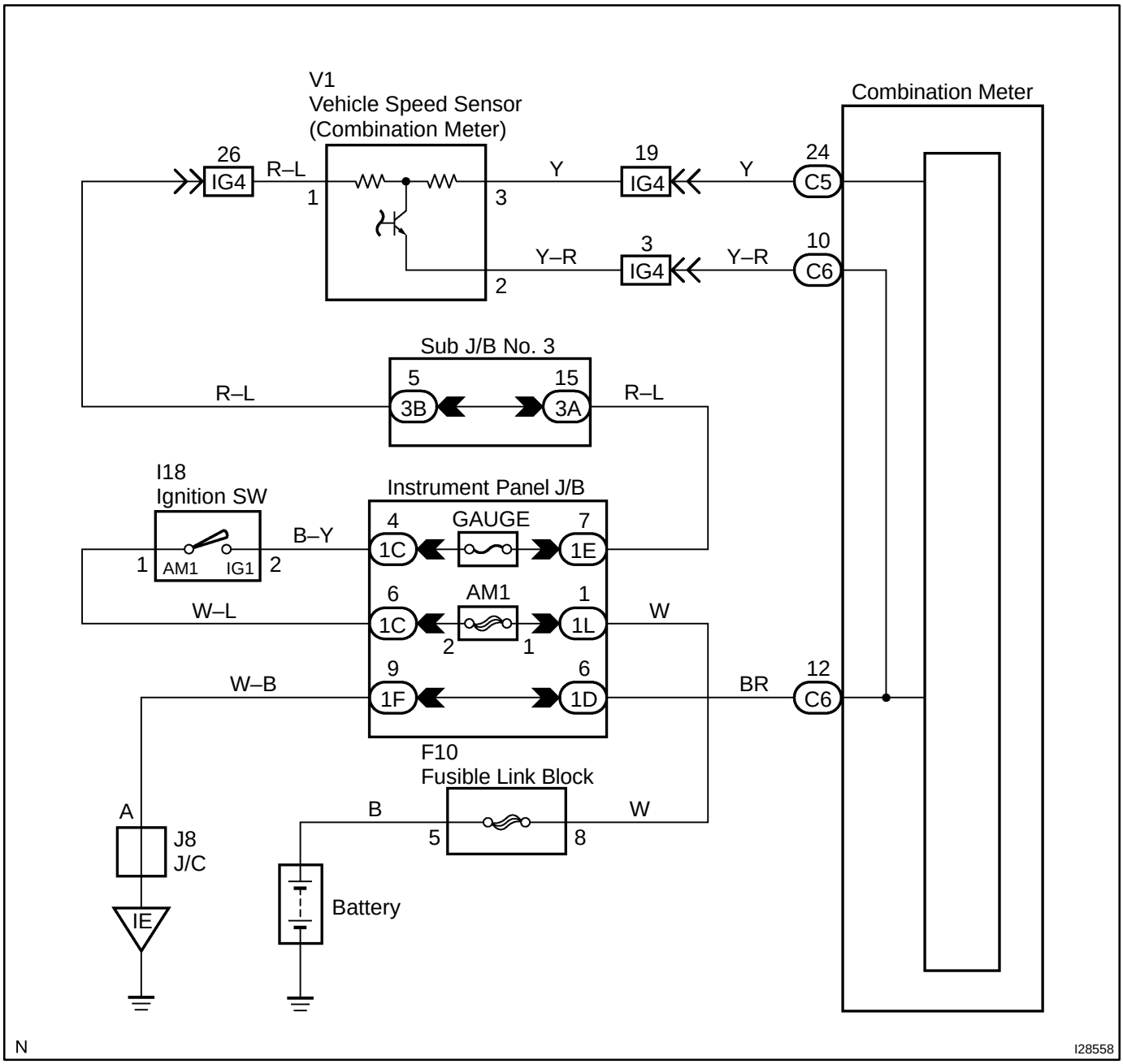
DID8Z–01

Malfunction in speedometer

CIRCUIT DESCRIPTION

The speedometer detects vehicle speed based on a 4–pulse signal from the vehicle speed sensor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 3 when not using the hand–held tester.

1	**Perform active test by hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

From the display on the tester, perform the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
SPEED METER	0 / 40 (24) / 80 (48) / 120 (72) / 160 (96) / 200 (120) km/h (mph)	The needle position should be within the acceptable tolerance.

OK:

Speedometer readings change according to hand–held tester operation.

NG → **Replace combination meter (See page IN–35).**

OK

2	**Read value of hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

Operate the hand–held tester according to the steps on the display and select ”DATA LIST”.

METER:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
SPEED METER	Vehicle Speedometer / Min.: 0 km/h (0 mph) Max.: 255 km/h (158 mph)	Almost the same as actual vehicle speed (When driving)	—

OK:

Vehicle speed displayed on the tester is almost the same as the actual vehicle speed.

OK → **Replace combination meter (See page IN–35).**

NG

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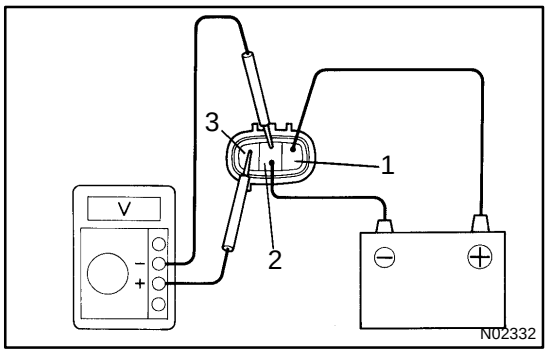
3	Inspect vehicle speed sensor.



PREPARATION:

(a) Disconnect the vehicle speed sensor connector.
(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2.
(c) Connect the positive (+) lead from the tester to terminal 3 and the negative (–) lead to terminal 2.
(d) Rotate the shaft.

CHECK:

Check that voltage between terminals 2 and 3 changes from approx. 0 V to16 V or more.

OK:

Voltage changes from approx. 0 V to 16 V

HINT:

The voltage should change 4 times for every revolution of the speed sensor shaft.

NG	Replace vehicle speed sensor.

OK

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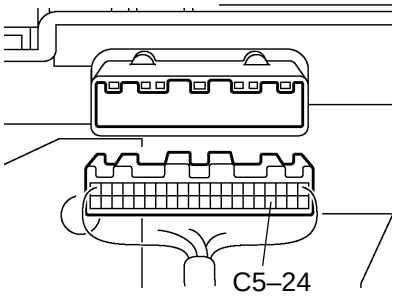
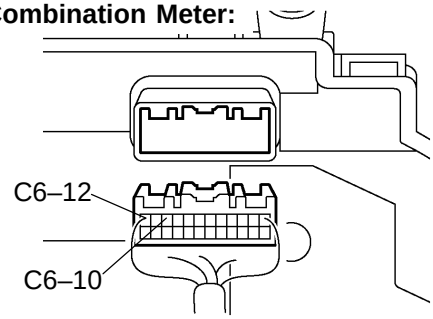
4	**Check harness and connector (Vehicle speed sensor – combination meter and vehicle speed sensor – battery).**

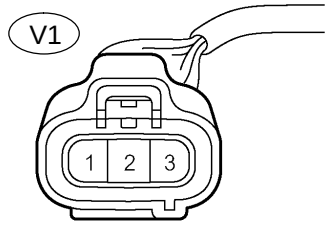
Combination Meter:



Combination Meter:



Vehicle Speed Sensor Wire Harness Side:



PREPARATION:

Disconnect the combination meter connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
C5–24 – V1–3	Always	Below 1 Ω
C6–10 – V1–2	Always	Below 1 Ω
C6–12 – Body ground	Always	Below 1 Ω
C5–24 – Body ground	Always	10 kΩ or higher
C6–10 – Body ground	Always	10 kΩ or higher

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
V1–1 – Body ground	Ignition switch OFF	Below 1 V
V1–1 – Body ground	Ignition switch ON	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

Replace combination meter (See page IN–35).

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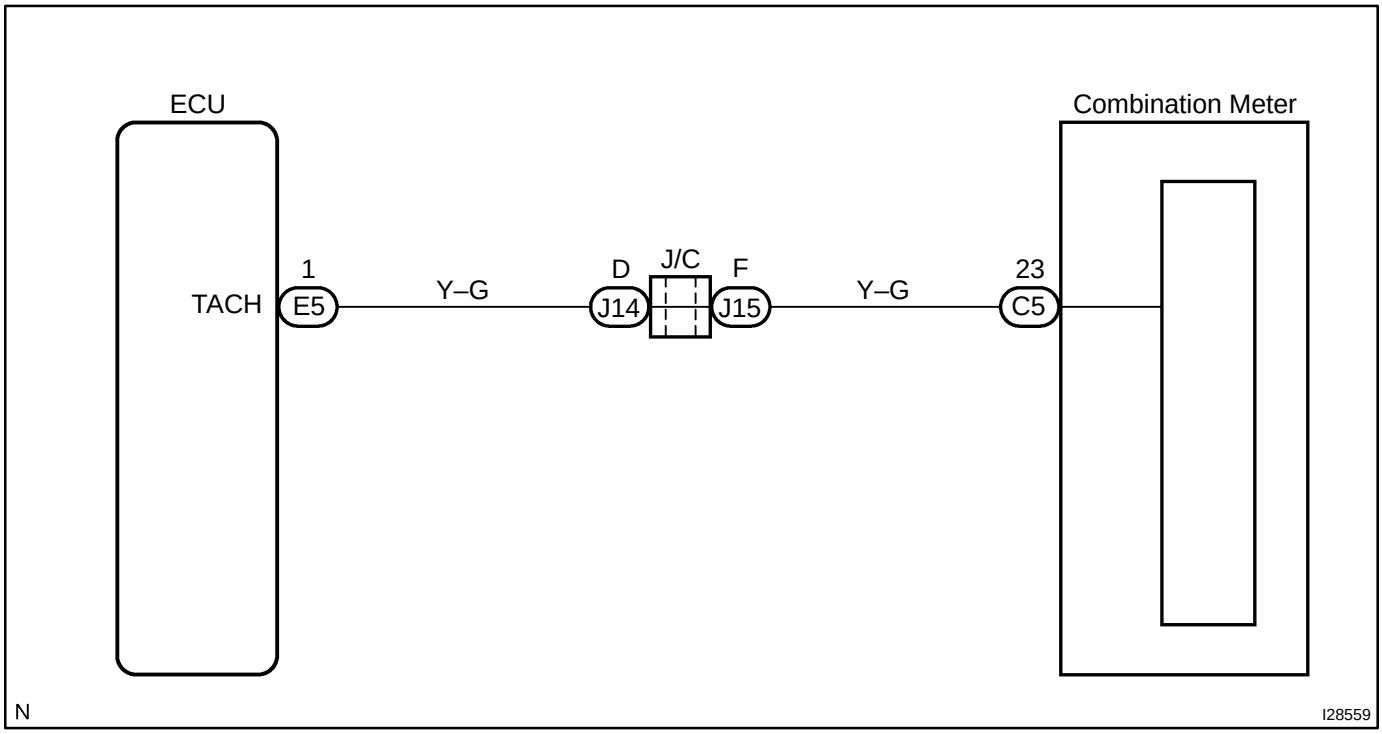
DID90–01

Malfunction in tachometer

CIRCUIT DESCRIPTION

The indication on the tachometer is based on information that the ECM receives from the crankshaft position sensor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 3 when not using the hand–held tester.

1	**Perform active test by hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON, and push the hand–held tester main switch ON.

CHECK:

From the display on the tester, perform the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
TACHOMETER	0 rpm / 1,000 rpm / 2,000 rpm / 3,000 rpm / 4,000 rpm / 5,000 rpm / 6,000 rpm / 7,000 rpm	Confirm that the vehicle is stopped and engine is idling.

OK:

Tachometer readings change according to hand–held tester operation.

NG → **Replace combination meter (See page IN–35).**

OK

2	**Read value of hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

Operate the hand–held tester according to the steps on the display and select ”DATA LIST”.

METER:

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
TACHO METER	Engine RPM / Min.: 0 rpm Max.: 12,750 rpm	Almost the same as actual engine speed (When engine is running)	—

OK:

Engine speed displayed on the tester is almost the same as the actual engine speed.

OK → **Replace combination meter (See page IN–35).**

NG

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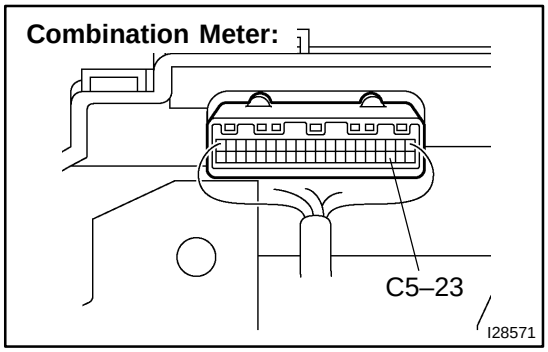
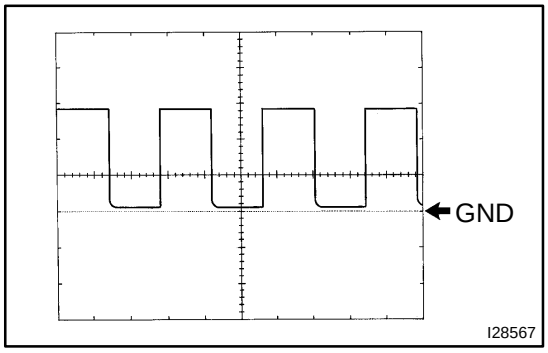
3	Inspect combination meter.





PREPARATION:

(a) Check the input signal waveform.
  (1) Remove the combination meter with the connectors connected.
  (2) Connect the oscilloscope to terminal C5–23 and body ground.
  (3) Start the engine.

CHECK:

Check signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	5 V/DIV, 10 ms/DIV
Vehicle condition	Engine idle speed

OK:

Waveform appears as shown in the illustration.

HINT:

As engine speed increases, the cycle of the signal waveform narrows.

OK	Replace combination meter (See page IN–35).

NG

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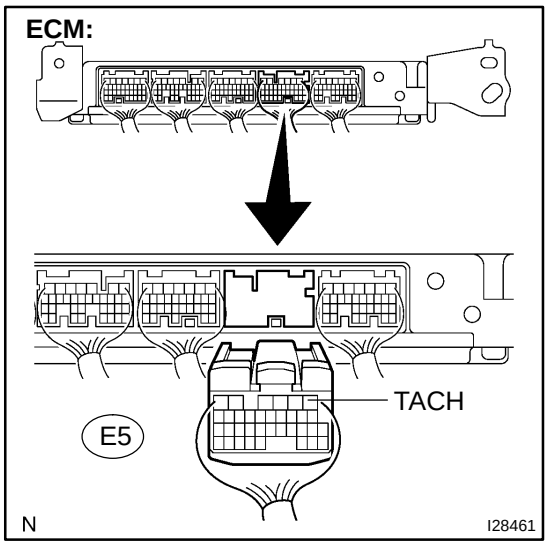
4	Check harness and connector (ECM – combination meter).



PREPARATION:

(a) Disconnect the C5 connector of the combination meter.

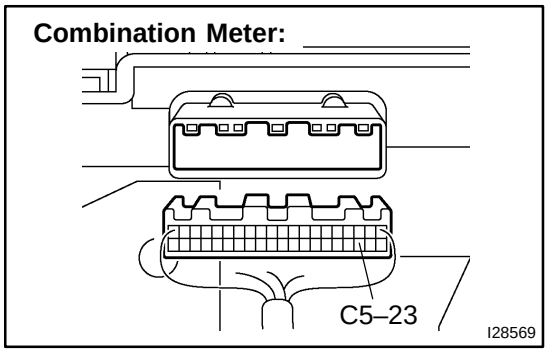
(b) Disconnect the E5 connector of the ECM.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection (Symbol)	Specified Condition
C5–23 – E5–1 (TACH)	Below 1 Ω
C5–23 – Body ground	10 kΩ or higher



NG → **Repair or replace harness or connector.**

OK →

Replace ECM (See page IN–35).

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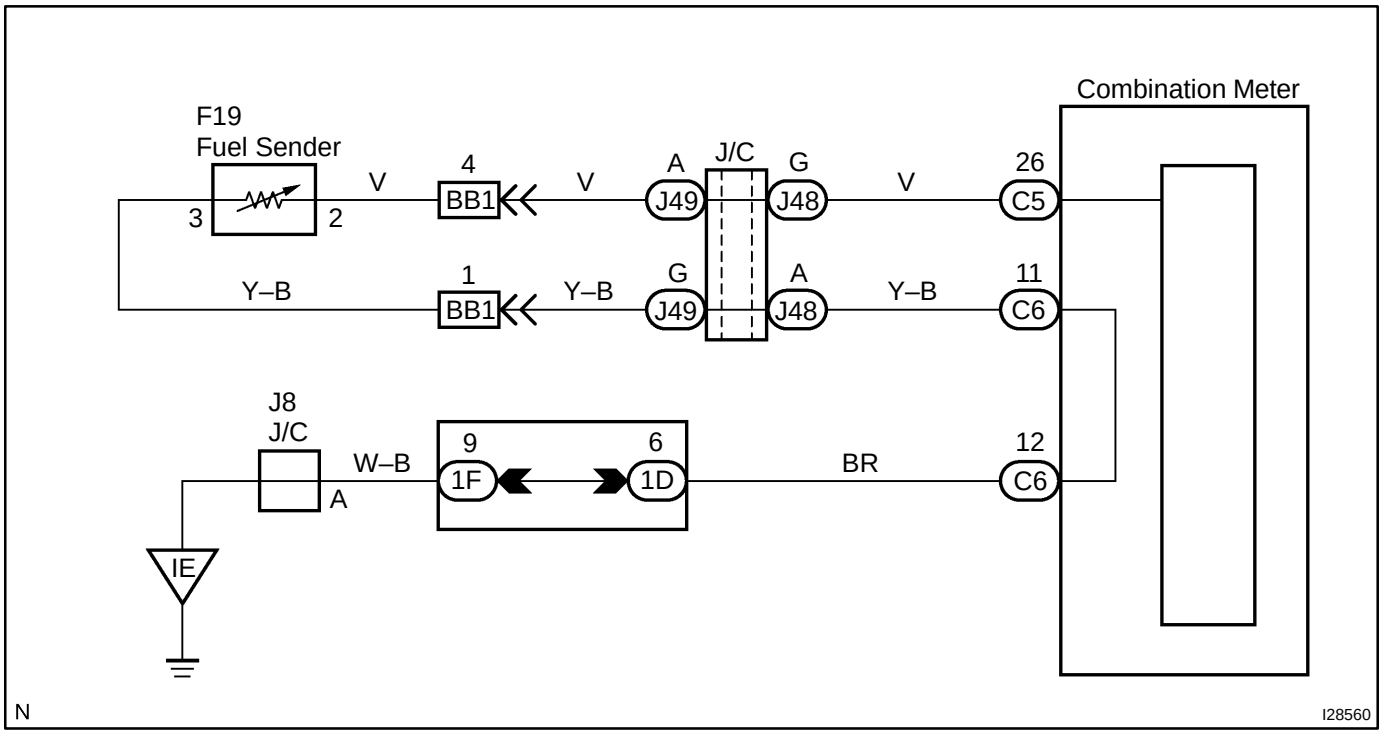
DID91–01

Malfunction in fuel receiver gauge

CIRCUIT DESCRIPTION

The fuel sender has a variable resistance mechanism. The resistance decreases when the fuel amount increases, and the resistance increases when the fuel amount decreases.
The fuel receiver gauge changes based on the resistance of the fuel sender.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 3 when not using the hand–held tester.

1	**Perform active test by hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

From the display on the tester, perform the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
FUEL GAUGE	EMPTY, 1/2, FULL	Confirm that the vehicle is stopped and engine is idling.

OK:

Fuel receiver gauge readings change according to hand–held tester operation.

NG → **Replace combination meter (See page IN–24).**

OK

2	**Read value of hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

Operate the hand–held tester according to the steps on the display and select ”DATA LIST”.

METER:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
FUEL GAUGE	Fuel Input / Min.: 0 Max.: 255	Tester indication changes according to the fuel receiver gauge angle.	—

OK:

Fuel value signal displayed on the tester is almost the same as the needle indication.

NG → **Replace combination meter (See page IN–24).**

OK

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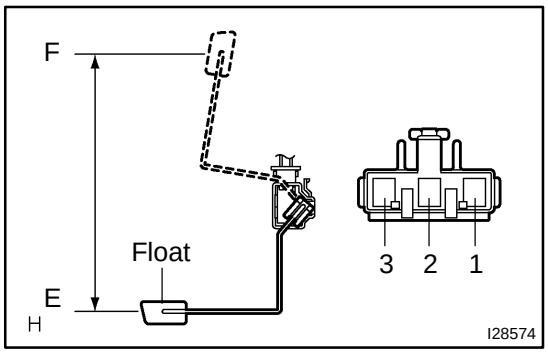
3	Inspect fuel receiver gauge.



PREPARATION:

Remove the fuel sender gauge assy.

CHECK:

(a) Measure the resistance between terminals 2 and 3 of the connector according to the value(s) in the table below.

OK:

Float level	Specified condition
F	3 to 5 Ω
E	107.5 to 112.5 Ω

NG → **Replace fuel sender gauge.**

OK

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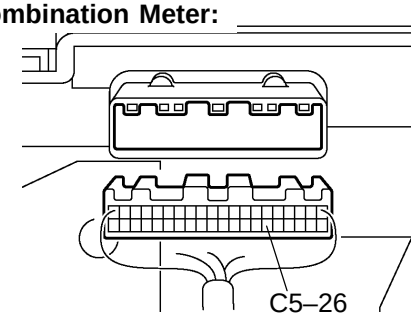
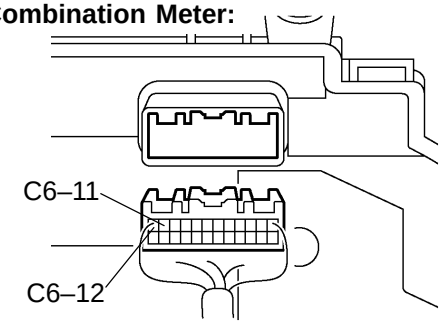
4	Check harness and connector (Fuel sender gauge – combination meter).

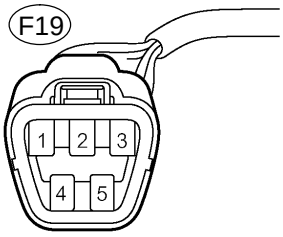
Combination Meter:



Combination Meter:



Fuel Sender Gauge Connector Front View:



PREPARATION:

Disconnect the combination meter connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
C5–26 – F19–2	Always	Below 1 Ω
C6–11 – F19–3	Always	Below 1 Ω
C6–12 – Body ground	Always	Below 1 Ω
C5–26 – Body ground	Always	10 kΩ or higher
C6–11 – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Replace combination meter (See page IN–35).

Dardoor.com

DID92–01

Malfunction in engine coolant temperature receiver gauge

CIRCUIT DESCRIPTION

The ECM receives an engine coolant temperature signal from the engine coolant temperature sensor and sends it to the A/C ECU.
The combination meter receives the signal from the A/C ECU through multiplex communication. Therefore, if a malfunction occurs in the engine coolant temperature receiver gauge, there may be a malfunction in the multiplex communication system, air conditioning system, or engine system.
(Multiplex communication system: See page DI–1892)
(Air conditioning system: See page DI–2301)
(Engine system: See page DI–9)

INSPECTION PROCEDURE

1	**Perform active test by hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.
CHECK:
From the display on the tester, perform the ”ACTIVE TEST”.
METER:

Item	Test Details	Diagnostic Note
COOLANT TEMP	HIGH / NORMAL / LOW (OFF)	Confirm that the vehicle is stopped and engine is idling.

OK:

Engine coolant temperature receiver gauge readings change according to hand–held tester operation.

OK → **Go to engine system or air conditioning system (See page DI–9 or DI–2301).**

NG

Replace combination meter (See page IN–35).

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DID93–01

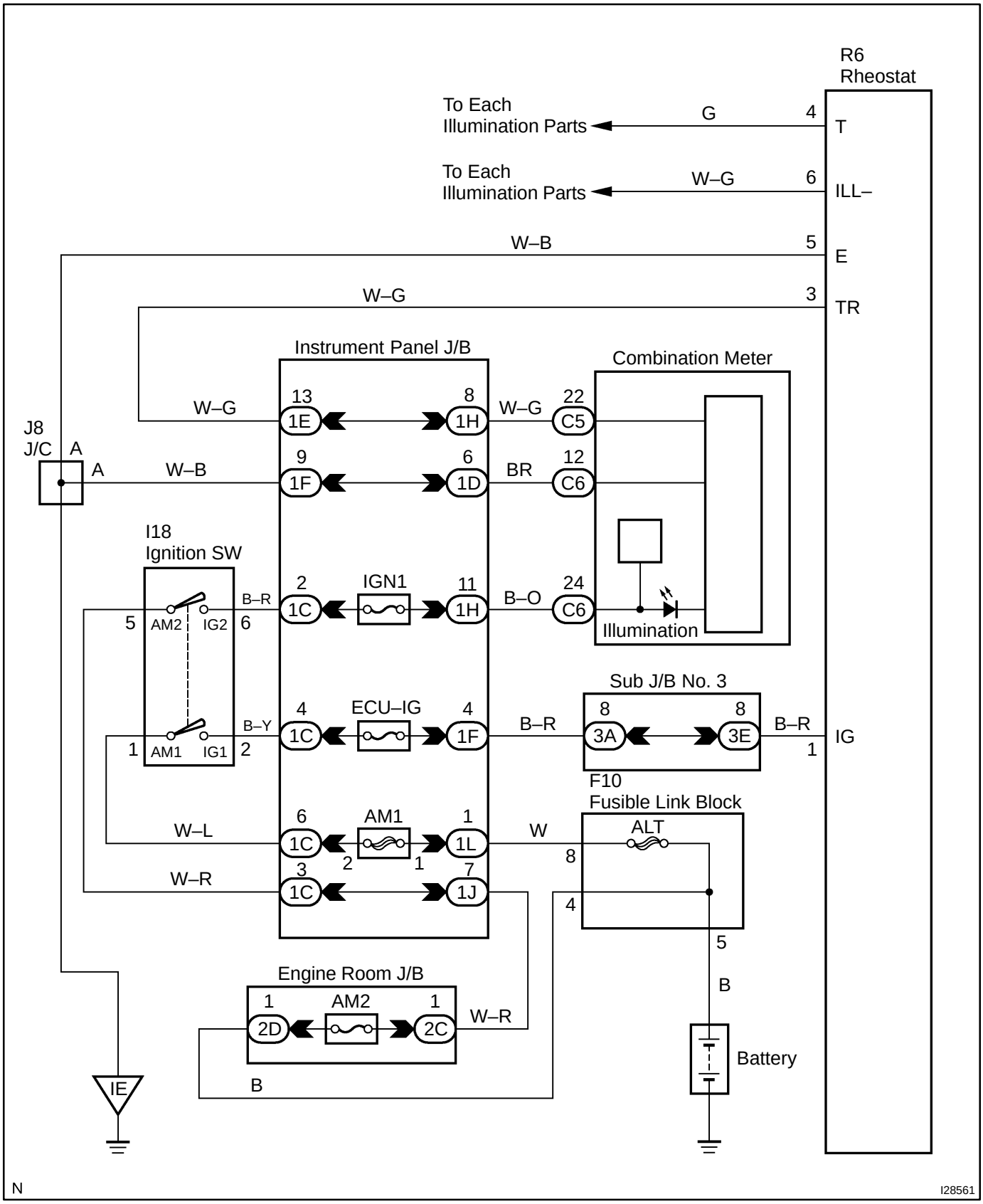
Operating light control rheostat does not change light brightness

CIRCUIT DESCRIPTION

Illumination intensity of the meter is increased by turning the knob of the light control rheostat switch clockwise, and it is decreased by turning the knob counterclockwise.

Dardoor.com

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	**Read value of hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

Operate the hand–held tester according to the steps on the display and select ”DATA LIST”.

METER:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
LIGHT RHEOSTAT	Light Control Rheostat / Min.: 0 Max.: 255	Light control rheostat switch is Dark (0) → Bright (255)	—

OK:

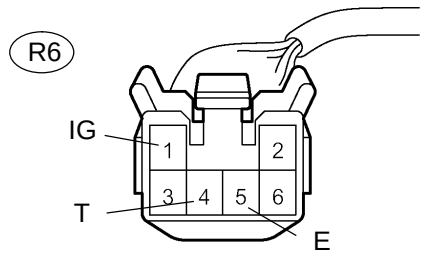
Light brightness can be changed within the specified range by manual operation.

OK → **Replace combination meter. (See page IN–35)**

NG

2	**Check harness and connector (Power source circuit).**

Wire Harness Connector Front View:



PREPARATION:

Disconnect the R6 light control rheostat switch connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Terminal No. (Symbol)	Condition	Specified condition
R6–5 (E) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Terminal No. (Symbol)	Condition	Specified condition
R6–4 (T) – Body ground	Light control switch TAIL or HEAD	10 to 14 V
R6–1 (IG) – Body ground	Ignition switch ON	10 to 14 V

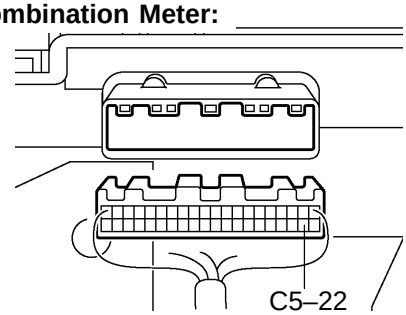
NG → **Repair or replace harness or connector.**

OK

Dardoor.com

3	Check harness and connector (Light control rheostat switch – combination meter).

Combination Meter:



PREPARATION:

Disconnect the C5 and E4 connectors of the combination meter.

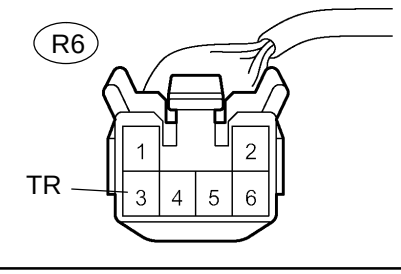
CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection (Symbol)	Specified Condition
C5–22 – R6–3 (TR)	Below 1 Ω
C5–22 – Body ground	10 kΩ or higher

Light Control Rheostat Switch Wire Harness Front View:

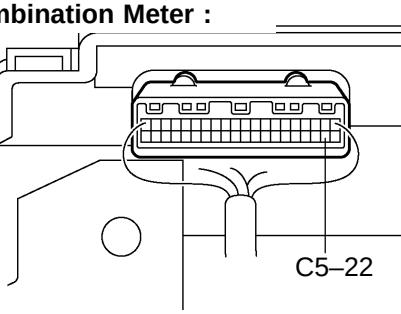


NG → **Repair or replace harness or connector.**

OK

4	Inspect combination meter.

Combination Meter :



PREPARATION:

Reconnect the combination meter connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

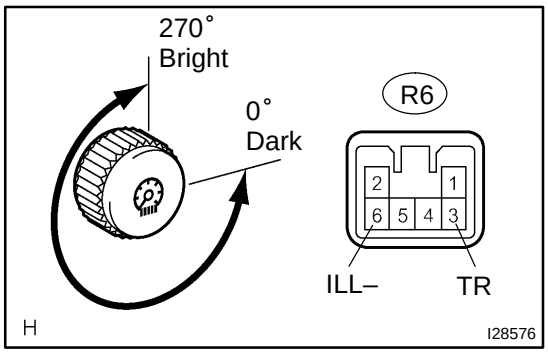
Tester connection	Condition	Specified condition
C5–22 – Body ground	Ignition switch ON, light control switch OFF → ON	Below 1 V → 10 to 14 V

NG → **Replace combination meter (See page IN–35).**

OK

Dardoor.com

5	Inspect light control rheostat switch.



PREPARATION:

(a) Reconnect the light control rheostat switch connector.
(b) Turn the ignition switch ON.
(c) Turn the light control switch to the TAIL or HEAD position.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
R6–3 (TR) – Body ground	Rheostat knob turned fully counterclockwise → fully clockwise	Below 1 V → 10 to 14 V
R6–6 (ILL–) – Body ground	Rheostat knob turned fully counterclockwise → fully clockwise	Below 1 V → 10 to 14 V

NG → **Replace light control rheostat switch.**

OK →

Replace combination meter (See page IN–35).

Dardoor.com

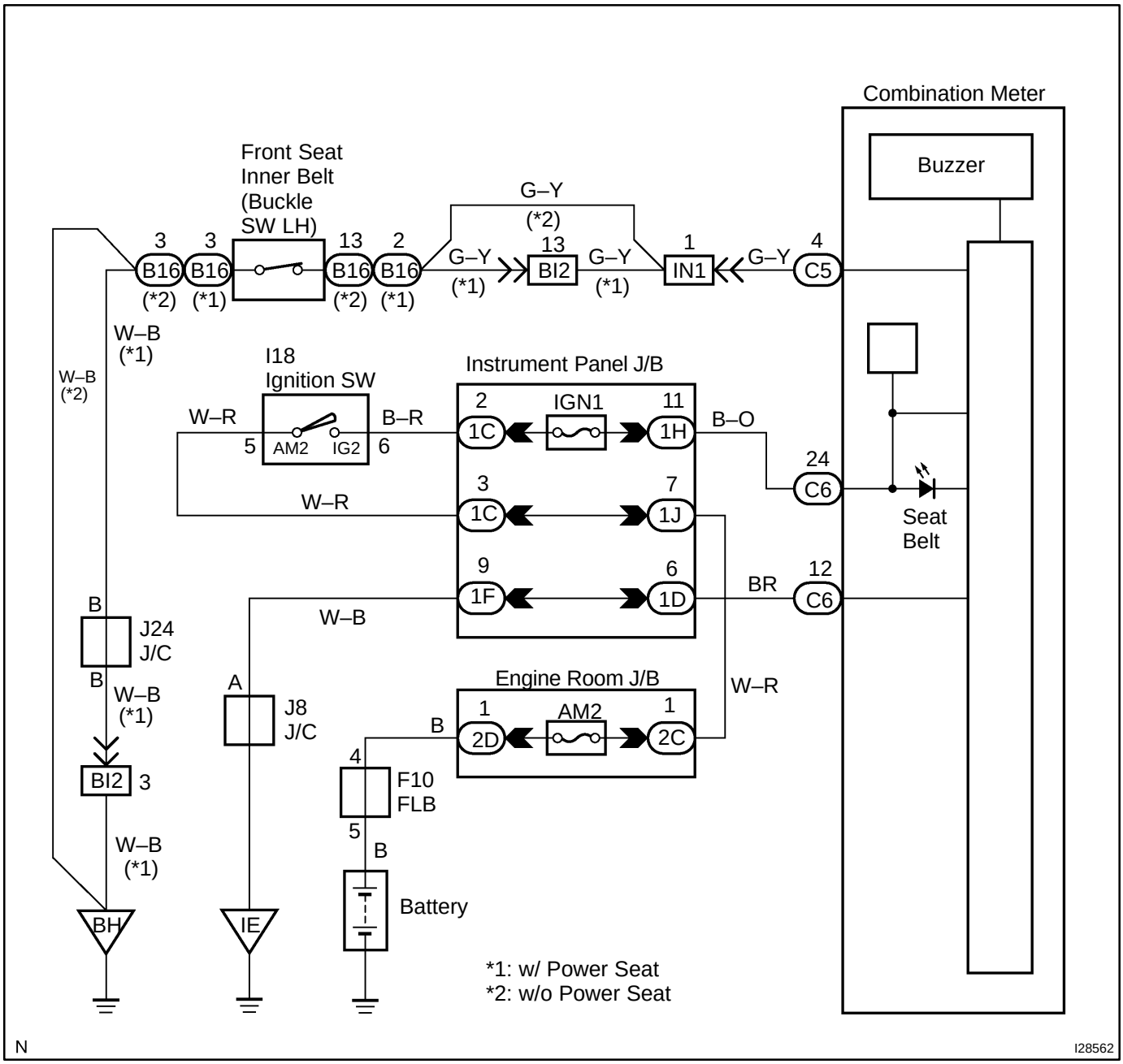
DID94–01

Seat belt warning for driver's seat does not operate

CIRCUIT DESCRIPTION

A buzzer and indicator are included in the seat belt warning system. When the ignition switch is ON and the seat belt on the driver side is not fastened, both the buzzer and indicator operate.
The buzzer and indicator are built into the combination meter.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Perform active test by hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

From the display on the tester, perform the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
SEAT BELT BUZZR	OFF / ON	Confirm that the vehicle is stopped and engine is idling.
D BELT REMIND	OFF / ON	Confirm that the vehicle is stopped and engine is idling.

OK:

Switch condition (ON/OFF) can be switched by ACTIVE TEST.

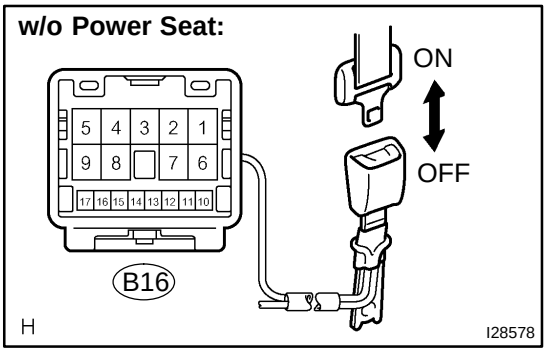
NG → **Replace combination meter (See page IN–35).**

OK

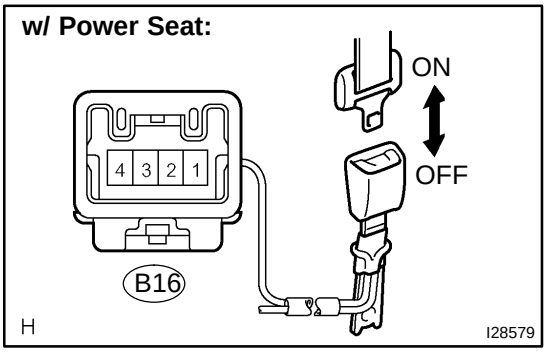
Dardoor.com

2	Inspect front seat inner belt (Driver side).

w/o Power Seat:



w/ Power Seat:



PREPARATION:

Disconnect the connector from the front seat inner belt assy (Driver Side).

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Terminal No.	Condition	Specified condition
(*1) B16–3 – B16–13	Seat belt is fastened	10 kΩ or higher
(*1) B16–3 – B16–13	Seat belt is unfastened	Below 1 Ω
(*2) B16–2 – B16–3	Seat belt is fastened	10 kΩ or higher
(*2) B16–2 – B16–3	Seat belt is unfastened	Below 1 Ω

*1: w/o Power Seat

*2: w/ Power Seat

NG → **Replace front seat inner belt (Driver side).**

OK

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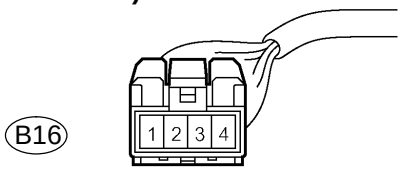
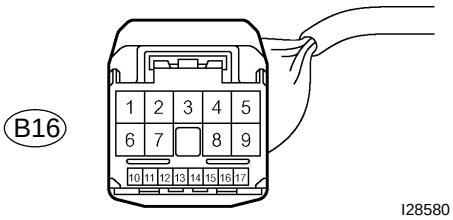
3	**Check harness and connector (Front seat inner belt – combination meter and front seat inner belt – body ground).**

Front Seat Inner Belt:
(w/ Power Seat)



(w/o Power Seat)



PREPARATION:

Disconnect the C5 connector of the combination meter.

CHECK:

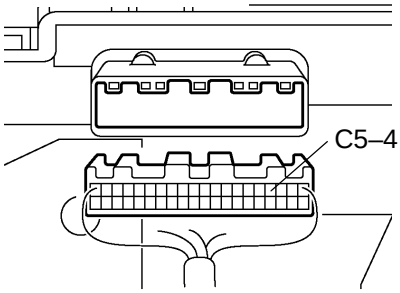
Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
C5–4 – B16–2 (*1)	Below 1 Ω
C5–4 – B16–13 (*2)	Below 1 Ω
B16–3 – Body ground	Below 1 Ω
C5–4 – Body ground	10 kΩ or higher

*1: w/ Power Seat
*2: w/o Power Seat

Combination Meter:



NG → **Repair or replace harness or connector.**

OK

Replace combination meter
(See page IN–35).

Dardoor.com

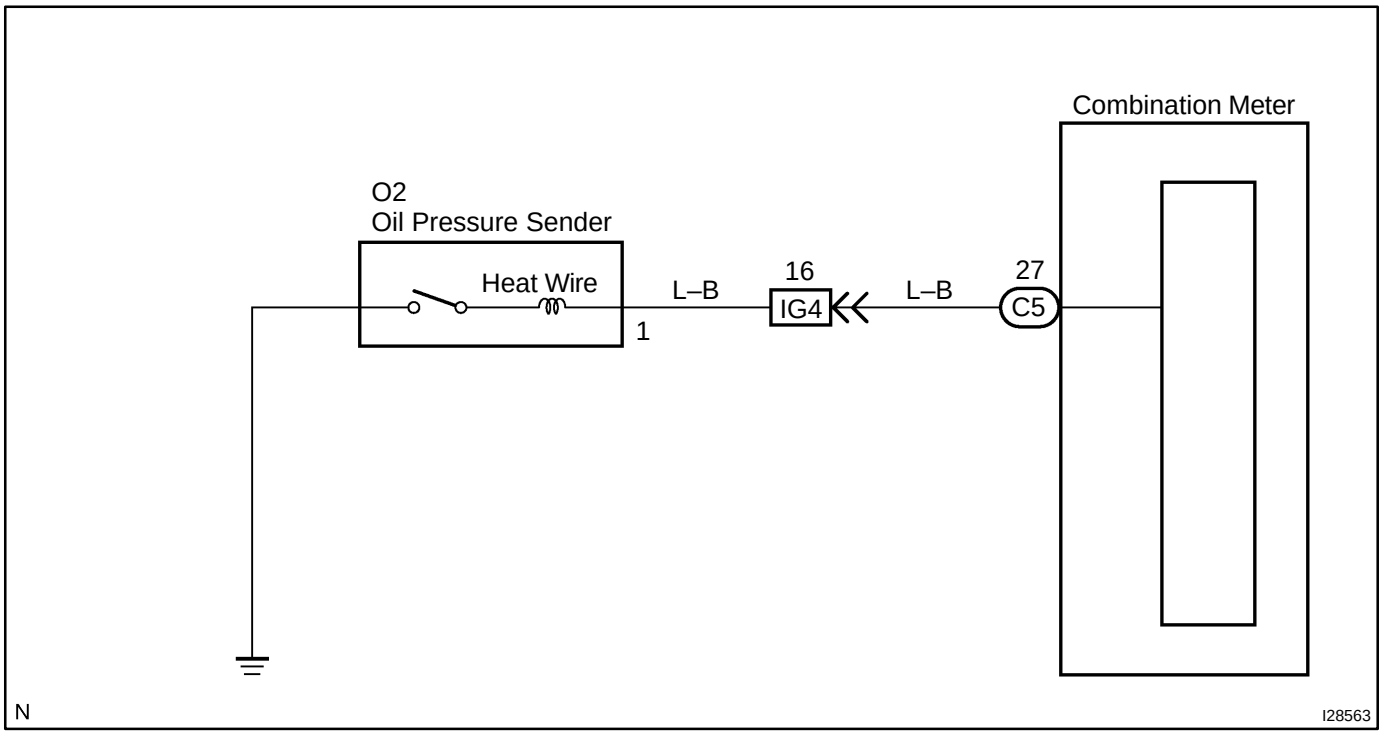
DID95–01

Malfunction in oil pressure receiver gauge

CIRCUIT DESCRIPTION

The oil pressure sender detects the oil pressure generated by engine start.
The combination meter determines that the engine is on when the engine revolution is 400 rpm or more, and determines that the engine is off when the engine revolution is 200 rpm or less.
The oil pressure receiver gauge detects and indicates the oil pressure applied to the oil pressure sender.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 3 when not using the hand–held tester.

1	**Perform active test by hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

From the display on the tester, perform the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
OIL PRESS METER	HIGH, 3/4, 1/2, 1/4, LOW (OFF)	Confirm that the vehicle is stopped and engine is idling.

OK:

Oil pressure receiver gauge readings change according to hand–held tester operation.

NG → **Replace combination meter (See page IN–35).**

OK

Dardoor.com

2	Read value of hand–held tester.

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

Operate the hand–held tester according to the steps on the display and select ”DATA LIST”.

METER:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
OIL GAUGE	Oil Gauge / Min.: 0 Max.: 255	Tester indication changes according to the oil pressure receiver gauge angle.	—

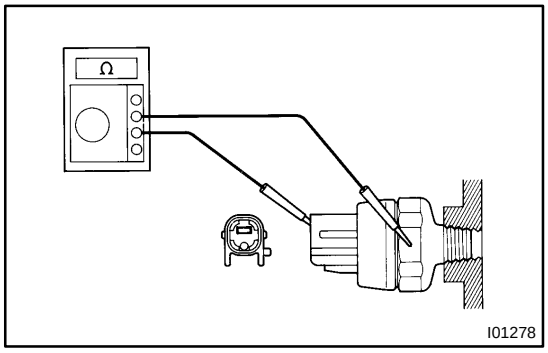
OK:

Oil pressure displayed on the tester is almost the same as the actual oil pressure.

OK → **Replace combination meter. (See page IN–35)**

NG

3	Inspect oil pressure sender gauge.



PREPARATION:

Disconnect the connector from the oil pressure sender.

CHECK:

(a) Check that no continuity exists between the terminal and ground with the engine stopped.

(b) Check that continuity exists between the terminal and ground with the engine running.

HINT:

Oil pressure should be over 24.5 kPa (0.25 kgf/cm^2, 3.55 psi).

OK:

When engine is stopped:
No continuity
When engine is running:
Continuity

NG → **Replace oil pressure sender gauge.**

OK

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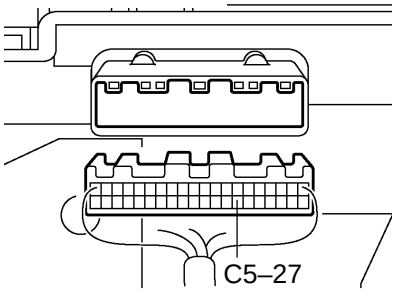
4	Check harness and connector (Oil pressure sender gauge – combination meter).

Combination Meter:



PREPARATION:

Disconnect the C5 connector of the combination meter.

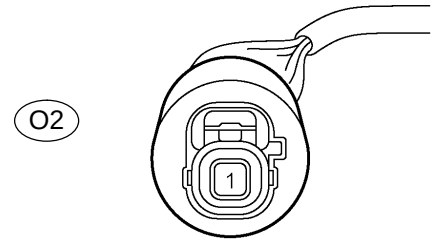
CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester Connection	Specified Condition
C5–27 – O2–1	Below 1 Ω
C5–27 – Body ground	10 kΩ or higher

Oil Pressure Sender Gauge Wire Harness:



NG → **Repair or replace harness or connector.**

OK →

Replace combination meter (See page IN–35).

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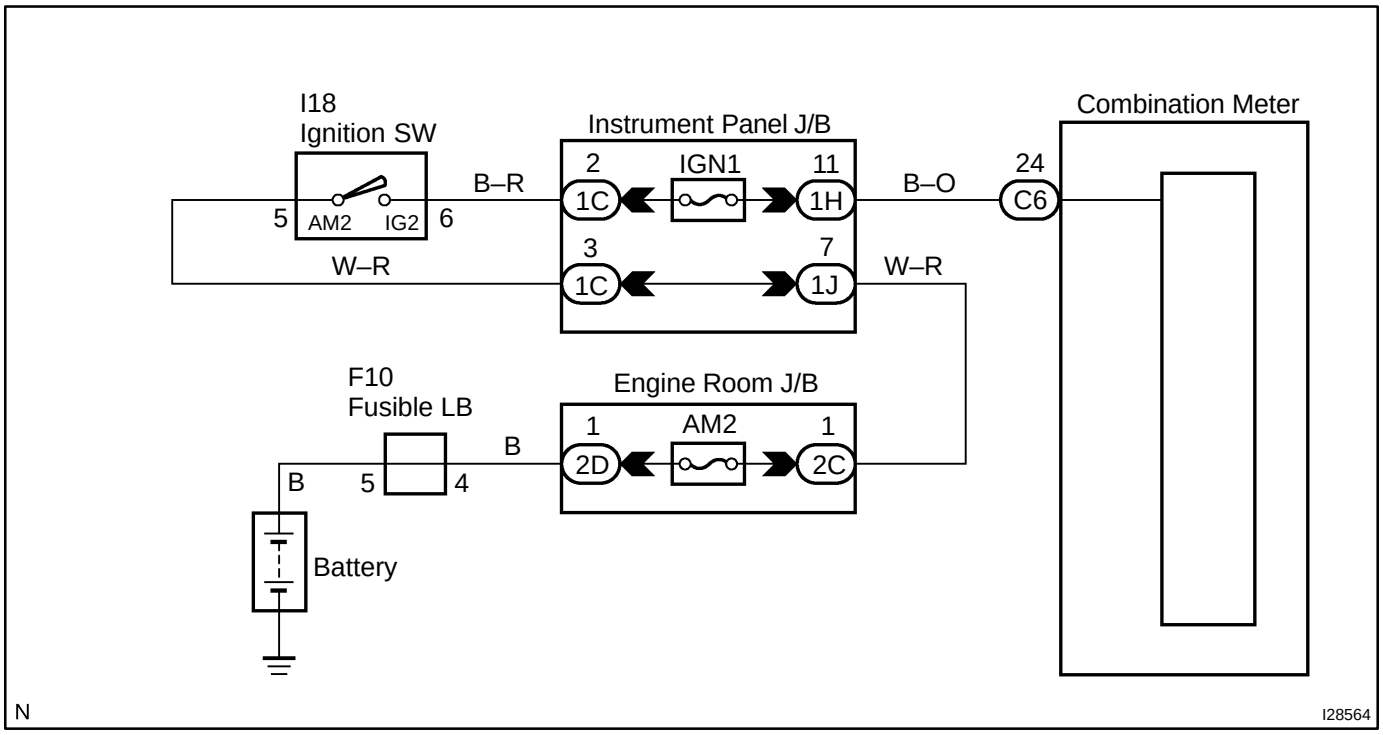
DID96–01

Malfunction in volt meter

CIRCUIT DESCRIPTION

The voltmeter indicates the voltage applied to the IG terminal of the combination meter.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 when using the hand–held tester and start from step 2 when not using the hand–held tester.

1	**Perform active test by hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

CHECK:

From the display on the tester, perform the ”ACTIVE TEST”.

METER:

Item	Test Details	Diagnostic Note
VOLT METER	9 V / 12 V / 15 V / 18V	Confirm that the vehicle is stopped and engine is idling.

OK:

Volt meter readings change according to hand–held tester operation.

NG → **Replace combination meter (See page IN–35).**

OK

2	**Check fuse.**

CHECK:

Measure the resistance of the IGN1 fuse in the instrument panel J/B.

OK:

Below 1 Ω

CHECK:

Measure the resistance of the AM2 fuse in the engine room J/B.

OK:

Below 1 Ω

NG → **Inspect for short circuit in harness and all components connected to fuse.**

OK

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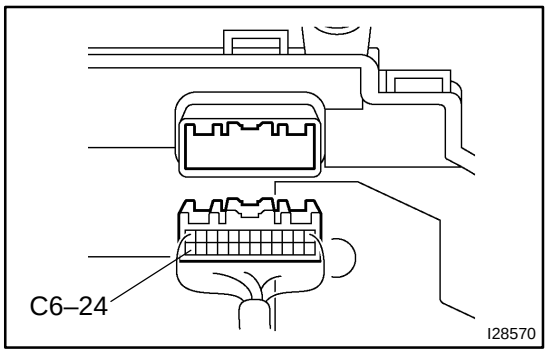
3	Inspect combination meter.



PREPARATION:

Disconnect the C6 connector of the combination meter.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Terminal No	Condition	Specified condition
C6–24 – Body ground	Ignition switch ON	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

Replace combination meter (See page IN–35).

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SLIDING ROOF SYSTEM

DID64–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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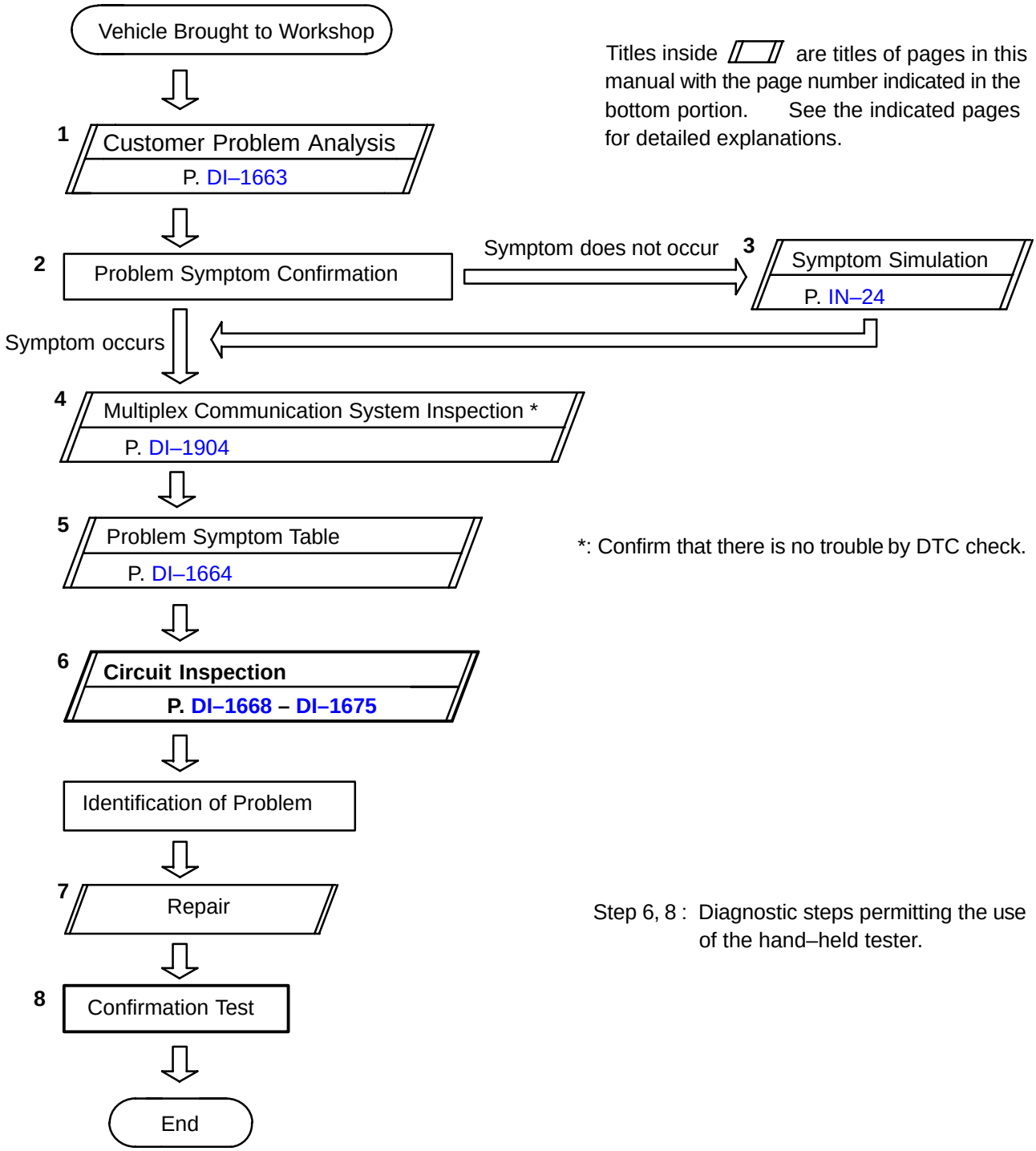
DI272–11

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

The ECU of this system is connected to the multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the multiplex communication system.



Titles inside ▱ are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.

*: Confirm that there is no trouble by DTC check.

Step 6, 8 : Diagnostic steps permitting the use of the hand–held tester.

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DI273–05

CUSTOMER PROBLEM ANALYSIS CHECK

SLIDING ROOF CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		▶ Constant ▶ Sometimes (Times per day, month) ▶ Once only
Weather Conditions When Problem Occurred	**Weather**	▶ Fine ▶ Cloudy ▶ Rainy ▶ Snowy ▶ Various/Others
	Outdoor temperature	▶ Hot ▶ Warm ▶ Cool ▶ Cold (Approx. °F (°C))

Problem Symptom	▶ Sliding roof control system does not operate.
	▶ Sliding roof operates abnormally or stops half way.
	▶ Jam protection system does not operate.

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DI276–09

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Sliding roof control system does not operate.	1. SUN ROOF Fuse 2. ECU–IG Fuse 3. Power Source Circuit 4. Sliding Roof Control Switch Circuit	BE–14 BE–14 DI–1668 DI–1671
Sliding roof operates abnormally or stops half way.	Sliding Roof Pulse Plate Circuit	DI–1675
Jam protection system does not operate.	Sliding Roof Pulse Plate Circuit	DI–1675

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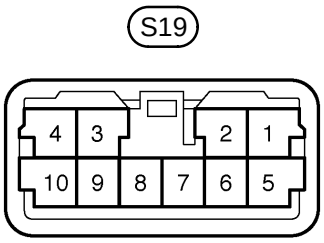
DI275–12

TERMINALS OF ECU



I04611

Symbols (Terminals No.)	Wiring Color	Condition	Specified Condition
MPX1 ↔ – (S19 – 2 ↔ –)	G–O ↔ –	Multiplex communication circuit	–
DWN ↔ E (S19 – 3 ↔ S19 – 7)	R–W ↔ W–B	Ignition switch ON → Sliding roof control switch TILT DOWN	10 to 14 V → Below 1 V
UP ↔ E (S19 – 4 ↔ S19 – 7)	R–Y ↔ W–B	Ignition switch ON → Sliding roof control switch TILT UP	10 to 14 V → Below 1 V
B ↔ E (S19 – 5 ↔ S19 – 7)	L–W ↔ W–B	Always	10 to 14 V
E ↔ Body ground (S19 – 7 ↔ Body ground)	W–B ↔ Body ground	Always	Below 1 V
IG ↔ E (S19 – 8 ↔ S19 – 7)	B–R ↔ W–B	Ignition switch ON → Ignition switch OFF or ACC	10 to 14 V → Below 1 V
OPN ↔ E (S19 – 9 ↔ S19 – 7)	P–B ↔ W–B	Ignition switch ON → Sliding roof control switch OPEN	10 to 14 V → Below 1 V
CLS ↔ E (S19 – 10 ↔ S19 – 7)	G–Y ↔ W–B	Ignition switch ON → Sliding roof control switch CLOSE	10 to 14 V → Below 1 V

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DID4Z–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the method to shorten the labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on tester, read the ”DATA LIST”.

SLIDE ROOF:

Item	Measurement Item/ Display (Range)	Normal condition	Diagnostic Note
LIMIT SW 1	Position SW NO.1/ ON or OFF	ON: 250 mm point from fully opened position OFF: Sliding roof fully closed position	–
LIMIT SW 2	Position SW NO.2/ ON or OFF	ON: Sliding roof fully closed position OFF: Sliding roof except fully closed position	–
OPEN SW	Sliding roof open SW signal/ON or OFF	ON: Sliding roof is open OFF: Sliding roof is close	–
CLOSE SW	Sliding roof close SW signal/ON or OFF	ON: Sliding roof is close OFF: Sliding roof is open	–
UP SW	Sliding roof up SW signal/ON or OFF	ON: Sliding roof is up OFF: Sliding roof is down	–
DOWN SW	Sliding roof down SW signal/ON or OFF	ON: Sliding roof is down OFF: Sliding roof is up	–
IG (DIRCT)	Ignition SW (Direct signal)/ON or OFF	ON: Ignition switch to on OFF: Ignition switch to off	–
IG (MPX)	Ignition SW (MPX)/ON or OFF	ON: Ignition switch to on OFF: Ignition switch to off	–

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one of the method to shorten the labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on tester, perform the ”ACTIVE TEST”.

SLIDE ROOF:

Item	Test Details	Diagnostic Note
SLIDE ROOF	Sliding roof CLOS/UP – OPN/DWN	During this ACTIVE TEST, jam protection caught detection can be monitored.

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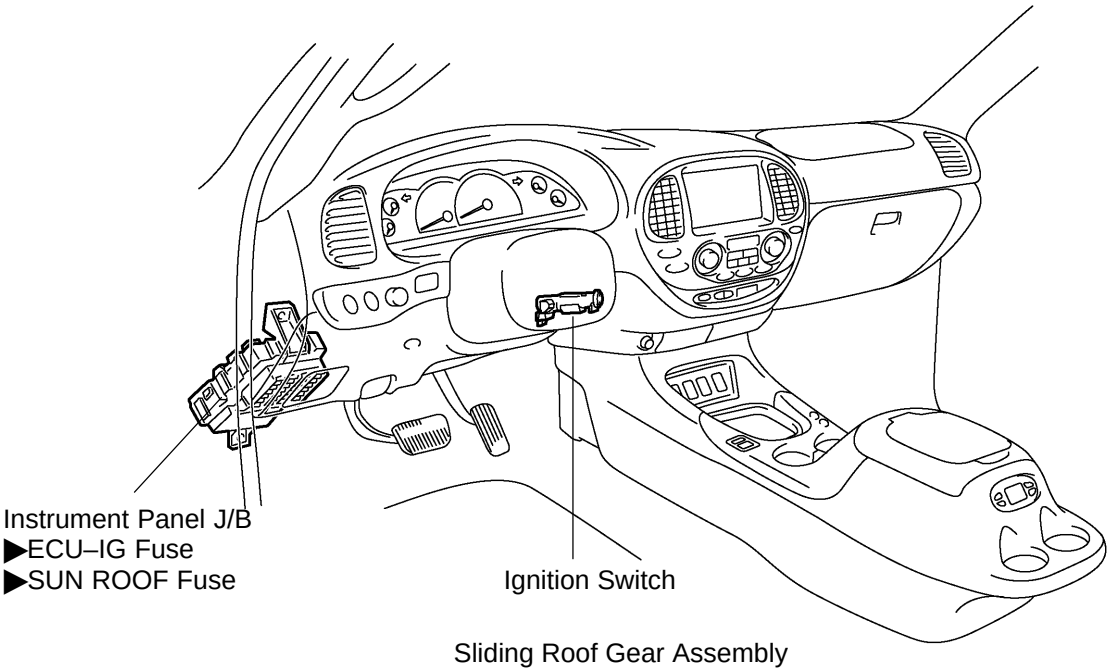
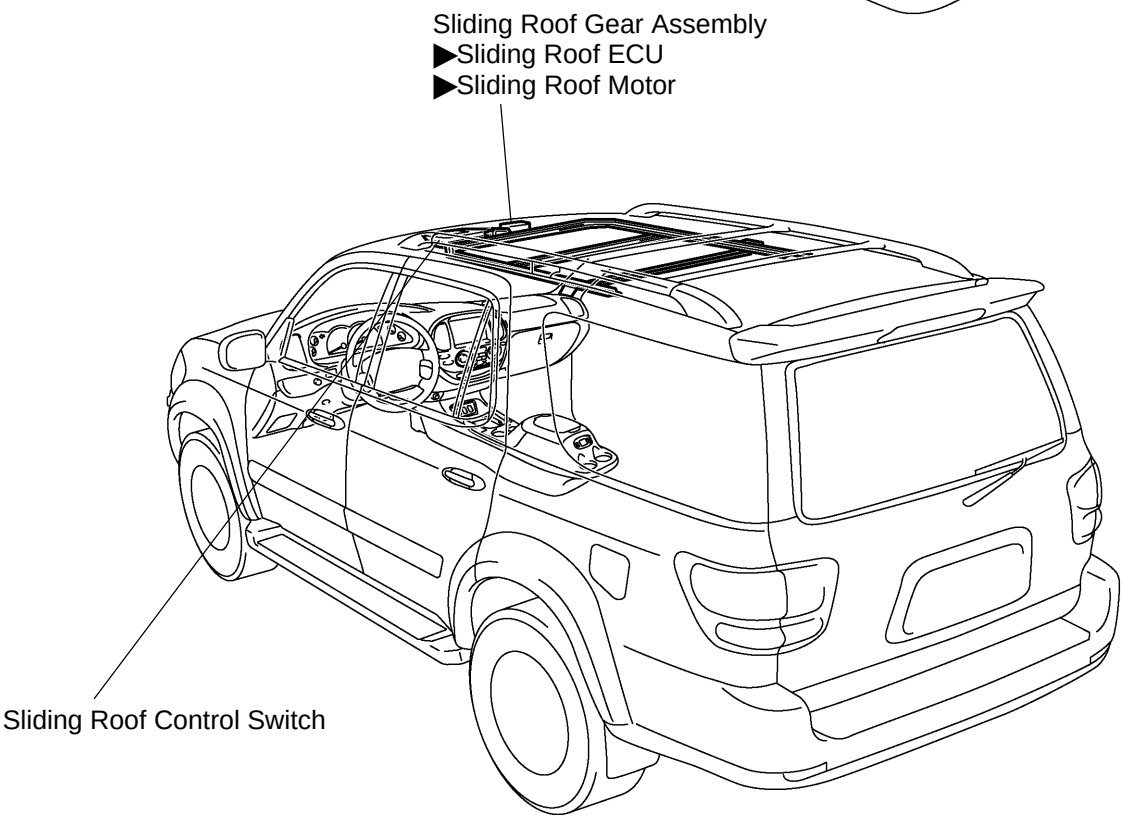
DI274–08

PARTS LOCATION





H

I28411

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DI277–14

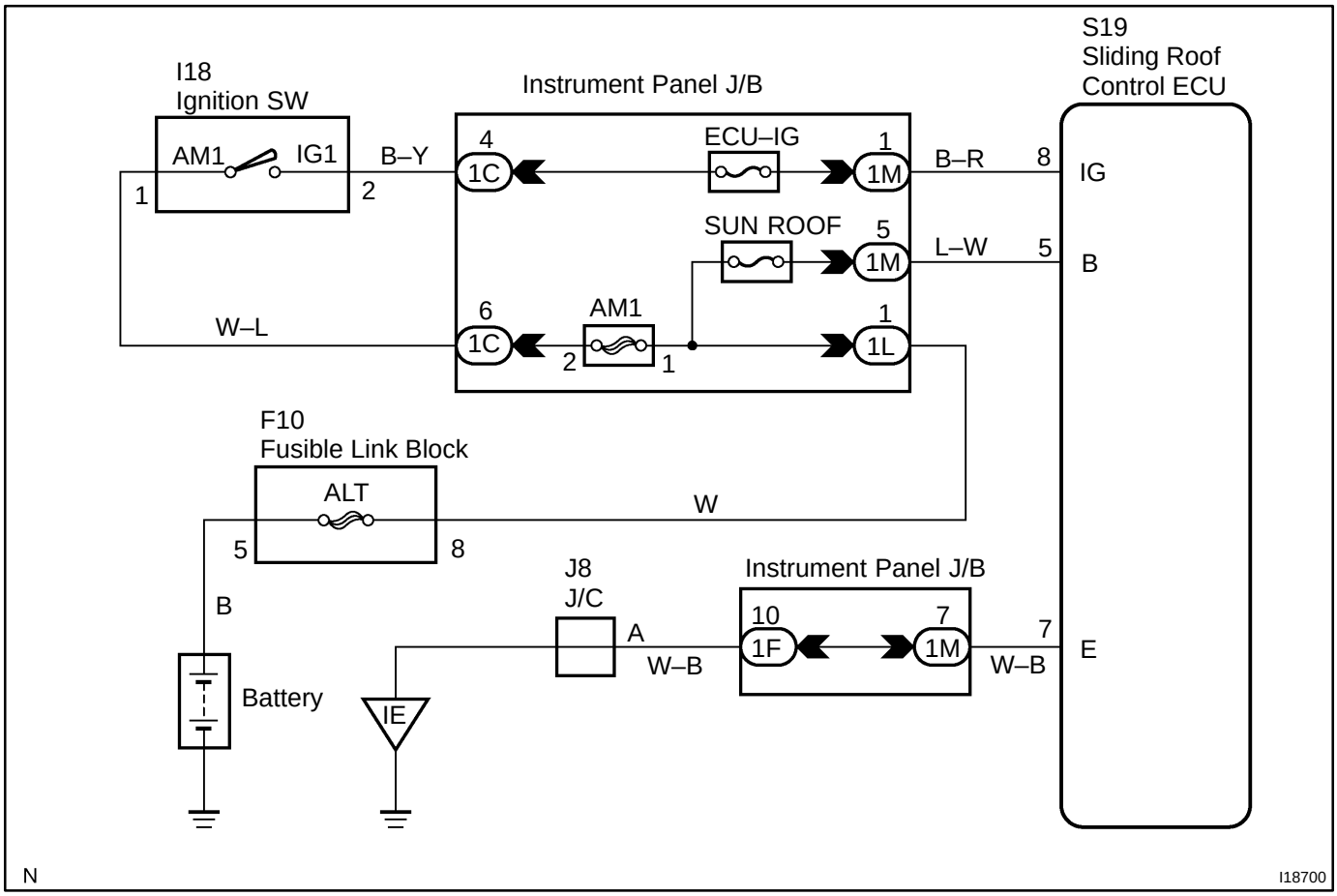
CIRCUIT INSPECTION

Power Source Circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the sliding roof control ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

If not using the hand–held tester, start from STEP 2.

1	**Perform active test.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn ignition switch ON and hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand–held tester.

CHECK:

Check that ”Sliding roof motor” operates as the hand–held tester directs.

SLIDE ROOF:

Item	Test Details	Diagnostic Note
SLIDE ROOF	Sliding roof CLOS/UP – OPN/DWN	During this ACTIVE TEST, jam protection caught detection can be monitored.

NOTICE:

Caution is necessary for a part of body not to be caught in as the jam protection system does not operate during conducting ACTIVE TEST.

HINT:

With one ACTIVE direction, the sliding roof can be slid and tilted continuously.

OK:

The slide roof operates normally.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1664).**

NG

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2	**Check voltage between terminals B, IG and GND of sliding roof control ECU connector.**

PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminals IG and GND.
OK:
Voltage: 10 to 14 V
PREPARATION:
(a) Turn ignition switch OFF.
(b) Disconnect the sliding roof control ECU connector.
CHECK:
Measure voltage between terminals B and GND.
OK:
Voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI–1664).**

NG

Repair or replace wire harness and connector.

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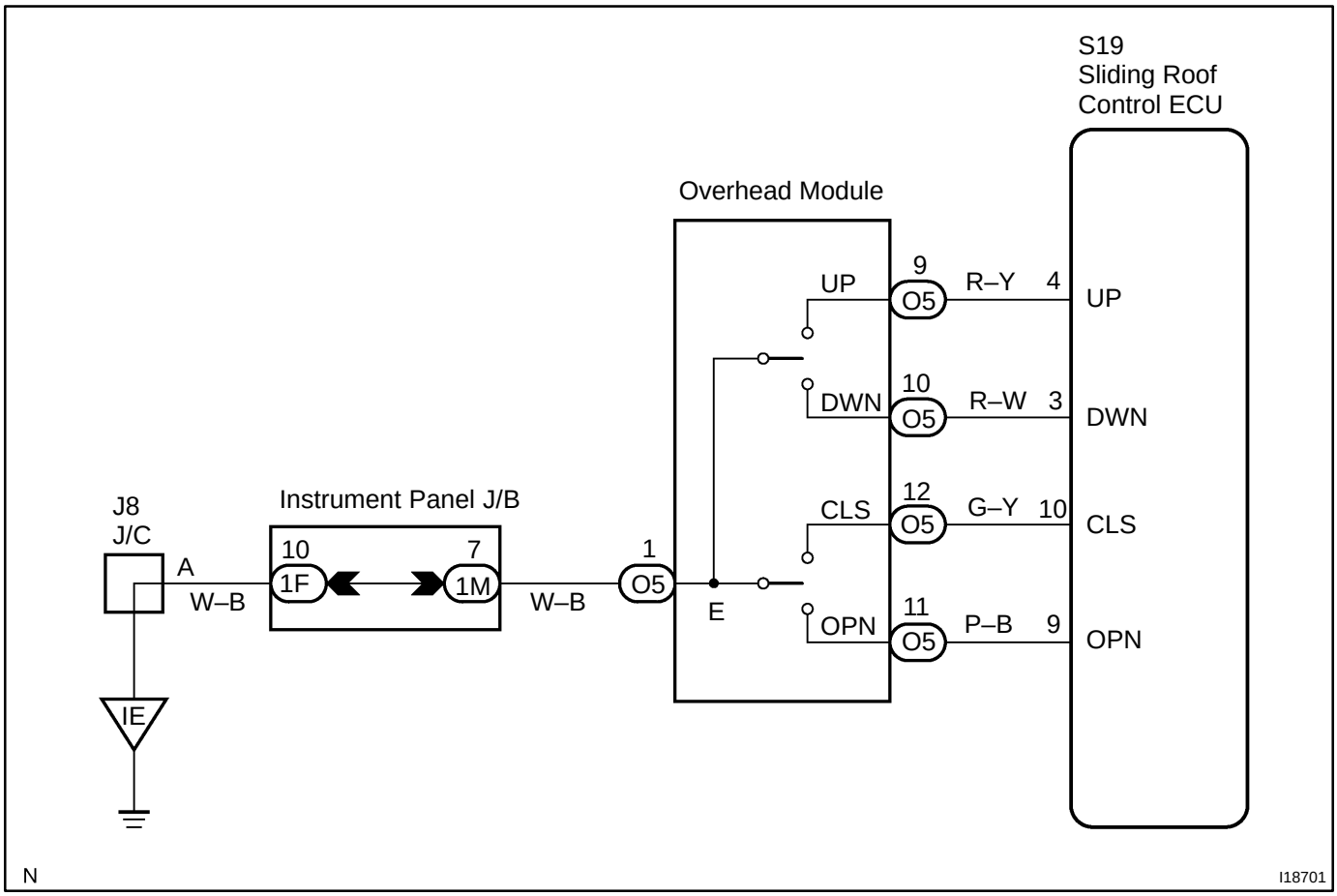
DI94F–05

Sliding Roof Control Switch Circuit

CIRCUIT DESCRIPTION

The sliding roof control switch is built into the overhead module.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

If not using the hand–held tester, start from STEP 2.

1	**Check sliding roof control switch operation.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn ignition switch ON and hand–held tester main switch ON.
(c) Select the DATA LIST mode on the hand–held tester.

CHECK:

Check that switch status (ON/OFF) changes on the screen of the hand–held tester as the sliding roof control switch of the vehicle is turned.

SLIDE ROOF:

Item	Measurement Item/ Display (Range)	Normal condition	Diagnostic Note
OPEN SW	Sliding roof open SW signal/ON or OFF	ON: Sliding roof is open OFF: Sliding roof is close	–
CLOSE SW	Sliding roof close SW signal/ON or OFF	ON: Sliding roof is close OFF: Sliding roof is open	–
UP SW	Sliding roof up SW signal/ON or OFF	ON: Sliding roof is up OFF: Sliding roof is down	–
DOWN SW	Sliding roof down SW signal/ON or OFF	ON: Sliding roof is down OFF: Sliding roof is up	–

OK:

The switch status changes in response to the vehicle switch operation.

NG → **Replace sliding roof control switch or overhead module.**

OK

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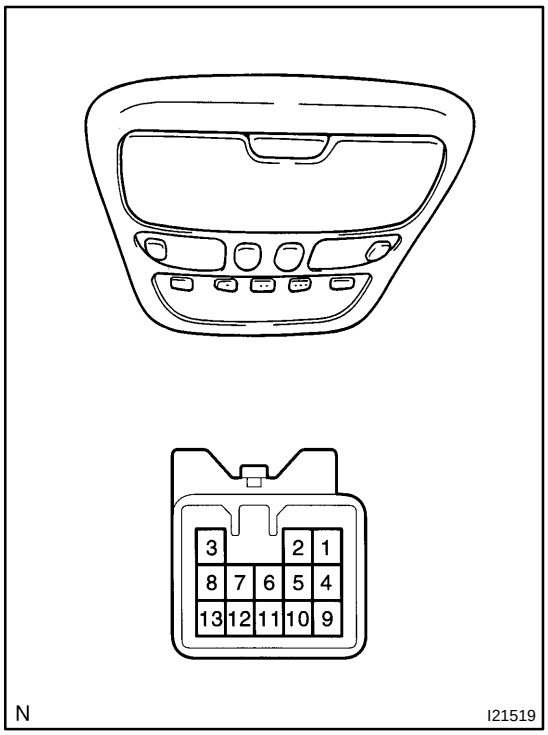
2	Check sliding roof control switch or overhead module.



PREPARATION:

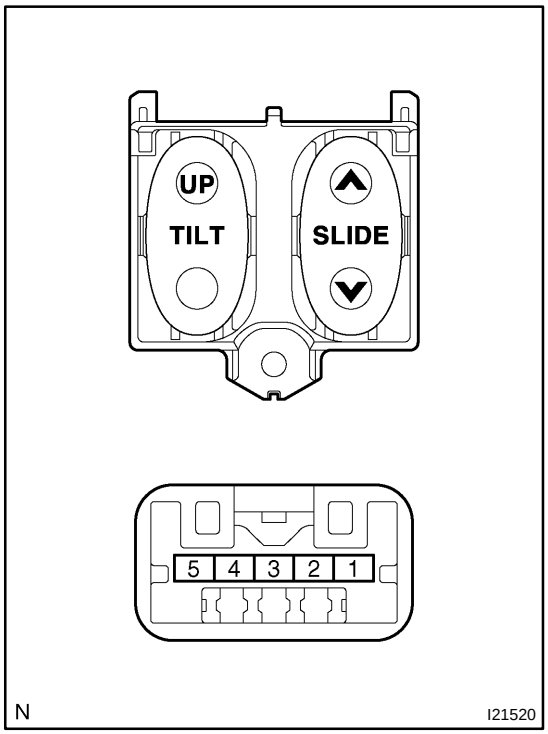
Remove overhead module.

CHECK:

Check continuity between terminals when switch operated.

OK:

Switch position	Tester connection	Specified condition
SLIDE OPEN	11 – 1	Continuity
SLIDE OFF	11 –1, 12 – 1	No continuity
SLIDE CLOSE	12 – 1	Continuity
TILT DOWN	10 – 1	Continuity
TILT OFF	9 – 1, 12 – 1	No continuity
TILT UP	9 – 1	Continuity



PREPARATION:

Remove sliding roof control switch.

CHECK:

Check continuity between terminals when switch operated.

OK:

Switch position	Tester connection	Specified condition
SLIDE OPEN	3 – 5	Continuity
SLIDE OFF	3 – 4, 3 – 5	No continuity
SLIDE CLOSE	3 – 4	Continuity
TILT DOWN	2 – 3	Continuity
TILT OFF	1 – 3, 2 – 3	No continuity
TILT UP	1 – 3	Continuity

NG → **Replace sliding roof control switch or overhead module.**

OK

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3	**Check for open and short in harness and connectors between sliding roof control ECU and sliding roof control switch or overhead module (See page IN–35).**

NG → **Repair and replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1664).

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DI279–11

Sliding Roof Pulse Plate Circuit

WIRING DIAGRAM

See page DI–1668.

INSPECTION PROCEDURE

HINT:

If not using the hand–held tester, start from STEP 3.

1	**Check sliding roof pulse plate operation.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn ignition switch ON and hand–held tester main switch ON.

(c) Select the DATA LIST mode on the hand–held tester.

CHECK:

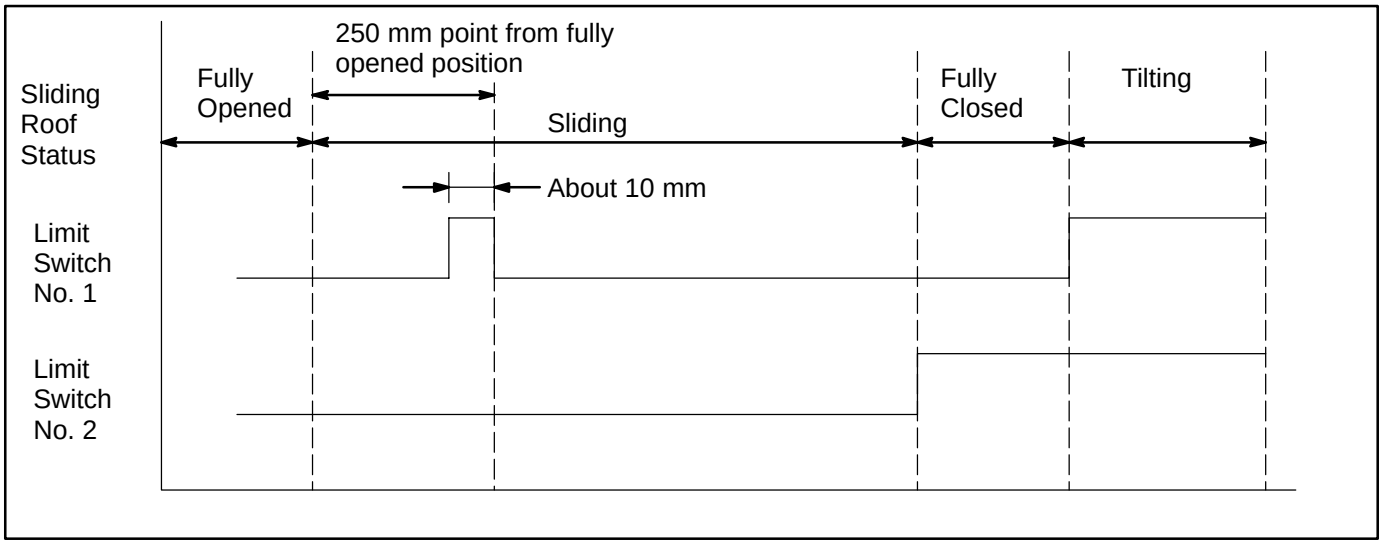
(a) Operate the sliding roof.

(b) At this time, check that status (ON/OFF) of limit switch 1 and limit switch 2 changes on the hand–held tester screen as shown in the chart below.

SLIDE ROOF:

Item	Measurement Item/ Display (Range)	Normal condition	Diagnostic Note
LIMIT SW 1	Position SW NO.1/ ON or OFF	ON: 250 mm point from fully opened position OFF: Sliding roof fully closed position	–
LIMIT SW 2	Position SW NO.2/ ON or OFF	ON: Sliding roof fully closed position OFF: Sliding roof except fully closed position	–

OK:



NG → **Replace sliding roof gear assembly.**

OK

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2	**Check sliding roof motor status.**

PREPARATION:

Connect the hand–held tester to the DLC3.

(a) Enter into ACTIVE TEST mode of hand–held tester.

CHECK:

(a) Check that ”Sliding roof motor” operates as the hand–held tester directs.

(b) At this time, check that motor status changes on the screen of the hand–held tester as the sliding roof switch of the vehicle is turned.

SLIDE ROOF:

Item	Test Details	Diagnostic Note
SLIDE ROOF	Sliding roof CLOS/UP – OPN/DWN	During this ACTIVE TEST, jam protection caught detection can be monitored.

NOTICE:

Caution is necessary for a part of body not to be caught in as the jam protection system does not operate during conducting ACTIVE TEST.

OK:

The motor operates normally.

NG → **Replace sliding roof gear assembly.**

OK

Go to step NO TAG.

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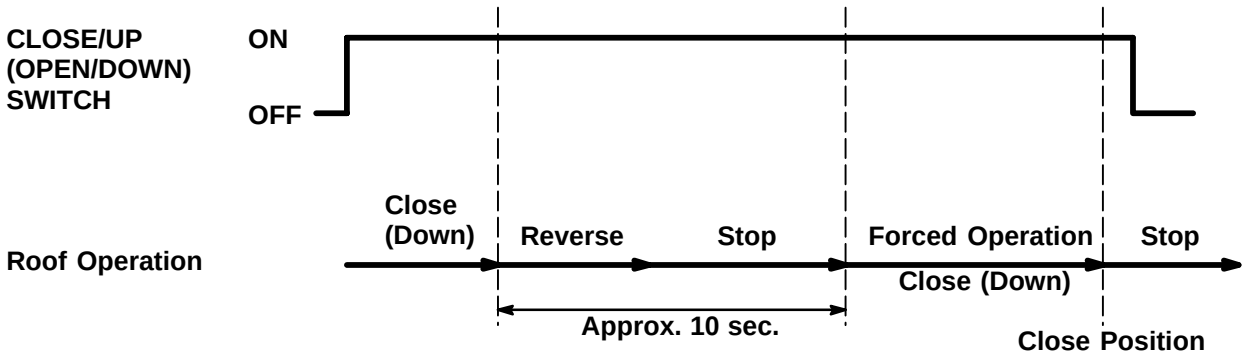
3	**Perform forced operation.**

Operate the sliding roof control switch in the CLOSE/UP direction. The jam protection function starts to operate and reverses. Keeping the CLOSE/UP direction further some 10 seconds restricts the jam protection function forcibly and begins manual operation.
HINT:
To conduct the sliding roof alignment, restricting the jam protection function is required.



NEXT

4	**Check sliding roof glass alignment (Mechanical malfunction) (See page IN–35).**

NG → **Adjust sliding roof (See page BO–82).**

OK →

Replace sliding roof gear assembly.

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BODY CONTROL SYSTEM

DID97–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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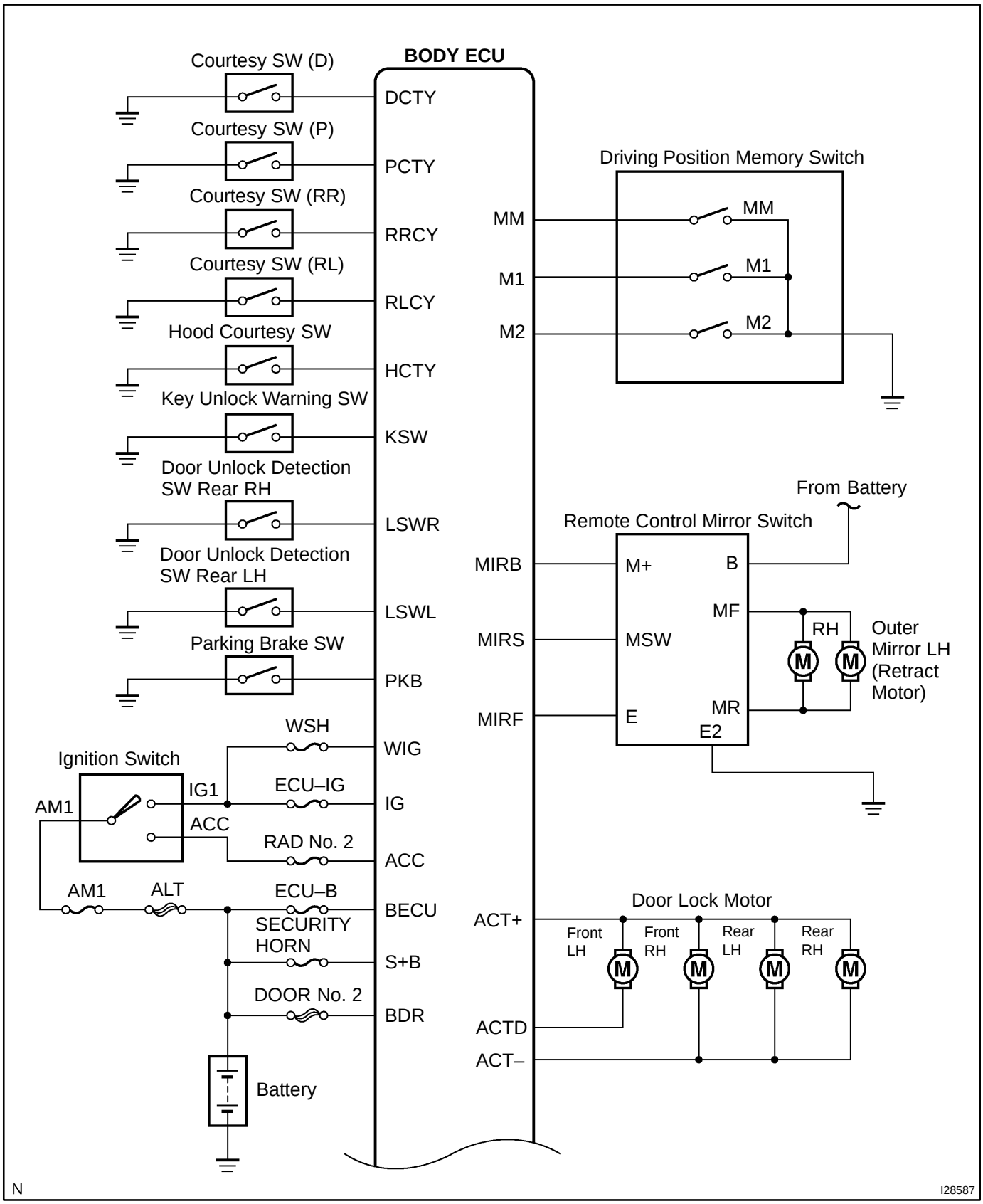
DID98–01

SYSTEM DIAGRAM



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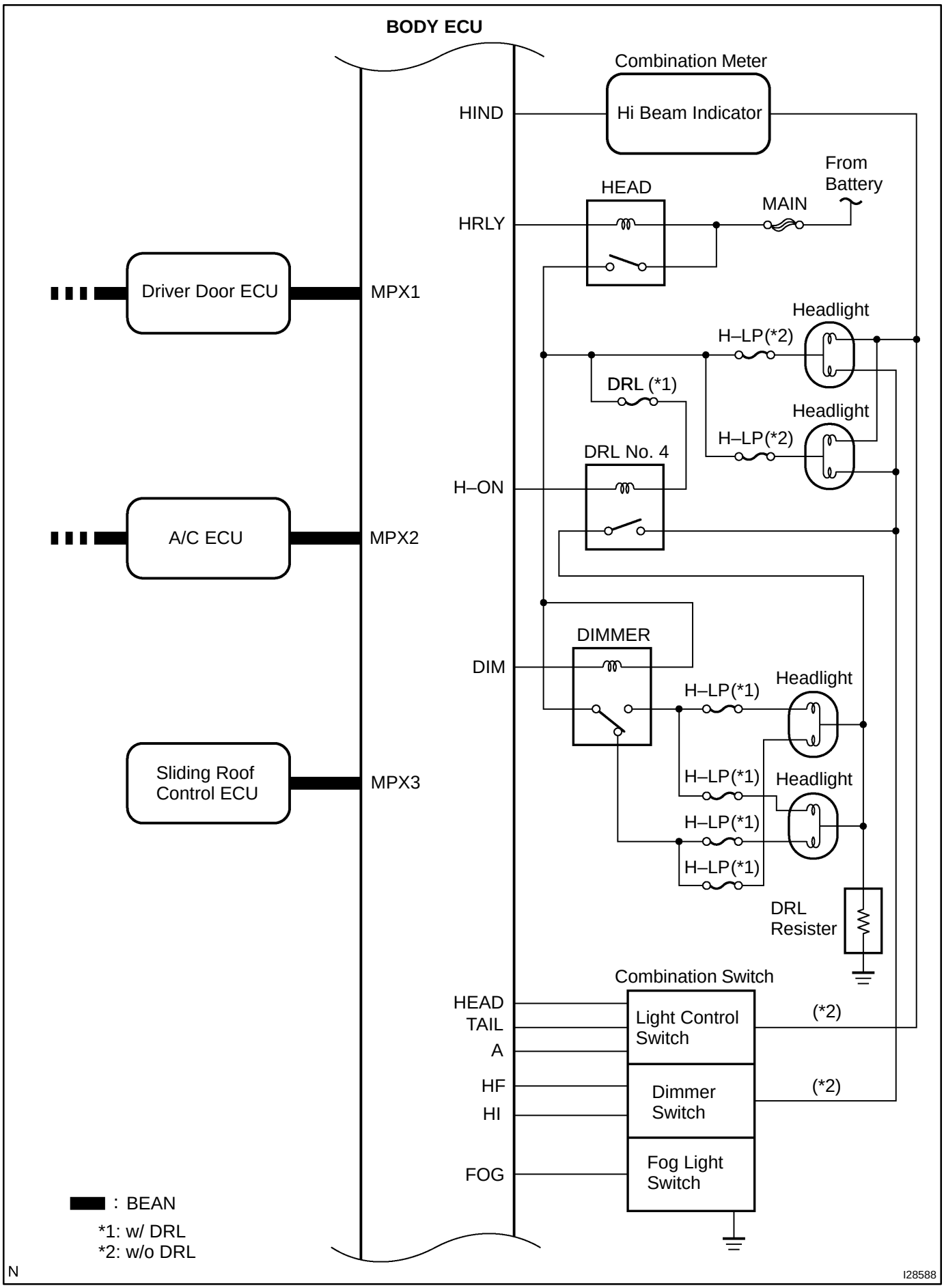
BODY ECU
Combination Meter
HIND
Hi Beam Indicator
From Battery
HEAD
MAIN
HRLY
Driver Door ECU
MPX1
Headlight
H–LP(*2)
DRL (*1)
Headlight
H–LP(*2)
DRL No. 4
H–ON
A/C ECU
MPX2
DIMMER
DIM
H–LP(*1)
Headlight
Sliding Roof Control ECU
MPX3
H–LP(*1)
Headlight
H–LP(*1)
H–LP(*1)
DRL Resister
Combination Switch
HEAD
TAIL
A
Light Control Switch
(*2)
HF
HI
Dimmer Switch
(*2)
FOG
Fog Light Switch
: BEAN
*1: w/ DRL
*2: w/o DRL
N
I28588

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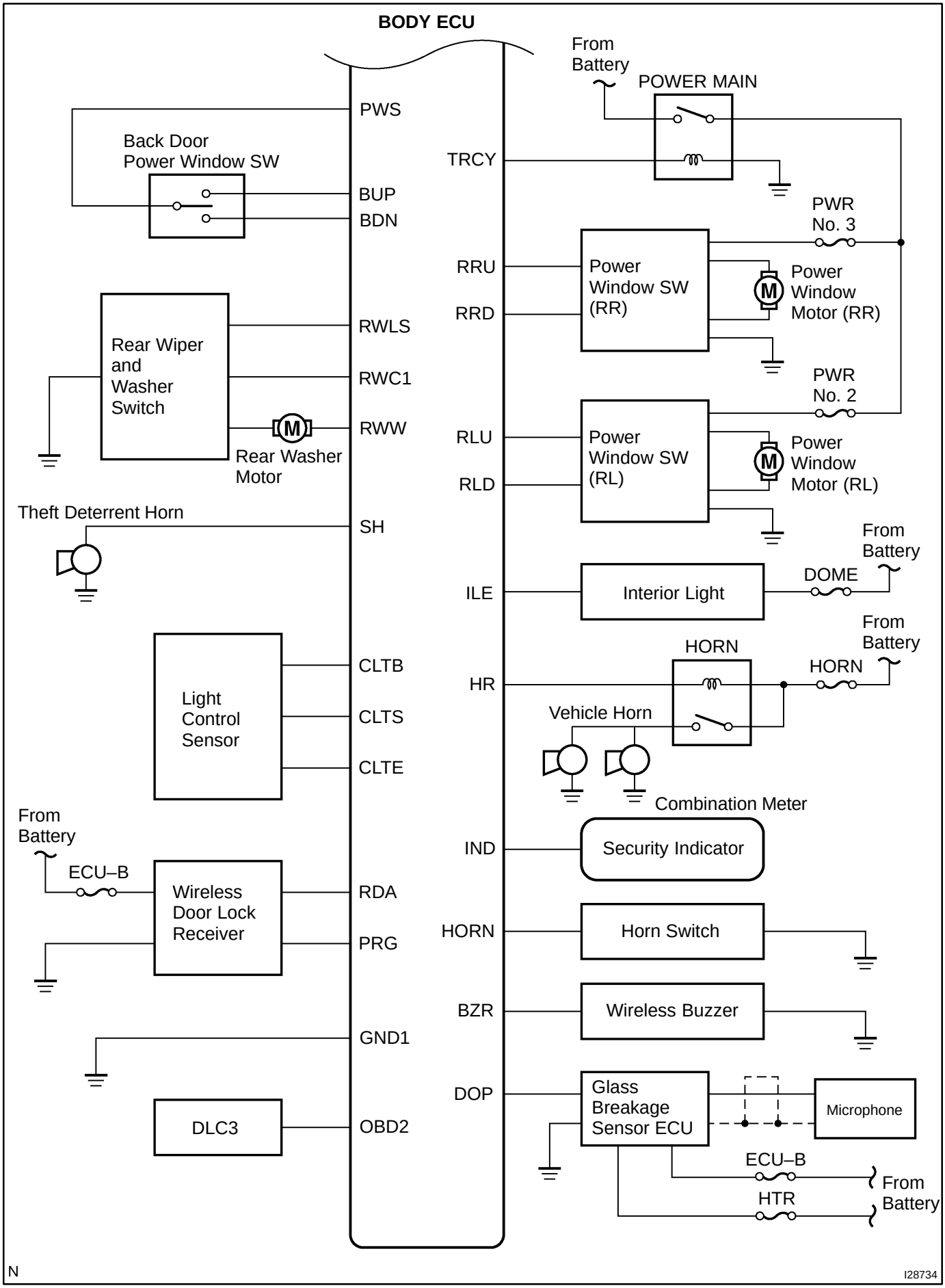
BODY ECU
From Battery
POWER MAIN
PWS
Back Door Power Window SW
TRCY
BUP
BDN
PWR No. 3
RRU
Power Window SW (RR)
Power Window Motor (RR)
RRD
Rear Wiper and Washer Switch
RWLS
RWC1
PWR No. 2
RWW
RLU
Power Window SW (RL)
Power Window Motor (RL)
Rear Washer Motor
RLD
Theft Deterrent Horn
SH
From Battery
DOME
ILE
Interior Light
From Battery
HORN
HORN
CLTB
HR
Light Control Sensor
CLTS
Vehicle Horn
CLTE
Combination Meter
From Battery
IND
Security Indicator
ECU–B
Wireless Door Lock Receiver
RDA
HORN
Horn Switch
PRG
BZR
Wireless Buzzer
GND1
DOP
Glass Breakage Sensor ECU
Microphone
DLC3
OBD2
ECU–B
From Battery
HTR
N
I28734

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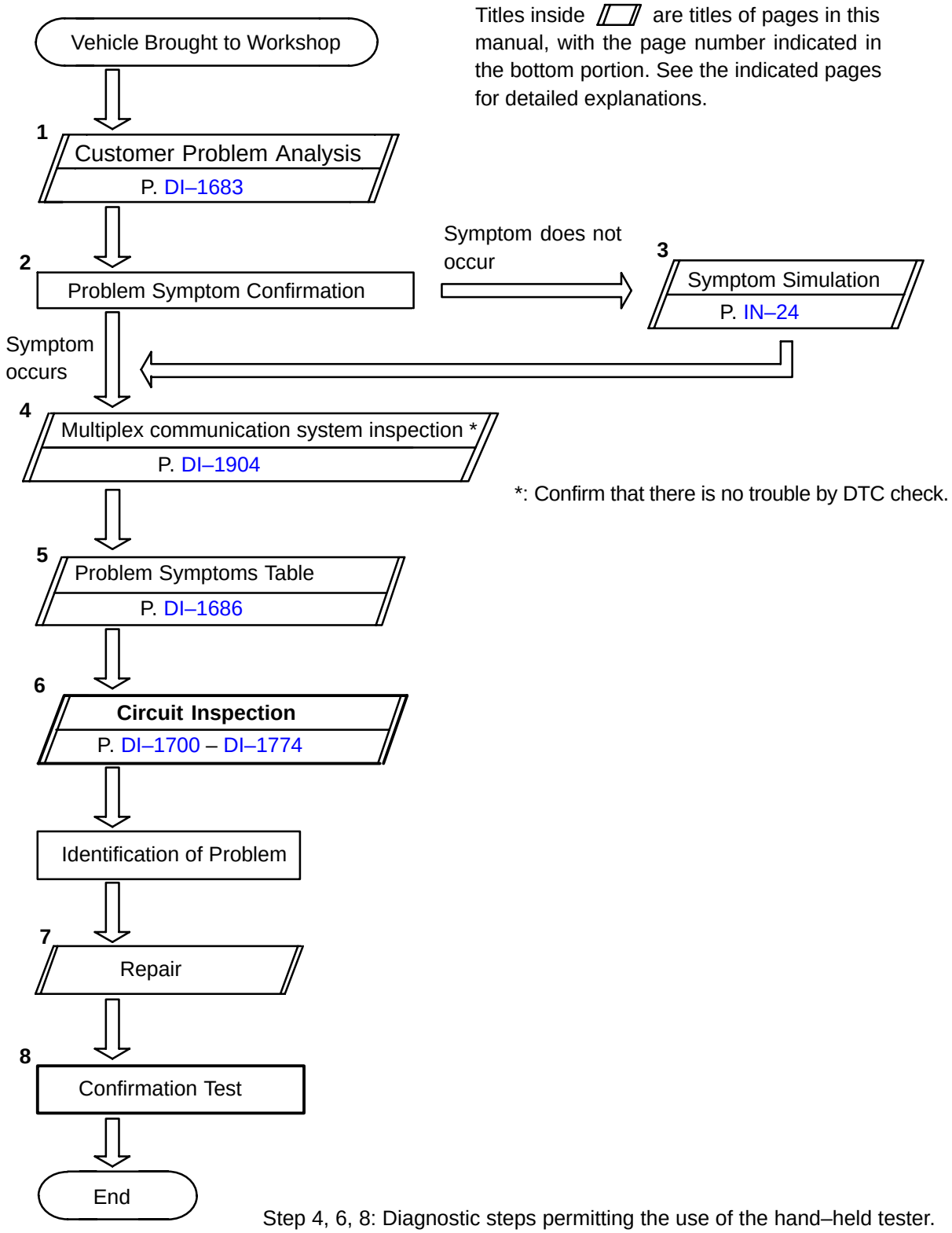
DI1OD–22

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

This ECU is connected to the multiplex communication system. Therefore, be sure to check that there is no troubles in the multiplex communication system before performing the troubleshooting.



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DI1OE–19

CUSTOMER PROBLEM ANALYSIS CHECK

BODY CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Licence Plate No.	
		Production Data	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Malfunction System	☐ Key Unlock Warning System
	☐ Headlight and Taillight System (Light Auto Turn–off system, Daytime Running Light System
	☐ Foglight System
	☐ Stop Light System
	☐ Automatic Light Control System
	☐ Illuminated Entry System
	☐ Theft Deterrent System
	☐ Wiper and Washer System
	☐ Power Window Control System
	☐ Power Door Lock Control System
	☐ Auto Lock/Unlock System
	☐ Wireless Door Lock Control System
	☐ Remote Control Mirror System (w/ Driving Position Memory)
	☐ Others (Buzzer etc.)

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DID9A–01

CUSTOMIZE PARAMETERS

HINT:

The following items can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is/are possible.**
- **Be sure to make a note of the current setting before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

WIRELESS DOOR LOCK:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
WIRELESS OPER	ON	Turns wireless door lock function ON/OFF.	ON/OFF
OPEN DOOR WARN	ON	Sounds buzzer for 10 seconds when door is not completely closed and transmitter LOCK switch is pressed.	ON/OFF
AUTO LOCK DELAY	30S	Controls amount of time from when doors are unlocked until they are locked by automatic lock function.	60S/30S
UNLOCK/2OPER	ON	When UNLOCK switch is pressed once, this function un–locks only the designated door. When unlock switch is pressed again within 3 seconds, all doors unlock. If setting is OFF, pressing UNLOCK switch once unlocks all doors.	ON/OFF
LNT/LGT ON/UNLK	ON	Turns on room light when wireless door lock system is oper-ated.	ON/OFF
ALARM FUNCTION	ON	Operates theft deterrent system when transmitter LOCK (PANIC) switch is held for 3 seconds.	ON/OFF
AUTO LOCK	OFF	Locks doors when the vehicle speed reaches a certain level.	ON/OFF
UNLK/KEY TWICE	ON	Unlocks only driver's door when driver's door key cylinder is turned to unlock once, and unlocks all doors when it is turned to unlock twice. In OFF setting, unlocks all doors when the cylinder is turned to unlock once.	ON/OFF
ALL UNLK/OPN–CL	OFF	Function that unlocks all doors when the driver door is opened after turning the ignition switch off.	ON/OFF
UNLOCK/PARK	OFF	Unlocks doors when shift lever is moved to P position from any position other than P while the ignition switch is ON.	ON/OFF

THEFT:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
WARNING TIME	15S	Changes warning time for PASSIVE MODE.	5S/15S/27.5S/60S
PASSIVE MODE	OFF	Switches theft deterrent system from arming preparation state to armed state 30 seconds after key is removed from ignition key cylinder and driver side door is closed, even if doors are not locked by wireless or door key lock operation.	ON/OFF
WARN BY GLS SEN	ON	Function that switches the alarm warning on/off when glass breakage is detected.	ON/OFF

DOOR LOCK:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
AUTO LOCK/SHIFT	ON	Locks doors when shift lever is moved from P to another position.	ON/OFF

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ILLUMINATED ENTRY:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
I/L ON/UNLOCK	ON	Illuminates interior light when ignition switch is turned from ACC to LOCK position.	ON/OFF
LIGHTING TIME	15S	Changes lighting time after closing doors (light quickly fades out when ignition switch is turned on).	15S/7.5S/30S

LIGHT CONTROL:

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
SENSITIVITY	NORMAL	Sensitivity adjustment is difficult to confirm. Check by driving the customer's vehicle.	NORMAL/DARK2/DARK1/ LIGHT1/LIGHT2
LIGHT OFF DELAY	30S	Keeps headlights on for a certain period of time after closing all doors with ignition switch on, light control switch in HEAD or AUTO position, and headlights on.	OFF/30S/60S/90S
DISP EX ON SEN	NORMAL	Changes brightness of lights such as combination meter indicator light, A/C indicator lamp, and clock lamp.	NORMAL/DARK2/DARK1/ LIGHT1/LIGHT2
DISP OFF SEN	NORMAL	Changes brightness of lights such as combination meter indicator light, A/C indicator lamp, and clock lamp.	NORMAL/DARK2/DARK1/ LIGHT1/LIGHT2

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DI1OH–18

PROBLEM SYMPTOMS TABLE

DOOR LOCK CONTROL

Symptom	Suspected Area	See page
Lock or unlock cannot be operated with door lock control switch.	1. Door lock control switch (Power source circuit) (Driver's) (Passenger's) 2. Body ECU	 DI–1788 DI–1826 IN–35
Door key linked function does not operate.	1. Door key lock and unlock switch circuit (Driver's) (Passenger's) 2. Body ECU	DI–1794 DI–1832 IN–35
Key confinement prevention function does not operate.	1. Key unlock warning switch circuit 2. Body ECU	DI–1715 IN–35
Door lock function does not operate.	1. Door lock motor circuit 2. Body ECU	DI–1720 IN–35

THEFT DETERRENT SYSTEM

Symptom	Suspected Area	See page
No alerting condition is operated. (The system cannot be set.)	1. Security indicator circuit 2. Key unlock warning switch circuit 3. Courtesy light switch circuit 4. Door unlock detection switch circuit (Driver's) (Passenger's) 5. Engine hood courtesy light switch circuit 6. Back door courtesy light switch circuit 7. Back door ECU 8. Body ECU	DI–1731 DI–1715 DI–1728 DI–1791 DI–1829 DI–1725 DI–1864 IN–35 IN–35
Cannot be canceled when IG is turned ON with a key.	1. Key unlock warning switch circuit 2. Ignition switch 3. Body ECU	DI–1715 BE–24 IN–35
Cannot be canceled when unlocking the back door with a key.	1. Back door ECU 2. Body ECU	IN–35 IN–35
Headlights do not light up as an alert function.	1. Headlight relay circuit 2. Body ECU	DI–1708 IN–35
Taillights do not light up as an alert function.	1. Taillight relay circuit 2. Body ECU	DI–1706 IN–35
Theft deterrent horn or vehicle horn does not sound.	1. Security horn circuit 2. Horn circuit 3. Body ECU	DI–1734 DI–1764 IN–35
During warning condition, cannot be canceled by unlocking the door with a key.	1. Door key lock and unlock switch circuit (Driver's) (Passenger's) 2. Body ECU	DI–1794 DI–1832 IN–35
During warning condition, cannot be canceled by unlocking the door with a key. (transmitter)	1. Transmitter 2. Body ECU	BE–99 IN–35
During warning condition, cannot be canceled by turning the ignition ON with a key.	1. Ignition switch 2. Key unlock warning switch circuit 3. Body ECU	BE–24 DI–1715 IN–35
The system operated for more than 60 seconds.	Body ECU	IN–35
Glass breakage sensor does not operate.	1. Glass breakage sensor circuit 2. Body ECU	DI–1774 IN–35

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WIRELESS DOOR LOCK CONTROL

Symptom	Suspected Area	See page
All functions of wireless door lock control system do not operate.	1. Transmitter 2. Wireless door lock receiver circuit 3. Key unlock warning switch circuit 4. Body ECU	BE–99 DI–1737 DI–1715 IN–35
Lock (or unlock) function does not operate.	1. Door unlock detection switch circuit (Driver's) (Passenger's) (Rear Door) (Back Door) 2. Any door ECU 3. Body ECU	DI–1791 DI–1829 DI–1723 DI–1869 IN–35 IN–35
Automatic lock function operates even if any door is opened within 30 seconds after all doors are unlocked by wireless door lock control system.	1. Door courtesy light switch circuit 2. Any door ECU 3. Body ECU	DI–1728 IN–35 IN–35
Wireless door lock function operates, but the buzzer does not sound.	1. Wireless door lock buzzer circuit 2. Body ECU	DI–1741 IN–35
Buzzer sounds, but wireless door lock function does not operate.	Body ECU	IN–35

REAR WIPER AND WASHER

Symptom	Suspected Area	See page
Rear wiper does not operate.	1. Rear wiper switch and motor circuit 2. Body ECU	DI–1704 IN–35
Rear washer does not operate.	1. Rear washer switch and motor circuit 2. Body ECU	DI–1704 IN–35

LIGHT CONTROL

Symptom	Suspected Area	See page
Automatic light control does not operate.	1. Automatic light control sensor circuit 2. Light control switch circuit 3. Body ECU	DI–1753 DI–1750 IN–35
Auto turn–off does not operate.	1. Door courtesy light switch circuit (Driver side) 2. Ignition switch 3. Driver door ECU 4. Body ECU	DI–1728 BE–24 IN–35 IN–35
Daytime running light function does not operate.	1. Daytime running light relay circuit 2. Parking brake switch circuit 3. Body ECU	DI–1712 DI–1744 IN–35

FOG LIGHT

Symptom	Suspected Area	See page
Fog lights do not come on.	1. Bulb 2. FOG fuse 3. Fog light relay and switch circuit 4. Body ECU	– BE–14 DI–1710 IN–35

OTHERS

Symptom	Suspected Area	See page
Illuminated entry function does not operate.	1. Illumination circuit 2. Body ECU	DI–1759 IN–35
All functions of the body control system do not operate.	1. Power source circuit 2. Body ECU	DI–1700 IN–35
Remote control mirror does not operate. (w/ Driving position memory)	1. Remote control mirror switch circuit 2. Driving position memory switch circuit 3. Body ECU	DI–1767 DI–1772 IN–35

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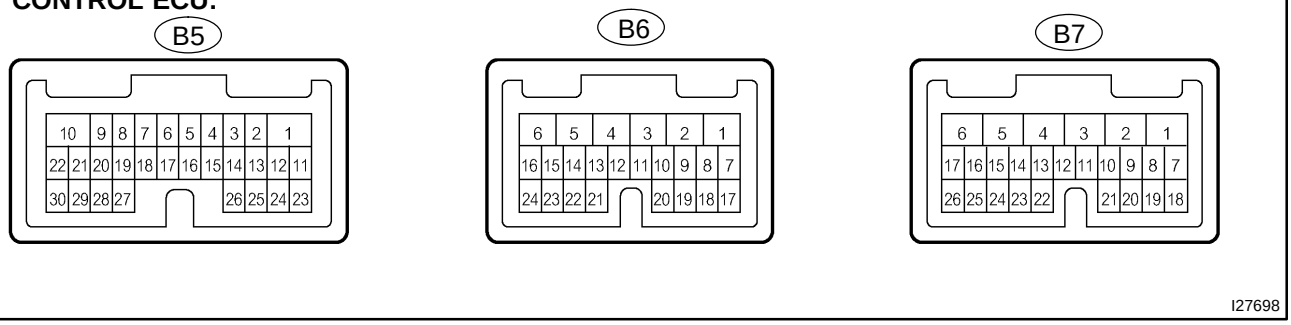
DI1OG–31

TERMINALS OF ECU

BODY CONTROL ECU:



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
KSW – GND1 (B5–13 – B6–6)	Y–G – W–B	Key unlock warning switch signal	Key unlock warning switch ON (Key inserted)	Below 1 V
KSW – GND1 (B5–13 – B6–6)	Y–G – W–B	Key unlock warning switch signal	Key unlock warning switch OFF (Key not inserted)	10 to 14 V
KSW2 – GND1 (B5–15 – B6–6)	Y–G – W–B	Key unlock warning switch signal (Immobilizer)	Key unlock warning switch ON (Key inserted)	Below 1 V
KSW2 – GND1 (B5–15 – B6–6)	Y–G – W–B	Key unlock warning switch signal (Immobilizer)	Key unlock warning switch OFF (Key not inserted)	10 to 14 V
HR – GND1 (B7–18 – B6–6)	W–R – W–B	Horn switch signal	Horn switch ON	Below 1 V
HR – GND1 (B7–18 – B6–6)	W–R – W–B	Horn switch signal	Horn switch OFF	10 to 14 V
BDN – GND1 (B6–15 – B6–6)	P–L – W–B	Back door power window motor (DOWN)	Back door power window switch DOWN position	Below 1 V
BDN – GND1 (B6–15 – B6–6)	P–L – W–B	Back door power window motor (DOWN)	Back door power window switch OFF or UP position	10 to 14 V
BUP – GND1 (B6–14 – B6–6)	W – W–B	Back door power window motor (UP)	Back door power window switch UP position	Below 1 V
BUP – GND1 (B6–14 – B6–6)	W – W–B	Back door power window motor (UP)	Back door power window switch OFF or DOWN position	10 to 14 V
ACC – GND1 (B7–10 – B6–6)	GR – W–B	Ignition switch (ACC)	Ignition switch OFF	Below 1 V
ACC – GND1 (B7–10 – B6–6)	GR – W–B	Ignition switch (ACC)	Ignition switch ACC or ON	10 to 14 V
BECU – GND1 (B6–5 – B6–6)	W–R – W–B	Battery	Always	10 to 14 V
RLCY – GND1 (B7–7 – B6–6)	R–W – W–B	Courtesy light switch (Rear LH)	Rear LH door courtesy light switch ON (Open)	Below 1 V
RLCY – GND1 (B7–7 – B6–6)	R–W – W–B	Courtesy light switch (Rear LH)	Rear LH door courtesy light switch OFF (Closed)	10 to 14 V
RRCY – GND1 (B5–8 – B6–6)	R–W – W–B	Courtesy light switch (Rear RH)	Rear RH door courtesy light switch ON (Open)	Below 1 V
RRCY – GND1 (B5–8 – B6–6)	R–W – W–B	Courtesy light switch (Rear RH)	Rear RH door courtesy light switch OFF (Closed)	10 to 14 V
PCTY – GND1 (B5–22 – B6–6)	LG–B – W–B	Courtesy light switch (Front RH)	Passenger door courtesy light switch ON (Open)	Below 1 V

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PCTY – GND1 (B5–22 – B6–6)	LG–B – W–B	Courtesy light switch (Front RH)	Passenger door courtesy light switch OFF (Closed)	10 to 14 V
LSWL – GND1 (B7–24 – B6–6)	P–L – W–B	Door unlock detection switch (Rear LH)	Rear LH door unlock detection switch ON (Unlocked)	Below 1 V
LSWL – GND1 (B7–24 – B6–6)	P–L – W–B	Door unlock detection switch (Rear LH)	Rear LH door unlock detection switch OFF (Locked)	10 to 14 V
DCTY – GND1 (B7–12 – B6–6)	GR–R – W–B	Courtesy light switch (Front LH)	Driver door courtesy light switch ON (Open)	Below 1 V
DCTY – GND1 (B7–12 – B6–6)	GR–R – W–B	Courtesy light switch (Front LH)	Driver door courtesy light switch OFF (Closed)	10 to 14 V
LSWR – GND1 (B5–21 – B6–6)	P–B – W–B	Door unlock detection switch (Rear RH)	Rear RH door unlock detection switch ON (Unlocked)	Below 1 V
LSWR – GND1 (B5–21 – B6–6)	P–B – W–B	Door unlock detection switch (Rear RH)	Rear RH door unlock detection switch OFF (Locked)	10 to 14 V
HORN – GND1 (B5–26 – B6–6)	B–Y – W–B	Horn switch signal	Horn switch OFF	10 to 14 V
HORN – GND1 (B5–26 – B6–6)	B–Y – W–B	Horn switch signal	Horn switch ON	Below 1 V
BDR – GND1 (B6–2 – B6–6)	L–W – W–B	Battery	Always	10 to 14 V
GND1 – Body ground (B6–6 – Body ground)	W–B – Body ground	Ground	Always	Below 1 V
RWLS – GND1 (B5–6 – B6–6)	Y–B – W–B	Rear wiper switch signal (ON)	Rear wiper switch ON	Below 1 V
RWLS – GND1 (B5–6 – B6–6)	Y–B – W–B	Rear wiper switch signal (ON)	Rear wiper switch OFF or INT	10 to 14 V
RWC1 – GND1 (B5–7 – B6–6)	G–B – W–B	Rear wiper switch signal (INT)	Rear wiper switch INT	Below 1 V
RWC1 – GND1 (B5–7 – B6–6)	G–B – W–B	Rear wiper switch signal (INT)	Rear wiper switch OFF	10 to 14 V
ACTD – GND1 (B7–2 – B6–6)	R–B – W–B	Door lock motor (Front LH)	Power door lock not operating or operating to UNLOCK	Below 1 V
ACTD – GND1 (B7–2 – B6–6)	R–B – W–B	Door lock motor (Front LH)	Power door lock not operating to LOCK	10 to 14 V
IND – GND1 (B5–16 – B6–6)	GR – W–B	Security indicator light	Security indicator is off	Below 1 V
IND – GND1 (B5–16 – B6–6)	GR – W–B	Security indicator light	Security indicator light is on	10 to 14 V
SH – GND1 (B7–1 – B6–6)	R–G – W–B	Theft deterrent horn signal	Security horn does not sound	Below 1 V
SH – GND1 (B7–1 – B6–6)	R–G – W–B	Theft deterrent horn signal	Security horn sounds	10 to 14 V
HRLY – GND1 (B7–8 – B6–6)	LG–R – W–B	HEAD relay signal	HEAD relay ON	Below 1 V
HRLY – GND1 (B7–8 – B6–6)	LG–R – W–B	HEAD relay signal	HEAD relay OFF	10 to 14 V
TRLY – GND1 (B7–11 – B6–6)	LG – W–B	Taillight relay signal	Taillight relay ON	Below 1 V
TRLY – GND1 (B7–11 – B6–6)	LG – W–B	Taillight relay signal	Taillight relay OFF	10 to 14 V

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HCTY – GND1 (B7–14 – B6–6)	L–W – W–B	Engine hood courtesy switch signal	Hood courtesy light switch ON (Open)	Below 1 V
HCTY – GND1 (B7–14 – B6–6)	L–W – W–B	Engine hood courtesy switch signal	Hood courtesy light switch OFF (Close)	10 to 14 V
WIG – GND1 (B7–5 – B6–6)	L–Y – W–B	Ignition Switch (IG)	Ignition switch LOCK	Below 1 V
WIG – GND1 (B7–5 – B6–6)	L–Y – W–B	Ignition Switch (IG)	Ignition switch ON	10 to 14 V
IG – GND1 (B7–6 – B6–6)	B–R – W–B	Ignition Switch (IG)	Ignition switch LOCK	Below 1 V
IG – GND1 (B7–6 – B6–6)	B–R – W–B	Ignition Switch (IG)	Ignition switch ON	10 to 14 V
RWW – GND1 (B7–4 – B6–6)	G–B – W–B	Rear washer switch (ON)	Rear washer switch ON	Below 1 V
RWW – GND1 (B7–4 – B6–6)	G–B – W–B	Rear washer switch (ON)	Rear washer switch OFF	10 to 14 V
ACT+ – GND1 (B5–1 – B6–6)	L–R – W–B	Door lock motor (UN-LOCK)	Power door lock not operating or operating to UNLOCK	Below 1 V
ACT+ – GND1 (B5–1 – B6–6)	L–R – W–B	Door lock motor (UN-LOCK)	Power door lock operating to LOCK	10 to 14 V
ACT– – GND1 (B5–10 – B6–6)	L–B – W–B	Door lock motor (LOCK)	Power door lock not operating or operating to LOCK	Below 1 V
ACT– – GND1 (B5–10 – B6–6)	L–B – W–B	Door lock motor (LOCK)	Power door lock operating to UN-LOCK twice	10 to 14 V
MPX1 (B7–22)	W–L	Multiplex communica-tion signal	Multiplex communication circuit	–
MPX2 (*2) (B5–24)	L–Y	Multiplex communica-tion signal	Multiplex communication circuit	–
MPX3 (B7–20)	G–O	Multiplex communica-tion signal	Multiplex communication circuit	–
ILE – GND1 (B7–3 – B6–6)	W – W–B	Illumination	Map Light is off	Below 1 V
ILE – GND1 (B7–3 – B6–6)	W – W–B	Illumination	Map Light is on	10 to 14 V
PRG – GND1 (B5–5 – B6–6)	V – W–B	Wireless transmitter signal ground	Wireless door look receiver com-munication circuit	–
RDA – GND1 (B5–4 – B6–6)	R–G – W–B	Wireless transmitter signal input	Wireless door lock control sys-tem is operated	Below 1 V
RDA – GND1 (B5–4 – B6–6)	R–G – W–B	Wireless transmitter signal input	Wireless door lock control sys-tem is not operated	10 to 14 V
HU – GND1 (B6–11 – B6–6)	Y–R – W–B	Headlight dimmer switch (HI)	Headlight dimmer switch position is Hi beam or FLASH	Below 1 V
HU – GND1 (B6–11 – B6–6)	Y–R – W–B	Headlight dimmer switch (HI)	Headlight dimmer switch position is not Hi beam or FLASH	10 to 14 V
HF – GND1 (B6–8 – B6–6)	R–L – W–B	Headlight dimmer switch (FLASH)	Headlight dimmer switch position is FLASH	Below 1 V
HF – GND1 (B6–8 – B6–6)	R–L – W–B	Headlight dimmer switch (FLASH)	Headlight dimmer switch position is not FLASH	10 to 14 V
TAIL – GND1 (B6–7 – B6–6)	G – W–B	Light control switch (TAIL)	Light control switch TAIL or HEAD	Below 1 V

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TAIL – GND1 (B6–7 – B6–6)	G – W–B	Light control switch (TAIL)	Light control switch OFF	10 to 14 V
CLTS (*3) – GND1 (B6–12 – B6–6)	Y – W–B	Automatic light control sensor (Signal)	Ignition switch OFF	Below 1 V
CLTS (*3) – GND1 (B6–12 – B6–6)	Y – W–B	Automatic light control sensor (Signal)	Ignition switch ON	Signal waveform
CLTE (*3) – GND1 (B6–3 – B6–6)	BR – W–B	Automatic light control sensor (Ground)	Always	Below 1 V
CLTB (*3) – GND1 (B6–4 – B6–6)	R–G – W–B	Automatic light control sensor (IG)	Ignition switch OFF	Below 1 V
CLTB (*3) – GND1 (B6–4 – B6–6)	R–G – W–B	Automatic light control sensor (IG)	Ignition switch ON	10 to 14 V
BZR – GND1 (B7–15 – B6–6)	LG – W–B	Wireless door lock buzzer signal	Buzzer does not sound	Below 1 V
BZR – GND1 (B7–15 – B6–6)	LG – W–B	Wireless door lock buzzer signal	Buzzer sounds	10 to 14 V
RLD – GND1 (B7–26 – B6–6)	L – W–B	Power window control (Rear LH (DOWN))	Ignition switch ON	Below 1 V
RLD – GND1 (B7–26 – B6–6)	L – W–B	Power window control (Rear LH (DOWN))	Ignition switch ON, Rear left power window DOWN operation	10 to 14 V
RLU – GND1 (B7–25 – B6–6)	G–R – W–B	Power window control (Rear LH (UP))	Ignition switch ON	Below 1 V
RLU – GND1 (B7–25 – B6–6)	G–R – W–B	Power window control (Rear LH (UP))	Ignition switch ON, Rear left power window UP operation	10 to 14 V
RRD – GND1 (B5–20 – B6–6)	L – W–B	Power window control (Rear RH (DOWN))	Ignition switch ON	Below 1 V
RRD – GND1 (B5–20 – B6–6)	L – W–B	Power window control (Rear RH (DOWN))	Ignition switch ON, Rear right power window DOWN operation	10 to 14 V
RRU – GND1 (B5–19 – B6–6)	G–Y – W–B	Power window control (Rear RH (UP))	Ignition switch ON	Below 1 V
RRU – GND1 (B5–19 – B6–6)	G–Y – W–B	Power window control (Rear RH (UP))	Ignition switch ON, Rear right power window UP operation	10 to 14 V
HEAD – GND1 (B6–9 – B6–6)	G–Y – W–B	Light control switch (HEAD)	Light control switch HEAD	Below 1 V
HEAD – GND1 (B6–9 – B6–6)	G–Y – W–B	Light control switch (HEAD)	Light control switch OFF or TAIL	10 to 14 V
PKB – GND1 (B5–3 – B6–6)	LG–R – W–B	Parking brake switch signal	Ignition switch ON, Parking brake applied	Below 1 V
PKB – GND1 (B5–3 – B6–6)	LG–R – W–B	Parking brake switch signal	Ignition switch ON, Parking brake not applied	10 to 14 V
GSW (B6–16)	GR–R	Airbag sensor communication signal	Airbag sensor communication circuit	–
OBD2 (B5–2)	G–R	Diagnosis signal	DLC3 communication circuit	–
FFOG – GND1 (B6–13 – B6–6)	G–B – W–B	Fog light switch signal	Headlight dimmer switch LOW, Fog light switch OFF	Below 1 V

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FFOG – GND1 (B6–13 – B6–6)	G–B – W–B	Fog light switch signal	Headlight dimmer switch LOW, Fog light switch ON	10 to 14 V
DIM (*1) – GND1 (B7–17 – B6–6)	R – W–B	DIMMER relay signal	Ignition switch OFF	Below 1 V
DIM (*1) – GND1 (B7–17 – B6–6)	R – W–B	DIMMER relay signal	Ignition switch ON	10 to 14 V
H–ON (*1) – GND1 (B7–16 – B6–6)	R–W – W–B	DRL No.4 relay signal	Ignition switch OFF	Below 1 V
H–ON (*1) – GND1 (B7–16 – B6–6)	R–W – W–B	DRL No.4 relay signal	Ignition switch ON	10 to 14 V
HIND (*1) – GND1 (B5–18 – B6–6)	GR–L – W–B	Hi–beam indicator light signal	Ignition switch OFF	Below 1 V
HIND (*1) – GND1 (B5–18 – B6–6)	GR–L – W–B	Hi–beam indicator light signal	Ignition switch ON	10 to 14 V
A (*3) – GND1 (B6–10 – B6–6)	L–R – W–B	Light control switch (AUTO)	Light control switch OFF	Below 1 V
A (*3) – GND1 (B6–10 – B6–6)	L–R – W–B	Light control switch (AUTO)	Light control switch AUTO	10 to 14 V
MIRE – GND1 (B5–28 – B6–6)	LG–B – W–B	Remote control mirror switch (Ground)	Always	Below 1 V
MIRS – GND1 (B5–29 – B6–6)	P–L – W–B	Remote control mirror switch (IG)	Ignition switch ON	10 to 14 V
MIRS – GND1 (B5–29 – B6–6)	P–L – W–B	Remote control mirror switch (IG)	Ignition switch ON, Mirror switch L or R position selected	Below 1 V
MIRB – GND1 (B5–30 – B6–6)	G–B – W–B	Remote control mirror switch (Battery)	Always	10 to 14 V
S+B – GND1 (B6–1 – B6–6)	W–L – W–B	Battery	Always	10 to 14 V
PWS – GND1 (B6–21 – B6–6)	R–L – W–B	Back door power window switch (Ground)	Ignition switch ON	Below 1 V
PWS – GND1 (B6–21 – B6–6)	R–L – W–B	Back door power window switch (Ground)	Ignition switch ON, Back door power window switch operated	10 to 14 V
M2 (*4) – GND1 (B6–22 – B6–6)	G – W–B	Driving position memory switch (M2)	Ignition switch ON	10 to 14 V
M2 (*4) – GND1 (B6–22 – B6–6)	G – W–B	Driving position memory switch (M2)	Ignition switch ON, Driving position memory switch M2 button pushed	Below 1 V
M1 (*4) – GND1 (B6–23 – B6–6)	L–Y – W–B	Driving position memory switch (M1)	Ignition switch ON	10 to 14 V
M1 (*4) – GND1 (B6–23 – B6–6)	L–Y – W–B	Driving position memory switch (M1)	Ignition switch ON, Driving position memory switch M1 button pushed	Below 1 V
MM (*4) – GND1 (B6–24 – B6–6)	L – W–B	Driving position memory switch (SET)	Ignition switch ON	10 to 14 V
MM (*4) – GND1 (B6–24 – B6–6)	L – W–B	Driving position memory switch (SET)	Ignition switch ON, Driving position memory switch SET button pushed	Below 1 V

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DOP (*2) – GND1 (B5–9 – B6–6)	P – W–B	Glass breakage sensor ECU communication	Armed state	Below 1 V
DOP (*2) – GND1 (B5–9 – B6–6)	P – W–B	Glass breakage sensor ECU communication	Alarm sounds (on glass breakage detection)	Pulse generation (See page DI–1774)

(*1): w/ Daytime Running Light
(*2): w/ Glass Breakage Sensor
(*3): w/ Automatic Light Control
(*4): w/ Driving Position Memory
(*5): w/ Sliding Roof

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DID99–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the hand–held tester, you can read the values of the switches, sensors, actuators and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the methods to shorten labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on the tester, read the ”DATA LIST”.

BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
KEY UNLK WRN SW	Key unlock warning switch/ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	–
ACC SW	ACC switch/ON or OFF	ON: Ignition switch ACC OFF: Ignition switch OFF	–
IG SW	IG switch/ON or OFF	ON: Ignition switch ON OFF: Ignition switch OFF	–
PARKING BRAKE SW	Parking brake switch/ON or OFF	ON: Parking brake pedal depressed (ON) OFF: Parking brake released (OFF)	–
HOOD COURTSY SW	Hood courtesy switch/ON or OFF	ON: Engine hood OPEN (Hood courtesy switch ON) OFF: Engine hood CLOSED (Hood courtesy switch OFF)	–
D DOR CTY SW	Driver door courtesy light switch/ON or OFF	ON: Driver door is opened OFF: Driver door is closed	–
P DOR CTY SW	Front passenger door courtesy light switch/ON or OFF	ON: Front passenger door is opened OFF: Front passenger door is closed	–
Rr DOR CTY SW	Rear passenger door courtesy light switch/ON or OFF	ON: Rear passenger door is opened OFF: Rear passenger door is closed	–
MIRR SEL SW R	Remote control mirror switch passenger side/ON or OFF	ON: Remote control mirror switch passenger side is selected OFF: Remote control mirror switch passenger side is not selected	–
MIRR SEL SW L	Remote control mirror switch driver side/ON or OFF	ON: Remote control mirror switch driver side is selected OFF: Remote control mirror switch driver side is not selected	–
MIRR POS SW R	Remote control mirror switch R position/ON or OFF	ON: Remote control mirror switch R position is selected OFF: Remote control mirror switch R position is not selected	–

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MIRR POS SW L	Remote control mirror switch L position/ON or OFF	ON: Remote control mirror switch L position is selected OFF: Remote control mirror switch L position is not selected	–
MIRR POS SW UP	Remote control mirror switch UP position/ON or OFF	ON: Remote control mirror switch UP position is selected OFF: Remote control mirror switch UP position is not selected	–
MIRR POS SW DWN	Remote control mirror switch DOWN position/ON or OFF	ON: Remote control mirror switch DOWN position is selected OFF: Remote control mirror switch DOWN position is not selected	–
AUTO LIGHT SW	Light control switch (AUTO)/ON or OFF	ON: Light control switch position is AUTO OFF: Light control switch position is not AUTO	–
HEAD LIGHT SW	Light control switch (HEAD)/ON or OFF	ON: Light control switch position is HEAD OFF: Light control switch position is not HEAD	–
TAIL LIGHT SW	Light control switch (TAIL)/ON or OFF	ON: Light control switch position is TAIL OFF: Light control switch position is not TAIL	–
ILLUMINATE RATE	Illumination rate information/ MIN: 0 MAX: 99.99	Condition value will be displayed Normal value: 0.8 ms to 22.0 ms	–
SEAT M1 SW	Memory seat switch (M1)/ON or OFF	ON: Memory seat switch position is M1 OFF: Memory seat switch position is not M1	–
SEAT M2 SW	Memory seat switch (M2)/ON or OFF	ON: Memory seat switch position is M2 OFF: Memory seat switch position is not M2	–
SEAT SET SW	Memory seat switch (SET)/ON or OFF	ON: Memory seat switch position is SET OFF: Memory seat switch position is not SET	–
GLS BRK DETECT	Glass breakage sensor/ON or OFF	ON: Glass breakage sensor operates OFF: Glass breakage sensor does not operate	–
WIRELESS OPER	Wireless door lock control function/ON or OFF	ON: Wireless door lock function operated OFF: Wireless door lock function not operated	–
OPEN DOOR WARN	DOOR indicator light/ON or OFF	ON: Any door is open OFF: All doors are closed	–
AUTO LOCK DELAY	Auto lock delay/60s or 30s	Customized value will be displayed	–
UNLOCK/2OPER	2 time operation wireless unlock signal/ON or OFF	Customized condition will be displayed	–

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INT/LGT ON/UNLK	ON or OFF	ON: Dome light comes on when the doors are unlocked by the wireless transmitter OFF: Dome light does not come on when the doors are unlocked by the wireless transmitter	–
ALARM FUNCTION	Panic function signal/ON or OFF	ON: Panic function operated OFF: Panic function not operated	–
AUTO LOCK	Vehicle speed linked door lock/ON or OFF	Customized condition will be displayed	–
UNLK/KEY TWICE	ON or OFF	ON: Pressing the ”UNLOCK” switch twice unlocks the driver side door OFF: Pressing the ”UNLOCK” switch twice does not unlock the driver side door	–
ALL UNLK/OPN–CL	Ignition switch OFF, shift lever P position, driver courtesy lamp switch ON signal/ON or OFF	ON: All doors unlock when opening driver door within 10 seconds after turning ignition switch OFF OFF: Doors are not unlocked	–
UNLOCK/PARK	Ignition switch OFF, shift lever P position, vehicle speed 0 km/h / ON or OFF	ON: All doors unlock when shift lever is moved to P from any position other than P while ignition switch is ON. OFF: No door unlocks even when shift lever is moved to P from any position other than P while ignition switch is ON	–
WARNING TIME	Warning time/5S, 15S, 27.5S or 60S	Customized value will be displayed	–
PASSIVE MODE	Passive mode information/ON or OFF	Customized condition will be displayed	–
WARN BY GLS SEN	ON or OFF	ON: Warns when glass breakage is detected OFF:Does not warn when glass breakage is detected	–
ENTRY DELAY	Illuminated entry delay/0S, 14S or 30S	Customized value will be displayed	–
AUTO LOCK/SHIFT	ON or OFF	ON: Auto lock function can be set by the shift lever OFF: Auto lock function cannot be set by the shift lever	–
I/L ON/UNLOCK	Room light signal/ON or OFF	ON: Room light is on OFF: Room light is off	–
LIGHTING TIME	Lighting time/7.5S, 15S or 30S	Customized value will be displayed	–
SENSITIVITY	Turn on luminous intensity/ DARK2, DARK1, NORMAL, LIGHT1 or LIGHT2	Customized condition will be displayed	–
LIGHT OFF DELAY	Light auto off delay/OFF, 30S, 60S or 90S	Customized condition will be displayed	–

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DISP EX ON SEN	Display extinction luminous intensity/NORMAL, DARK2, DARK1, LIGHT1 or LIGHT2	Customized condition will be displayed	–
DISP EX OFF SEN	Display extinction release luminous intensity/NORMAL, DARK2, DARK1, LIGHT1 or LIGHT2	Customized condition will be displayed	–

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relays, actuators and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one of the methods to shorten labor time.

It is possible to display the DATE LIST during the ACTIVE TEST.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on the tester, perform the ”ACTIVE TEST”.

BODY ECU:

Item	Test Details	Diagnostic Note
SECURITY INDIC	Turn security indicator light ON/OFF	–
SECURITY HORN	Turn theft horn ON/OFF	This test is available only for vehicles equipped with security horn.
BUZZ CONT SOUND	Wireless buzzer continuous sound ON/OFF	–
BUZZ RESP SOUND	Turn wireless buzzer ON/OFF	Turn volume to MAX if it is a wireless buzzer equipped vehicle.
HEAD LIGHT	Headlight relay ON/OFF	–
TAIL LIGHT	Taillight ON/OFF	–
ILLUMI OUTPUT	Illuminated entry system ON/OFF	IG is ON, E/G is stopped and light control SW is OFF.
ALL COURTESY	DOOR indicator light ON/OFF	–
VEHICLE HORN	Turn vehicle horn ON/OFF	–
RL P/W UP/DOWN	Rear left passenger power window DOWN/UP	Caution: This test causes vehicle parts to move. Watch your hands and feet.
RR P/W UP/DOWN	Rear right passenger power window DOWN/UP	Caution: This test causes vehicle parts to move. Watch your hands and feet.
DOOR LOCK	Door lock LOCK/UNLOCK	All doors are closed.

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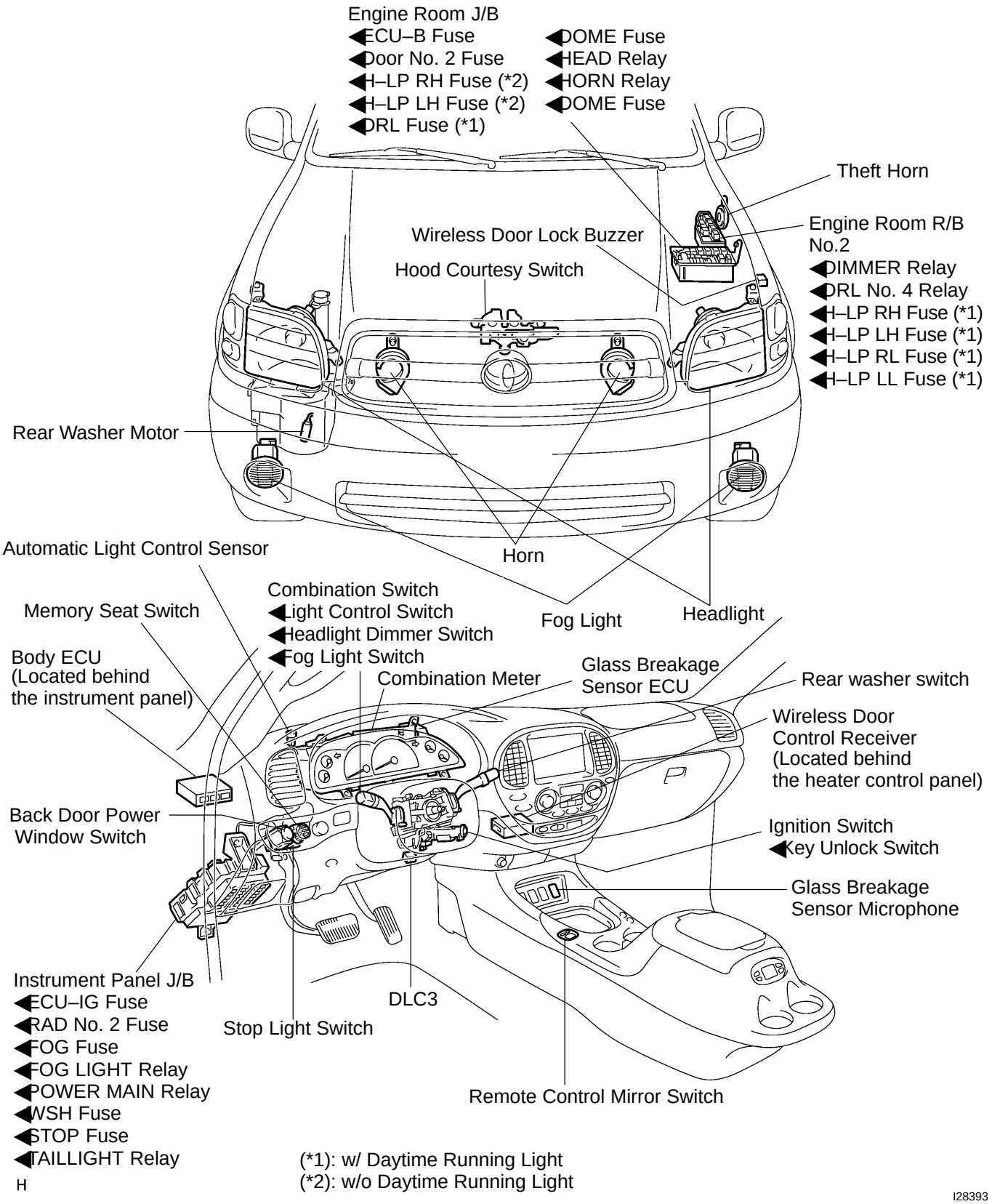
DI94R–07

PARTS LOCATION



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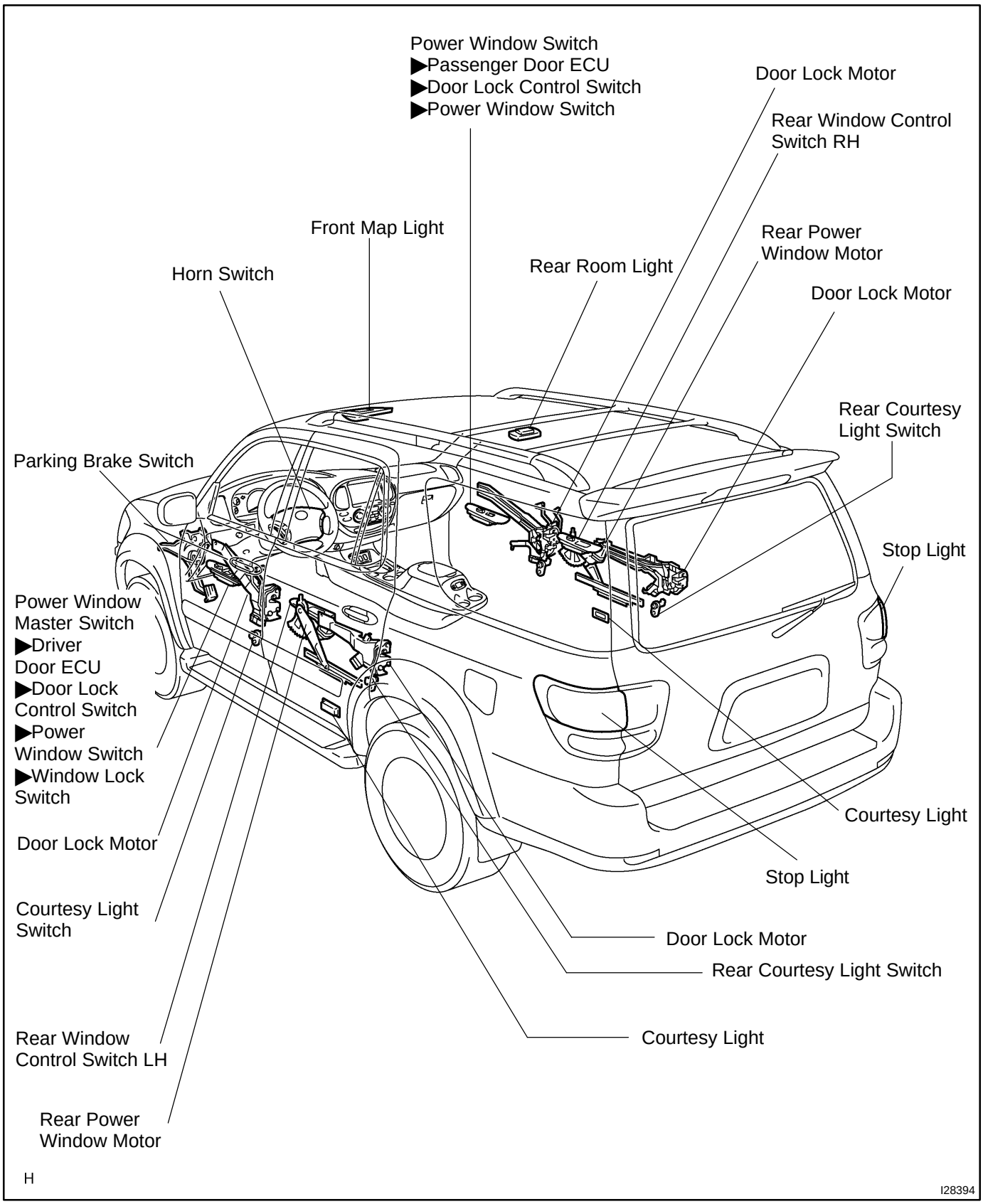
Power Window Switch
▶Passenger Door ECU
▶Door Lock Control Switch
▶Power Window Switch
Door Lock Motor
Rear Window Control Switch RH
Front Map Light
Horn Switch
Rear Room Light
Rear Power Window Motor
Door Lock Motor
Rear Courtesy Light Switch
Parking Brake Switch
Stop Light
Power Window Master Switch
▶Driver Door ECU
▶Door Lock Control Switch
▶Power Window Switch
▶Window Lock Switch
Door Lock Motor
Courtesy Light
Courtesy Light Switch
Stop Light
Door Lock Motor
Rear Courtesy Light Switch
Courtesy Light
Rear Window Control Switch LH
Rear Power Window Motor
H
I28394

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DI94S–08

CIRCUIT INSPECTION

Power source circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the body ECU.
BDR terminal: Power source for door lock motor
S+B terminal: Power source for security horn
ACC terminal: Power source for accessory
BECU terminal: Power source for backing up body ECU
IG terminal: Power source for starting body ECU
WIG terminal: Power source for washer motor

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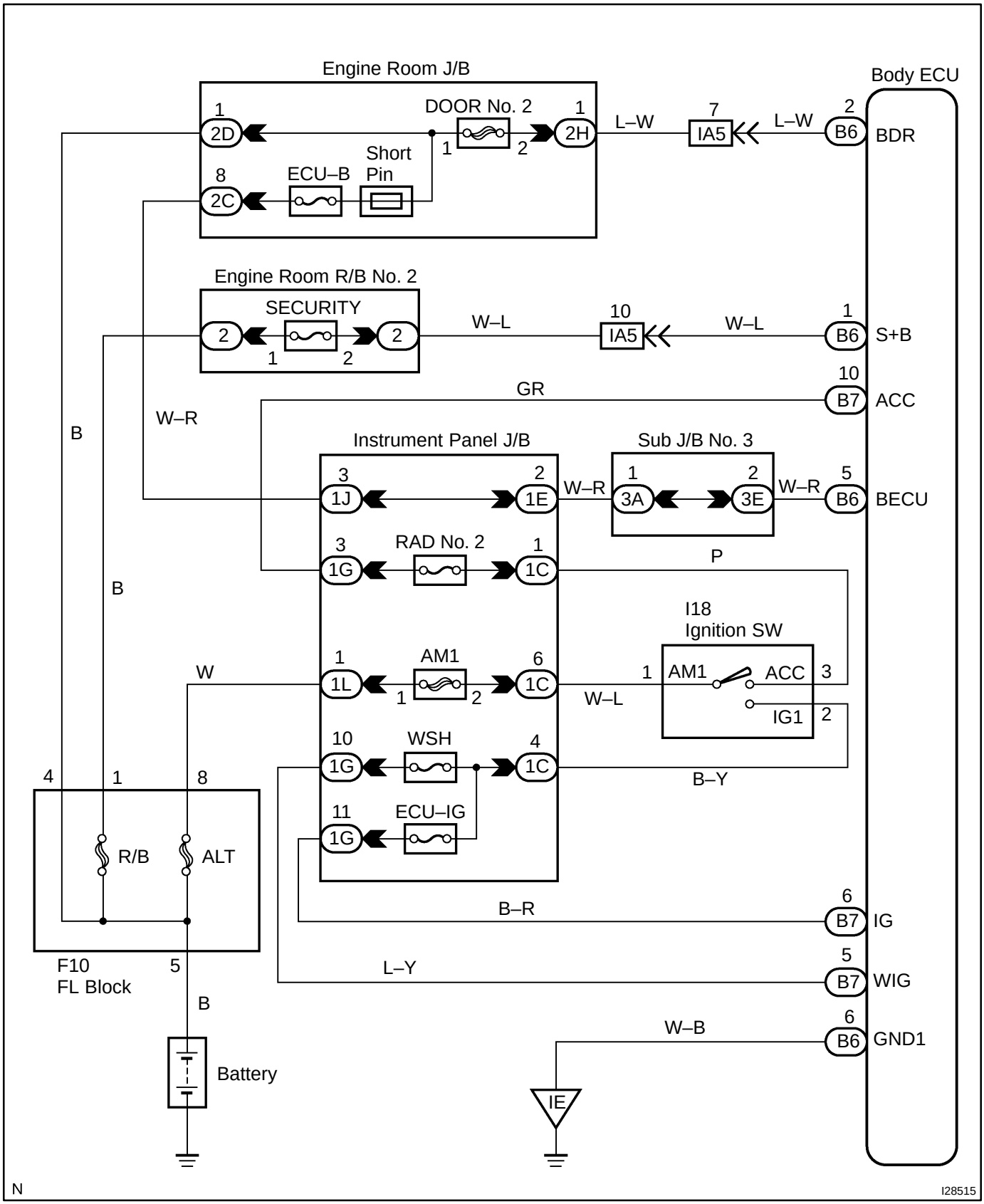
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check RAD No. 2, AM1, WSH, ECU–IG, Door No. 2 and ECU–B fuses.**

CHECK:
Check for continuity of the RAD No. 2, AM1, WSH, ECU–IG, door No. 2 and ECU–B fuses.
OK:
Continuity

NG → **Replace defective fuse.**

OK

2	**Check voltage between terminals ACC, WIG, IG, BECU, S+B, BDR and GND1 of body ECU connector.**

PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals ACC, WIG, IG and GND1.
OK:
Voltage: 10 to 14 V
PREPARATION:
Turn the ignition switch OFF.
CHECK:
Measure the voltage between terminals BECU, BDR, S+B and GND1.
OK:
Voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

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3	**Check wire harness and connector between body ECU and body ground, body ECU and battery (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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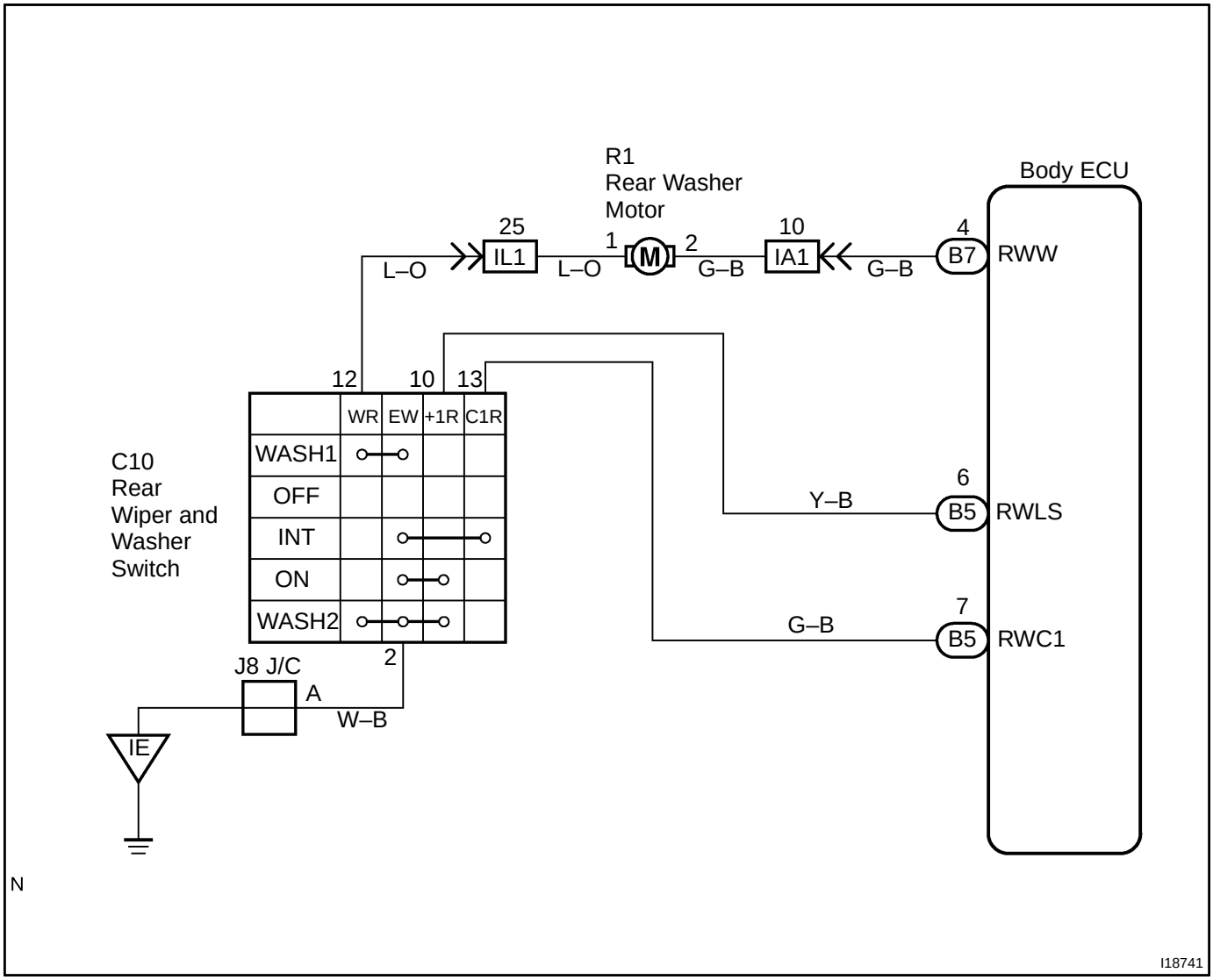
DI56X–09

Rear wiper switch and motor circuit

CIRCUIT DESCRIPTION

Body ECU judges the switch position with the terminal voltage of the rear wiper and washer switch and runs the washer motor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check wiper and washer switch (See page BE–49).

NG → Replace wiper and washer switch.

OK

2	Check rear washer motor (See page BE–49).

NG → Replace rear washer motor.

OK

3	Check wire harness and connector between wiper and washer switch and body ECU, wiper and washer switch and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

4	Check wire harness and connector between rear washer motor and washer switch, rear washer motor and body ECU (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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Taillight Relay Circuit

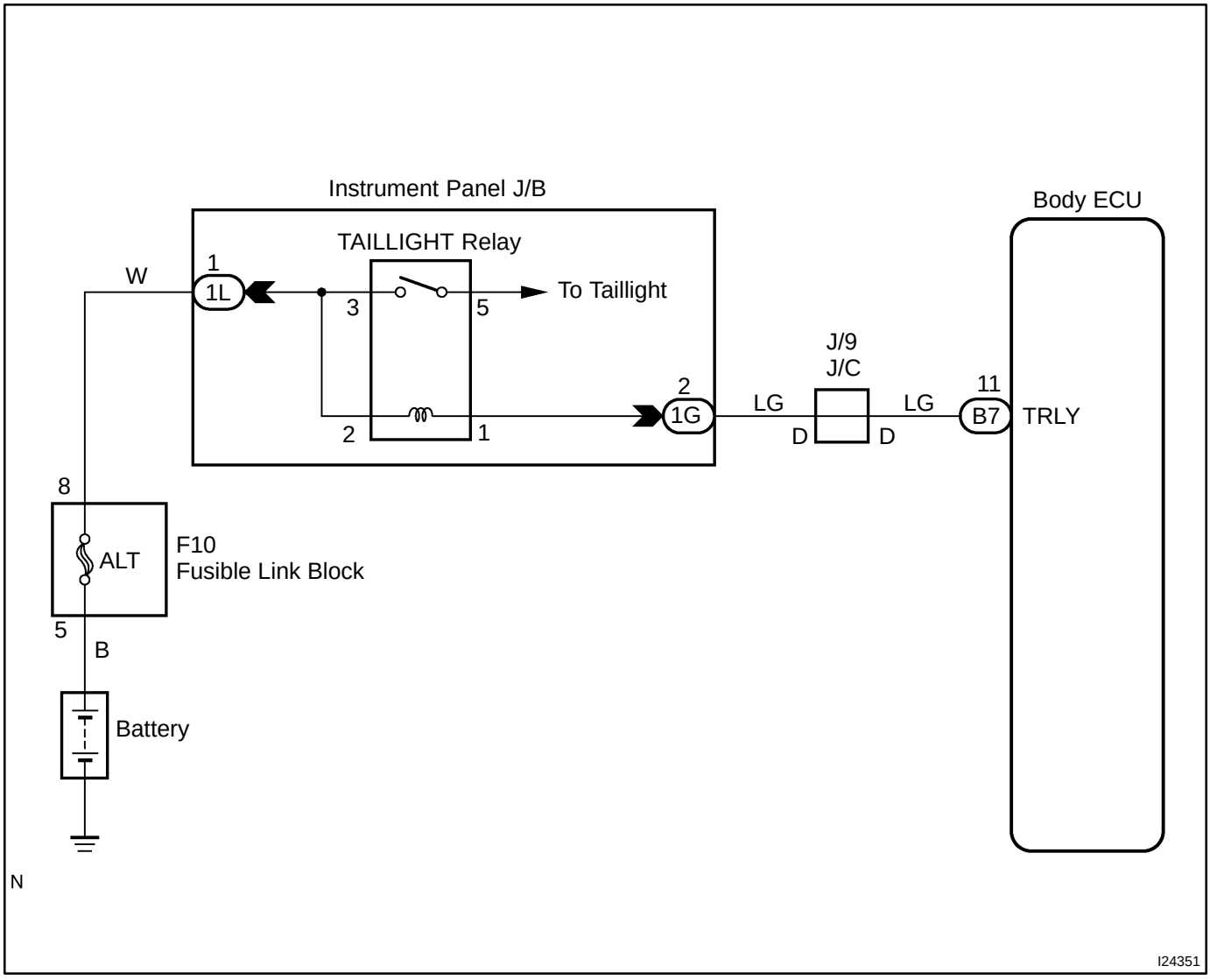
CIRCUIT DESCRIPTION

TAILLIGHT relay will be ”ON” by operating the light control switch. The transistor which activates the tail light relay has two sorts: one is activated by the light control switch for fail safe and the other is activated by CPU. When the theft deterrent system is activated, it causes the transistor in the ECU to switch ON and OFF at approximately 0.4 sec. intervals. This switches the TAILLIGHT relay ON and OFF, and thus flashing the taillights (See the wiring diagram below).

In this condition, if any of the following operations is done, the transistor in the ECU goes OFF and the TAILLIGHT relay switches OFF, and thus stopping the taillights flashing:

(1) Unlock the front LH or RH door with a key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check TAILLIGHT relay using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, perform the ”ACTIVE TEST”.

BODY ECU:

Item	Test Details	Diagnostic Note
TAIL LIGHT	Taillight ON/OFF	–

OK:

The taillights turn on or off correctly when operating them through the hand–held tester.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check TAILLIGHT relay (See page BE–27).**

NG → **Replace TAILLIGHT relay.**

OK

3	**Check wire harness and connector between TAILLIGHT relay and body ECU, battery and TAILLIGHT relay (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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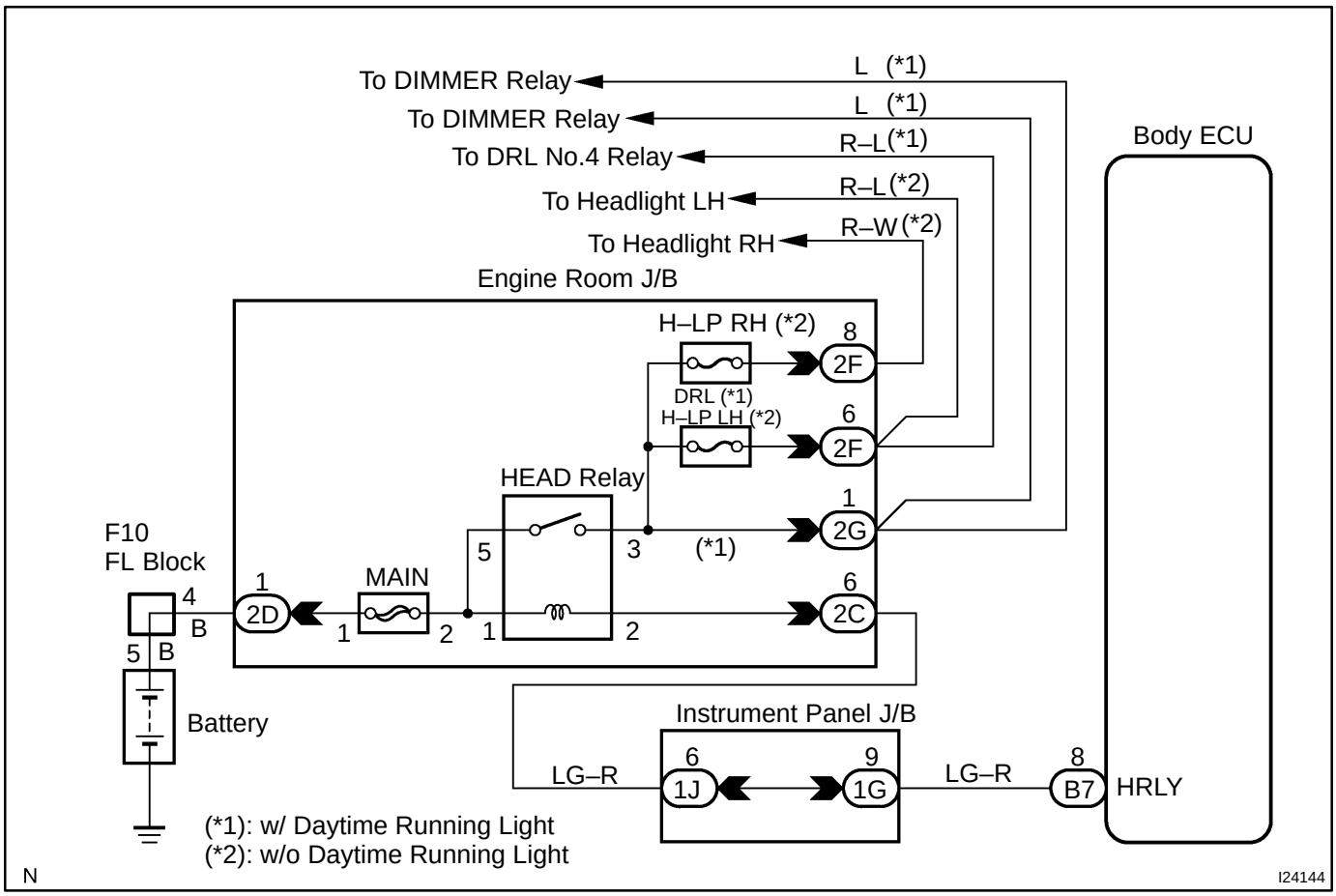
Headlight Relay Circuit

CIRCUIT DESCRIPTION

HEAD relay will be ”ON” by operating the light control switch. The transistor which activates the HEAD relay has two sorts: one is activated by the light control switch for fail safe and the other is activated by CPU. The one that is activated by CPU prevents the headlight from turning off at the time of trouble with the other system in the automatic operation circuit.
When the theft deterrent system is activated, it causes the transistor in the ECU to switch ON and OFF at approximately 0.25 sec. intervals. This switches the HEAD relay ON and OFF, and thus flashing the headlights (See the wiring diagram below).
In this condition, if any of the following operations is done, the transistor in the ECU goes OFF and the HEAD control relay switches OFF, and thus stopping the headlights flashing:

(1) Unlock the front LH or RH door with a key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check HEAD relay using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, perform the ”ACTIVE TEST”.
BODY ECU:

Item	Test Details	Diagnostic Note
HEAD LIGHT	Headlight relay ON/OFF	–

OK:
The headlights turn on or off correctly when operating them through the hand–held tester.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check HEAD relay (See page BE–27).**

NG → **Replace HEAD relay.**

OK

3	**Check wire harness and connector between HEAD relay and body ECU, battery and HEAD relay (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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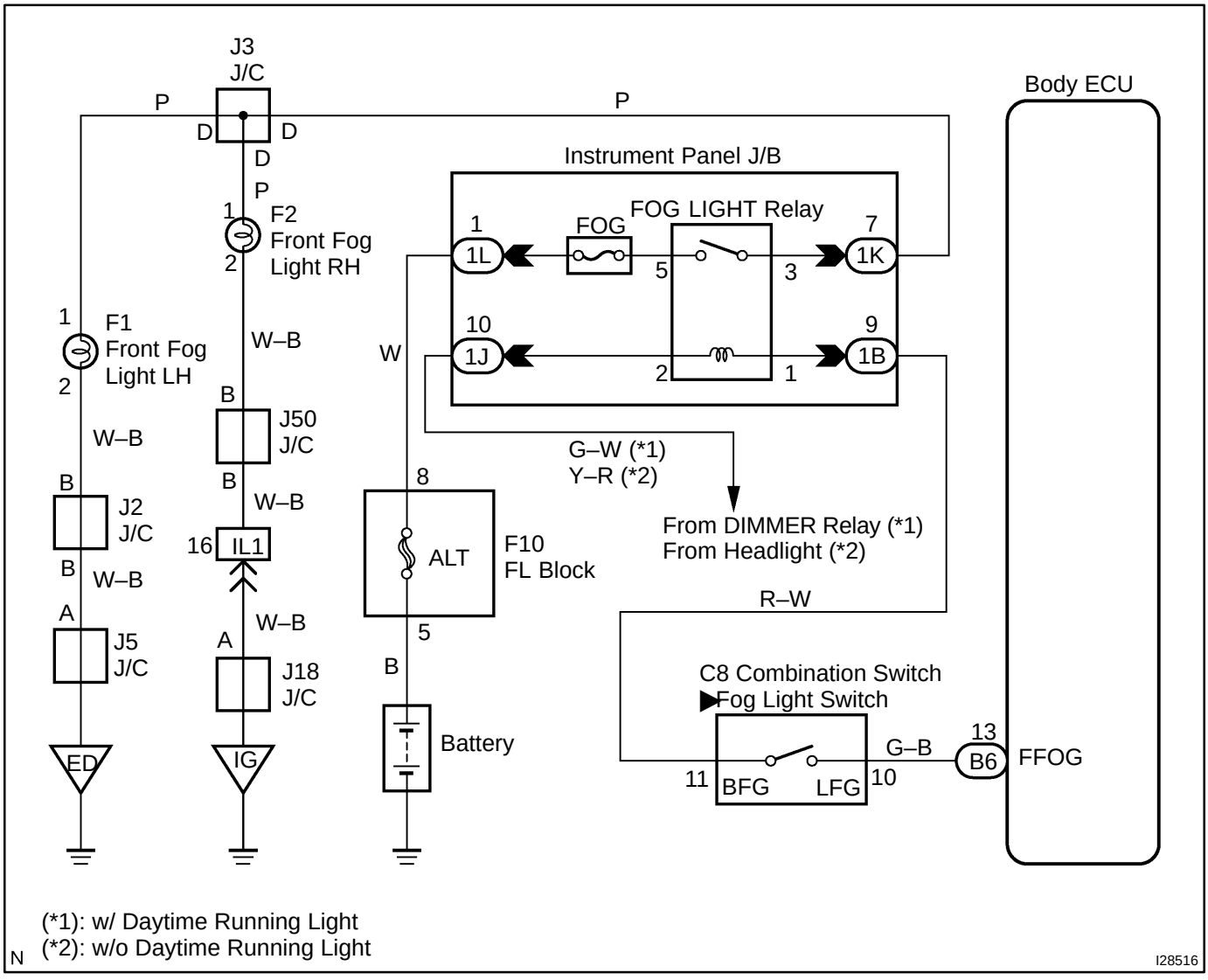
DI6U4–14

Front fog light relay and switch circuit

CIRCUIT DESCRIPTION

The fog light switch is built into the combination switch.
Turning the fog light switch ON supplies power to terminal FFOG of the body ECU.
The fog lights come on when the FOG light relay is turned on.

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	Check FOG LIGHT relay (See page BE–34).

NG → Replace FOG LIGHT relay.

OK

2	Check fog light switch (See page BE–34).

NG → Replace fog light switch.

OK

3	Check wire harness and connector between FOG LIGHT relay and fog light switch, FOG LIGHT relay and battery, FOG LIGHT relay and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

4	Check wire harness and connector between fog light switch and body ECU (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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Daytime running light relay circuit

CIRCUIT DESCRIPTION

Power is supplied to the DIMMER and DRL No. 4 relays when the HEAD relay is turned on.
The HEAD relay turns on by turning the light control switch to the TAIL or HEAD position.
The DIMMER relay turns on by turning the headlight dimmer switch to the LOW, HIGH, or FLASH position.
The body ECU determines the light control switch position and turns on the DRL No. 4 and DIMMER relays.
The DRL No. 4 relay and the daytime running light resistor are parallel circuits. If the light control switch is OFF, electric current flows to body ground via the resistor instead of driving the DRL No. 4 relay. The headlights come on and dim according to the amount of resistance.

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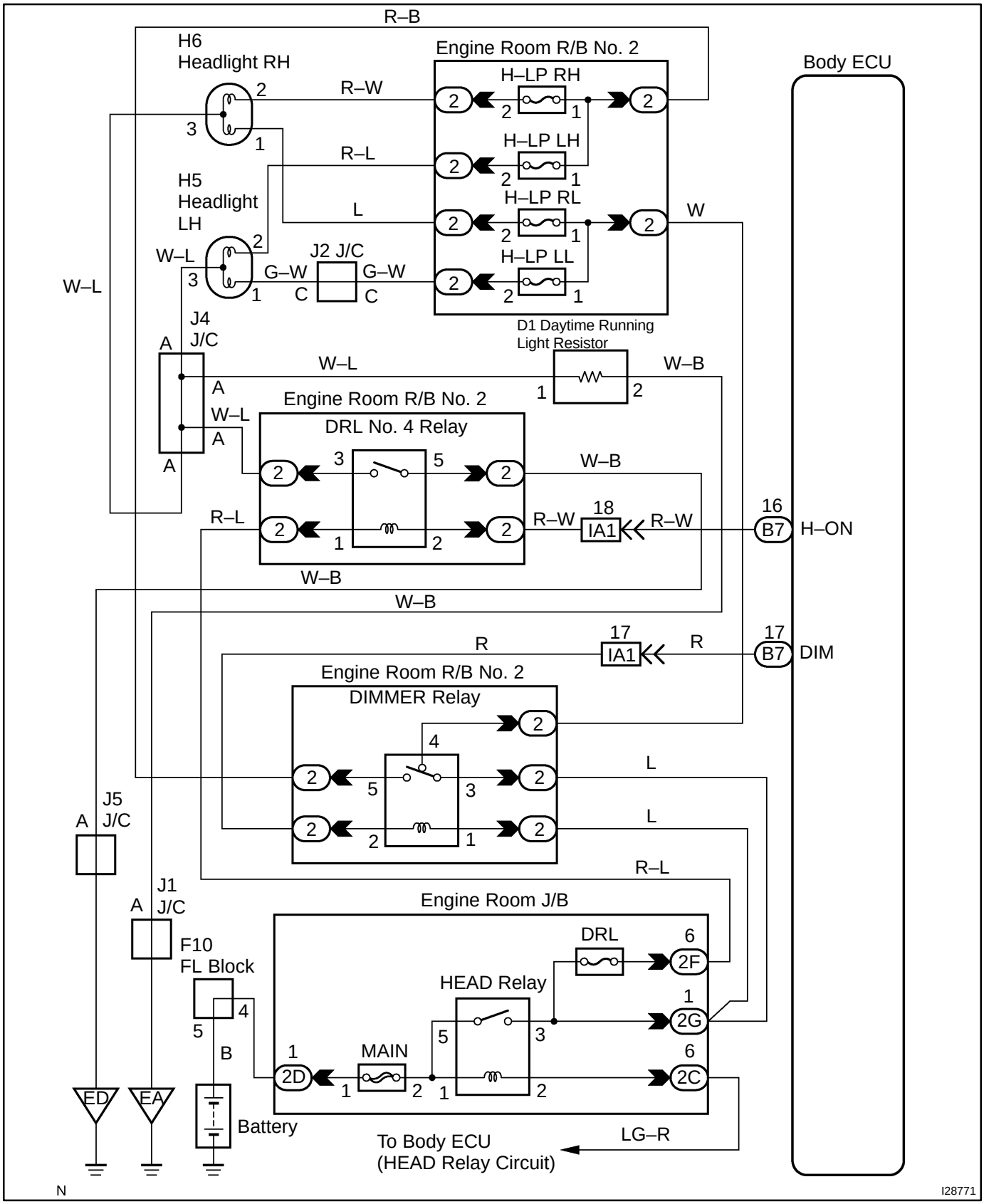
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check DRL No. 4 relay and DIMMER relay (See page BE–27).

NG → Replace DRL No. 4 relay and DIMMER relay.

OK

2	Check wire harness and connector (Daytime running light circuit) (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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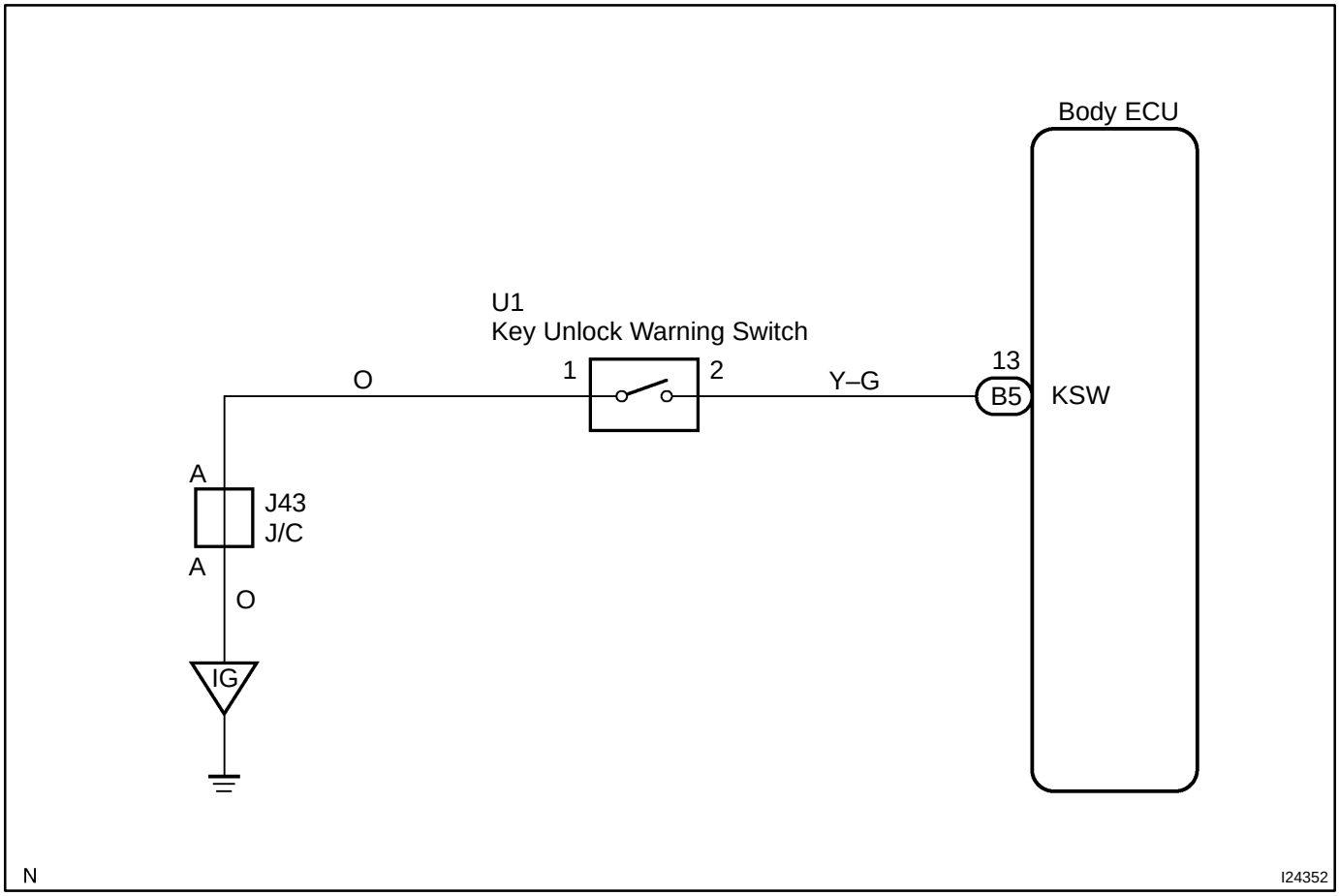
DI571–11

Key unlock warning switch circuit

CIRCUIT DESCRIPTION

The key unlock warning switch turns on when the ignition key is inserted into the key cylinder and turns off when the key is removed.

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check key unlock warning switch using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, read the ”DATA LIST”.
BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
KEY UNLK WRN SW	Key unlock warning switch/ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	–

OK:
The indication on the tester switches between ON and OFF in accordance with the key unlock warning switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check key unlock warning switch (See page BE–24).**

NG → **Replace key unlock warning switch.**

OK

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3	Check wire harness and connector between key unlock warning switch and body ECU, key unlock warning switch and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK →

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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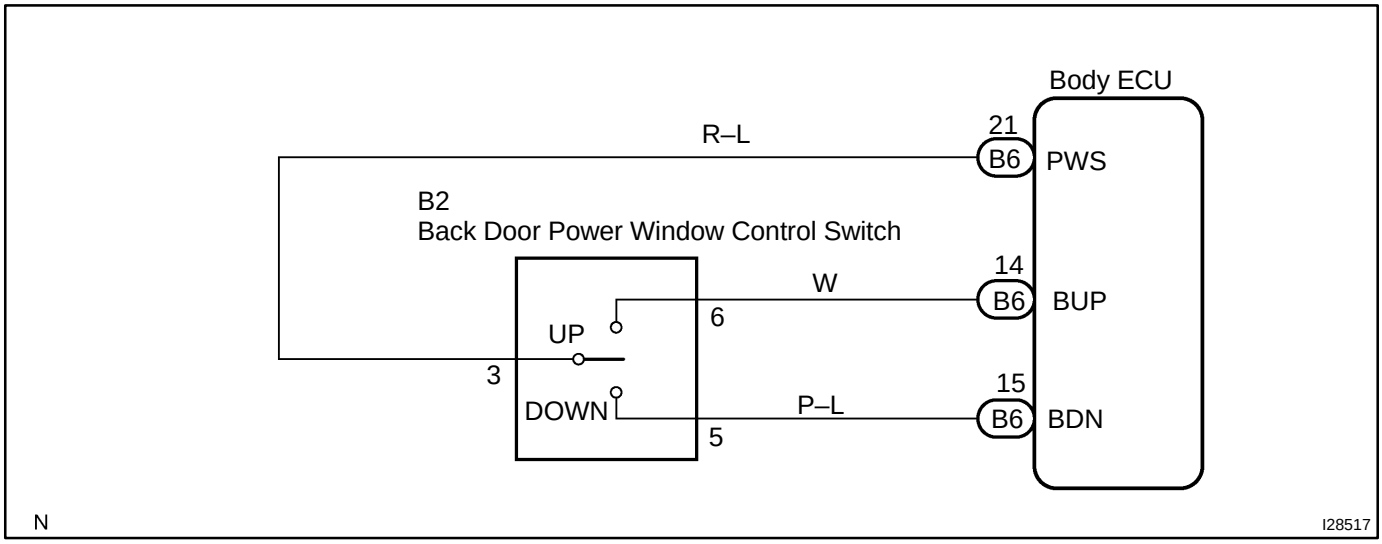
DI572–08

Back door power window switch circuit

CIRCUIT DESCRIPTION

The body ECU detects the condition of the back door power window switch and sends the related information to the back door ECU via BEAN.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check back door power window control switch (See page BE–75).

NG → Replace back door power window control switch.

OK ↓

2	Check wire harness and connector between back door power window control switch and body ECU (See page IN–35).

NG → Repair or replace wire harness or connector.

OK ↓

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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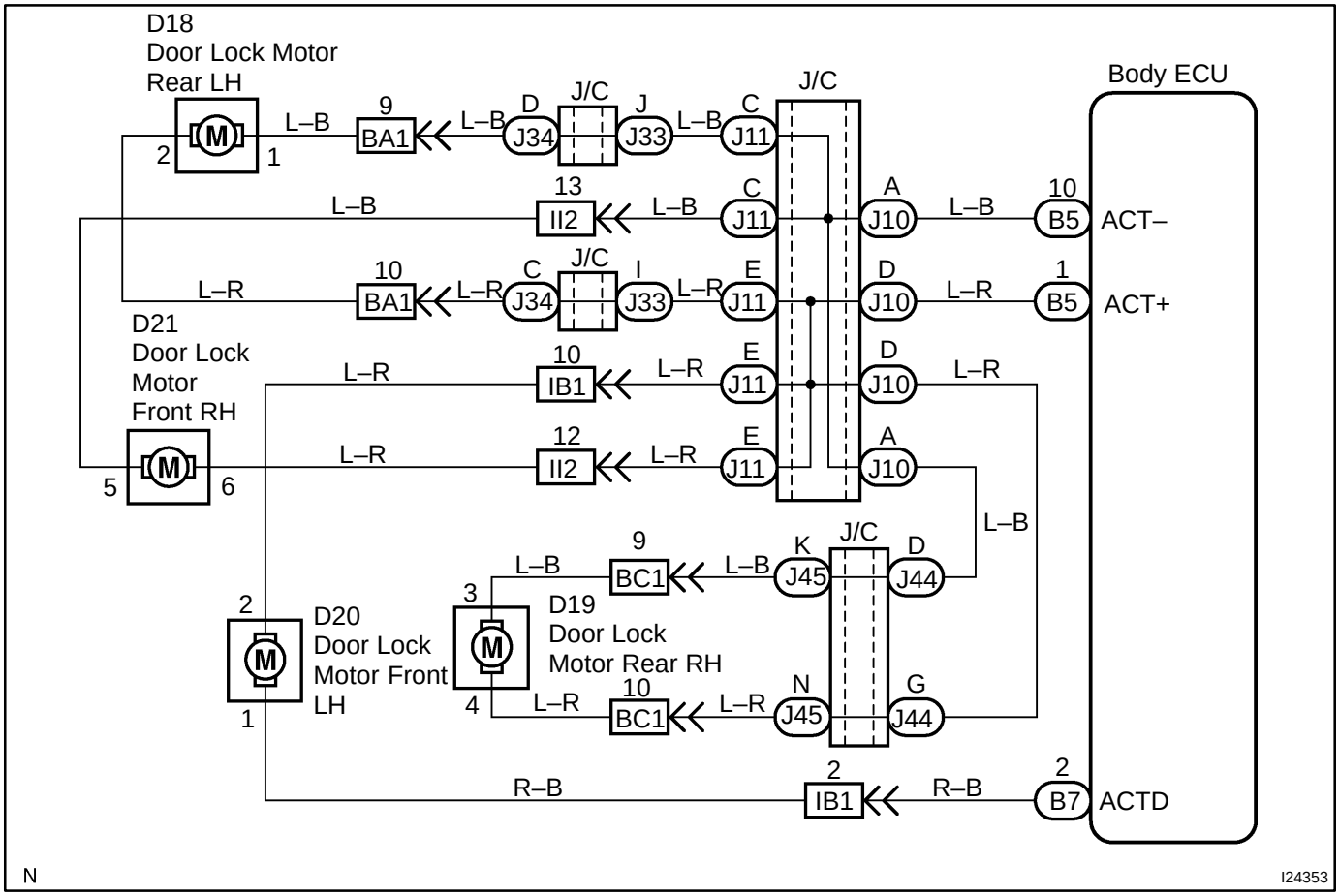
DI573–11

Door lock motor circuit

CIRCUIT DESCRIPTION

The body ECU actuates the door lock motor when it receives a motor drive signal from the wireless transmitter or an ECU via BEAN.

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check door lock motor using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
(a) According to the display on the tester, perform the ”ACTIVE TEST”.
BODY ECU:

Item	Test Details	Diagnostic Note
DOOR LOCK	Door lock LOCK/UNLOCK	All doors are closed.

OK:

All door lock motors lock or unlock the doors correctly when operating them through the hand–held tester.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check door lock motor (See page BE–79).**

NG → **Replace door lock motor.**

OK

Dardoor.com

3	**Check wire harness and connector between door lock motor and body ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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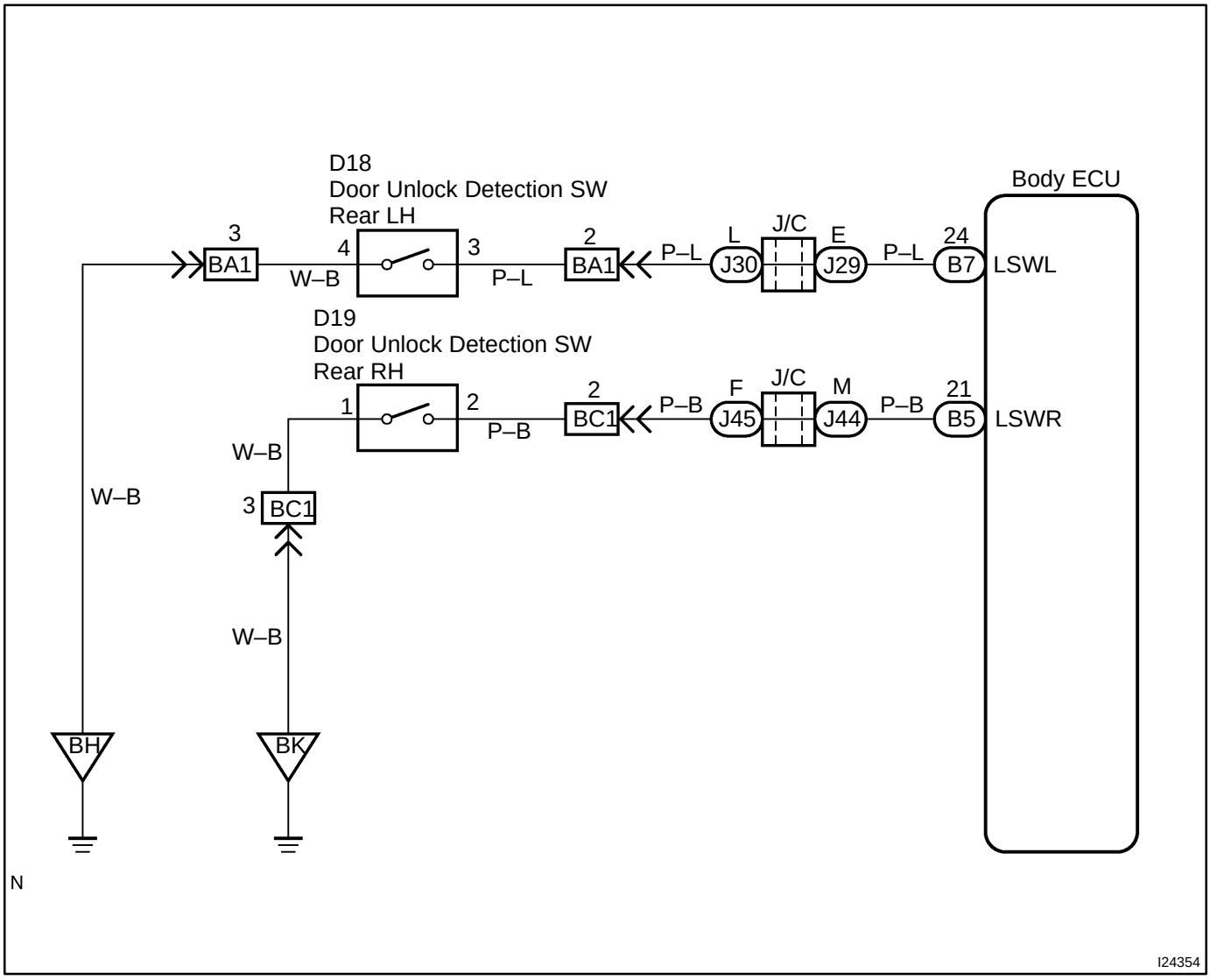
DI574–10

Rear Door unlock detection switch circuit

CIRCUIT DESCRIPTION

The door unlock detection switch is built in the door lock motor assembly. This switch is ON when the door lock knob is in the unlock position and OFF when the lock knob is in the lock position. The ECU detects the door lock knob conditions in this circuit.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check rear door unlock detection switch (See page BE–79).

NG → Replace door lock motor assembly.

OK ↓

2	Check wire harness and connector between door unlock detection switch and body ECU, door unlock detection switch and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK ↓

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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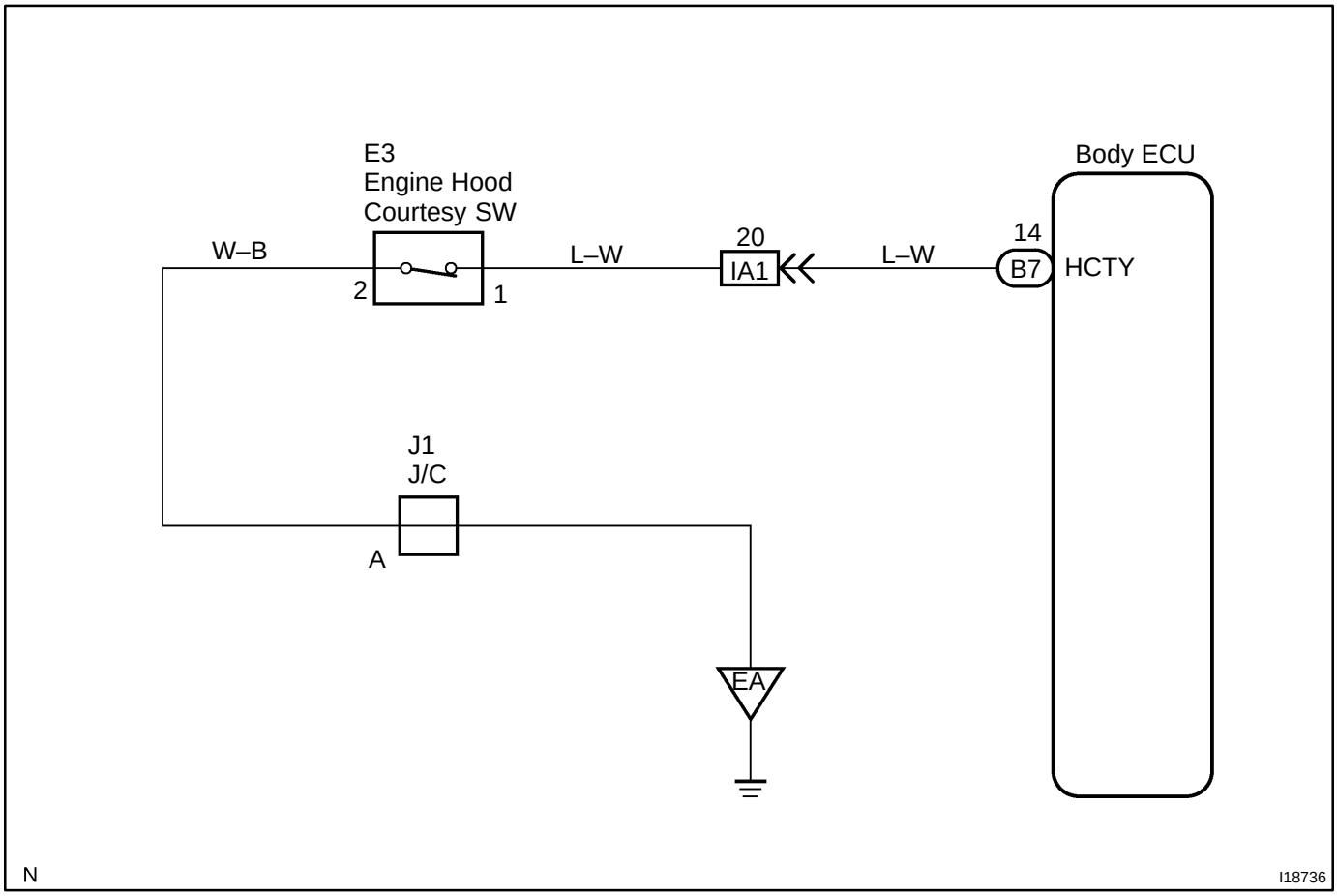
DI7NV–08

Engine Hood Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The engine hood courtesy switch is built into the engine hood lock assembly, and is turned on when the engine hood is opened and goes off when the engine hood is closed.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check engine hood courtesy switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the ”DATA LIST”.

BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
HOOD COURTSY SW	Hood courtesy switch/ON or OFF	ON: Engine hood OPEN (Hood courtesy switch ON) OFF: Engine hood CLOSE (Hood courtesy switch OFF)	–

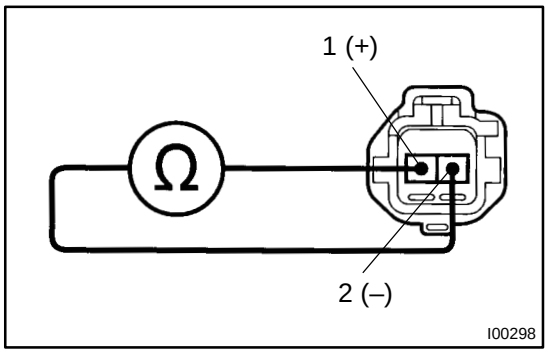
OK:

The indication on the tester switches between ON and OFF in accordance with the engine hood courtesy switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check engine hood courtesy switch.**



PREPARATION:

Disconnect the engine hood courtesy switch connector.

CHECK:

Check continuity between terminals 1 and 2 when the engine hood lock is locked and unlocked.

OK:

Engine hood lock condition	Tester connection	Specified condition
LOCK	1 – 2	No continuity
UNLOCK	1 – 2	Continuity

NG → **Replace engine hood courtesy switch.**

OK

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3	**Check harness and connector between body ECU and switch, switch and body ground (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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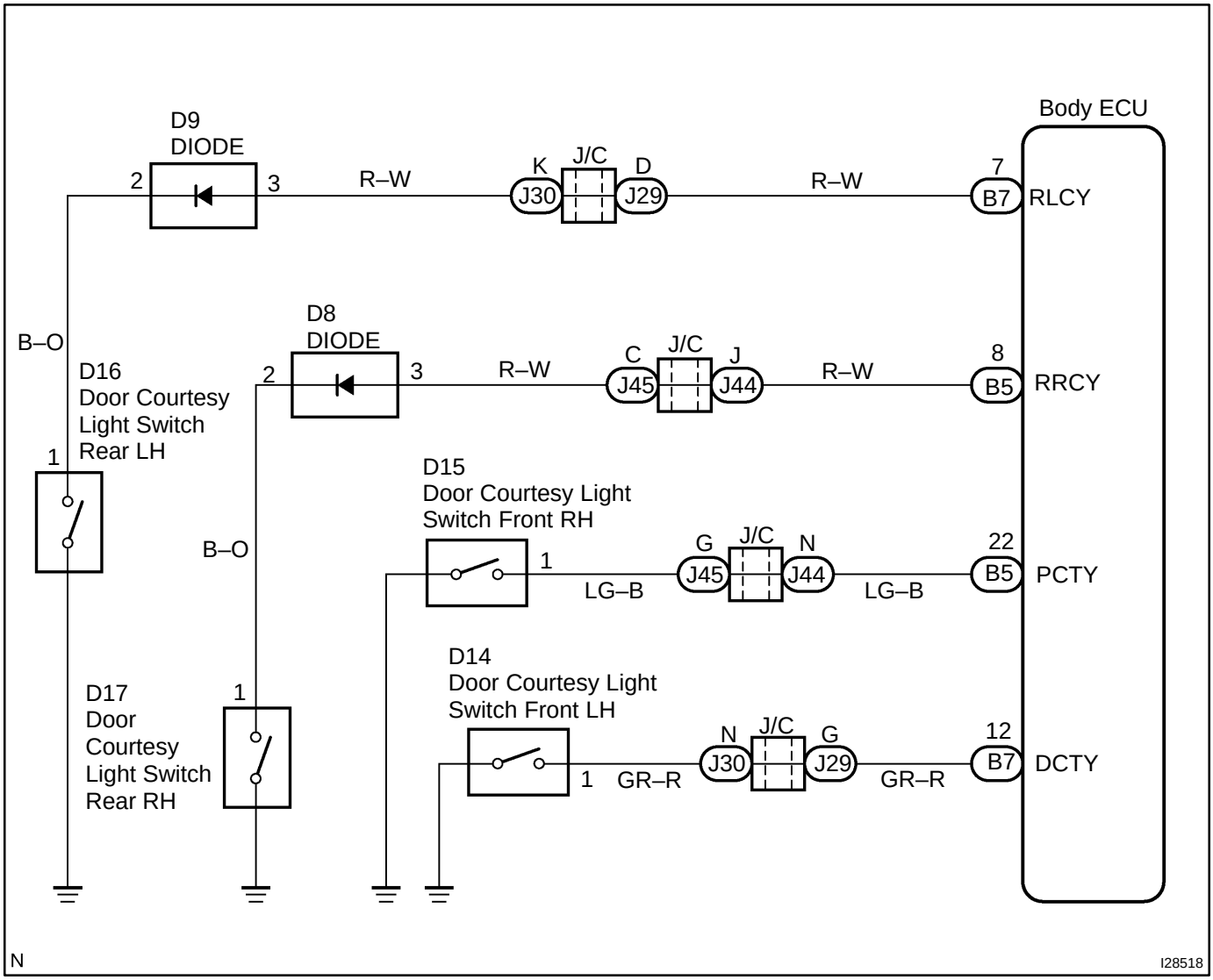
DI577–10

Door courtesy light switch circuit

CIRCUIT DESCRIPTION

The door courtesy light switch is turned ON when the door is opened and is turned OFF when the door is closed.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check courtesy light switch using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, read the ”DATA LIST”.
BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D DOR CTY SW	Driver door courtesy light switch/ ON or OFF	ON: Driver door is opened OFF: Driver door is closed	–
P DOR CTY SW	Front passenger door courtesy light switch/ON or OFF	ON: Front passenger door is opened OFF: Front passenger door is closed	–
Rr DOR CTY SW	Rear passenger door courtesy light switch/ON or OFF	ON: Rear passenger door is opened OFF: Rear passenger door is closed	–

OK:

The indication on the tester switches between ON and OFF in accordance with the open/close door status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check door courtesy light switch (See page BE–40).**

NG → **Replace courtesy light switch.**

OK

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3	Check wire harness and connector between door courtesy light switch and body ECU, door courtesy light switch and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK →

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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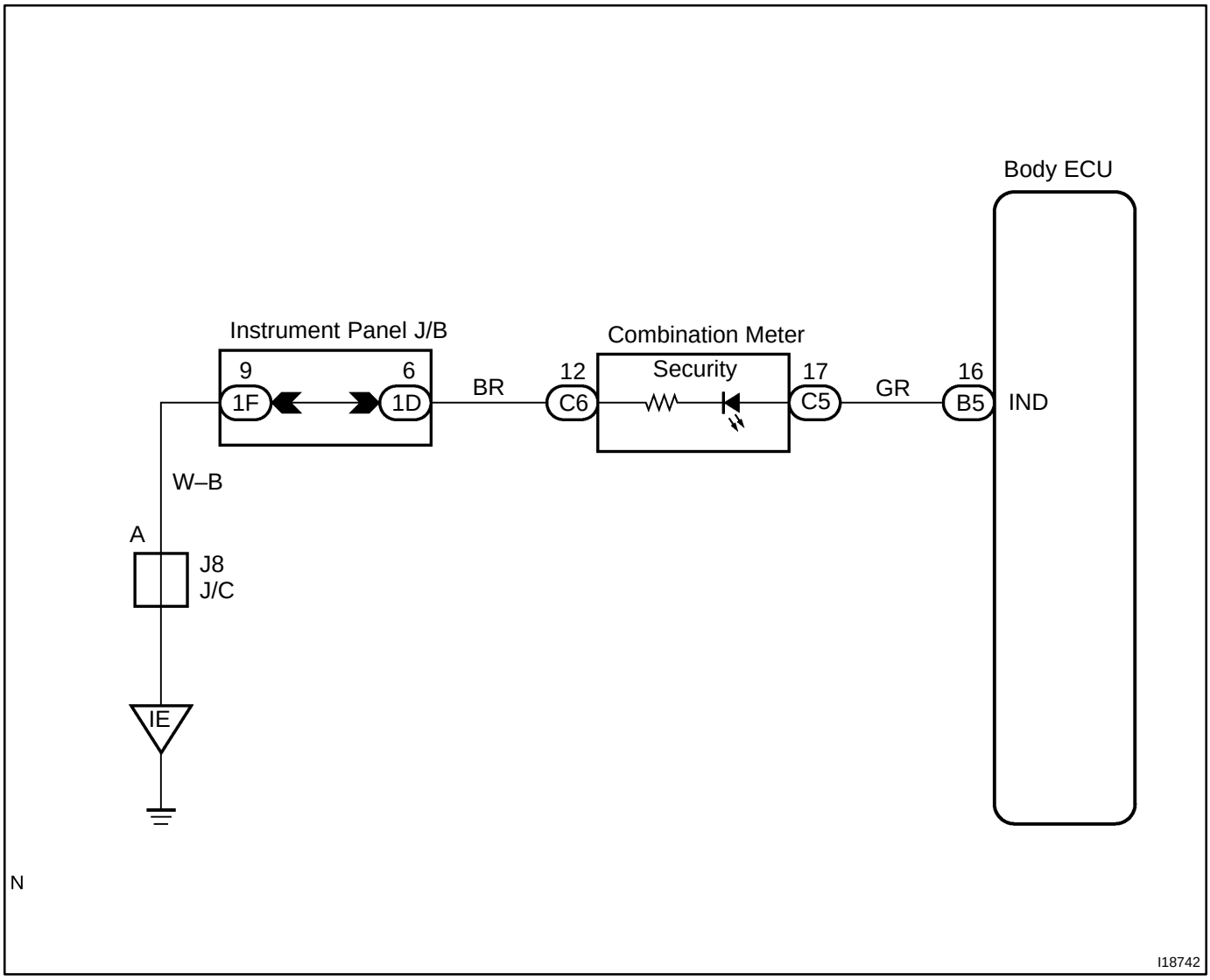
DI579–09

Theft deterrent indicator circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is preparing to set, this circuit turns on the indicator light. When the system has been set, it continually turns the indicator light on for 1 second and turns it off for 1 second, and thus blinking the indicator light.
This theft deterrent indicator sends a key judgment of the immobilizer to the transponder key ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check theft deterrent indicator using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, perform the ”ACTIVE TEST”.
BODY ECU:

Item	Test Details	Diagnostic Note
SECURITY INDIC	Turn security indicator light ON/OFF	–

OK:

The theft deterrent indicator light flashes or goes off correctly when operating it through the hand–held tester.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check theft deterrent indicator (See page DI–1608).**

NG → **Replace combination meter.**

OK

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3	Check wire harness and connector between theft deterrent indicator (combination meter) and body ECU, theft deterrent indicator (combination meter) and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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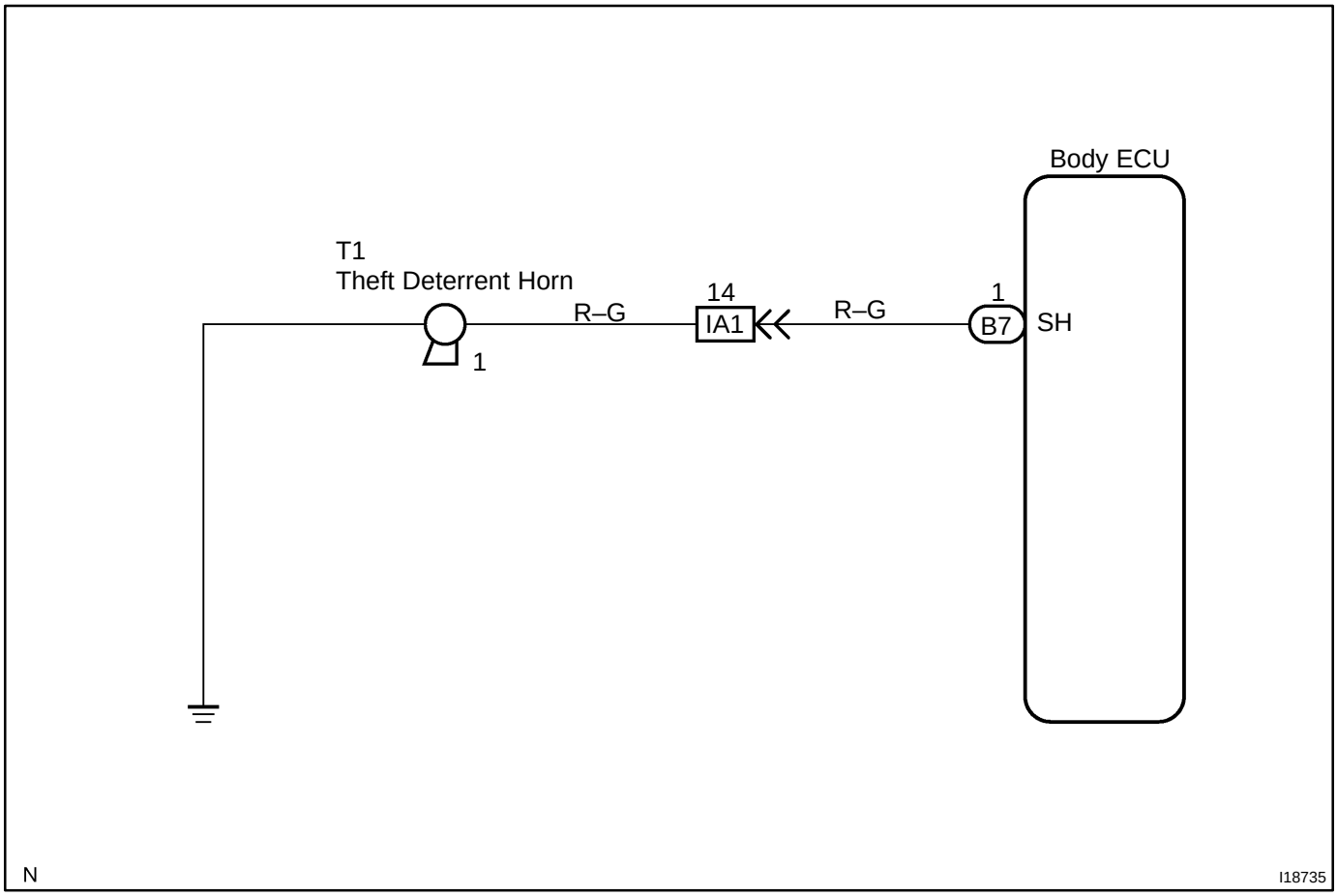
Theft deterrent horn circuit

CIRCUIT DESCRIPTION

During warning of the theft deterrent system, the body ECU activates the theft deterrent horn.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check theft deterrent horn using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, perform the ”ACTIVE TEST”.
BODY ECU:

Item	Test Details	Diagnostic Note
SECURITY HORN	Turn theft horn ON/OFF	This test is available only for vehicles equipped with security horn.

OK:
The theft deterrent horn sounds or stops correctly when operating it through the hand–held tester.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check theft deterrent horn (See page BE–92).**

NG → **Replace theft deterrent horn.**

OK

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3	**Check wire harness and connector between theft deterrent horn and body ECU, theft deterrent horn and body ground (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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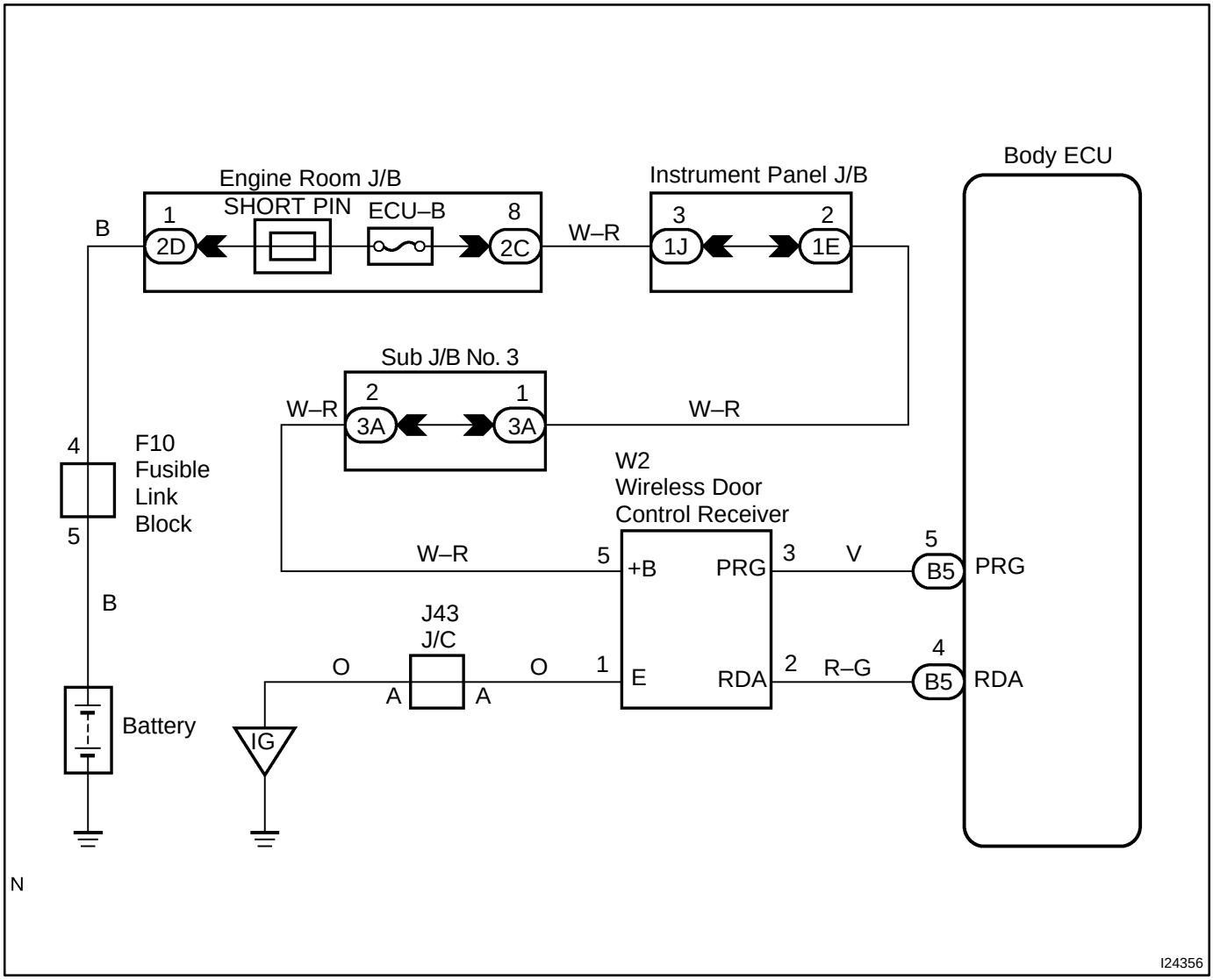
Wireless door lock receiver circuit

CIRCUIT DESCRIPTION

The signal from the transmitter is sent to the body ECU through RDA line of the wireless door control receiver. RDA line is diagnosed by the body ECU, check DTC also in case of the failure of the wireless function.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check that DTC B1242 is not indicated (See page DI–1829).**

OK:

DTC B1242 is not indicated.

NG → **Go to multiplex communication system (See page DI–1892).**

OK ↓

2	**Check wire harness and connector (PRG circuit).**

PREPARATION:

Disconnect the connectors of the wireless door lock receiver and body ECU.

CHECK:

Check continuity between terminal W2–3 (PRG) of the wireless door lock receiver and terminal B5–5 (PRG) of the body ECU.

OK:

Continuity

NG → **Repair or replace wire harness or connector.**

OK ↓

3	**Check voltage between terminals +B and E of wireless door lock receiver.**

CHECK:

Measure the voltage between terminals W2–5 (+B) and W2–1 (E) of the wireless door lock receiver.

OK:

Voltage: 10 to 14 V

NG → **Repair or replace harness or connector.**

OK ↓

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4	**Check wireless door lock receiver.**

PREPARATION:
Check that malfunction disappears when another wireless door lock receiver in good condition is installed.
CHECK:
Check wireless door lock function.
OK:

The wireless door lock system operates normally.

NG → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

OK →

Failure of the original wireless door lock receiver.

5	**Check wire harness and connector (RDA circuit).**

PREPARATION:
Disconnect the wireless door lock receiver connector.
CHECK:
Check continuity between terminal W2–2 (RDA) of the wireless door lock receiver and terminal B5–4 (RDA) of the body ECU.
OK:

Continuity

NG → **Repair or replace harness or connector.**

OK →

6	**Check voltage between terminals +B and E of wireless door lock receiver.**

CHECK:
Measure the voltage between terminals W2–5 (+B) and W2–1 (E) of the wireless door lock receiver.
OK:

Voltage: 10 to 14 V

NG → **Repair or replace harness or connector.**

OK →

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7	**Check wireless door lock receiver.**

PREPARATION:

Check that malfunction disappears when another wireless door lock receiver in good condition is installed.

CHECK:

Check wireless door lock function.

OK:

The wireless door lock system operates normally.

NG → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

OK →

Failure of the original wireless door lock receiver.

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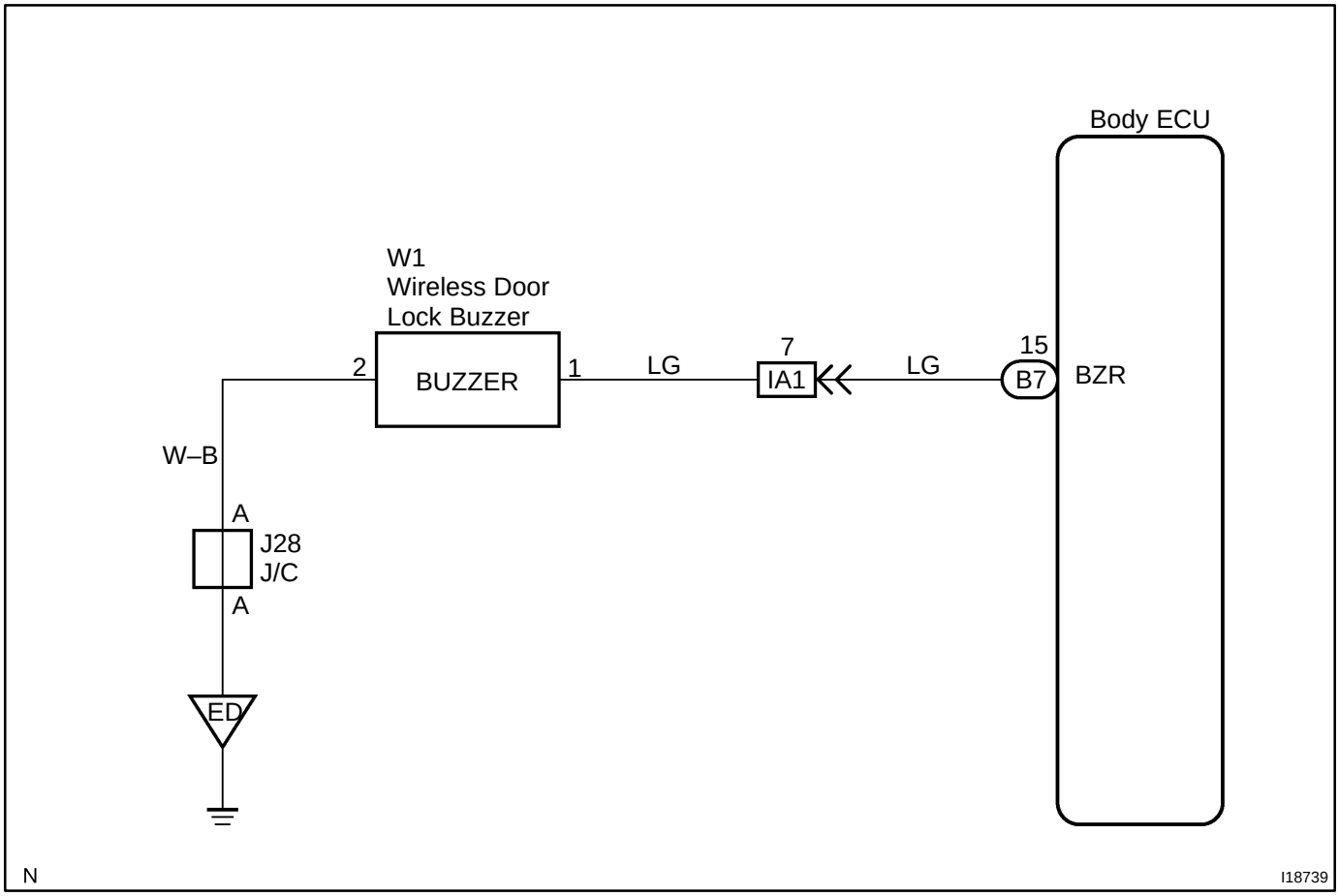
DI6LW–13

Wireless door lock buzzer circuit

CIRCUIT DESCRIPTION

The body ECU receives a door OPEN/CLOSE demand signal from the wireless transmitter via the wireless door lock receiver. The ECU then sounds the wireless door lock buzzer as an answer back.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check wireless door lock buzzer using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, perform the ”ACTIVE TEST”.
BODY ECU:

Item	Test Details	Diagnostic Note
BUZZ RESP SOUND	Turn wireless buzzer ON/OFF	Turn volume to MAX. if it is a wireless buzzer equipped vehicle.

OK:
The wireless door lock buzzer sounds normally.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check wireless door lock buzzer (See page BE–99).**

NG → **Replace wireless door lock buzzer.**

OK

Dardoor.com

3	**Check wire harness and connector between wireless door lock buzzer and body ECU, body ground and wireless door lock buzzer (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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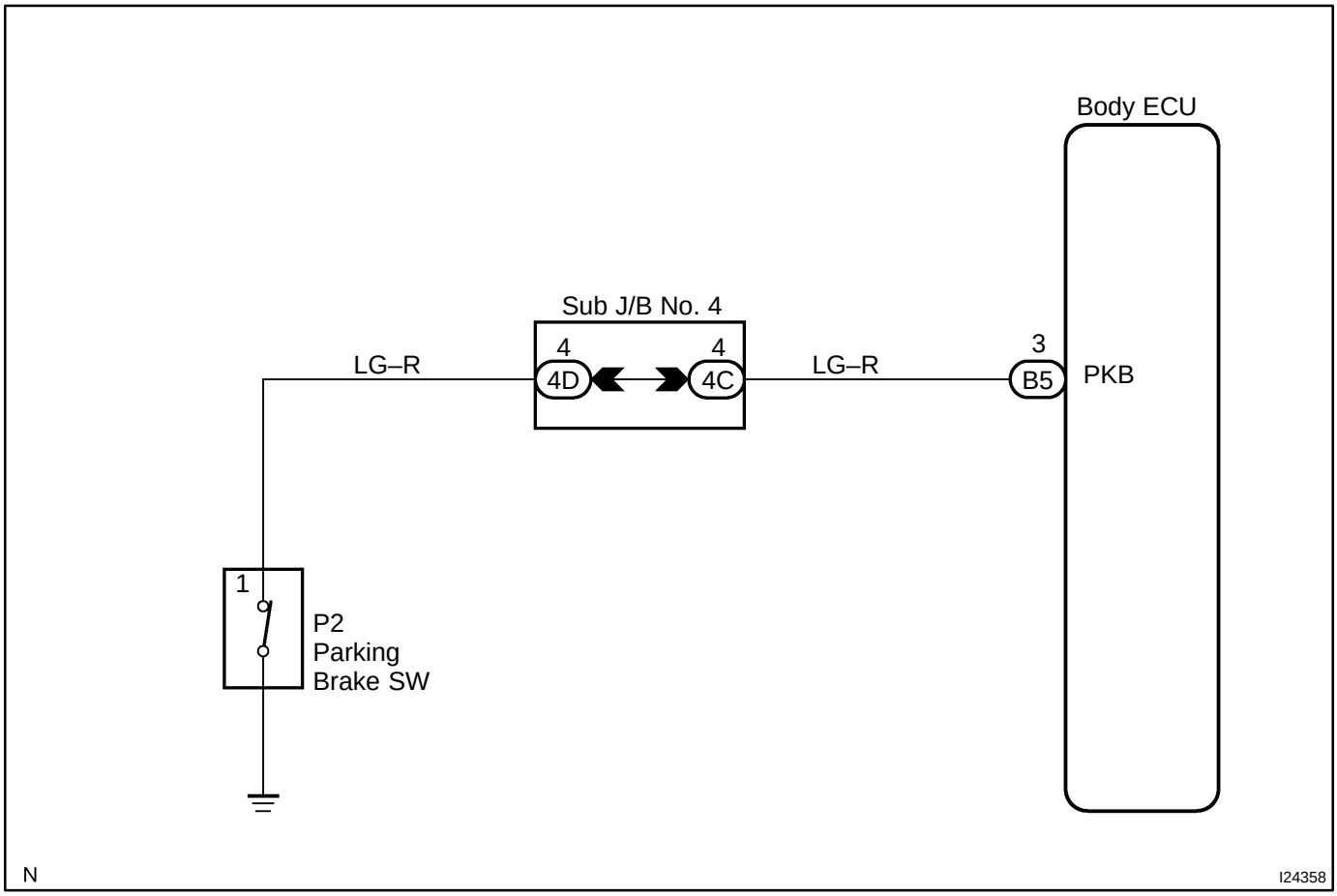
DI29Y–18

Parking brake switch circuit

CIRCUIT DESCRIPTION

The body ECU determines if the parking brake switch is ON or OFF and sends the parking brake switch ON/OFF signal to the combination meter via BEAN.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check parking brake switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the ”DATA LIST”.

BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
PARKING BRAKE SW	Parking brake switch/ON or OFF	ON: Parking brake pedal depressed (ON) OFF: Parking brake released (OFF)	–

OK:

The indication on the tester switches between ON and OFF in accordance with the parking brake switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check parking brake switch (See page BE–55).**

NG → **Replace parking brake switch.**

OK

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3	**Check wire harness and connector between parking brake switch and body ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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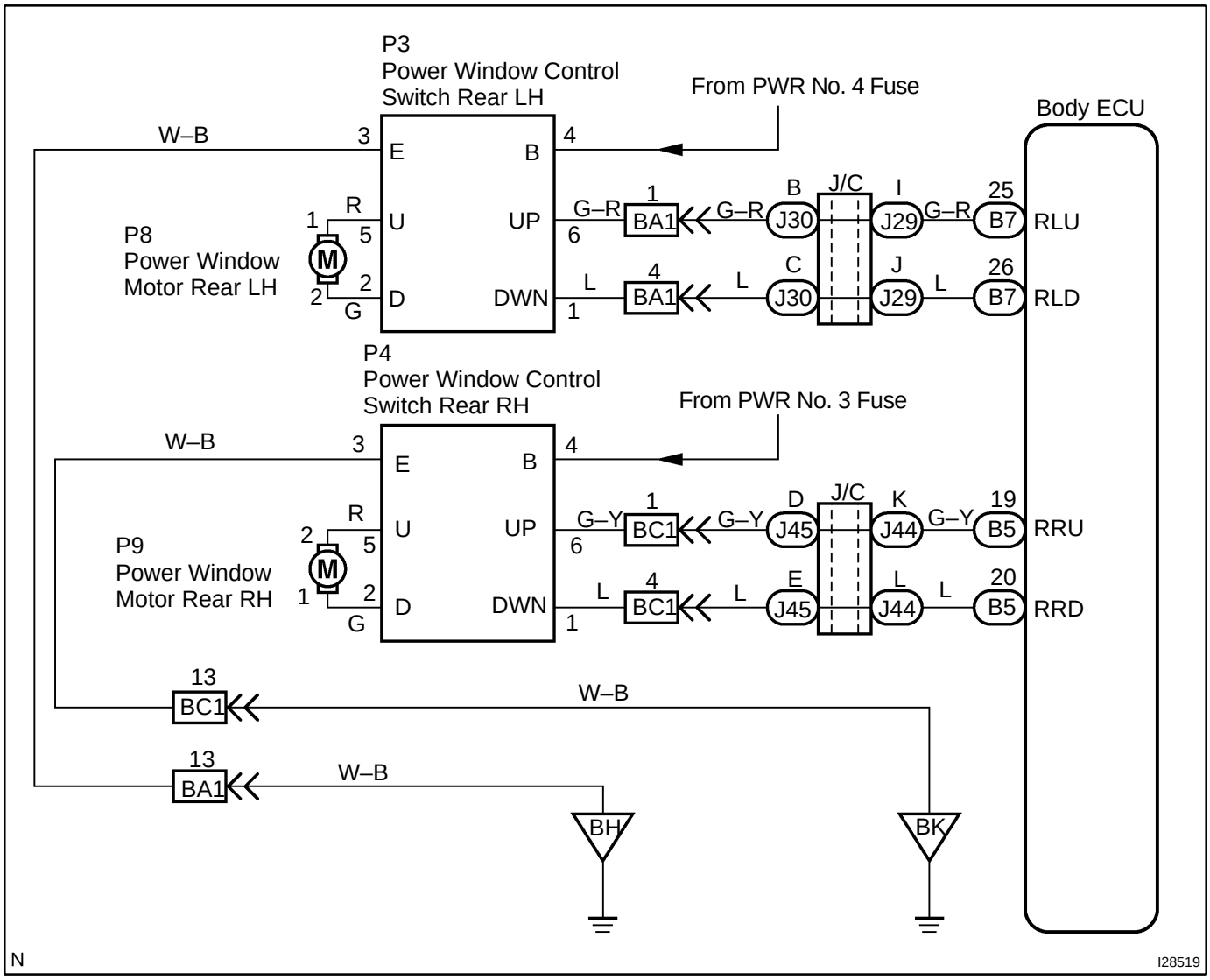
DI6LS–11

Rear power window switch circuit

CIRCUIT DESCRIPTION

The rear power window switch controls the UP/DOWN function of the rear power window motor.
The driver door ECU (power window master switch) operates the remote control of each window UP/DOWN function via BEAN.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check rear power window motor using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, perform the ”ACTIVE TEST”.

BODY ECU:

Item	Test Details	Diagnostic Note
RL P/W UP/DOWN	Rear left passenger power window DOWN/UP	Caution: This test causes vehicle parts to move. Watch your hands and feet.
RR P/W UP/DOWN	Rear right passenger power window DOWN/UP	Caution: This test causes vehicle parts to move. Watch your hands and feet.

OK:

The rear power windows go up or down correctly when operating them through the hand–held tester.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check power window control switch rear (See page BE–69).**

NG → **Replace power window switch rear.**

OK

3	**Check wire harness and connector between power window control switch rear and body ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

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4	**Check power window motor rear (See page BE–69).**

NG → **Replace power window motor rear.**

OK

5	**Check voltage between power window control switch rear and battery, power window control switch rear and body ground.**

PREPARATION:
Disconnect the power window control switch rear connector.
CHECK:
Measure the voltage between terminals P3–4 (B) and P3–3 (E), and terminals P4–4 (B) and P4–3 (E) of the power window control switch rear.
OK:

Voltage: 10 to 14 V

NG → **Repair or replace harness or connector.**

OK

6	**Check wire harness and connector between power window motor rear and power window control switch rear (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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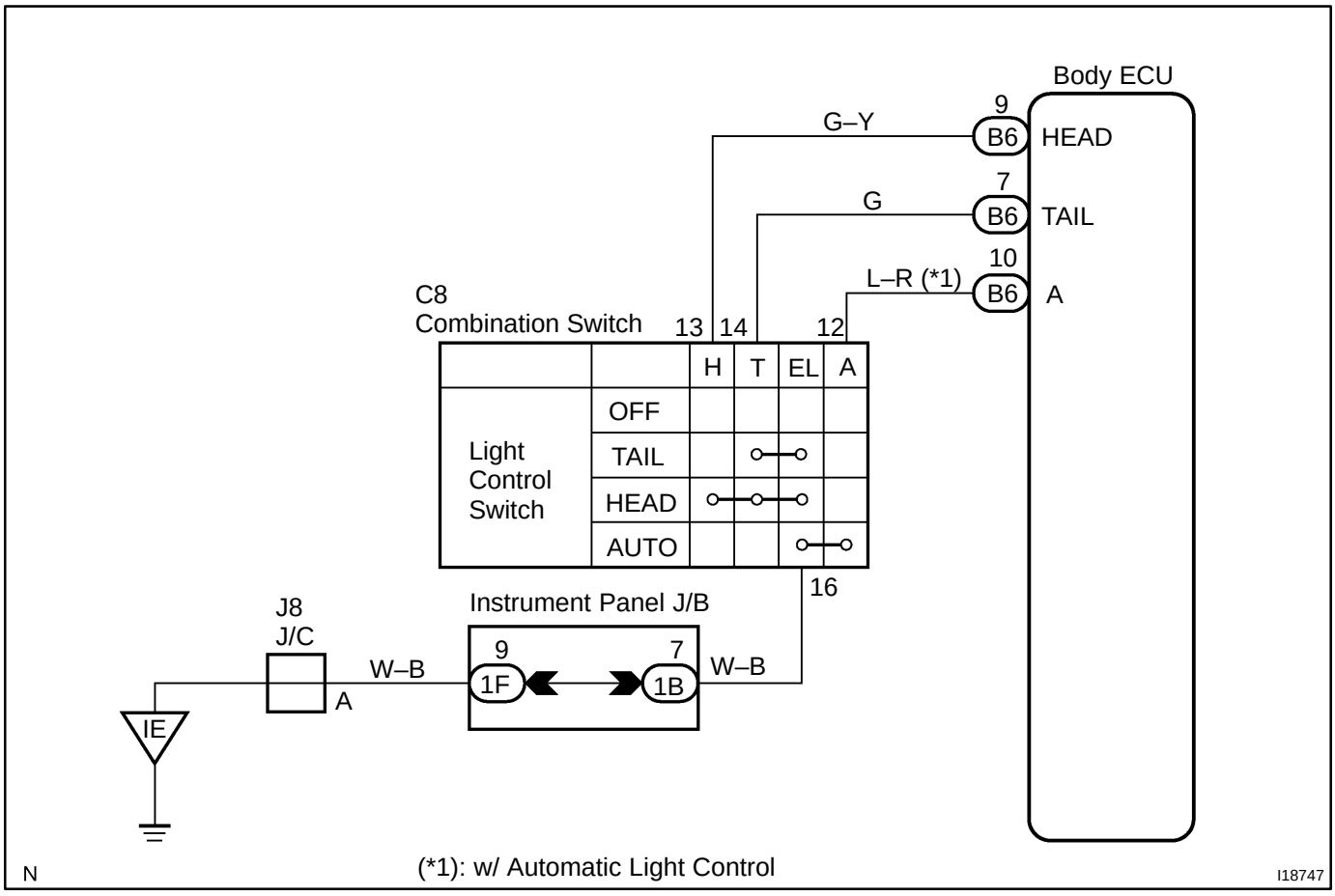
DI1OL–27

Light control switch circuit

CIRCUIT DESCRIPTION

The body ECU detects the light control switch position and drives the DRL No. 4 and HEAD relays.
If the vehicle is equipped with an automatic light control system, the light control switch includes the AUTO position.
The body ECU turns the headlights ON and OFF based on the ambient light level outside the vehicle, which is detected by the automatic light control sensor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check headlight control switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the ”DATA LIST”.

BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
AUTO LIGHT SW	Light control switch (AUTO)/ON or OFF	ON: Light control switch position is AUTO OFF: Light control switch position is not AUTO	–
HEAD LIGHT SW	Light control switch (HEAD)/ON or OFF	ON: Light control switch position is HEAD OFF: Light control switch position is not HEAD	–
TAIL LIGHT SW	Light control switch (TAIL)/ON or OFF	ON: Light control switch position is TAIL OFF: Light control switch position is not TAIL	–

OK:

The indication on the tester switches between ON and OFF in accordance with the light control switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check light control switch (See page BE–27).**

NG → **Replace light control switch.**

OK

Dardoor.com

3	Check wire harness and connector between light control switch and body ECU, light control switch and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK →

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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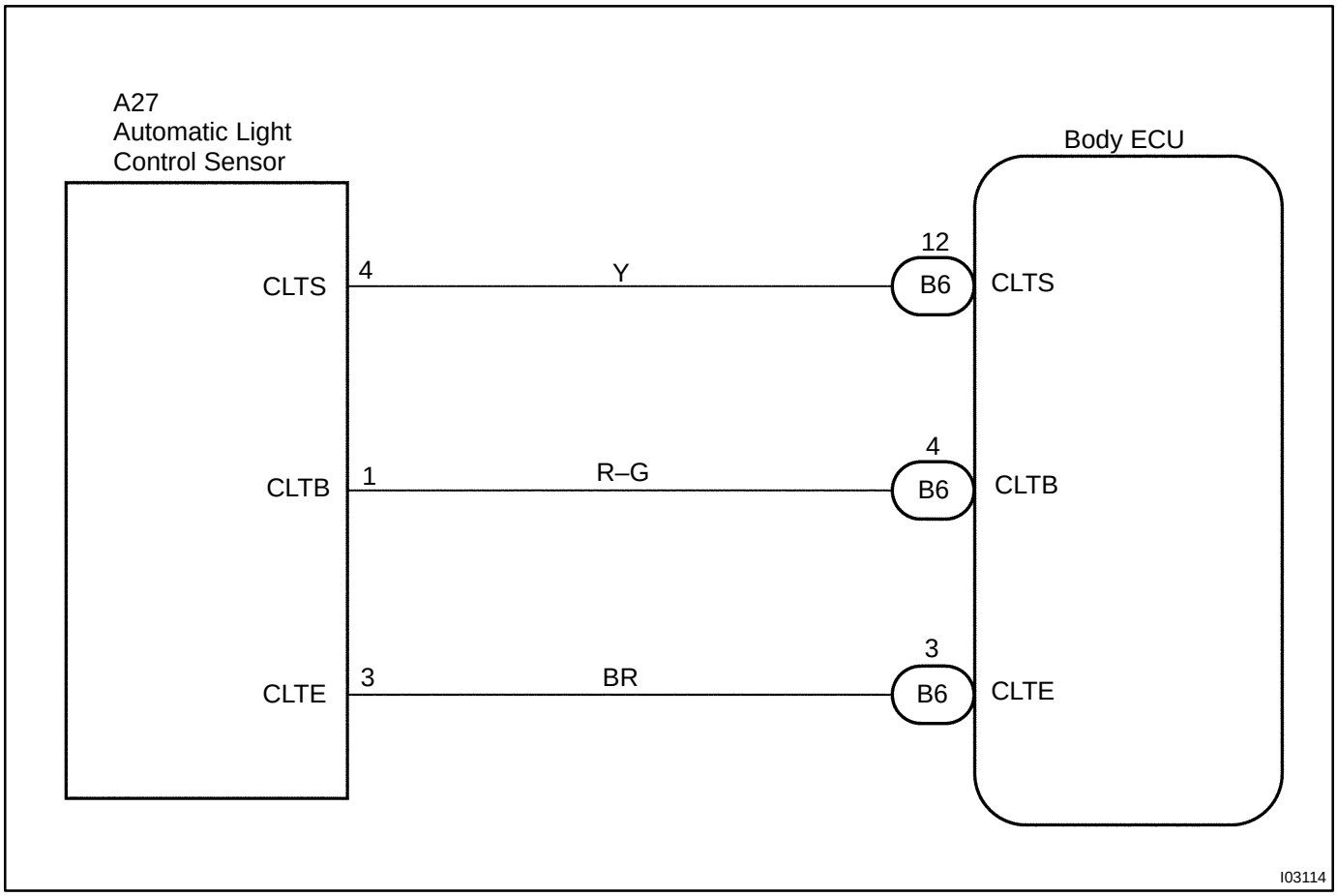
DI1OL–28

Automatic light control sensor circuit

CIRCUIT DESCRIPTION

The body ECU detects the ambient light level outside the vehicle via the automatic light control sensor. The body ECU turns the headlights ON and OFF based on the ambient light level sensed by the automatic light control sensor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check automatic light control sensor.**

When using hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch and hand–held tester main switch ON.

BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
ILLUMINATE RATE	Illumination rate information/ MIN: 0 MAX: 99.99	Condition value will be displayed Normal value: 0.8 ms to 22.0 ms	–

CHECK:

The illumination rate value should change within the following range such as when the light sensor is exposed to light or covered by hand.

OK:

0.8 ms to 22.0 ms

HINT:

Time needed for the light sensor to generate one cycle of frequency according to the brightness.

When not using hand–held tester (See page BE–27):

NG → **Replace automatic light control sensor.**

OK

2	**Check harness and connector between automatic light control sensor and body ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next inspection shown in problem symptoms table (See page DI–1686).

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DI94U–08

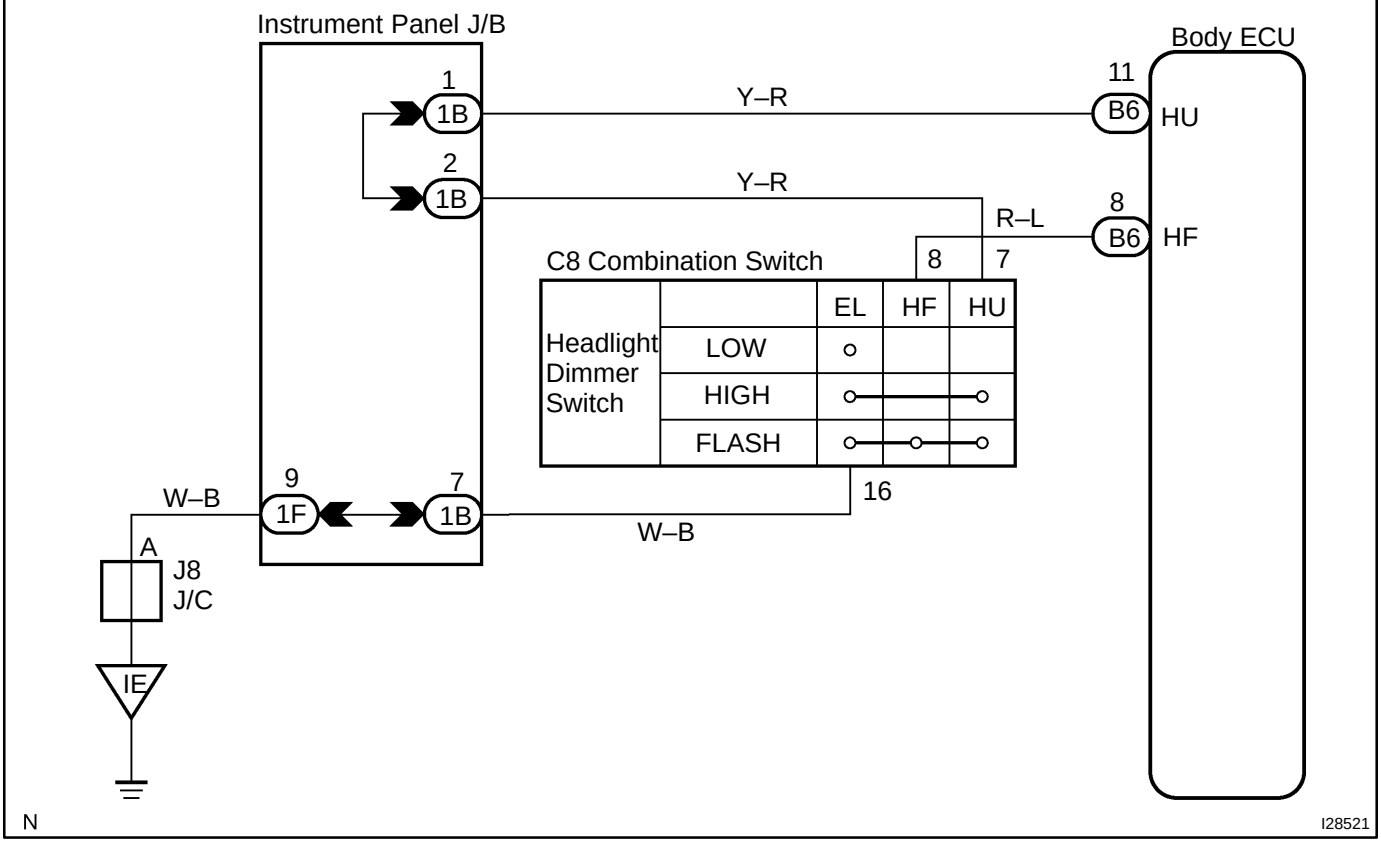
Headlight dimmer switch circuit

CIRCUIT DESCRIPTION

This circuit detects the headlight dimmer switch condition.
w/ daytime running light:
The body ECU detects the headlight dimmer switch position and turns on the DIMMER relay.
The body ECU informs the combination meter of the headlight dimmer switch condition via BEAN.
When the headlight dimmer switch position is HI or FLASH, the HI beam indicator light on the combination meter comes on.
w/o daytime running light:
When the headlight dimmer switch position is HI or FLASH, the HI beam indicator light on the combination meter comes on.
When the HI beam headlights come on, current is supplied to the HI beam indicator light on the combination meter to turn the indicator light on.

WIRING DIAGRAM

w/ Daytime Running Light:



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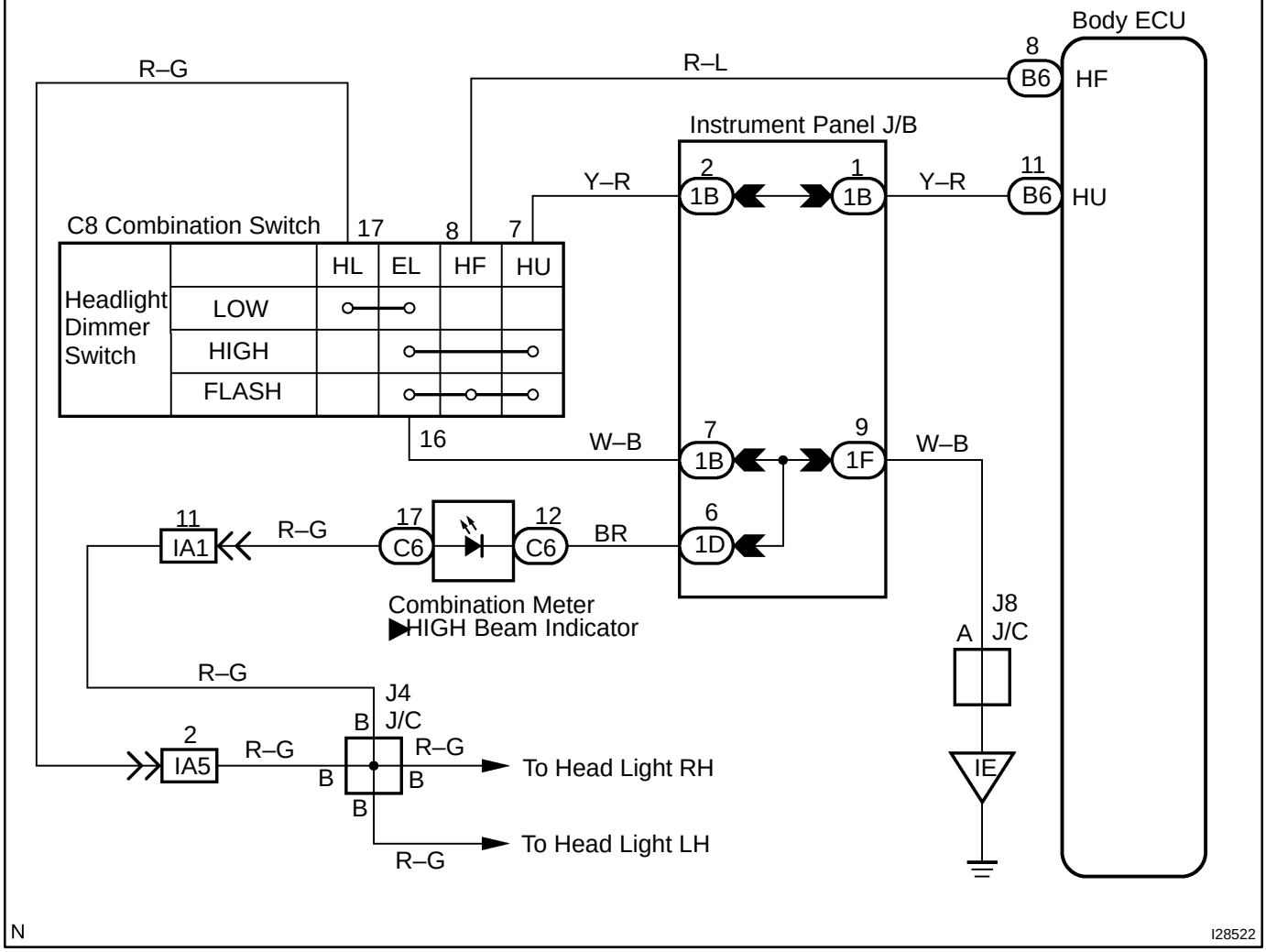
w/o Daytime Running Light:



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INSPECTION PROCEDURE

1	Check headlight dimmer switch (See page BE–27).

NG → Replace headlight dimmer switch.

OK

2	Check wire harness and connector between headlight dimmer switch and body ECU, headlight dimmer switch and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

3	Check apparatus.

CHECK:

Choose the apparatus to be inspected.

w/o Daytime running light	A
w/ Daytime running light	B

B → Proceed to next circuit inspection shown in problem symptoms table (see page DI–1686).

A

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4	**Check wire harness and connector between combination meter and headlight dimmer switch, combination meter and headlight (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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DID9B–01

Illumination circuit

CIRCUIT DESCRIPTION

The body ECU and the back door ECU detect the condition of each door courtesy light switch.
FRONT COURTESY LIGHT SWITCH CONTROL:
The 2 front courtesy light switches are directly connected to the body ECU and back door ECU. If the courtesy light switch is turned on (a front door is opened), voltage applied to terminal ILE of the body ECU is grounded inside the ECU and the step light, front courtesy light, etc. come on.

REAR COURTESY LIGHT SWITCH CONTROL:
The 2 rear courtesy light switches are directly connected to the body ECU and back door ECU via each courtesy light. The rear courtesy light comes on when a rear door is opened.

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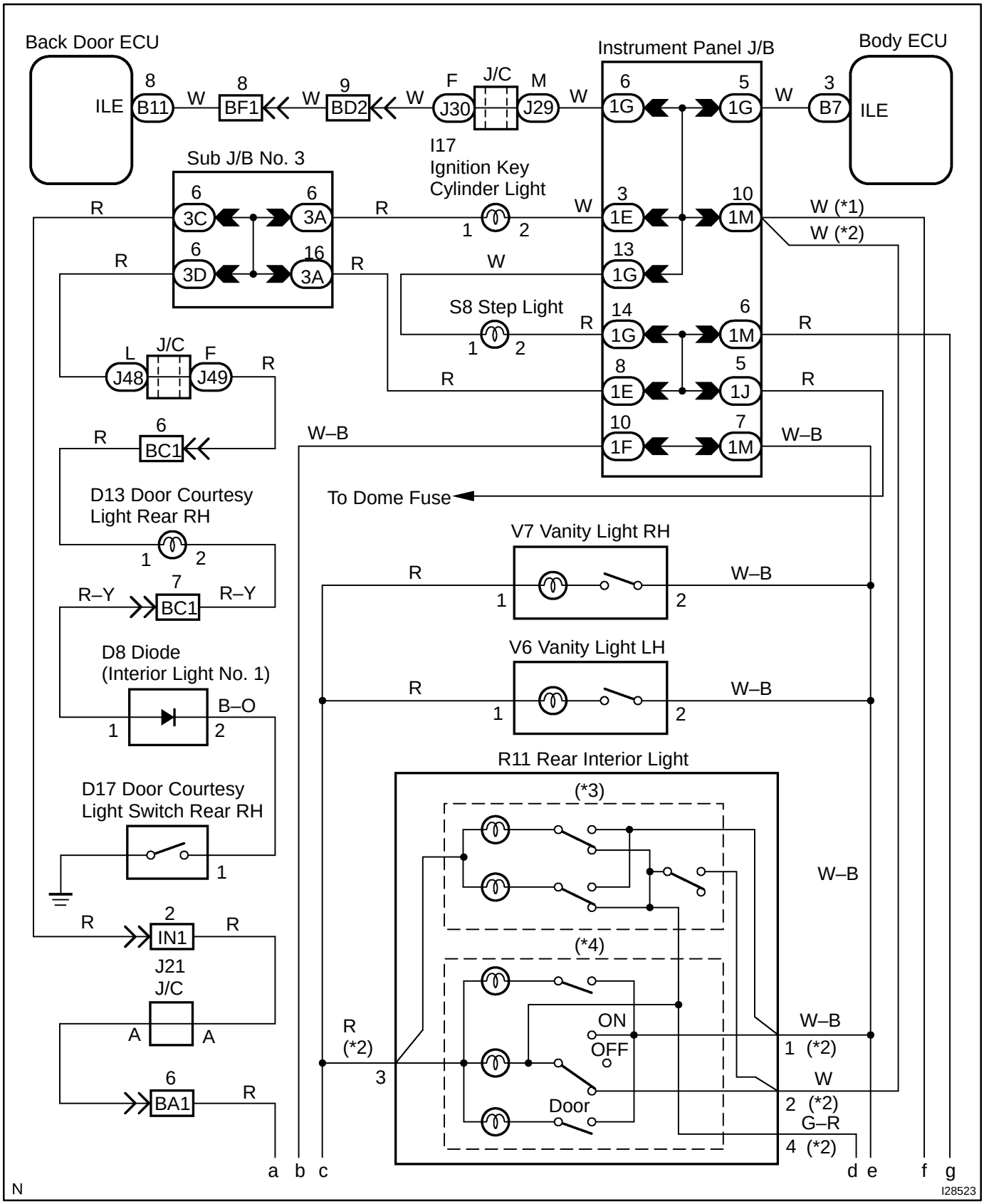
WIRING DIAGRAM



(*1): w/o Sliding Roof, RSE and RSA
(*2): w/ Sliding Roof, RSE or RSA
(*3): w/ Sliding Roof w/ RSE or RSA
(*4): w/ Sliding Roof w/o RSE and RSA

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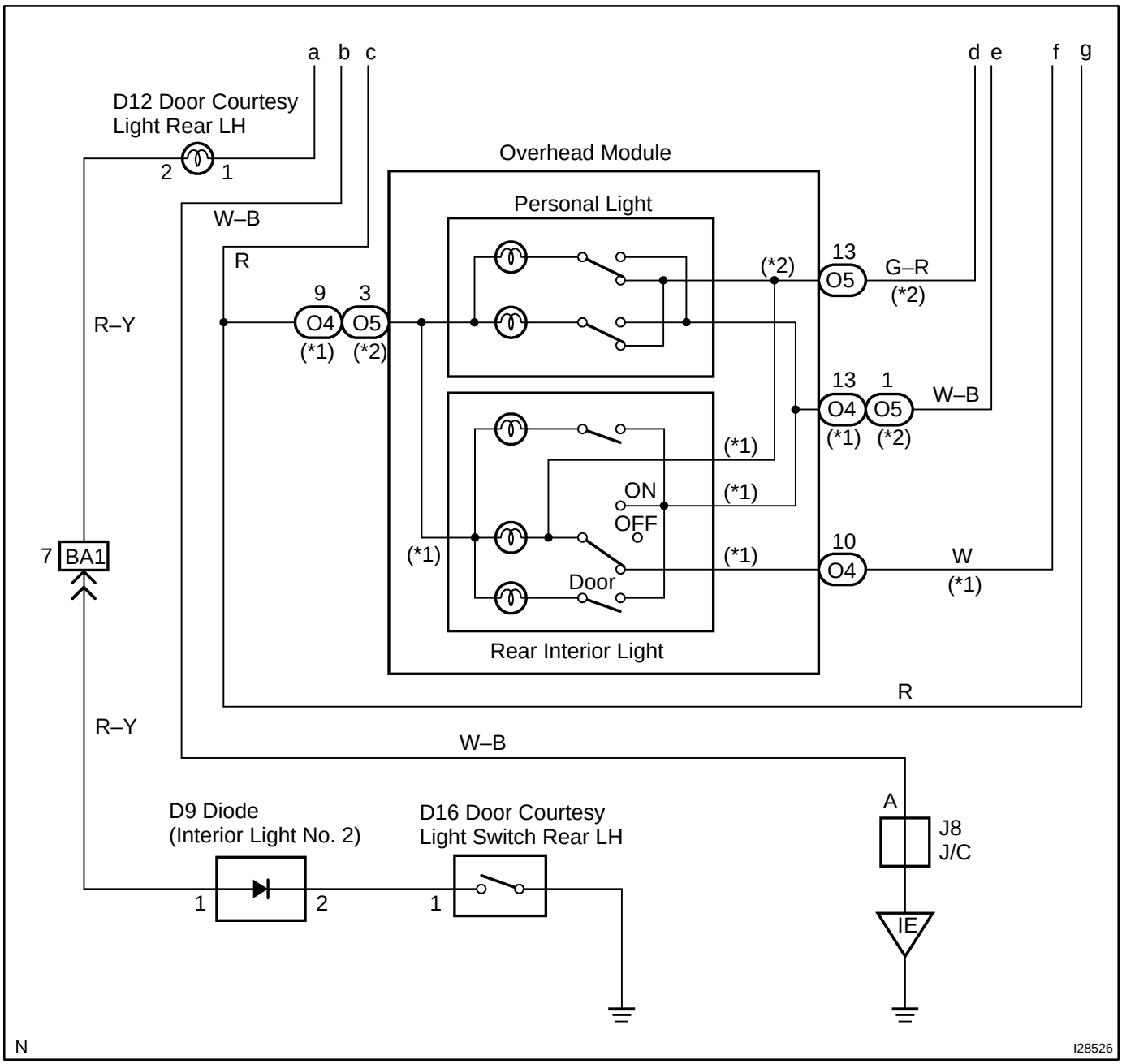

(*1): w/o Sliding Roof, RSE and RSA
(*2): w/ Sliding Roof, RSE or RSA

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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check illumination (interior light) using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON. (Do not start the engine.)
(c) Turn the light control switch OFF.

CHECK:
According to the display on the tester, perform the ”ACTIVE TEST”.

BODY ECU:

Item	Test Details	Diagnostic Note
ILLUMI OUTPUT	Illuminated entry system ON/OFF	–

OK:

The illumination (interior) lights turn on or off correctly when operating them through the hand–held tester.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check illumination light (interior light system) (See page BE–40).**

NG → **Replace defective light.**

OK

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3	**Check wire harness and connector between each illumination light and body ECU, each illumination light and back door ECU, each illumination light and battery (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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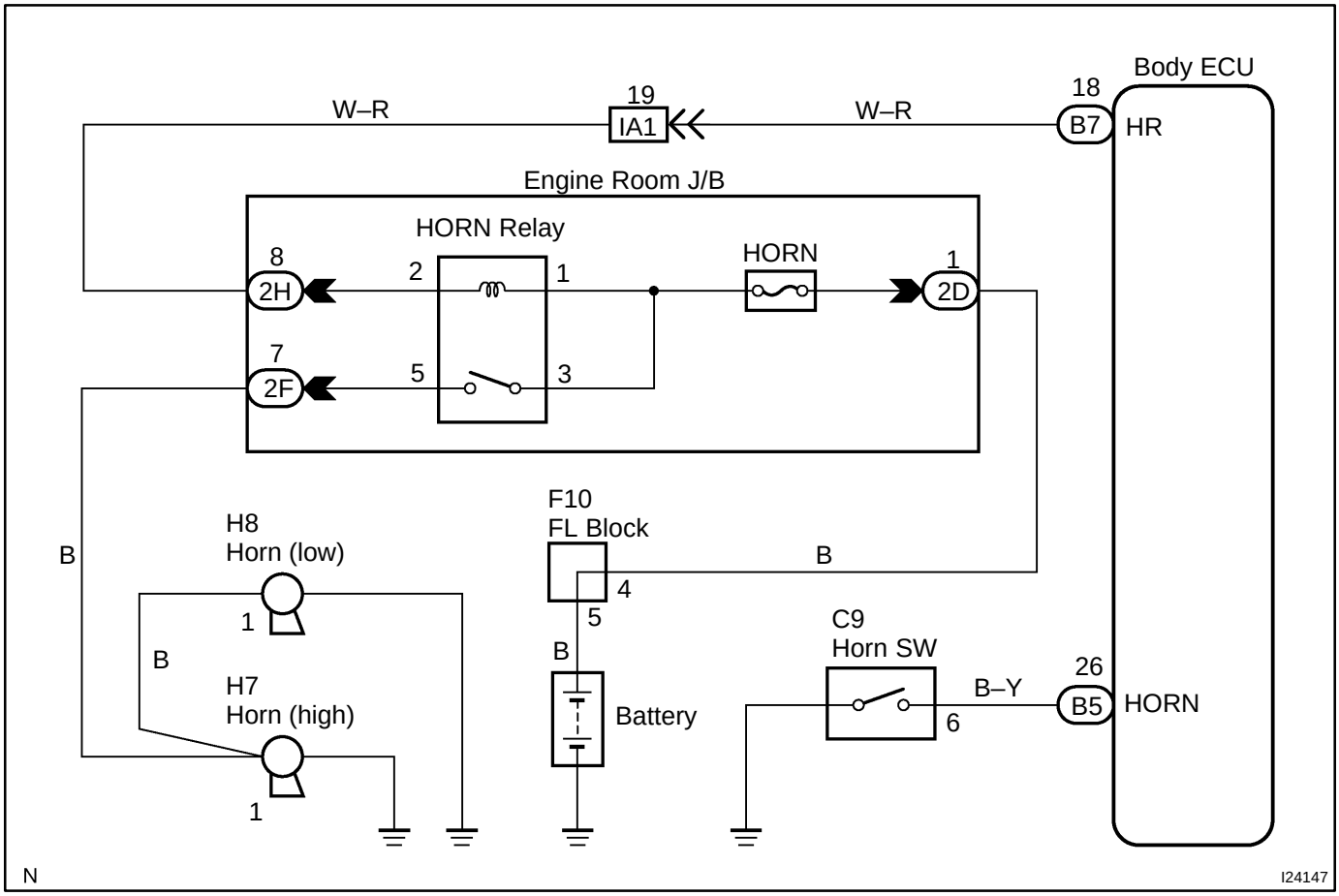
DI94T–08

Horn circuit

CIRCUIT DESCRIPTION

The vehicle horn sounds when the horn switch is pressed. It also sounds as an alarm for the theft deterrent system when the body ECU detects any alert condition.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check vehicle horn using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, perform the ”ACTIVE TEST”.
BODY ECU:

Item	Test Details	Diagnostic Note
VEHICLE HORN	Turn vehicle horn sound ON/OFF	–

OK:
The horn sounds or stops correctly when operating it through the hand–held tester.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

2	**Check horn (See page BE–145).**

NG → **Replace horn.**

OK

3	**Check horn switch (See page BE–145).**

NG → **Replace horn switch.**

OK

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4	Check horn relay (See page BE–145).

NG → Replace horn relay.

OK

5	Check wire harness and connector between horn and body ECU, body ECU and horn switch (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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DID9C–01

Remote control mirror switch circuit (w/ Driving position memory)

CIRCUIT DESCRIPTION

The remote control mirror switch has different levels of resistance depending on the switch position.
The body ECU senses the switch position through the resistance of the remote control mirror switch.
The body ECU sends an up/down/right/left signal to the driver door ECU and the passenger door ECU via BEAN.
The mirror's driving position and retract position are directly controlled by the remote control mirror switch.

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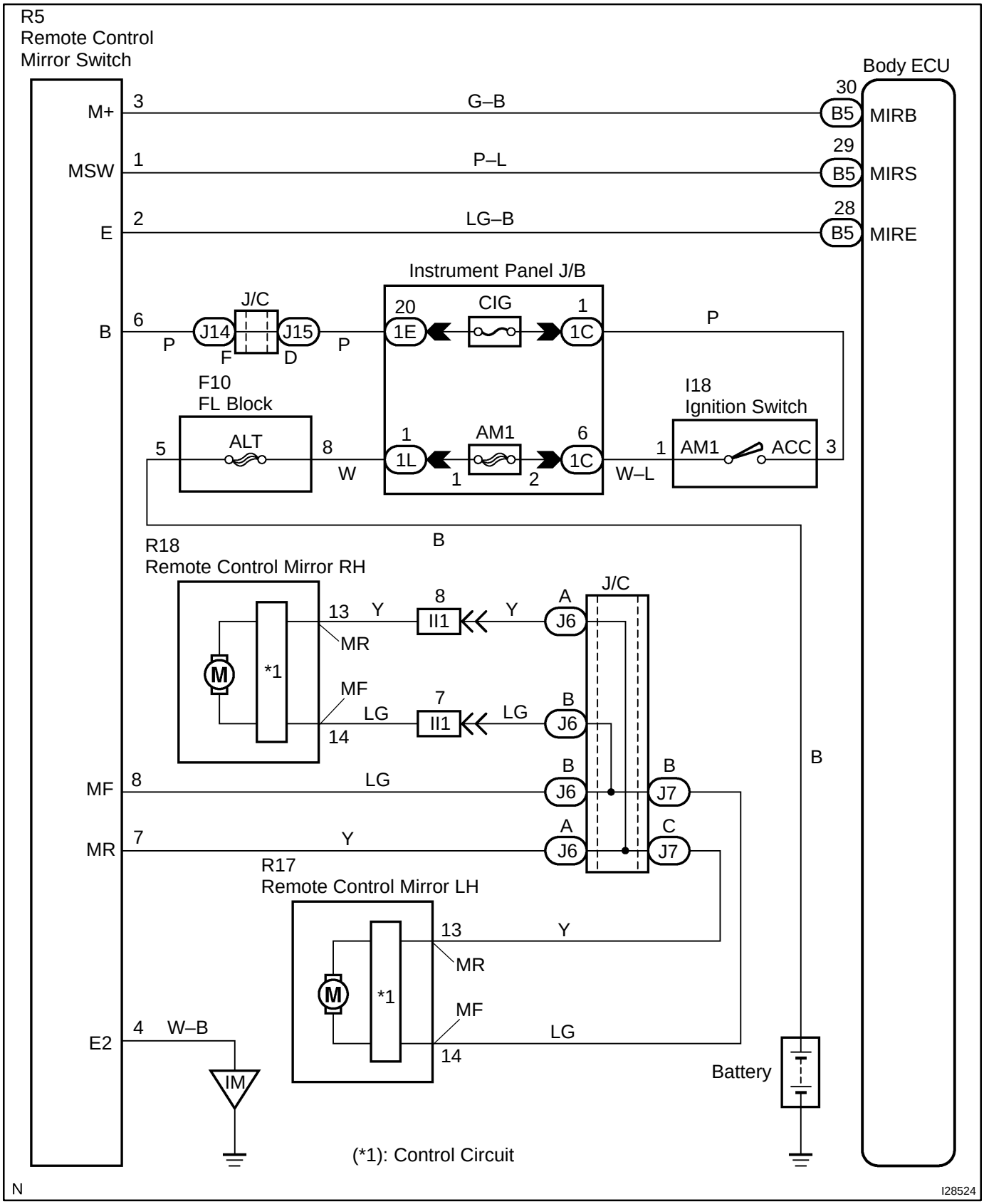
WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check remote mirror control switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the ”DATA LIST”.

BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
MIRR SEL SW R	Remote control mirror switch passenger side/ON or OFF	ON: Remote control mirror switch passenger side is selected OFF: Remote control mirror switch passenger side is not selected	–
MIRR SEL SW L	Remote control mirror switch driver side/ON or OFF	ON: Remote control mirror switch driver side is selected OFF: Remote control mirror switch driver side is not selected	–
MIRR POS SW R	Remote control mirror switch R position/ON or OFF	ON: Remote control mirror switch R position is selected OFF: Remote control mirror switch R position is not selected	–
MIRR POS SW L	Remote control mirror switch L position/ON or OFF	ON: Remote control mirror switch L position is selected OFF: Remote control mirror switch L position is not selected	–
MIRR POS SW UP	Remote control mirror switch UP position/ON or OFF	ON: Remote control mirror switch UP position is selected OFF: Remote control mirror switch UP position is not selected	–
MIRR POS SW DWN	Remote control mirror switch DOWN position/ON or OFF	ON: Remote control mirror switch DOWN position is selected OFF: Remote control mirror switch DOWN position is not selected	–

OK:

The indication on the tester switches between ON and OFF in accordance with the remote control mirror switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).**

NG

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2	**Check remote control mirror switch (See page BE–115).**

NG → **Replace remote control mirror switch.**

OK

3	**Check voltage between remote control mirror switch and battery, remote control mirror switch and body ground.**

PREPARATION:

(a) Disconnect the remote control mirror switch connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals R5–6 (B) and R5–2 (E) of the remote control mirror switch.

OK:

Voltage: 10 to 14 V

NG → **Repair or replace harness or connector.**

OK

4	**Check wire harness and connector between remote control mirror switch and remote control mirror (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

5	**Check retract motor operation (See page BE–115).**

NG → **Replace remote control mirror.**

OK

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6	**Check wire harness and connector between remote control mirror switch and remote control mirror (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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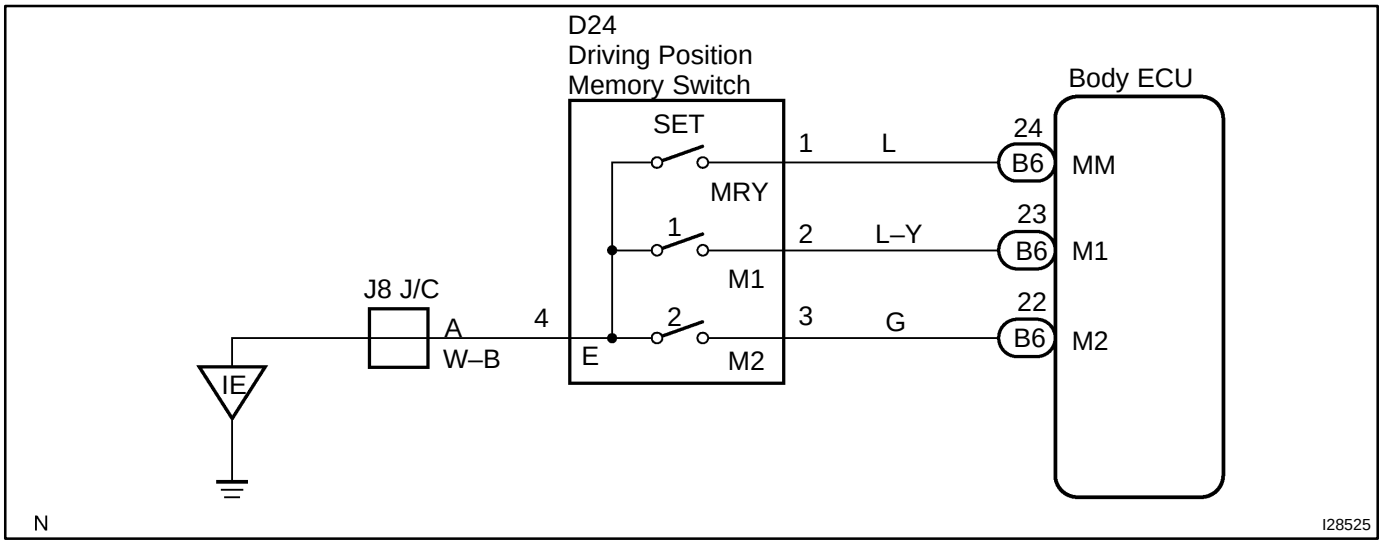
Driving position memory switch circuit (w/ Driving position memory)

CIRCUIT DESCRIPTION

The position control ECU & switch assy memorizes the driver seat position and the outer mirror positions. It controls each motor when the driving position memory switch is operated.
The position signals of the driving position memory switch received by the body ECU are sent to the position control ECU and switch assy via BEAN.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check driving position memory switch (See page DI–1518).

NG → Replace driving position memory switch.

OK ↓

2	Check wire harness and connector between driving position memory switch and body ECU, driving position memory switch and body ground (See page IN–35).

NG → Repair or replace harness or connector.

OK ↓

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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DID9E–01

Glass breakage sensor ECU circuit

CIRCUIT DESCRIPTION

The glass breakage sensor microphone detects the sound of metal (and other) objects striking the windows and outputs a signal to the glass breakage sensor ECU. Sound of breaking window glass is amplified (fixed frequency) by the resonator provided in front of the microphone.
The glass breakage sensor ECU receives a signal from the glass breakage sensor microphone. If the signal matches the specification, the ECU outputs the glass breakage signal to the body ECU.
The body ECU receives the signal from the glass breakage sensor ECU and outputs a warning.

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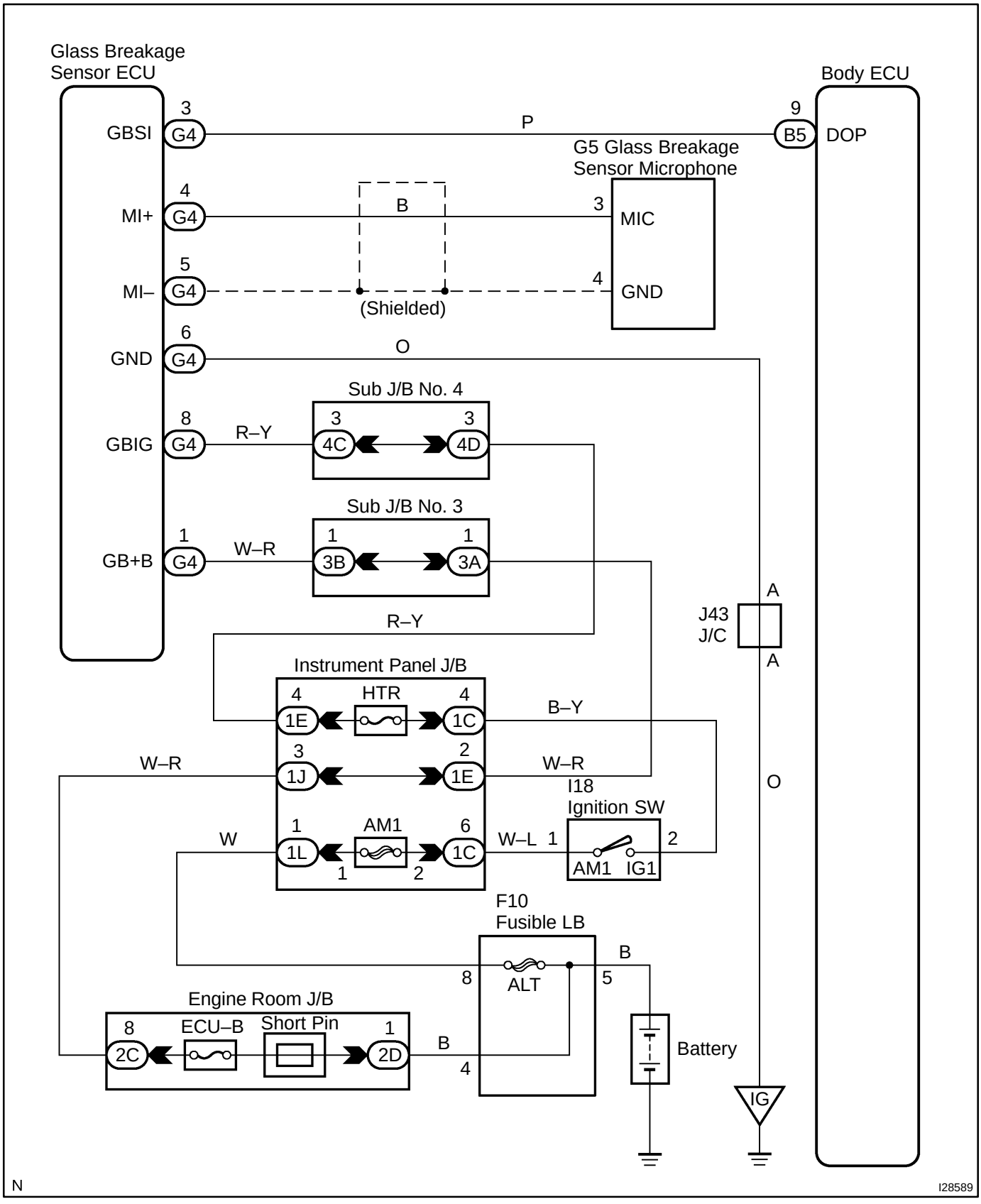
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check voltage between terminals GBIG, GB+B and GND of glass breakage sensor ECU.**

PREPARATION:
Disconnect the glass breakage sensor ECU connector.
CHECK:
Measure the voltage between terminals GB+B and GND of the glass breakage sensor ECU.
OK:
Voltage: 10 to 14 V
PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals GBIG and GND of the glass breakage sensor ECU.
OK:
Voltage: 10 to 14 V

NG → **Repair or replace wire harness or connector.**

OK

2	**Check wire harness and connector between glass breakage sensor ECU and body ECU (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

3	**Check wire harness and connector between glass breakage sensor ECU and glass breakage sensor microphone (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

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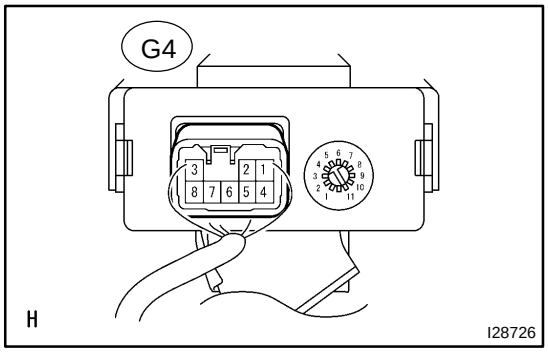
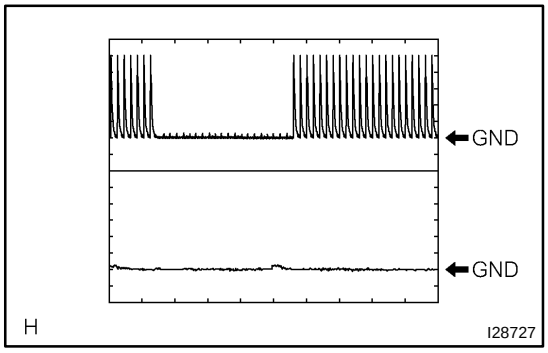
4	Check glass breakage sensor ECU (microphone output).





PREPARATION:

(a) Reconnect the glass breakage sensor ECU, glass breakage sensor microphone and body ECU connectors.

(b) Connect an oscilloscope to terminal G4–3 of the glass breakage sensor ECU and body ground.

(c) Turn the ignition switch ON.

CHECK:

Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	12 V/DIV, 300 ms/DIV
Vehicle condition	Tap the glass breakage sensor microphone with a hard object such as your fingernail.

OK:

As shown in the illustration.

NG → **Replace glass breakage sensor microphone.**

HINT:

If the problem recurs even after replacement, replace the glass breakage sensor ECU.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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DRIVER DOOR CONTROL SYSTEM

DIDEI–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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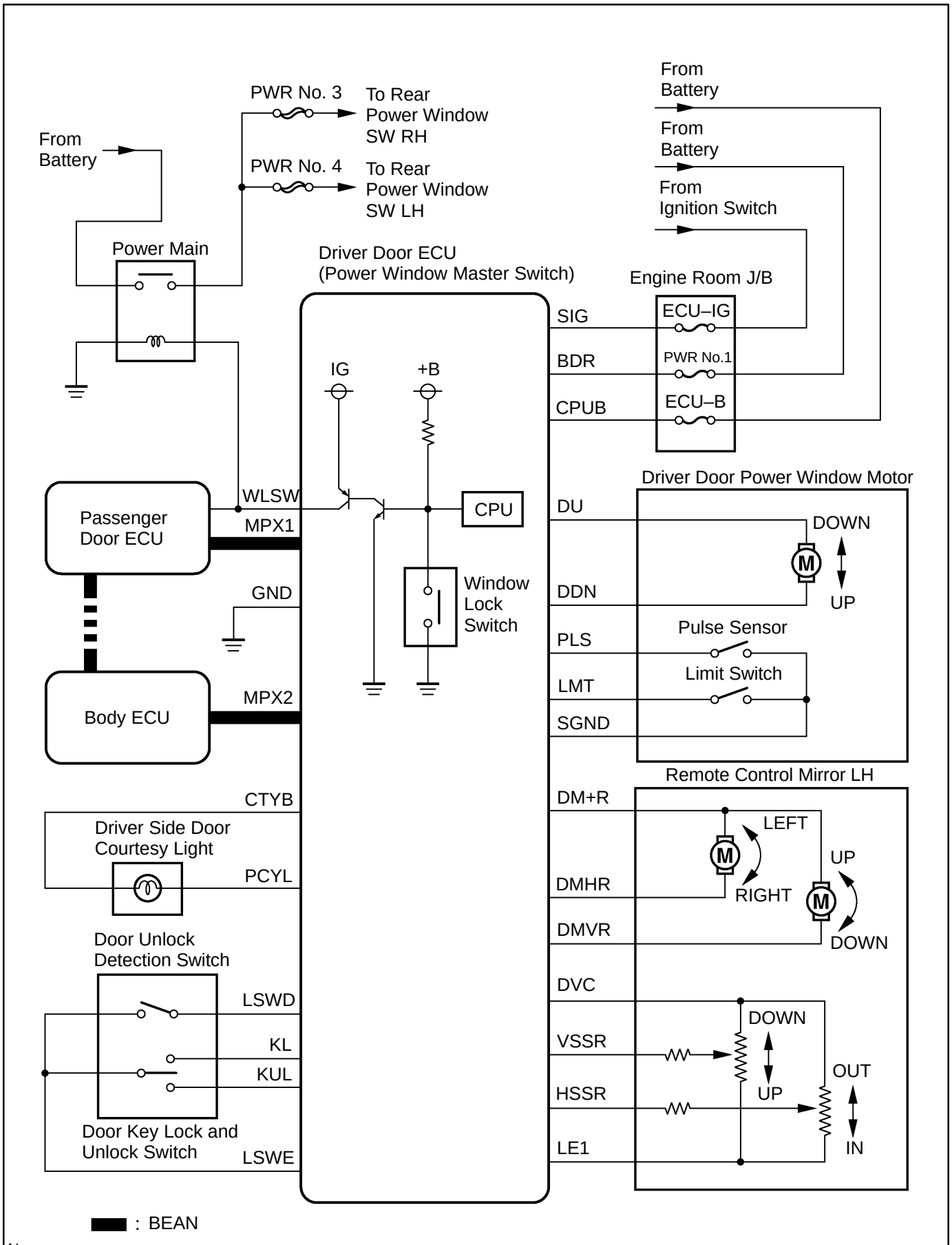
DIDEK–01

SYSTEM DIAGRAM



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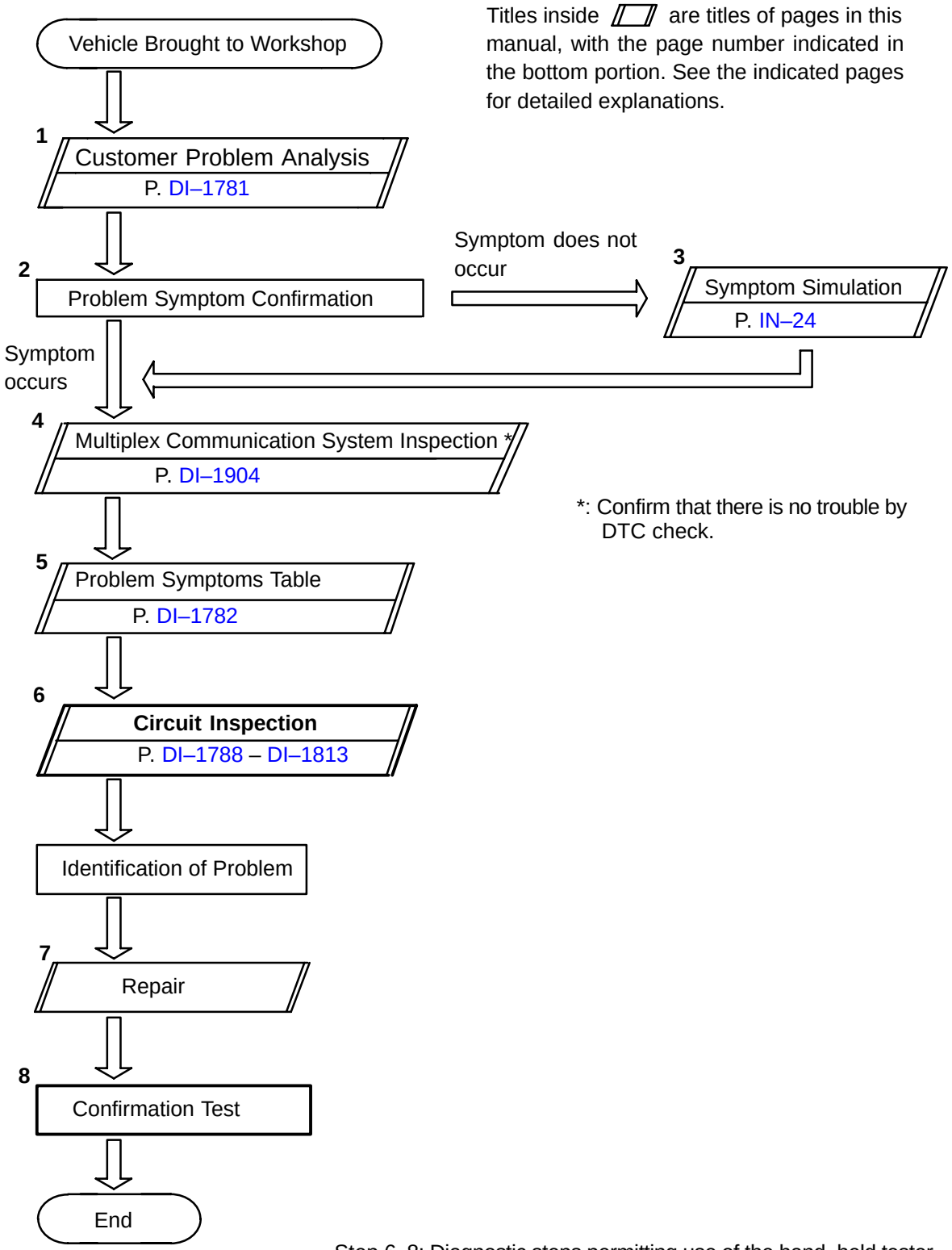
DI1P8–07

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

This ECU is connected to the multiplex communication system. Therefore, be sure to check that there is no trouble in the multiplex communication system before performing the troubleshooting.



Step 6, 8: Diagnostic steps permitting use of the hand–held tester.

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DI1P9–06

CUSTOMER PROBLEM ANALYSIS CHECK

DRIVER DOOR CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Licence Plate No.	
		Production Date	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Malfunction System	☐ Power Window Control System
	☐ Power Door Lock Control System
	☐ Theft Deterrent System
	☐ Jam Protection System
	☐ Driver Side Door Courtesy Light System
	☐ Remote Control Mirror LH System
	☐ Other

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DI1PC–06

PROBLEM SYMPTOMS TABLE

POWER WINDOW CONTROL SYSTEM

Symptom	Suspected Area	See page
All the power windows do not operate.	4. Power source circuit 5. Window lock switch circuit 6. Body ECU	DI–1788 DI–1805 IN–35
Power window does not operate.	1. Power source circuit 2. Power window motor circuit 3. Window lock switch circuit 4. Driver door ECU	DI–1788 DI–1798 DI–1805 IN–35
Auto up (or down) function does not operate.	1. Power source circuit 2. Driver door ECU	DI–1788 IN–35
Jam protection function and auto up (or down) function do not operate.	1. Jam protection limit switch circuit 2. Jam protection pulse sensor circuit 3. Driver door ECU	DI–1800 DI–1803 IN–35

OTHER

Symptom	Suspected Area	See page
Door parts do not function.	1. Power source circuit 2. Driver door ECU	DI–1788 IN–35
Door key related function does not operate.	1. Door key lock and unlock switch circuit 2. Driver door ECU	DI–1794 IN–35
Courtesy light does not come on. (driver's)	1. Door courtesy light circuit 2. Driver door ECU	DI–1796 IN–35
Remote control mirror LH does not operate. (w/ Driving position memory)	1. Remote control mirror motor LH circuit 2. Remote control mirror position sensor LH circuit 3. Driver door ECU	DI–1808 DI–1810 IN–35
Door lock control does not operate.	1. Door unlock detection switch circuit 2. Door lock motor circuit 3. Driver door ECU	DI–1791 DI–1720 IN–35

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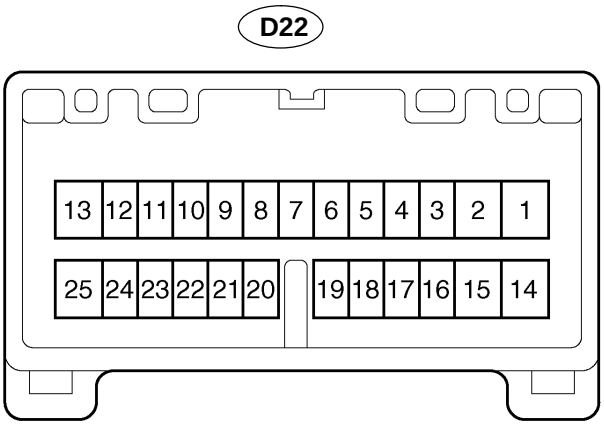
DI1PB–09

TERMINALS OF ECU

DRIVER DOOR ECU :



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I18633

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CPUB ↔ GND (23 ↔ 13)	W–R ↔ W–B	Battery	Always	10 to 14 V
BDR ↔ GND (25 ↔ 13)	L–W ↔ W–B	Battery	Always	10 to 14 V
CTYB ↔ DCYL (5 ↔ 6)	R ↔ R–W	Courtesy switch driver side	Driver's door closed	10 to 14 V
CTYB ↔ DCYL (5 ↔ 6)	R ↔ R–W	Courtesy switch driver side	Driver's door open	Below 1 V
SIG ↔ GND (21 ↔ 13)	B–R ↔ W–B	Ignition switch	Ignition switch ON	10 to 14 V
GND ↔ Body Ground (13 ↔ Body Ground)	W–B ↔ Body Ground	Ground	Always	Below 1 V
PLS ↔ SGND (3 ↔ 4)	L–R ↔ W–B	Power window pulse sensor	Power window is operated	Pulse Generation
PLS ↔ SGND (3 ↔ 4)	L–R ↔ W–B	Power window pulse sensor	Power window is not operated (Switch ON)	Below 1 V
PLS ↔ SGND (3 ↔ 4)	L–R ↔ W–B	Power window pulse sensor	Power window is not operated (Switch OFF)	10 to 14 V
LMT ↔ SGND (2 ↔ 4)	L–Y ↔ W–B	Power window limit switch	Driver's door window not fully closed position	Below 1 V
LMT ↔ SGND (2 ↔ 4)	L–Y ↔ W–B	Power window limit switch	Driver's door window fully closed position	10 to 14 V
DU ↔ DDN (1 ↔ 14)	R ↔ G	Power window motor (UP)	Ignition switch ON and driver's window switch OFF	Below 1 V
DU ↔ DDN (1 ↔ 14)	R ↔ G	Power window motor (UP)	Ignition switch ON and driver's window switch UP	10 to 14 V
DDN ↔ DU (14 ↔ 1)	G ↔ R	Power window motor (DOWN)	Ignition switch ON and driver's window switch OFF	Below 1 V
DDN ↔ DU (14 ↔ 1)	G ↔ R	Power window motor (DOWN)	Ignition switch ON and driver's window switch DOWN	10 to 14 V
MPX1 ↔ – (20 ↔ –)	G–B ↔ –	Multiplex communication line	Multiplex communication circuit	–

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MPX2 ↔ – (8 ↔ –)	W–L ↔ –	Multiplex communication line	Multiplex communication circuit	–
KL ↔ LSWE (22 ↔ 9)	LG–B ↔ W–B	Door key lock and unlock switch (LOCK)	Door key lock and unlock switch LOCK	Below 1 V
KL ↔ LSWE (22 ↔ 9)	LG–B ↔ W–B	Door key lock and unlock switch (LOCK)	Door key lock and unlock switch OFF or UNLOCK	10 to 14 V
KUL ↔ LSWE (10 ↔ 9)	LG–R ↔ W–B	Door key lock and unlock switch (UNLOCK)	Door key lock and unlock switch UNLOCK	Below 1 V
KUL ↔ LSWE (10 ↔ 9)	LG–R ↔ W–B	Door key lock and unlock switch (UNLOCK)	Door key lock and unlock switch OFF or LOCK	10 to 14 V
LSWD ↔ LSWE (24 ↔ 9)	R–Y ↔ W–B	Door unlock detection switch	Driver door is locked	10 to 14 V
LSWD ↔ LSWE (24 ↔ 9)	R–Y ↔ W–B	Door unlock detection switch	Driver door is unlocked	Below 1 V
WLSW ↔ GND (7 ↔ 13)	R–L ↔ W–B	Window lock switch	Driver side window lock switch position UNLOCK	Below 1 V
WLSW ↔ GND (7 ↔ 13)	R–L ↔ W–B	Window lock switch	Driver side window lock switch position LOCK	10 to 14 V
SGND ↔ Body Ground (4 ↔ Body Ground)	W–B ↔ Body Ground	Ground	Always	Below 1 V
LSWE ↔ Body Ground (9 ↔ Body Ground)	W–B ↔ Body Ground	Ground	Always	Below 1 V
DM+R (*1) ↔ GND (15 ↔ 13)	L–W ↔ W–B	Outer mirror motor	Remote control mirror is not operated	Below 1 V
DM+R (*1) ↔ GND (15 ↔ 13)	L–W ↔ W–B	Outer mirror motor	Remote control mirror is operated DOWN or RIGHT	10 to 14 V
DMVR (*1) ↔ GND (17 ↔ 13)	BR–B ↔ W–B	Outer mirror motor	Remote control mirror is not operated	Below 1 V
DMVR (*1) ↔ GND (17 ↔ 13)	BR–B ↔ W–B	Outer mirror motor	Remote control mirror is operated UP or RIGHT	10 to 14 V
DMHR (*1) ↔ GND (16 ↔ 13)	BR–R ↔ W–B	Outer mirror motor	Remote control mirror is not operated	Below 1 V
DMHR (*1) ↔ GND (16 ↔ 13)	BR–R ↔ W–B	Outer mirror motor	Remote control mirror is operated LEFT or DOWN	10 to 14 V
DVC (*1) ↔ LE1 (11 ↔ 12)	BR–W ↔ L–R	Outer mirror position sensor	Ignition switch OFF	Below 1 V
DVC (*1) ↔ LE1 (11 ↔ 12)	BR–W ↔ L–R	Outer mirror position sensor	Ignition switch ON	4.8 to 5.2 V
VSSR (*1) ↔ LE1 (18 ↔ 12)	BR–Y ↔ L–R	Outer mirror position sensor	Ignition switch ON, outer mirror position full DOWN	0.5 to 1.8 V
VSSR (*1) ↔ LE1 (18 ↔ 12)	BR–Y ↔ L–R	Outer mirror position sensor	Ignition switch ON, outer mirror position full UP	3.5 to 4.5 V
HSSR (*1) ↔ LE1 (19 ↔ 12)	L–B ↔ L–R	Outer mirror position sensor	Ignition switch ON, outer mirror position full OUT	0.5 to 1.8 V
HSSR (*1) ↔ LE1 (19 ↔ 12)	L–B ↔ L–R	Outer mirror position sensor	Ignition switch ON, outer mirror position full IN	3.5 to 4.5 V

*1: w/ Driving position memory

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DIDEM–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one of the methods to shorten labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on the tester, read the DATA LIST.

D–DOOR:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D P/W AUTO SW	Driver door power window auto SW signal/ ON or OFF	ON: Driver door power window auto UP/DOWN SW is ON OFF: Driver door power window auto UP/DOWN SW is OFF	–
P P/W AUTO SW	Driver door power window auto SW signal/ ON or OFF	ON: Driver door power window auto UP/DOWN SW is ON OFF: Driver door power window auto UP/DOWN SW is OFF	–
LIMIT SW	Jam protection limit SW/ ON or OFF	ON: Window is almost fully open OFF: Window is open	*1
LOCK POS SW	Lock position SW signal/ ON or OFF	ON: Door lock is in unlock position OFF: Door lock is in lock position	–

*1: If the jam protection limit switch is turned ON, the jam protection function will stop.

Even if the switch is not turned ON when the windows are almost fully open, the window will not fully close as jam protection operates at upper window positions during automatic–up operation.

HINT:

The following data list can be used when the power window is operated through manual–up operation during the ACTIVE TEST.

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
GLASS POS–1/4	Detects things caught in the P/W / OK or CAUTION (Displayed during the active test)	OK: Nothing caught in the range between fully open and 1/4 open	*2
GLASS POS–2/4	Detects things caught in the P/W / OK or CAUTION (Displayed during the active test)	OK: Nothing caught in the range between 1/4 open and 2/4 open	*2
GLASS POS–3/4	Detects things caught in the P/W / OK or CAUTION (Displayed during the active test)	OK: Nothing caught in the range between 2/4 open and 3/4 open	*2
GLASS POS–OPEN	Detects things caught in the P/W / OK or CAUTION (Displayed during the active test)	OK: Nothing caught in the range between 3/4 open and fully open	*2

HINT:

*2: If the CAUTION is displayed without applying any resistance in each range, there must be something caught somewhere in that range.

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
UP/DOOR KEY (*1)	Driver door key lock and unlock switch linked window open and close/AVAIL or NOT AVL	AVAIL: Key–linked open and close SET NOT AVL: Key–linked open and close UNSET	–
DOWN/DOOR KEY (*1)	Driver door key lock and unlock switch linked window open and close/AVAIL or NOT AVL	AVAIL: Key–linked open and close SET NOT AVL: Key–linked open and close UNSET	–

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*1: When the ignition key is not in the key cylinder and the back door is locked, turning and holding the key in the back door key cylinder in the lock position for 1.5 seconds or more activates the driver door ECU to operate the power window motor and close the power window.
Similarly, turning and holding the key in the back door key cylinder in the unlock position for 1.5 seconds or more when the back door is unlocked will open the power window.

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
MIR POS SEN V	Vertical mirror position/Min.: 0, Max.: 5	Within range from 0 to 5 V	–
MIR POS SEN H	Vertical mirror position/Min.: 0, Max.: 5	Within range from 0 to 5 V	–

2. ACTIVE TEST

HINT:
Performing the ACTIVE TEST using the hand–held tester allows the relay, actuator and so on to operate without removal. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten labor time.
It is possible to display the DATA LIST during the ACTIVE TEST.
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) According to the display on the tester, perform the ACTIVE TEST.

D–DOOR:

Item	Test Details	Diagnostic Note
P/W UP/DOWN	Drive the P/W Motor UP/DOWN	During this ACTIVE TEST, jam protection, caught detection can be monitored. (Refer to the DATA LIST for details)
MIRR UP/DOWN	Mirror motor vertical operation UP/OFF/DOWN	–
MIRR RIGHT/LEFT	Mirror motor horizontal operation RIGHT/OFF/ LEFT	–

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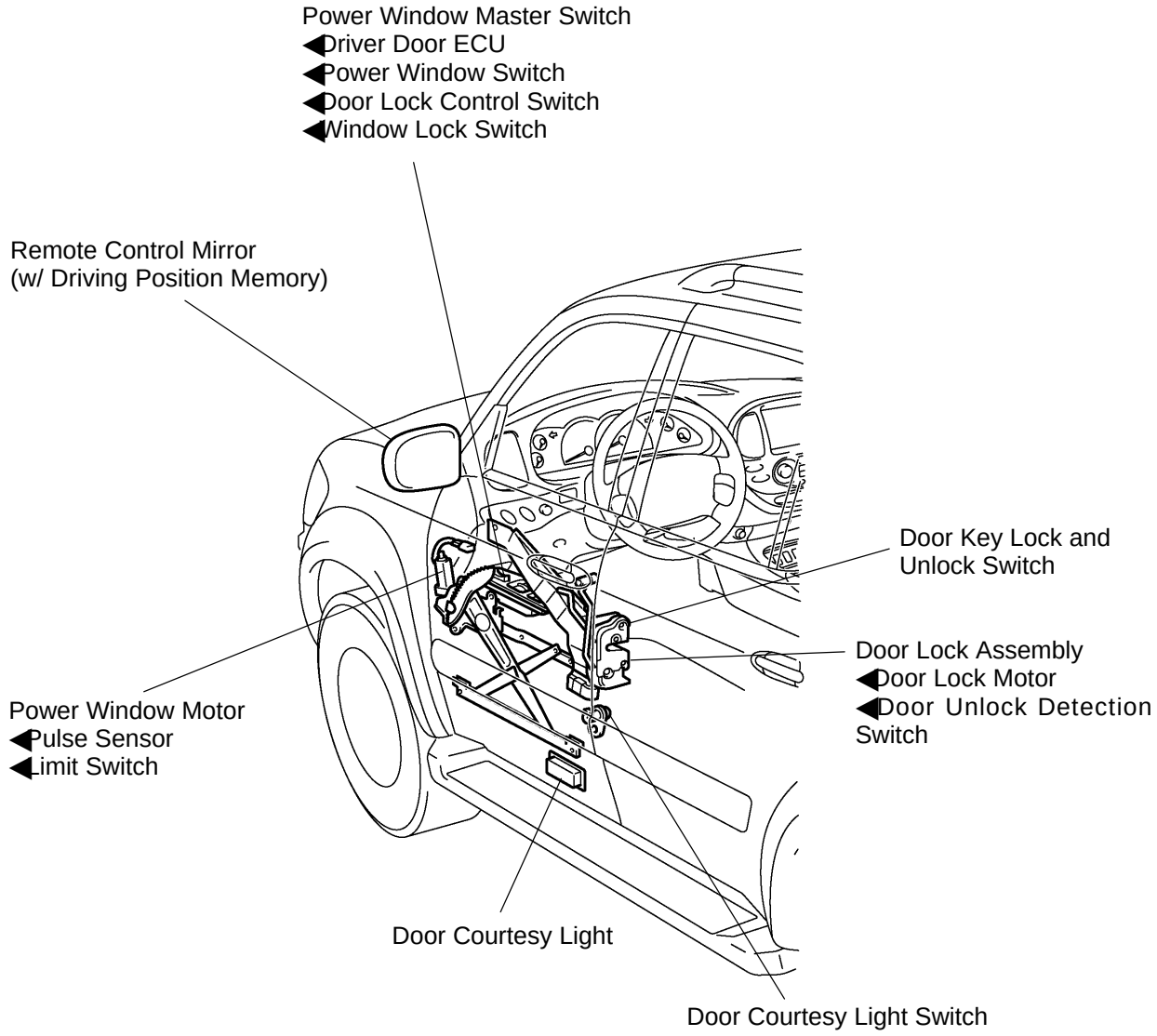
DI1PA–08

PARTS LOCATION

▶Driver door ECU is the same with power window master switch.



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DI1PD–10

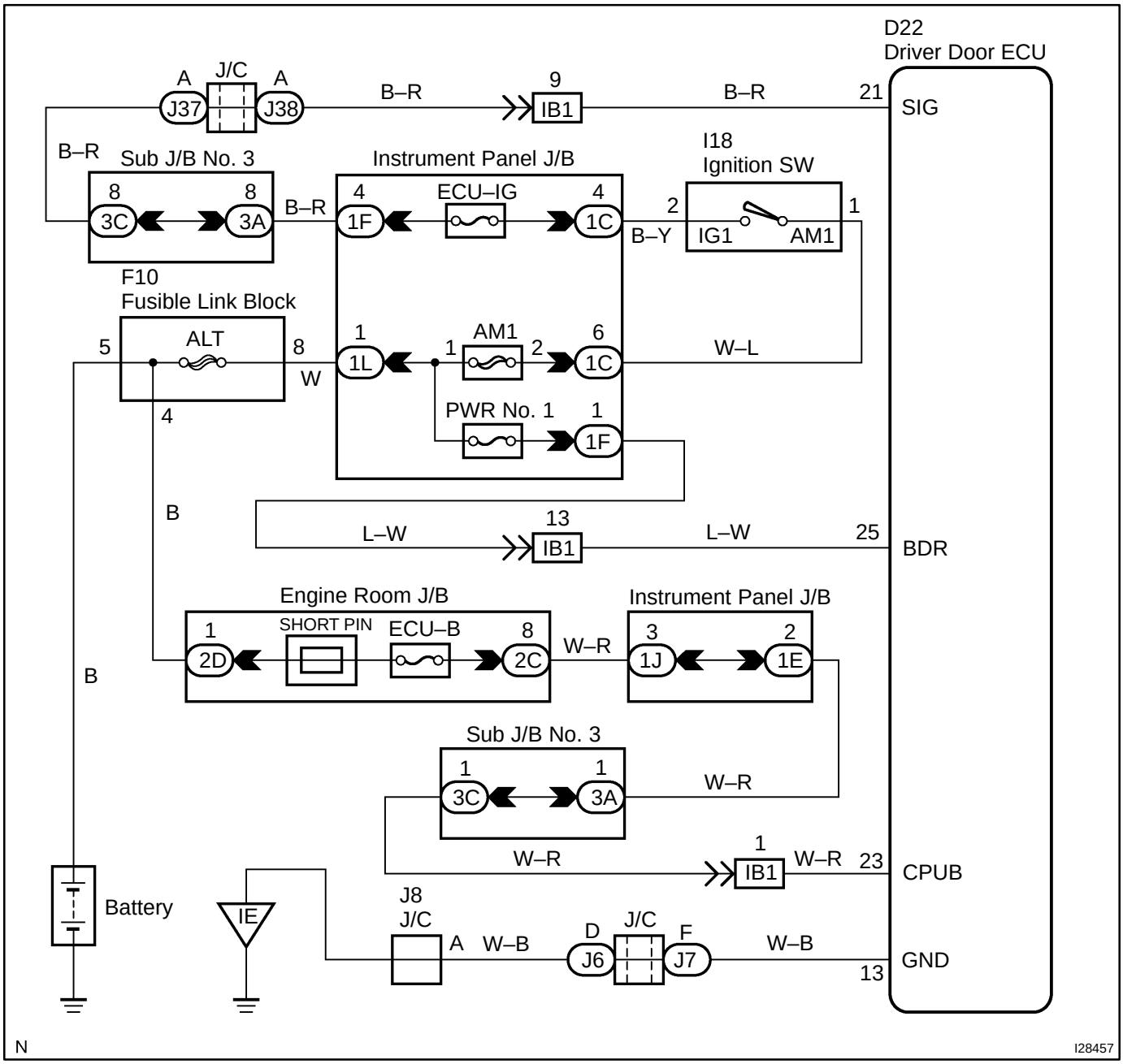
CIRCUIT INSPECTION

Power source circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the driver door ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check ECU–IG, AM1, PWR No. 1 and ECU–B fuse.**

CHECK:

Check continuity of the ECU–IG, AM1, PWR No. 1 and ECU–B fuse.

OK:

Continuity

NG → **Replace the faulty fuse.**

OK

2	**Check voltage between terminals BDR, CPUB, SIG and GND of driver door ECU connector.**

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals SIG and GND of the driver door ECU of the wire harness side connector.

OK:

Voltage: 10 to 14 V

PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the driver door ECU connector.

CHECK:

Measure the voltage between terminals BDR, CPUB and GND of the driver door ECU of the wire harness side connector.

OK:

Voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).**

NG

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3	**Check wire harness and connector (Driver door ECU – body ground, battery) (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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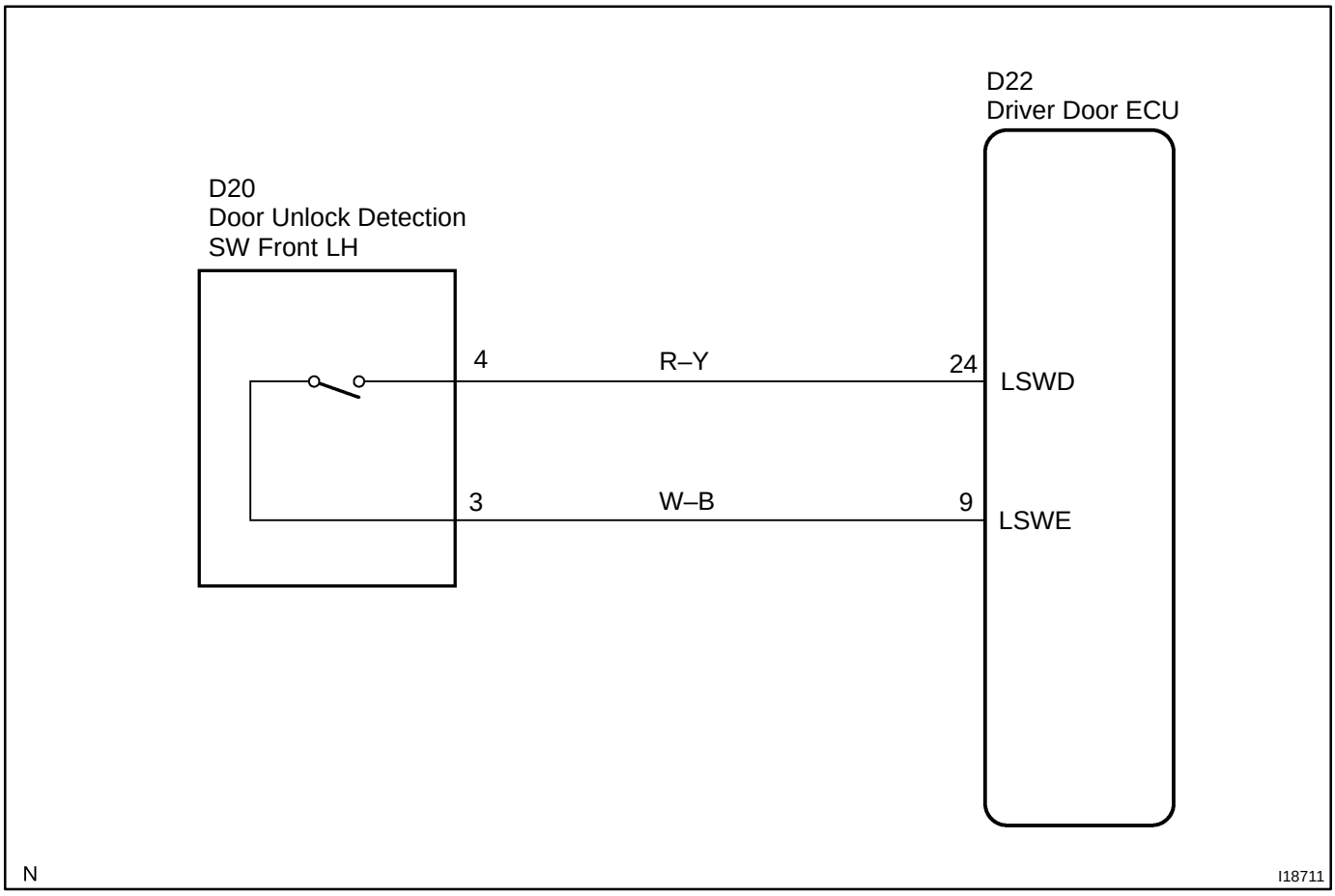
Door unlock detection switch circuit

CIRCUIT DESCRIPTION

The door unlock detection switch is built in the door lock motor. This switch is ON when the door lock knob is in the unlock position and OFF when the lock knob is in the lock position. The ECU detects the door lock knob conditions in this circuit. It is used as one of the operating conditions for the key confinement prevention function.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check door unlock detection switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the DATA LIST.

D–DOOR:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
LOCK POS SW	Lock position SW signal/ ON or OFF	ON: Door lock is in unlock position OFF: Door lock is in lock position	–

OK:

Indication on the tester switches between ON and OFF in accordance with the door unlock detection switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).**

NG

2	**Check door unlock detection switch (See page BE–79).**

NG → **Replace the door lock assembly.**

OK

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3	**Check wire harness and connector between door unlock detection switch and driver door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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DI1PH–17

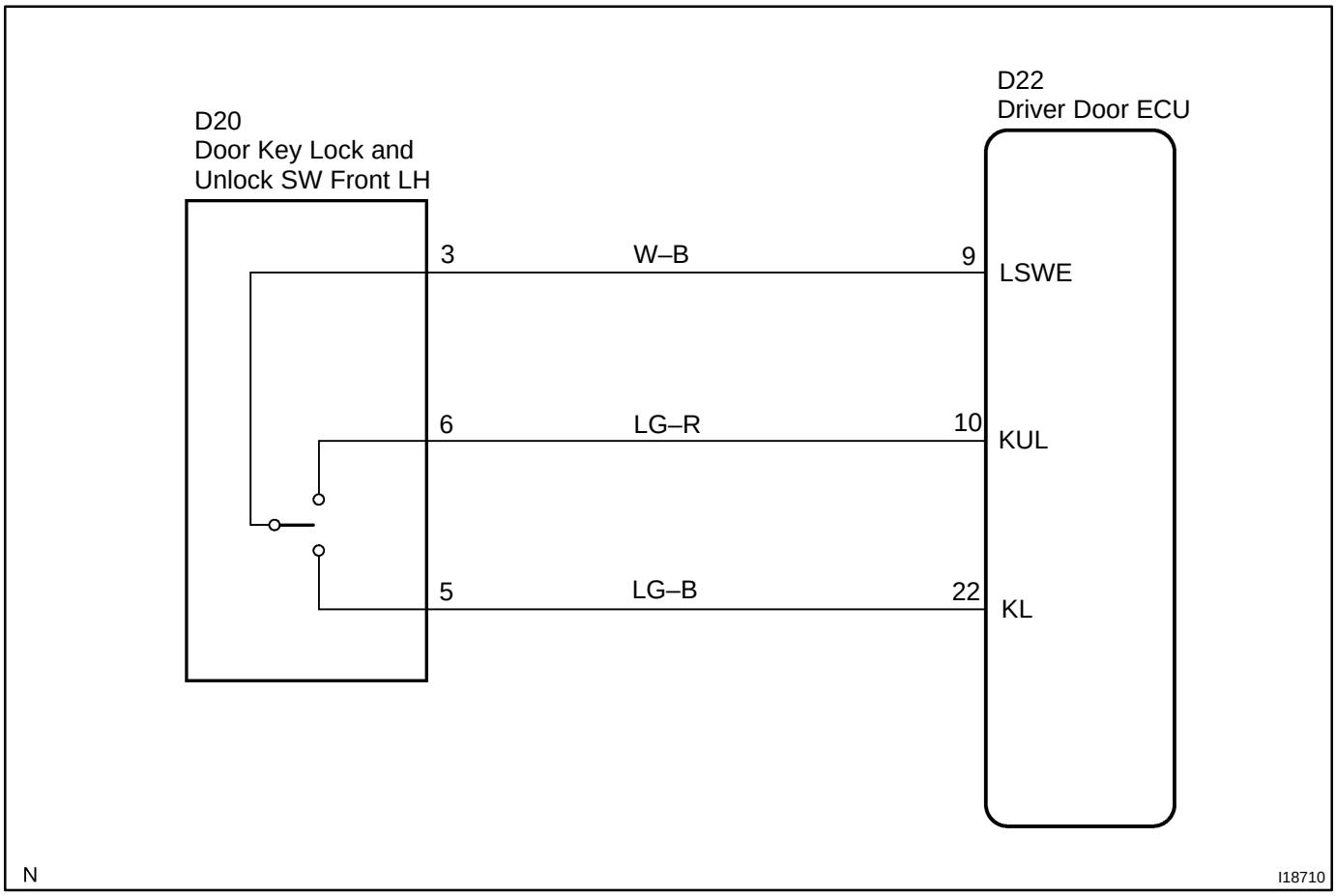
Door key lock and unlock switch circuit

CIRCUIT DESCRIPTION

The door key lock and unlock switch is built in the door lock motor. When the key is turned to the lock side, terminal 5 of the switch is grounded and when the key is turned to the unlock side, terminal 6 of the switch is grounded.

The door key lock and unlock switch can be checked using the DTC check (refer to DI–1904).

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check the door key lock and unlock switch (See page BE–79).

NG → Replace the door key lock and unlock switch.

OK

2	Check wire harness and connector between door key lock and unlock switch and driver door ECU (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1686).

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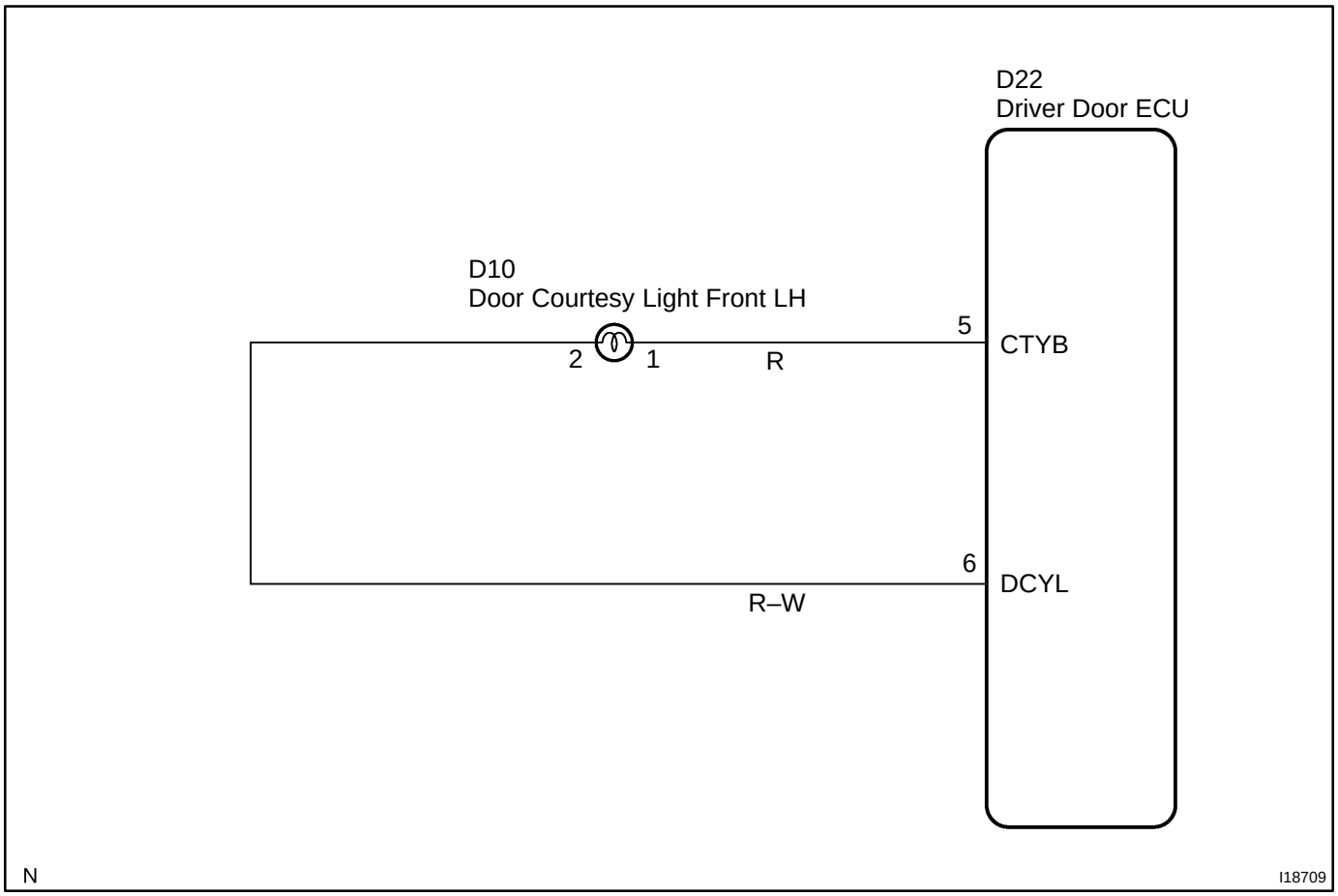
DI1PI–18

Door courtesy light circuit

CIRCUIT DESCRIPTION

The door courtesy light comes on when the door is opened and goes off when the door is closed.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check door courtesy light operation.**

CHECK:

Check that the door courtesy light comes on when the door is opened, and goes off when the door is closed.

OK:

Door courtesy light normally operates.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).**

NG

2	**Check door courtesy light (See page BE–40).**

NG → **Replace the door courtesy light.**

OK

3	**Check wire harness and connector between door courtesy light and driver door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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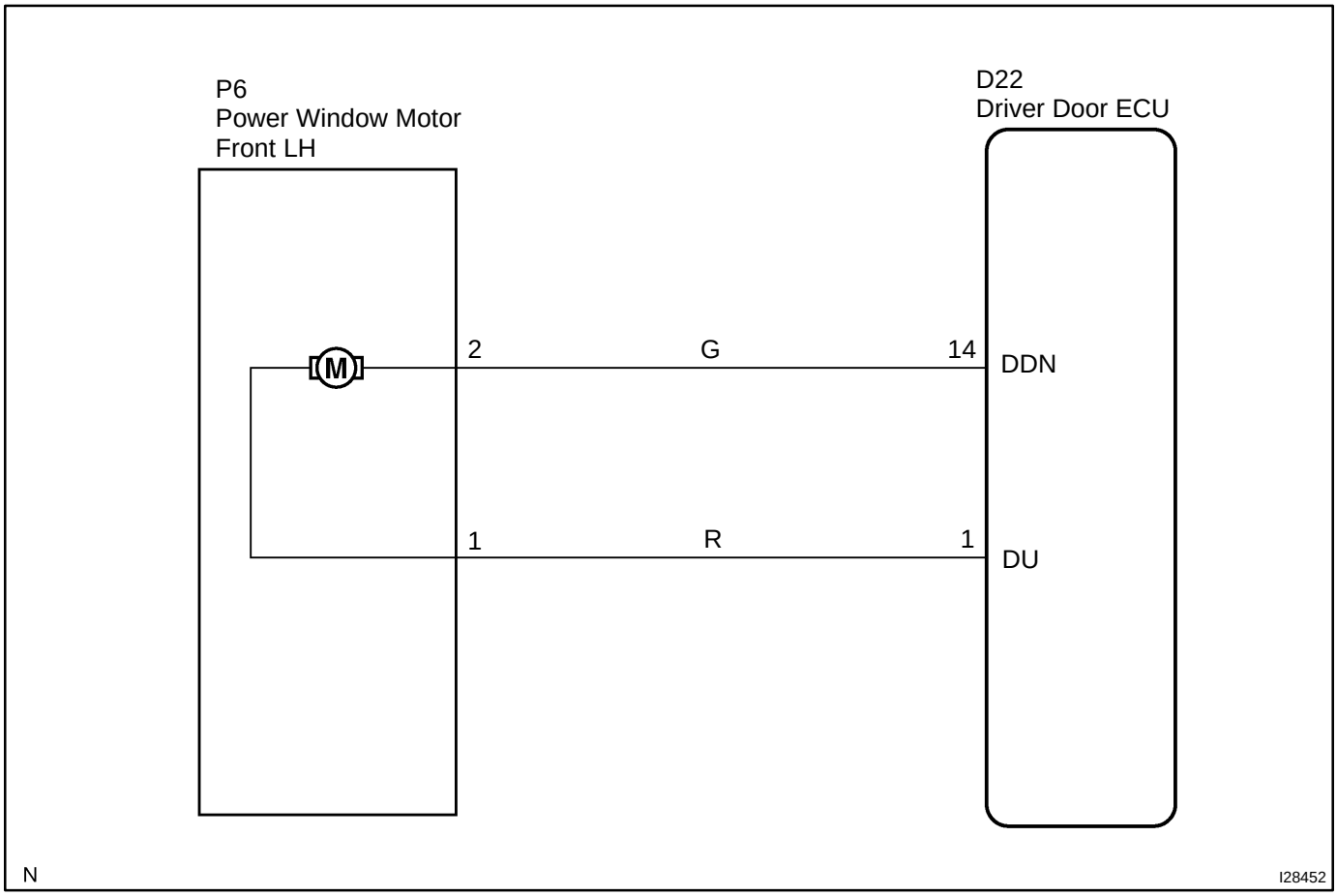
DI1PJ–09

Power window motor circuit

CIRCUIT DESCRIPTION

The power window goes down when voltage is applied to terminal 2 of the power window motor, and the window goes up when voltage is applied to terminal 1.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check power window motor using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, perform the ACTIVE TEST.

D–DOOR:

Item	Test Details	Diagnostic Note
P/W UP/DOWN	Drive the P/W Motor UP/DOWN	During this ACTIVE TEST, jam protection, caught detection can be monitored. (Refer to the DATA LIST for details)

OK:

Power window operates normally.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).**

NG

2	**Check power window motor (See page BE–69).**

NG → **Replace the power window motor.**

OK

3	**Check wire harness and connector between power window motor and driver door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

Author : Date : 1993

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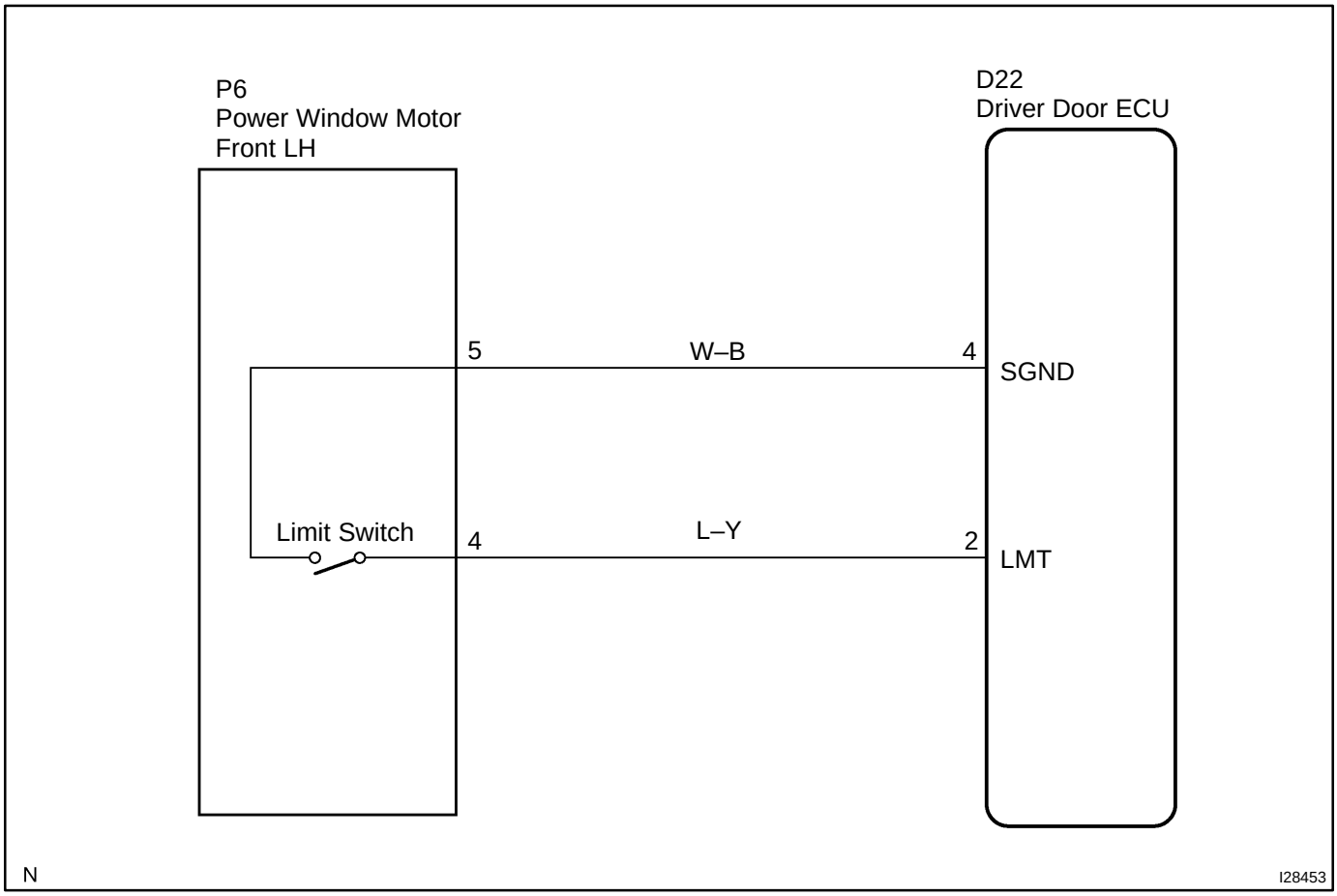
DI1PK–07

Jam protection limit switch circuit

CIRCUIT DESCRIPTION

The jam protection limit switch, built in the power window motor, turns off before top dead center. The ECU reads this ”OFF” signal and fully closes the window.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check jam protection limit switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the DATA LIST.

D–DOOR:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
LIMIT SW	Jam protection limit SW/ ON or OFF	ON: Window is almost fully open OFF: Window is open	*1

*1: If the jam protection limit switch is turned ON, the jam protection function will stop.

Even if the switch is not turned ON when the windows are almost fully open, the window will not fully close as jam protection operates at upper window positions during automatic–up operation.

OK:

Indication on the tester switches between ON and OFF in accordance with the jam protection limit switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).**

NG

2	**Check jam protection limit switch (jam protection function) (See page BE–69).**

NG → **Replace the power window motor.**

OK

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3	**Check wire harness and connector between jam protection limit switch and driver door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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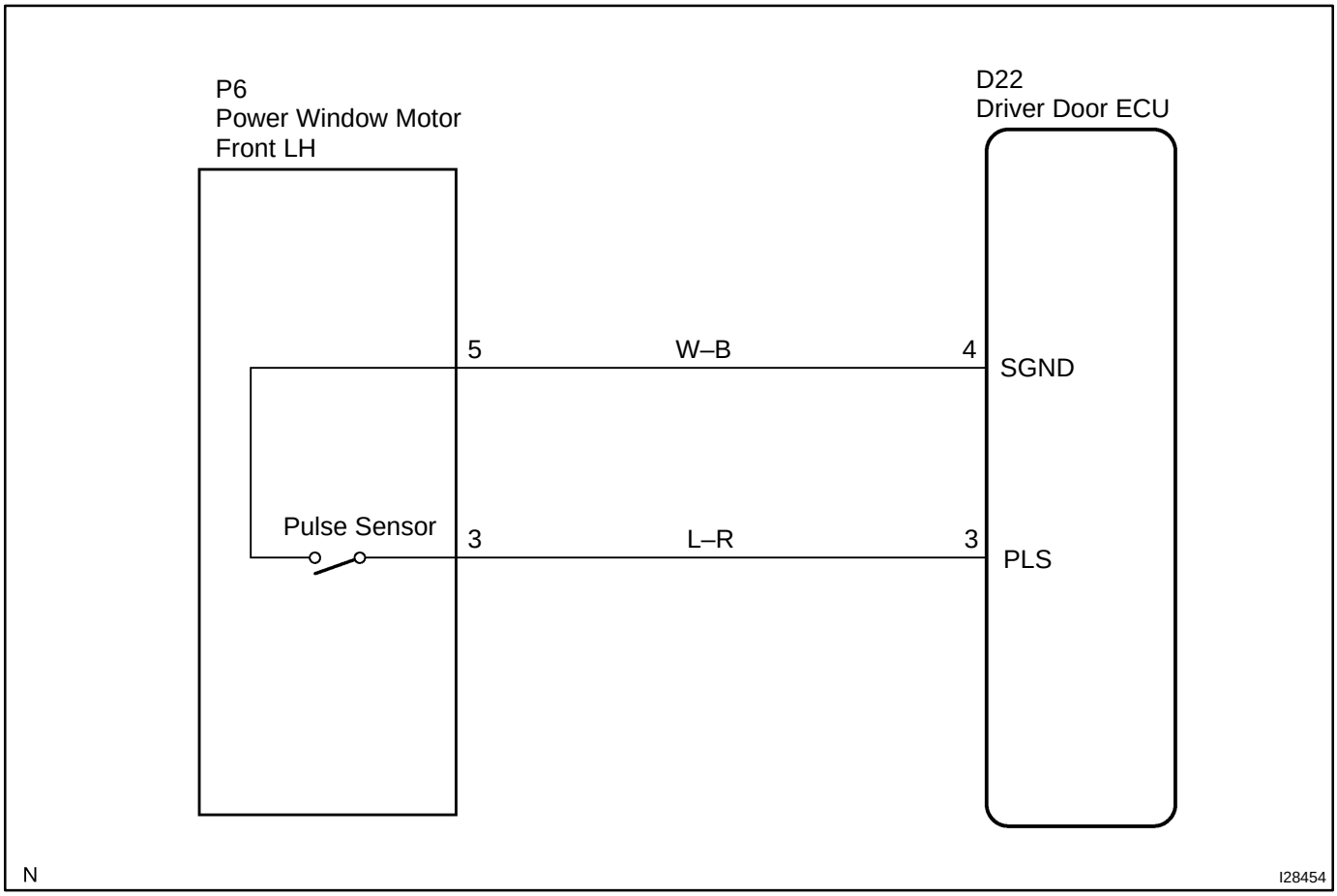
DI1PL–09

Jam protection pulse sensor circuit

CIRCUIT DESCRIPTION

The jam protection pulse sensor, built in the power window motor, outputs a ON/OFF pulse when the motor rotates.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check the jam protection pulse sensor circuit using DTC check (See page DI–1904).**

CHECK:
Check if DTC B1232 of the multiplex communication system is output.
OK:
DTC is not output.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).**

NG

2	**Check jam protection pulse sensor (See page BE–69).**

NG → **Replace the power window motor.**

OK

3	**Check wire harness and connector between jam protection pulse sensor and driver door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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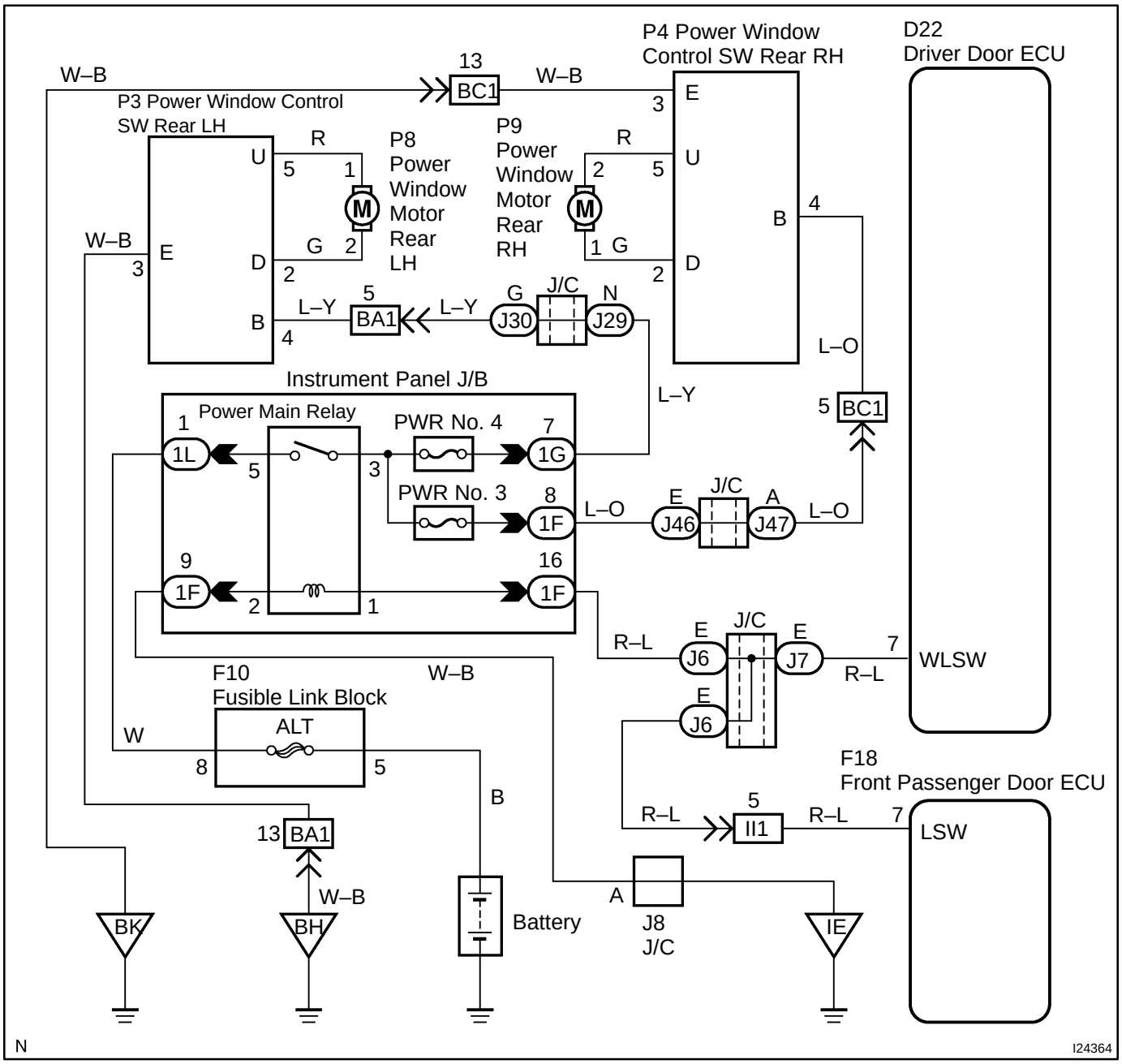
Window lock switch circuit

CIRCUIT DESCRIPTION

The window lock switch circuit can be checked using the DTC check (refer to DI–1904).
The window lock switch is built in the driver door ECU. Voltage applied to the WLSW terminal of the driver door ECU is shut off when the window lock switch is turned to the LOCK position. Thus the power main relay stops power supply to the other power window control switches.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

Check if DTC B1221 of the multiplex communication system is output. When the DTC is not output, proceed to the following procedures and when it is output, perform inspection (see page DI–1904).

1	**Check window lock switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the DATA LIST.

D–DOOR:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
LOCK POS SW	Lock position SW signal/ ON or OFF	ON: Door lock is in unlock position OFF: Door lock is in lock position	–

OK:

Indication on the tester switches between ON and OFF in accordance with the window lock switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).**

NG

2	**Check power main relay (See page BE–69).**

NG → **Replace power main relay.**

OK

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3	Check wire harness and connector between driver door ECU and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

4	Check wire harness and connector between passenger door ECU and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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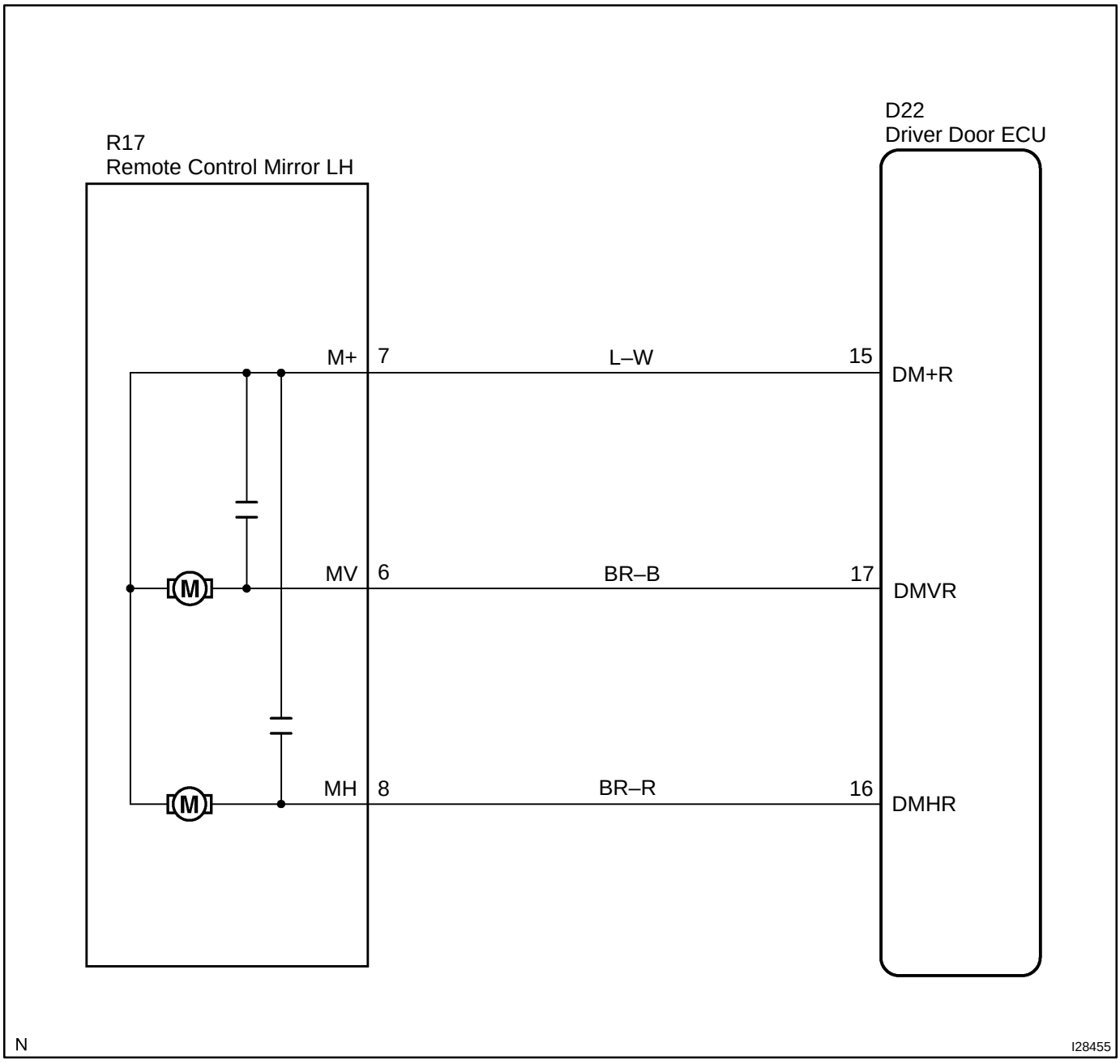
DIDEP–01

Remote control mirror motor LH circuit (w/ Driving position memory)

CIRCUIT DESCRIPTION

SEQUOIA features a driving position memory function, and up to 2 driver positions can be memorized. The driver door ECU operates 2 motors built into the remote control mirror. The motors move the mirror to the memorized positions based on information from the position sensor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check remote control mirror motor (See page BE–115).

NG → Replace remote control mirror motor.

OK

2	Check wire harness and connector between remote control mirror motor and driver door ECU (See page IN–35).

NG → Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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Remote control mirror position sensor LH circuit (w/ Driving position memory)

CIRCUIT DESCRIPTION

SEQUOIA features a driving position memory function, and up to 2 driver positions can be memorized. The driver door ECU operates 2 motors built into the remote control mirror. The motors move the mirror to the memorized positions based on information from the position sensor.

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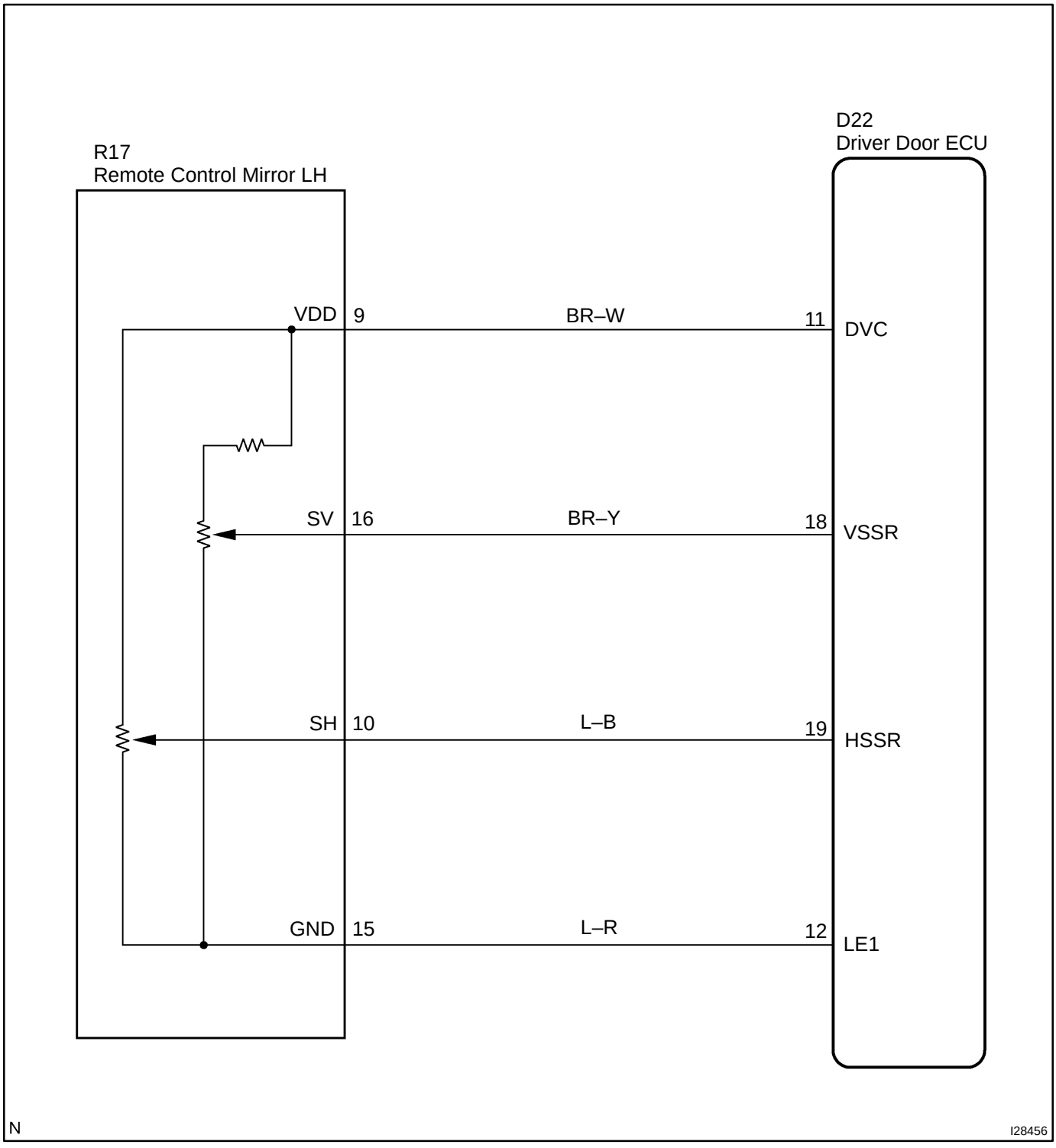
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check remote control mirror position sensor (See page DI–1783).

NG → Replace remote control mirror.

OK

2	Check wire harness and connector between remote control mirror position sensor and driver door ECU (See page IN–35).

NG → Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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DI94N–04

Power window master switch circuit

CIRCUIT DESCRIPTION

The power window master switch circuit can be checked using the DTC check (refer to DI–1904).

INSPECTION PROCEDURE

1	**Check the power window master switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the DATA LIST.

D–DOOR:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D P/W AUTO SW	P/W auto SW signal/ ON or OFF	ON: P/W auto UP/DOWN SW is ON OFF: P/W auto UP/DOWN SW is OFF	–
P P/W AUTO SW	P/W auto SW signal/ ON or OFF	ON: P/W auto UP/DOWN SW is ON OFF: P/W auto UP/DOWN SW is OFF	–

OK:

Indication on the tester switches between ON and OFF in accordance with the window auto up operation status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).**

NG

Replace the driver door ECU.

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PASSENGER DOOR CONTROL SYSTEM

DIDER–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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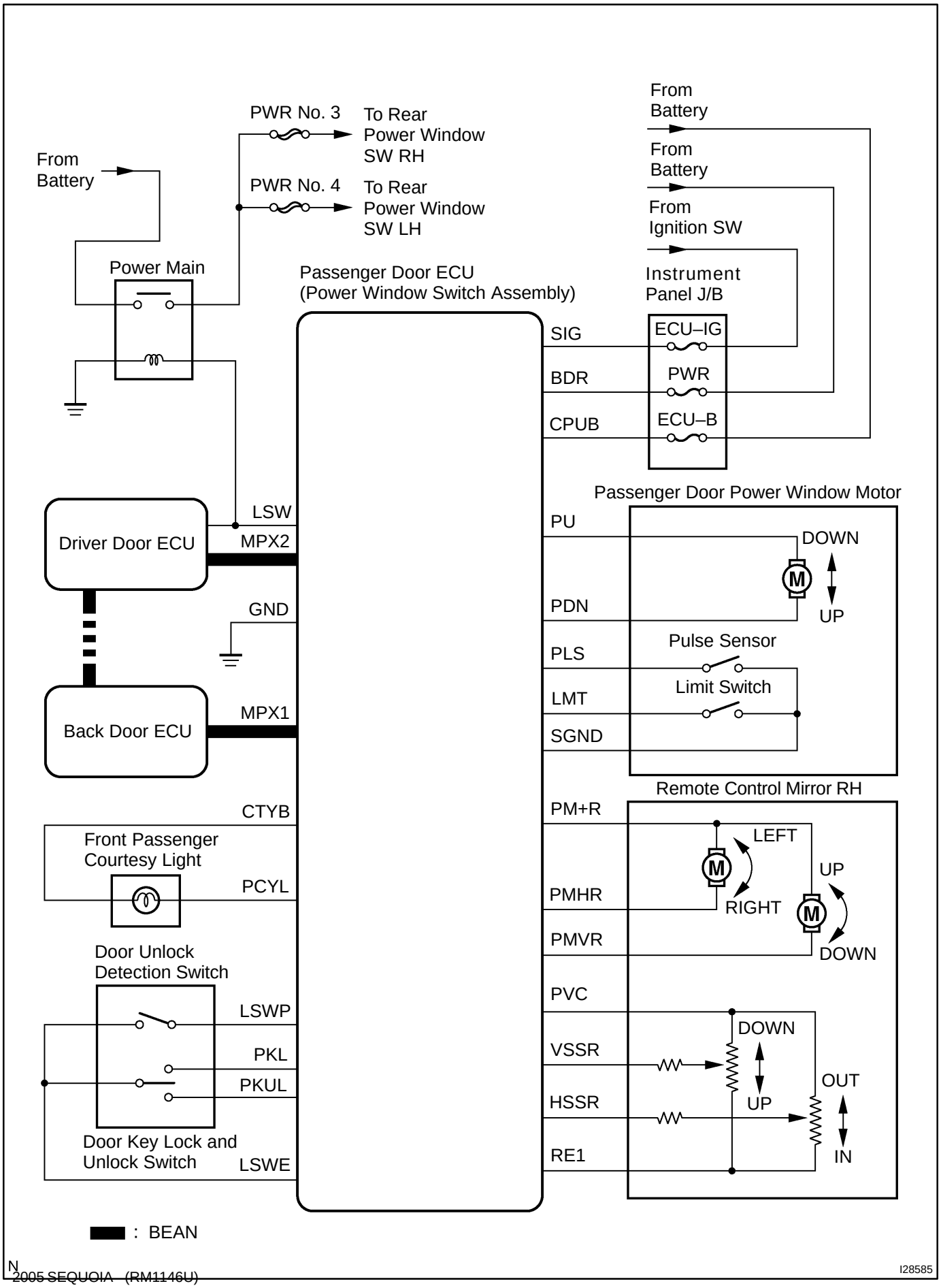
DIDES–01

SYSTEM DIAGRAM



I28585

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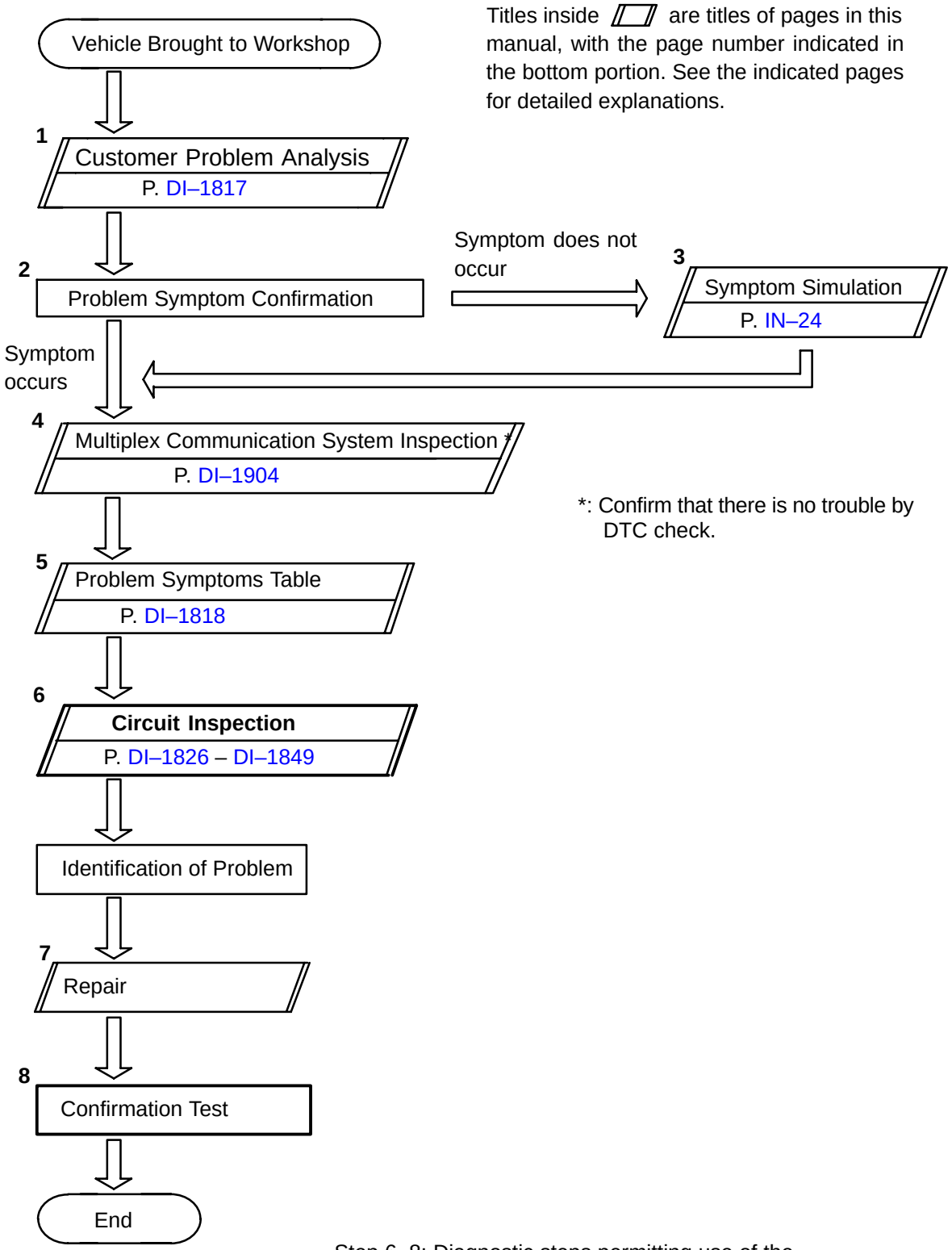
DI1PP–07

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

This ECU is connected to the multiplex communication system. Therefore, be sure to check that there is no trouble in the multiplex communication system before performing the troubleshooting.



Step 6, 8: Diagnostic steps permitting use of the hand–held tester.

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DI1PT–06

CUSTOMER PROBLEM ANALYSIS CHECK

PASSENGER DOOR CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Licence Plate No.	
		Production Date	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Malfunction System	☐ Power Window Control System
	☐ Power Door Lock Control System
	☐ Theft Deterrent System
	☐ Jam Protection System
	☐ Front Passenger Side Door Courtesy Light System
	☐ Remote Control Mirror RH System
	☐ Other

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DI1PV–06

PROBLEM SYMPTOMS TABLE

POWER WINDOW CONTROL SYSTEM

Symptom	Suspected Area	See page
Power window does not operate.	1. Power source circuit 2. Power window motor circuit 3. Window lock switch circuit 4. Passenger door ECU	DI–1826 DI–1836 DI–1843 IN–35
Auto up (or down) function does not operate.	1. Power source circuit 2. Passenger door ECU	DI–1826 IN–35
Jam protection function and auto up (or down) function do not operate.	1. Jam protection limit switch circuit 2. Jam protection pulse sensor circuit 3. Passenger door ECU	DI–1838 DI–1841 IN–35

OTHER

Symptom	Suspected Area	See page
Door parts do not function.	1. Power source circuit 2. Passenger door ECU	DI–1826 IN–35
Door key related function does not operate.	1. Door key lock and unlock switch circuit 2. Passenger door ECU	DI–1832 IN–35
Courtesy light does not come on. (Passenger's)	1. Door courtesy light circuit 2. Passenger door ECU	DI–1834 IN–35
Remote control mirror RH does not operate. (w/ Driving position memory)	1. Remote control mirror motor RH circuit 2. Remote control mirror position sensor RH circuit 3. Passenger door ECU	DI–1845 DI–1847 IN–35
Door lock control does not operate.	1. Door unlock detection switch circuit 2. Door lock motor circuit 3. Passenger door ECU	DI–1829 DI–1720 IN–35

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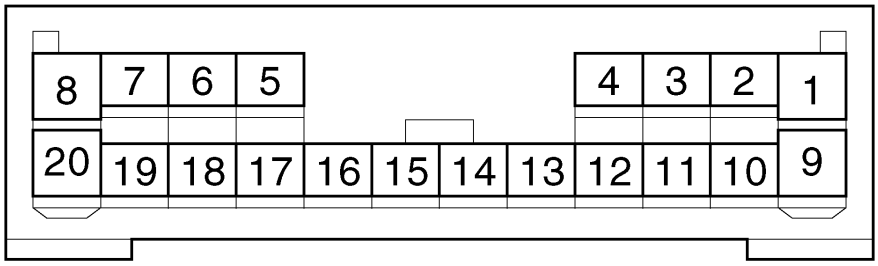
DIDET–01

TERMINALS OF ECU

PASSENGER DOOR ECU
(w/o Driving Position Memory):

F18



N

I18630

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BDR ↔ GND (20 ↔ 8)	L–Y ↔ W–B	Battery	Always	10 to 14 V
CPUB ↔ GND (12 ↔ 8)	W–R ↔ W–B	Battery	Always	10 to 14 V
SIG ↔ GND (19 ↔ 8)	B–R ↔ W–B	Ignition switch	Ignition switch ON	10 to 14 V
GND ↔ Body Ground (8 ↔ Body ground)	W–B ↔ Body Ground	Ground	Always	Below 1 V
PLS ↔ SGND (17 ↔ 18)	L–R ↔ W–B	Power window pulse sensor	Power window is operated	Pulse generation
PLS ↔ SGND (17 ↔ 18)	L–R ↔ W–B	Power window pulse sensor	Power window is not operated (Switch ON)	Below 1 V
PLS ↔ SGND (17 ↔ 18)	L–R ↔ W–B	Power window pulse sensor	Power window is not operated (Switch OFF)	10 to 14 V
LMT ↔ SGND (16 ↔ 18)	L–W ↔ W–B	Power window limit switch	Front passenger's door window not fully closed position	Below 1 V
LMT ↔ SGND (16 ↔ 18)	L–W ↔ W–B	Power window limit switch	Front passenger's door window fully closed position	10 to 14 V
PU ↔ PDN (1 ↔ 9)	R ↔ G	Power window motor (UP)	Ignition switch ON and front passenger's window switch OFF	Below 1 V
PU ↔ PDN (1 ↔ 9)	R ↔ G	Power window motor (UP)	Ignition switch ON and front passenger's window switch UP	10 to 14 V
PDN ↔ PU (9 ↔ 1)	G ↔ R	Power window motor (DOWN)	Ignition switch ON and front passenger's window switch OFF	Below 1 V
PDN ↔ PU (9 ↔ 1)	G ↔ R	Power window motor (DOWN)	Ignition switch ON and front passenger's window switch DOWN	10 to 14 V
MPX1 ↔ – (10 ↔ –)	B ↔ –	Multiplex communication line	Multiplex communication circuit	–
MPX2 ↔ – (11 ↔ –)	G–B ↔ –	Multiplex communication line	Multiplex communication circuit	–

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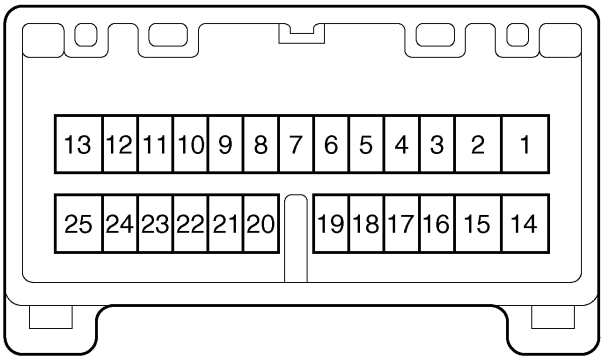
PKL ↔ LSWE (3 ↔ 13)	LG–B ↔ W–B	Door key lock and unlock switch (LOCK)	Door key lock and unlock switch LOCK	Below 1 V
PKL ↔ LSWE (3 ↔ 13)	LG–B ↔ W–B	Door key lock and unlock switch (LOCK)	Door key lock and unlock switch OFF or UNLOCK	10 to 14 V
PKUL ↔ LSWE (2 ↔ 13)	LG–R ↔ W–B	Door key lock and unlock switch (UNLOCK)	Door key lock and unlock switch UNLOCK	Below 1 V
PKUL ↔ LSWE (2 ↔ 13)	LG–R ↔ W–B	Door key lock and unlock switch (UNLOCK)	Door key lock and unlock switch OFF or LOCK	10 to 14 V
LSWP ↔ LSWE (4 ↔ 13)	R–Y ↔ W–B	Door unlock detection switch	Front passenger's door is locked	10 to 14 V
LSWP ↔ LSWE (4 ↔ 13)	R–Y ↔ W–B	Door unlock detection switch	Front passenger's door is unlocked	Below 1 V
LSW ↔ GND (7 ↔ 8)	R–L ↔ W–B	Window lock switch	Window lock switch position UNLOCK	Below 1 V
LSW ↔ GND (7 ↔ 8)	R–L ↔ W–B	Window lock switch	Window lock switch position LOCK	10 to 14 V
CTYB ↔ PCYL (6 ↔ 5)	R ↔ R–W	Door courtesy light (Front RH)	Front passenger's door closed	10 to 14 V
CTYB ↔ PCYL (6 ↔ 5)	R ↔ R–W	Door courtesy light (Front RH)	Front passenger's door open	Below 1 V
LSWE ↔ Body ground (13 ↔ Body ground)	W–B ↔ Body ground	Ground	Always	Below 1 V
SGND ↔ Body ground (18 ↔ Body ground)	W–B ↔ Body ground	Ground	Always	Below 1 V

PASSENGER DOOR ECU (w/ Driving Position Memory):

F18



N

I18633

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
MPX1 ↔ – (20 ↔ –)	B ↔ –	Multiplex communication line	Multiplex communication circuit	Pulse generation
SIG ↔ GND (21 ↔ 13)	B–R ↔ W–B	Ignition switch	Ignition switch ON	10 to 14 V

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BDR ↔ GND (25 ↔ 13)	L–Y ↔ W–B	Battery	Always	10 to 14 V
CPUB ↔ GND (23 ↔ 13)	W–R ↔ W–B	Battery	Always	10 to 14 V
LMT ↔ SGND (2 ↔ 4)	L–W ↔ W–B	Power window limit switch	Front passenger's door window not fully closed	Below 1 V
LMT ↔ SGND (2 ↔ 4)	L–W ↔ W–B	Power window limit switch	Front passenger's door window fully closed	10 to 14 V
PLS ↔ SGND (3 ↔ 4)	L–R ↔ W–B	Power window pulse sensor	Power window is operated	Pulse generation
SGND ↔ Body ground (4 ↔ Body ground)	W–B ↔ Body ground	Ground	Always	Below 1 V
PU ↔ PDN (1 ↔ 14)	R ↔ G	Power window motor (UP)	Ignition switch ON and front passenger's window switch OFF	Below 1 V
PU ↔ PDN (1 ↔ 14)	R ↔ G	Power window motor (UP)	Ignition switch ON and front passenger's window switch UP	10 to 14 V
PDN ↔ PU (14 ↔ 1)	G ↔ R	Power window motor (DOWN)	Ignition switch ON and front passenger's window switch OFF	Below 1 V
PDN ↔ PU (14 ↔ 1)	G ↔ R	Power window motor (DOWN)	Ignition switch ON and front passenger's window switch DOWN	10 to 14 V
LSW ↔ GND (7 ↔ 13)	R–L ↔ W–B	Window lock switch	Window lock switch position UNLOCK	Below 1 V
LSW ↔ GND (7 ↔ 13)	R–L ↔ W–B	Window lock switch	Window lock switch position LOCK	10 to 14 V
MPX2 ↔ – (8 ↔ –)	G–B ↔ –	Multiplex communication line	Multiplex communication circuit	Pulse generation
GND ↔ Body ground (13 ↔ Body ground)	W–B ↔ Body ground	Ground	Always	Below 1 V
LSWP ↔ LSWE (24 ↔ 9)	R–Y ↔ W–B	Door unlock detection switch	Front passenger's door is locked	10 to 14 V
LSWP ↔ LSWE (24 ↔ 9)	R–Y ↔ W–B	Door unlock detection switch	Front passenger's door is unlocked	Below 1 V
LSWE ↔ Body ground (9 ↔ Body ground)	W–B ↔ Body ground	Ground	Always	Below 1 V
PKUL ↔ GND (10 ↔ 13)	LG–R ↔ W–B	Door key lock and unlock switch (UNLOCK)	Door key lock and unlock switch UNLOCK	Below 1 V
PKUL ↔ GND (10 ↔ 13)	LG–R ↔ W–B	Door key lock and unlock switch (UNLOCK)	Door key lock and unlock switch OFF or LOCK	10 to 14 V
PKL ↔ GND (22 ↔ 13)	LG–B ↔ W–B	Door key lock and unlock switch (LOCK)	Door key lock and unlock switch LOCK	Below 1 V
PKL ↔ GND (22 ↔ 13)	LG–B ↔ W–B	Door key lock and unlock switch (LOCK)	Door key lock and unlock switch OFF or UNLOCK	10 to 14 V
CTYB ↔ PCYL (5 ↔ 6)	R ↔ R–W	Door courtesy light (Front RH)	Front passenger's door closed	10 to 14 V

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CTYB ↔ PCYL (5 ↔ 6)	R ↔ R–W	Door courtesy light (Front RH)	Front passenger's door open	Below 1 V
PVC ↔ RE1 (11 ↔ 12)	GR–B ↔ GR–R	Outer mirror position sensor	Ignition switch OFF	Below 1 V
PVC ↔ RE1 (11 ↔ 12)	GR–B ↔ GR–R	Outer mirror position sensor	Ignition switch ON	4.8 to 5.2 V
VSSR ↔ RE1 (18 ↔ 12)	GR–G ↔ GR–R	Outer mirror position sensor	Ignition switch ON, outer mirror position full OUT	0.5 to 1.8 V
VSSR ↔ RE1 (18 ↔ 12)	GR–G ↔ GR–R	Outer mirror position sensor	Ignition switch ON, outer mirror position full IN	3.5 to 4.5 V
HSSR ↔ RE1 (19 ↔ 12)	GR–L ↔ GR–R	Outer mirror position sensor	Ignition switch ON, outer mirror position full DOWN	0.5 to 1.8 V
HSSR ↔ RE1 (19 ↔ 12)	GR–L ↔ GR–R	Outer mirror position sensor	Ignition switch ON, outer mirror position full UP	3.5 to 4.5 V
PM+R ↔ GND (15 ↔ 13)	L–W ↔ W–B	Outer mirror motor	Remote control mirror is not operated	Below 1 V
PM+R ↔ GND (15 ↔ 13)	L–W ↔ W–B	Outer mirror motor	Remote control mirror is operated DOWN or RIGHT	10 to 14 V
PMVR ↔ GND (17 ↔ 13)	LG–B ↔ W–B	Outer mirror motor	Remote control mirror is not operated	Below 1 V
PMVR ↔ GND (17 ↔ 13)	LG–B ↔ W–B	Outer mirror motor	Remote control mirror is operated UP or RIGHT	10 to 14 V
PMHR ↔ GND (16 ↔ 13)	LG–R ↔ W–B	Outer mirror motor	Remote control mirror is not operated	Below 1 V
PMHR ↔ GND (16 ↔ 13)	LG–R ↔ W–B	Outer mirror motor	Remote control mirror is operated LEFT or DOWN	10 to 14 V

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DIDEU–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one of the methods to shorten labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on the tester, read the DATA LIST.

P–DOOR:

Item	Measurement Item/Display (Range)	Normal condition	Diagnostic Note
P P/W AUTO SW	Front passenger power window auto SW signal/ ON or OFF	ON: Front passenger power window auto UP/DOWN SW is ON OFF: Front passenger power window auto UP/DOWN SW is OFF	–
LIMIT SW	Jam protection limit SW/ ON or OFF	ON: Window is almost fully open OFF: Window is open	*1
LOCK POS SW	Lock position SW signal/ ON or OFF	ON: Door lock is in unlock position OFF: Door lock is in lock position	–

*1: If the jam protection limit switch is turned ON, the jam protection function will stop.

Even if the switch is not turned ON when the windows are almost fully open, the window will not fully close as jam protection operates at upper window positions during automatic–up operation.

HINT:

The following data list can be used when the power window is operated through manual–up operation during the ACTIVE TEST.

Item	Measurement Item/Display (Range)	Normal condition	Diagnostic Note
GRASS POS–1/4	Detects things caught in the P/W / OK or CAUTION (Displayed during the active test)	OK: Nothing caught in the range between closed and 1/4 open	*2
GRASS POS–1/2	Detects things caught in the P/W / OK or CAUTION (Displayed during the active test)	OK: Nothing caught in the range between 1/4 open and 1/2 open	*2
GRASS POS–3/4	Detects things caught in the P/W / OK or CAUTION (Displayed during the active test)	OK: Nothing caught in the range between 1/2 open and 3/4 open	*2
GRASS POS–OPEN	Detects things caught in the P/W / OK or CAUTION (Displayed during the active test)	OK: Nothing caught in the range between 3/4 open and fully open	*2

HINT:

*2: If the CAUTION is displayed without applying any resistance in each range, there must be something caught somewhere in that range.

Item	Measurement Item/Display (Range)	Normal condition	Diagnostic Note
MIR POS SEN V	Vertical mirror position/Min.: 0, Max.: 5	Within range from 0 to 5 V	–
MIR POS SEN H	Vertical mirror position/Min.: 0, Max.: 5	Within range from 0 to 5 V	–

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2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on the tester, perform the ACTIVE TEST.

P–DOOR:

Item	Test Details	Diagnostic Note
P/W UP/DOWN	Drive the P/W Motor UP/DOWN	During this ACTIVE TEST, jam protection, caught detection can be monitored. (Refer to the DATA LIST for details)
MIRR UP/DOWN	Mirror motor vertical operation UP/OFF/DOWN	–
MIRR RIGHT/LEFT	Mirror motor horizontal operation RIGHT/OFF/ LEFT	–

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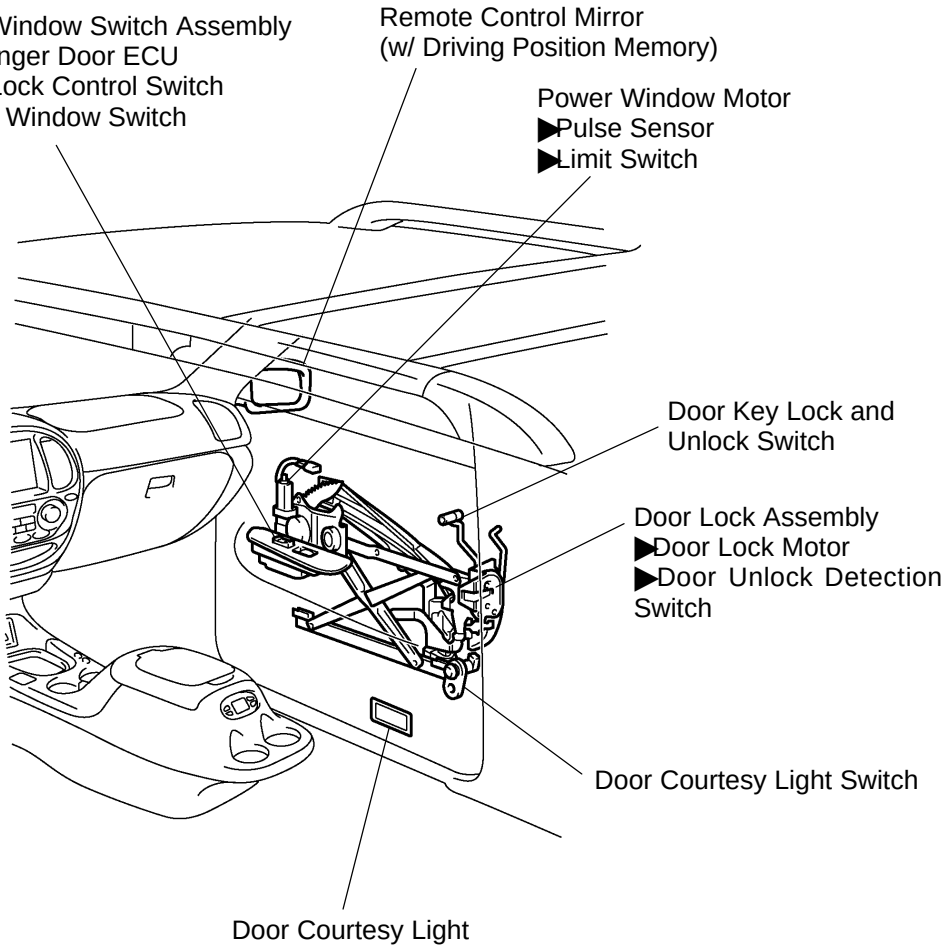
DI1PS–08

PARTS LOCATION

▶Passenger door ECU is the same with Power Window Switch



H

I28391

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DI1PQ–11

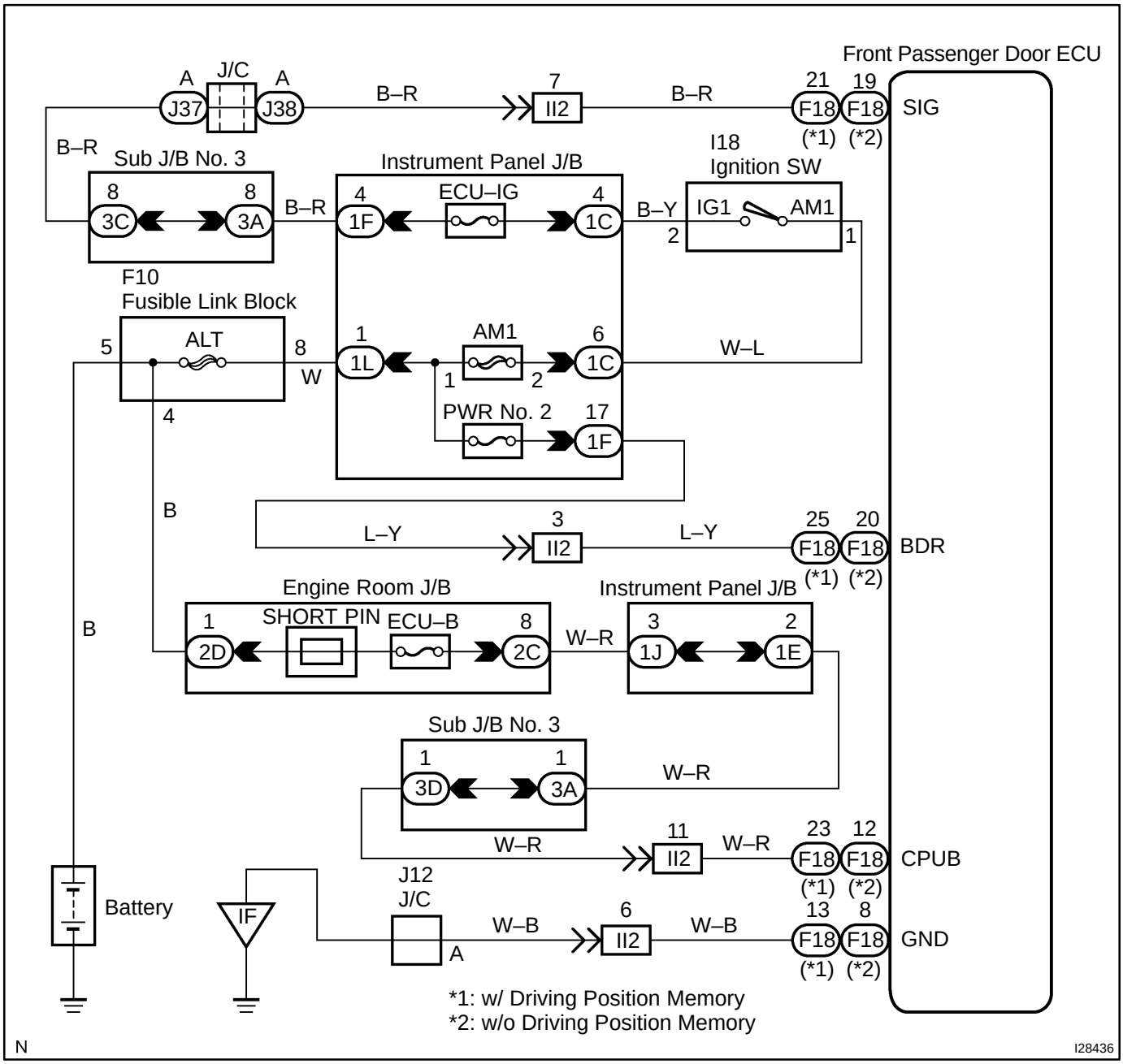
CIRCUIT INSPECTION

Power source circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the passenger door ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check ECU–IG, AM1, PWR No. 5 and ECU–B fuse.**

CHECK:

Check continuity of the ECU–IG, AM1, PWR No. 5 and ECU–B fuse.

OK:

Continuity

NG → **Replace the faulty fuse.**

OK

2	**Check voltage between terminals BDR, CPUB, SIG and GND of passenger door ECU connector.**

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals SIG and GND of the passenger door ECU of the wire harness side connector.

OK:

Voltage: 10 to 14 V

PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the passenger door ECU connector.

CHECK:

Measure the voltage between terminals BDR, CPUB and GND of the passenger door ECU of the wire harness side connector.

OK:

Voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).**

NG

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3	Check wire harness and connector between passenger door ECU and battery (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

4	Check wire harness and connector between passenger door ECU and body ground (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1782).

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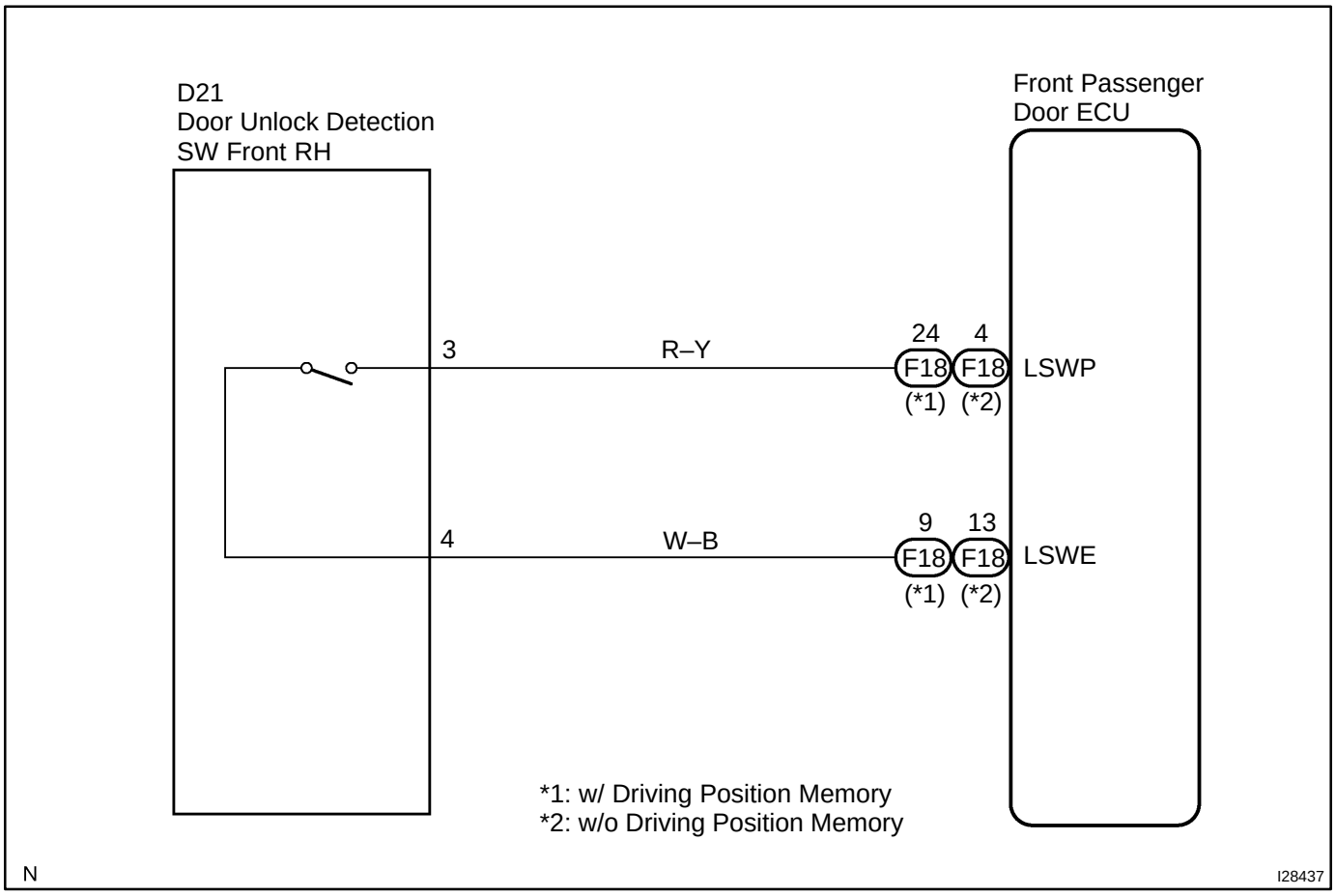
DI1Q8–09

Door unlock detection switch circuit

CIRCUIT DESCRIPTION

The door unlock detection switch is built in the door lock motor. This switch is ON when the door lock knob is in the unlock position and OFF when the lock knob is in the lock position. The ECU detects the door lock knob conditions in this circuit. It is used as one of the operating conditions for the key confinement prevention function.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check door unlock detection switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the DATA LIST.

P–DOOR:

Item	Measurement Item/Display (Range)	Normal condition	Diagnostic Note
LOCK POS SW	Lock position SW signal/ ON or OFF	ON: Door lock is in unlock position OFF: Door lock is in lock position	–

OK:

Indication on the tester switches between ON and OFF in accordance with the door unlock detection switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).**

NG

2	**Check door unlock detection switch (See page BE–79).**

NG → **Replace the door lock assembly.**

OK

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3	**Check wire harness and connector between door unlock detection switch and passenger door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

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DI1Q9–09

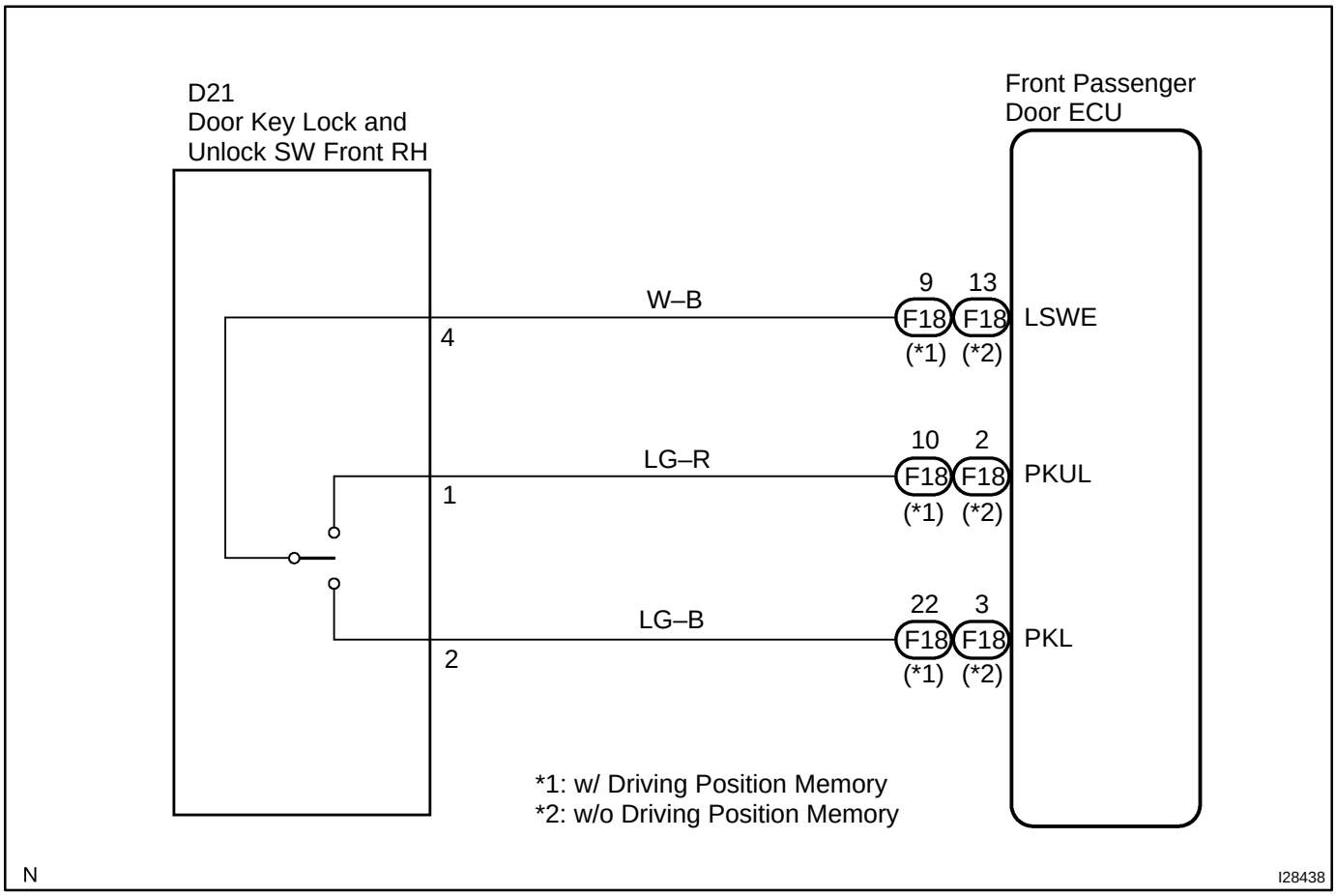
Door key lock and unlock switch circuit

CIRCUIT DESCRIPTION

The door key lock and unlock switch is built in the door lock motor. When the key is turned to the lock side, terminal 2 of the switch is grounded and when the key is turned to the unlock side, terminal 1 of the switch is grounded.

The door key lock and unlock switch can be checked using the DTC check (refer to DI–1904).

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check the door key lock and unlock switch (See page BE–79).

NG → Replace the door key lock and unlock switch.

OK

2	Check wire harness and connector between door key lock and unlock switch and passenger door ECU (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

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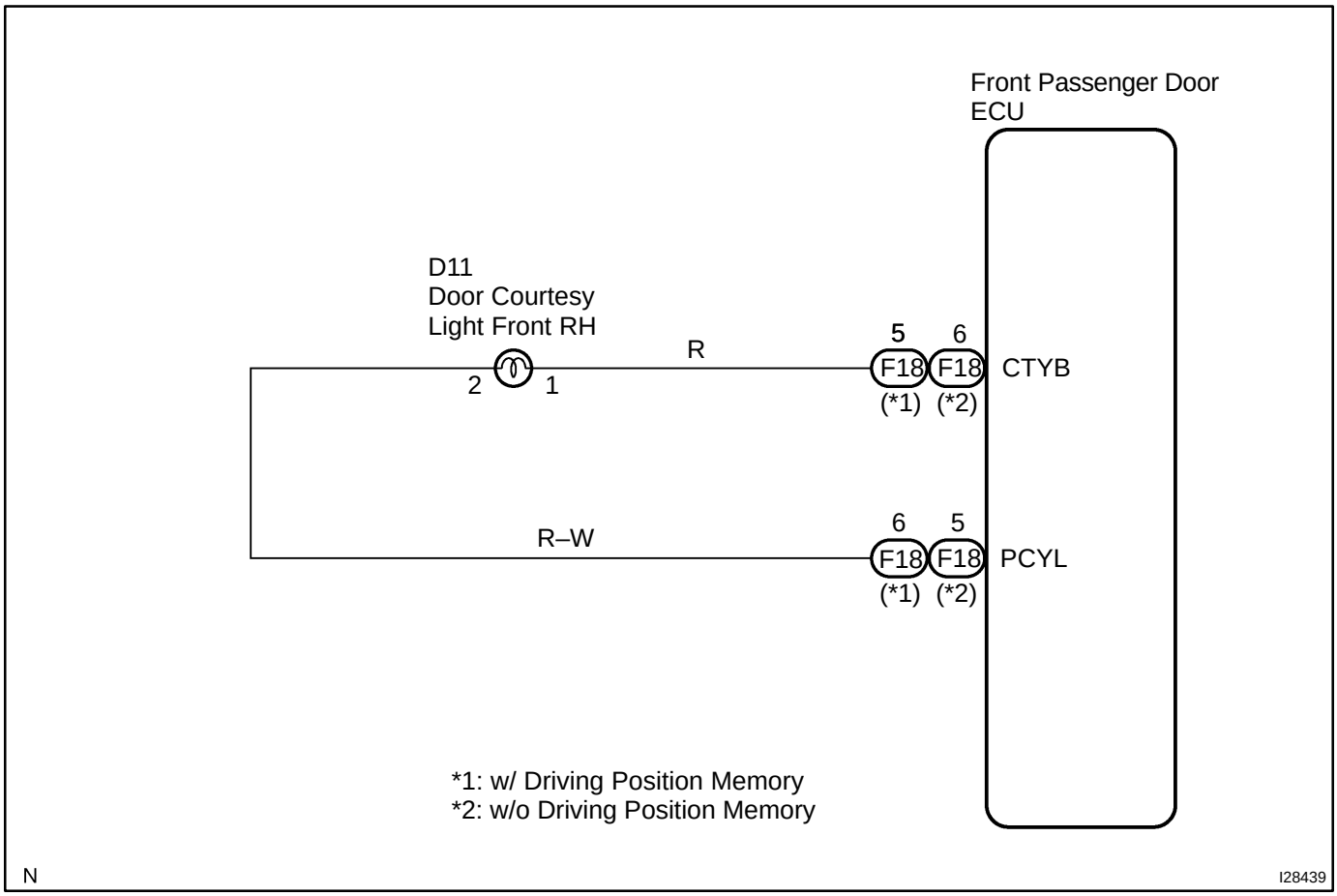
DI1QA–09

Door courtesy light circuit

CIRCUIT DESCRIPTION

The door courtesy light comes on when the door is opened and goes off when the door is closed.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check door courtesy light operation.**

CHECK:

Check that the door courtesy light comes on when the door is opened, and goes off when the door is closed.

OK:

Door courtesy light normally operates.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).**

NG

2	**Check door courtesy light (See page BE–40).**

NG → **Replace the door courtesy light.**

OK

3	**Check wire harness and connector between door courtesy light and passenger door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

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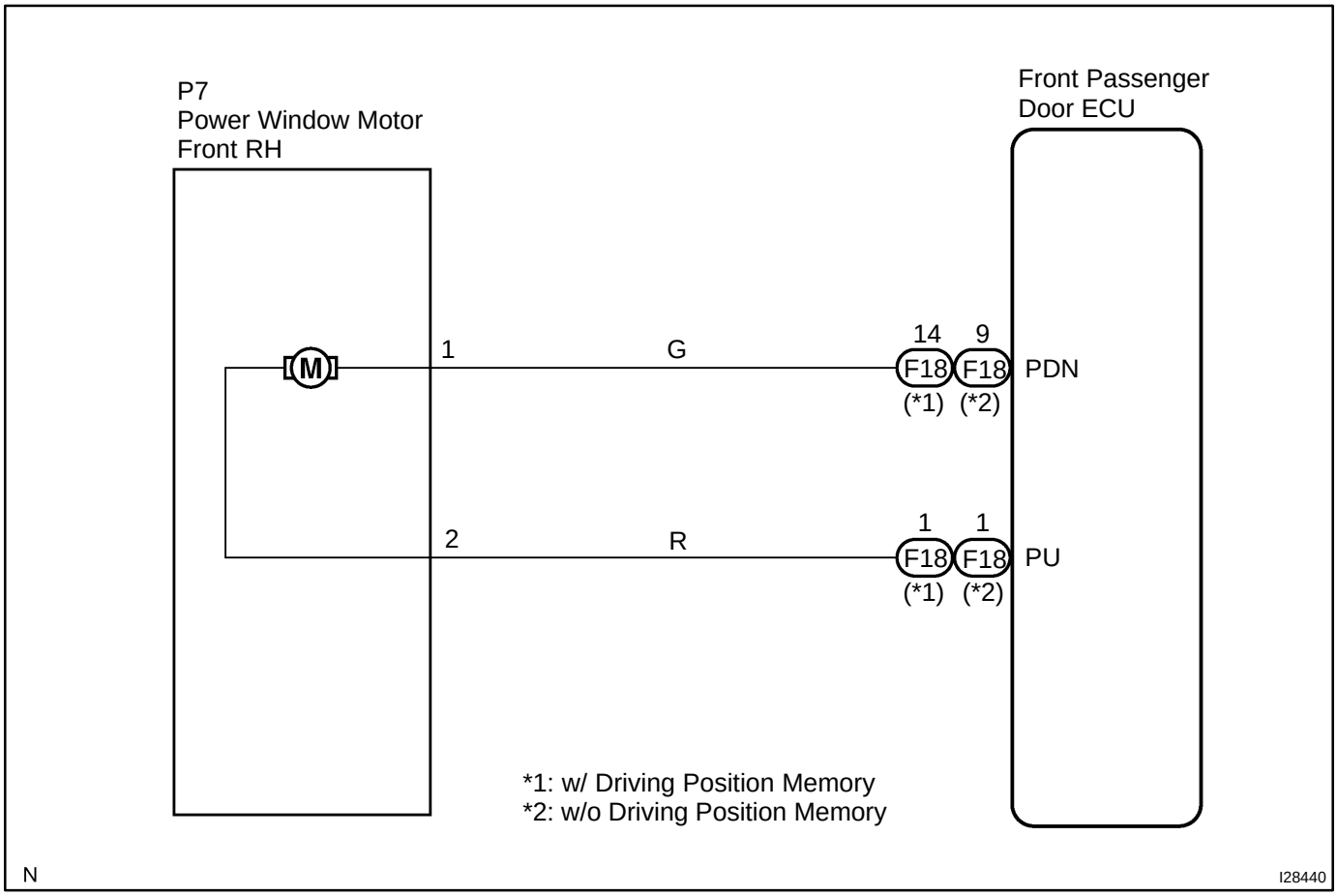
Power window motor circuit

CIRCUIT DESCRIPTION

The power window goes down when voltage is applied to terminal 1 of the power window motor, and the window goes up when voltage is applied to terminal 2.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check power window motor using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, perform the ACTIVE TEST.

P–DOOR:

Item	Test Details	Diagnostic Note
P/W UP/DOWN	Drive the P/W Motor UP/DOWN	During this ACTIVE TEST, jam protection, caught detection can be monitored. (Refer to the DATA LIST for details)

OK:

Power window operates normally.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).**

NG

2	**Check power window motor (See page BE–69).**

NG → **Replace the power window motor.**

OK

3	**Check wire harness and connector between power window motor and passenger door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

Author : Date : 2031

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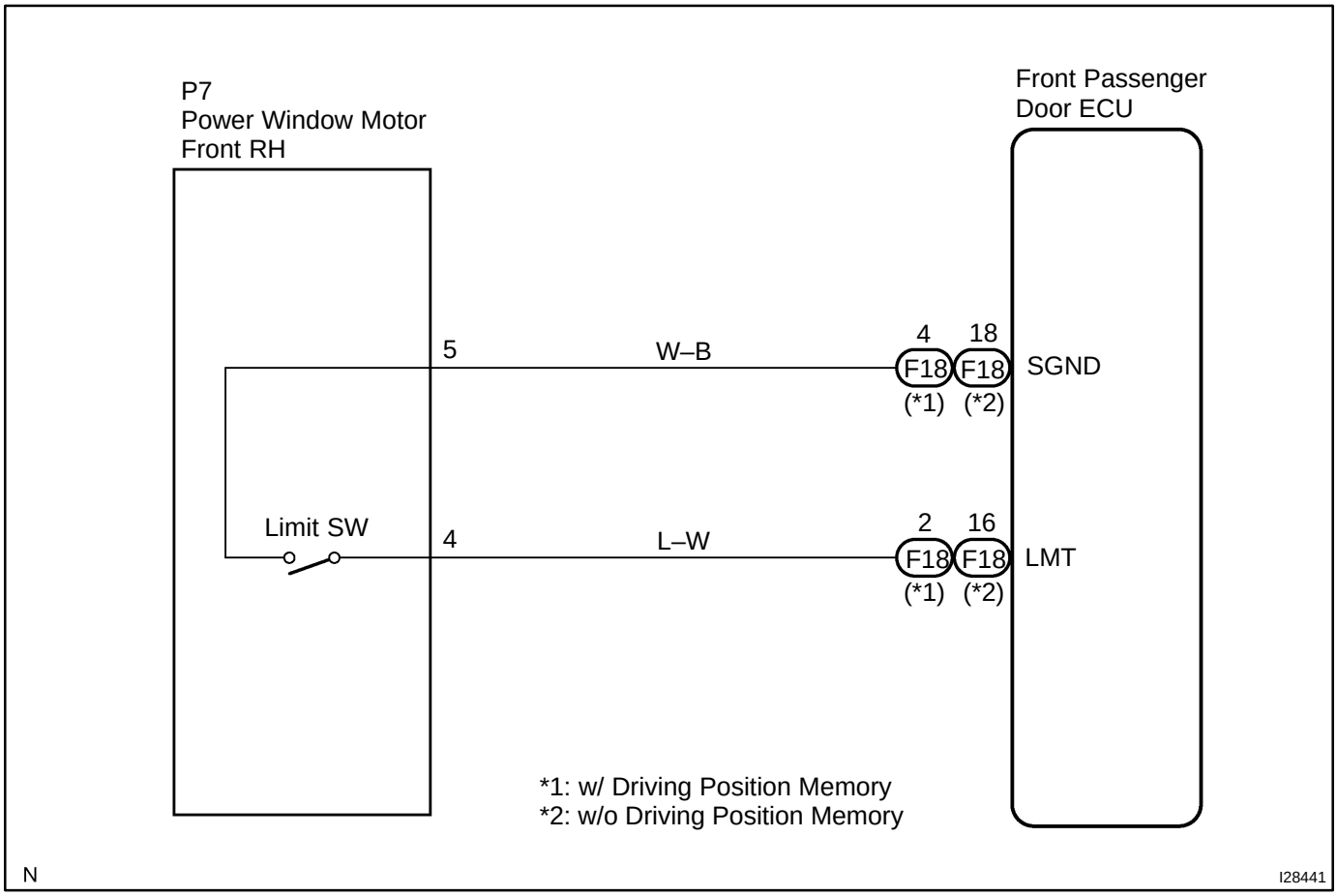
Jam protection limit switch circuit

CIRCUIT DESCRIPTION

The jam protection limit switch, built in the power window motor, turns off before top dead center. The ECU reads this ”OFF” signal and fully closes the window.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check jam protection limit switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the DATA LIST.

P–DOOR:

Item	Measurement Item/Display (Range)	Normal condition	Diagnostic Note
LIMIT SW	Jam protection limit SW/ ON or OFF	ON: Window is almost fully open OFF: Window is open	*1

*1: If the jam protection limit switch is turned ON, the jam protection function will stop.

Even if the switch is not turned ON when the windows are almost fully open, the window will not fully close as jam protection operates at upper window positions during automatic–up operation.

OK:

Indication on the tester switches between ON and OFF in accordance with the jam protection limit switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).**

NG

2	**Check jam protection limit switch (Jam protection function) (See page BE–69).**

NG → **Replace the power window motor.**

OK

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3	**Check wire harness and connector between jam protection limit switch and passenger door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

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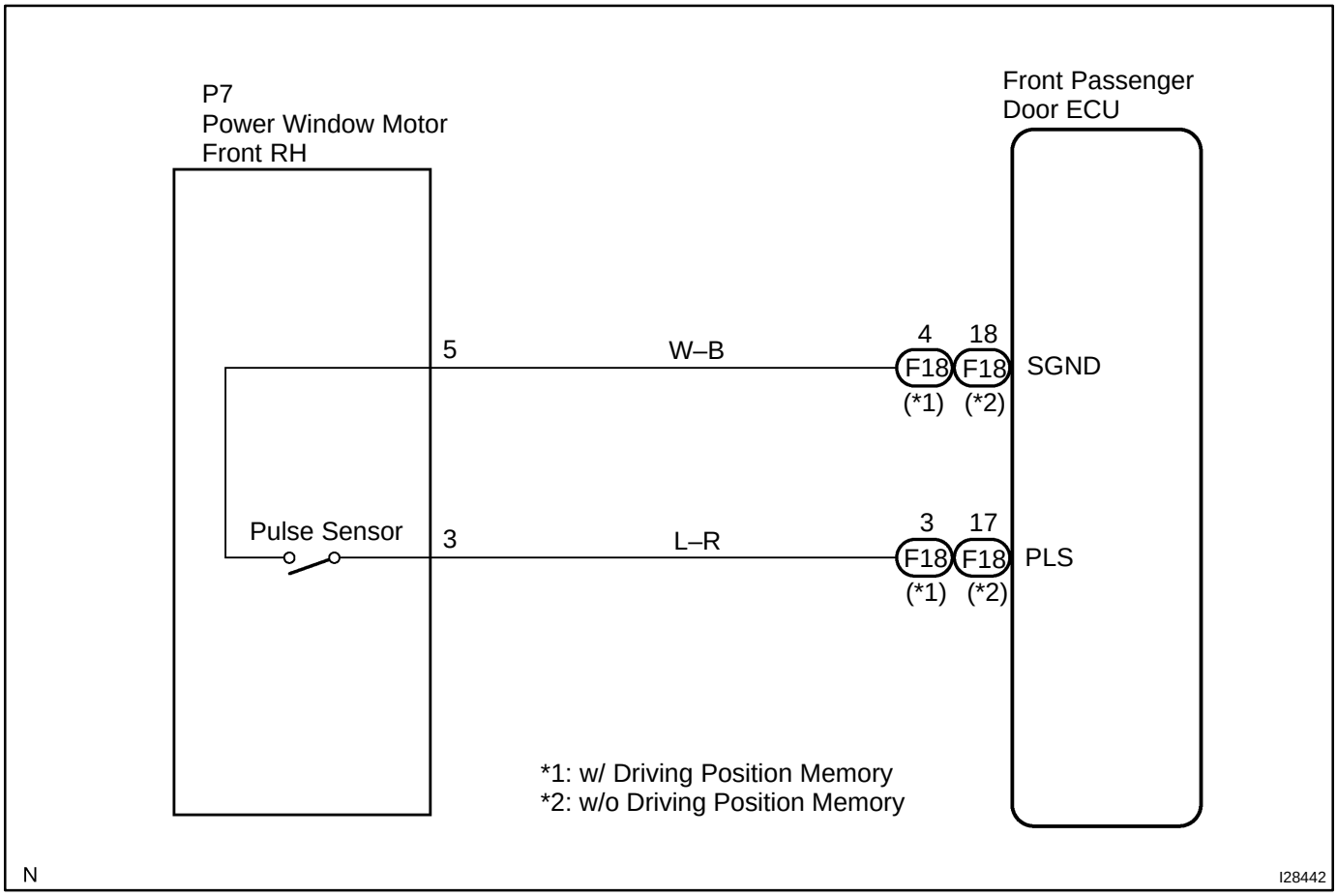
Jam protection pulse sensor circuit

CIRCUIT DESCRIPTION

The jam protection pulse sensor, built in the power window motor, outputs a ON/OFF pulse when the motor rotates.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check the jam protection pulse sensor circuit using DTC check (See page DI–1904).**

CHECK:
Check if DTC B1234 of the multiplex communication system is output.
OK:
DTC is not output.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).**

NG

2	**Check jam protection pulse sensor (See page BE–69).**

NG → **Replace the power window motor.**

OK

3	**Check wire harness and connector between jam protection pulse sensor and passenger door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

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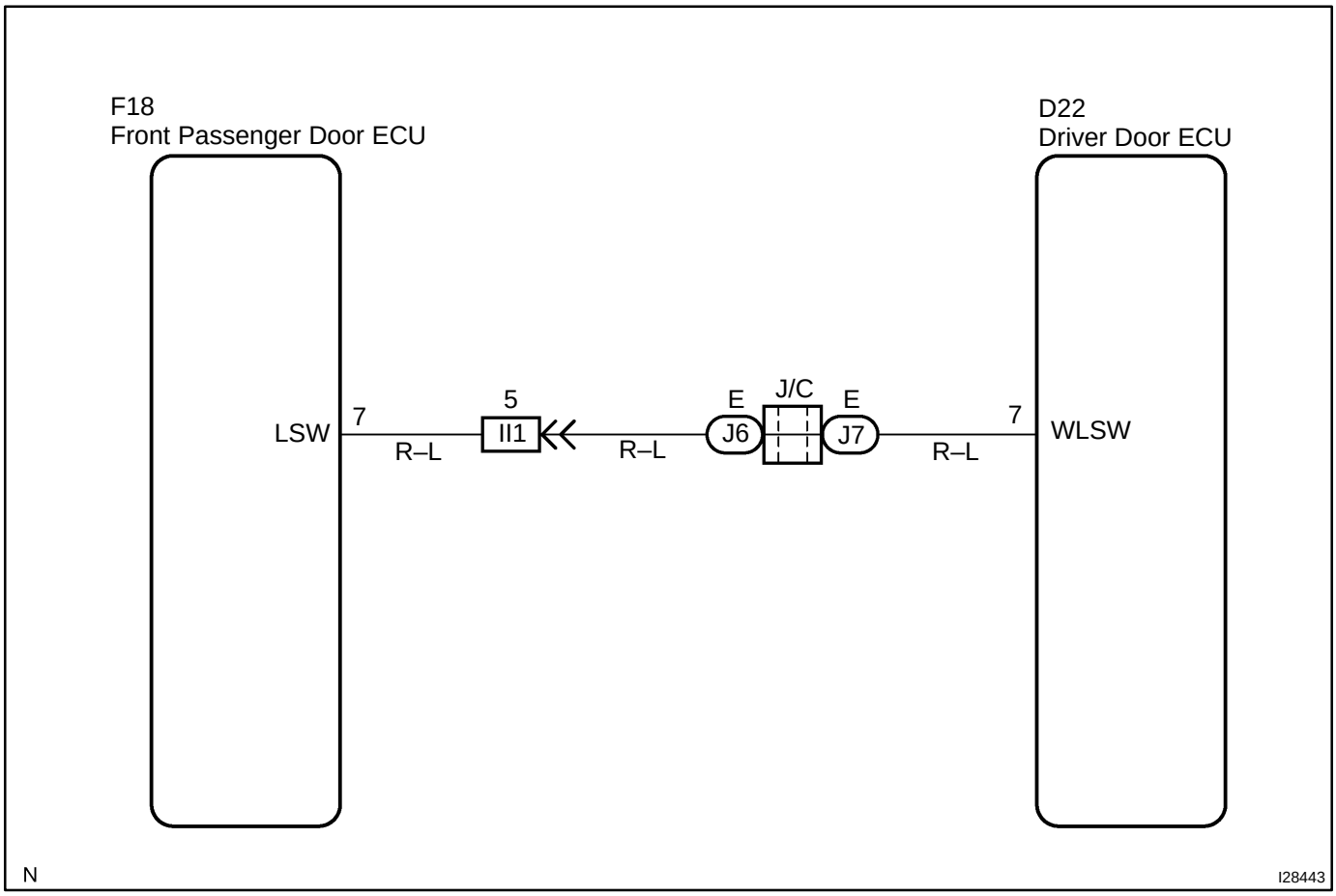
Window lock switch circuit

CIRCUIT DESCRIPTION

The power window lock switch circuit can be checked using the DTC check (refer to DI–1904).
The window lock switch is built in the passenger door ECU. Voltage applied to the LSW terminal of the passenger door ECU is shut off when the window lock switch is turned to the LOCK position. The power main relay stops power supply to the other power window control switches.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

Check if DTC B1223 of the multiplex communication system is output. When the DTC is not output, proceed to the following procedures and when it is output, perform inspection (see page DI–1904).

1	**Check window lock switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the DATA LIST.

P–DOOR:

Item	Measurement Item/Display (Range)	Normal condition	Diagnostic Note
P P/W AUTO SW	P/W auto SW signal/ ON or OFF	ON: P/W auto UP/DOWN SW is ON OFF: P/W auto UP/DOWN SW is OFF	–
LOCK POS SW	Lock position SW signal/ ON or OFF	ON: Door lock is in unlock position OFF: Door lock is in lock position	–

OK:

Indication on the tester switches between ON and OFF in accordance with the window lock switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).**

NG

2	**Check wire harness and connector between passenger door ECU and driver door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

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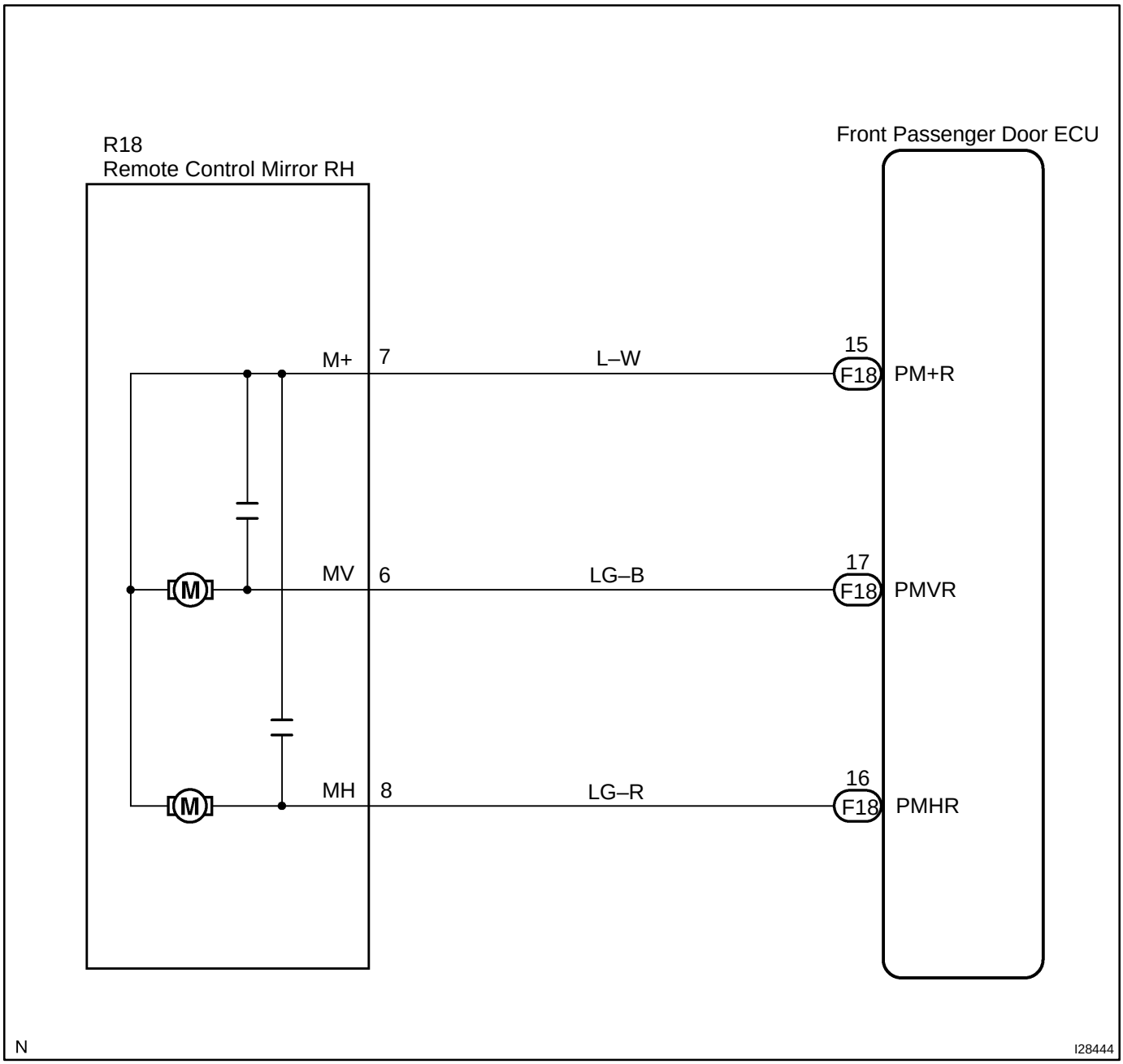
Remote control mirror motor RH circuit (w/ Driving position memory)

CIRCUIT DESCRIPTION

SEQUOIA features a driving position memory function, and up to 2 driver positions can be memorized. The passenger door ECU operates 2 motors built into the remote control mirror. The motors move the mirror to the memorized positions based on information from the position sensor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check remote control mirror motor (See page BE–115).

NG → Replace outer mirror motor.

OK

2	Check wire harness and connector between remote mirror motor and driver door ECU (See page IN–35).

NG → Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

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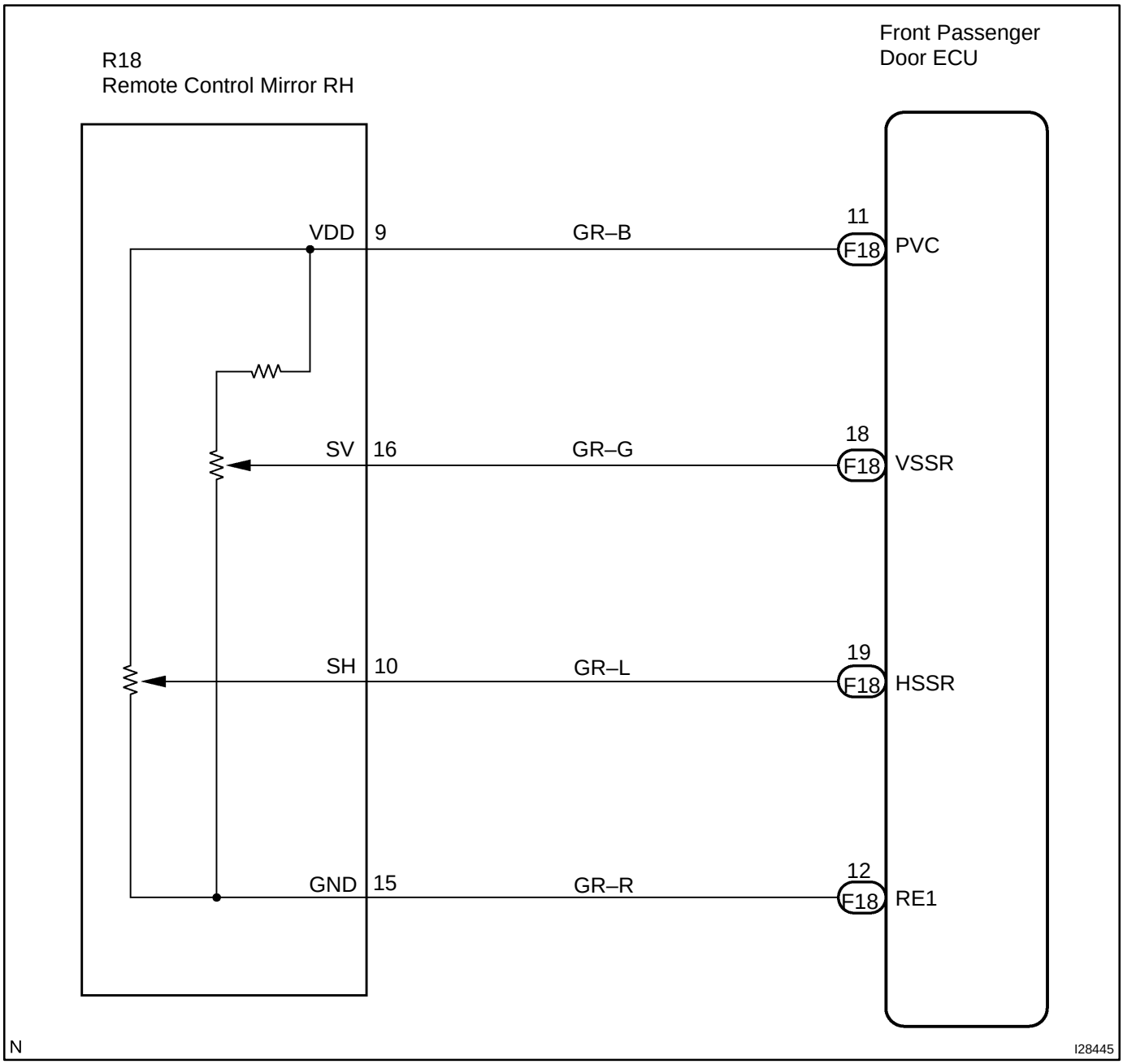
Remote control mirror position sensor RH circuit (w/ Driving position memory)

CIRCUIT DESCRIPTION

SEQUOIA features a driving position memory function, and up to 2 driver positions can be memorized. The passenger door ECU operates 2 motors built into the remote control mirror. The motors move the mirror to the memorized positions based on information from the position sensor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check remote control mirror position sensor (See page DI–1819).

NG → Replace outer mirror.

OK

2	Check wire harness and connector between remote control mirror position sensor and driver door ECU (See page IN–35).

NG → Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).

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DI94M–05

Power window switch circuit

CIRCUIT DESCRIPTION

The power window switch circuit can be checked using the DTC check (refer to DI–1904).

INSPECTION PROCEDURE

1	**Check the power window switch using hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

According to the display on the tester, read the DATA LIST.

P–DOOR:

Item	Measurement Item/Display (Range)	Normal condition	Diagnostic Note
P P/W AUTO SW	Front passenger power window auto SW signal/ ON or OFF	ON: Front passenger power window auto UP/DOWN SW is ON OFF: Front door power window auto UP/DOWN SW is OFF	–

OK:

Indication on the tester switches between ON and OFF in accordance with the window auto up operation status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1818).**

NG

Replace the passenger door ECU.

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BACK DOOR CONTROL SYSTEM

DID9F–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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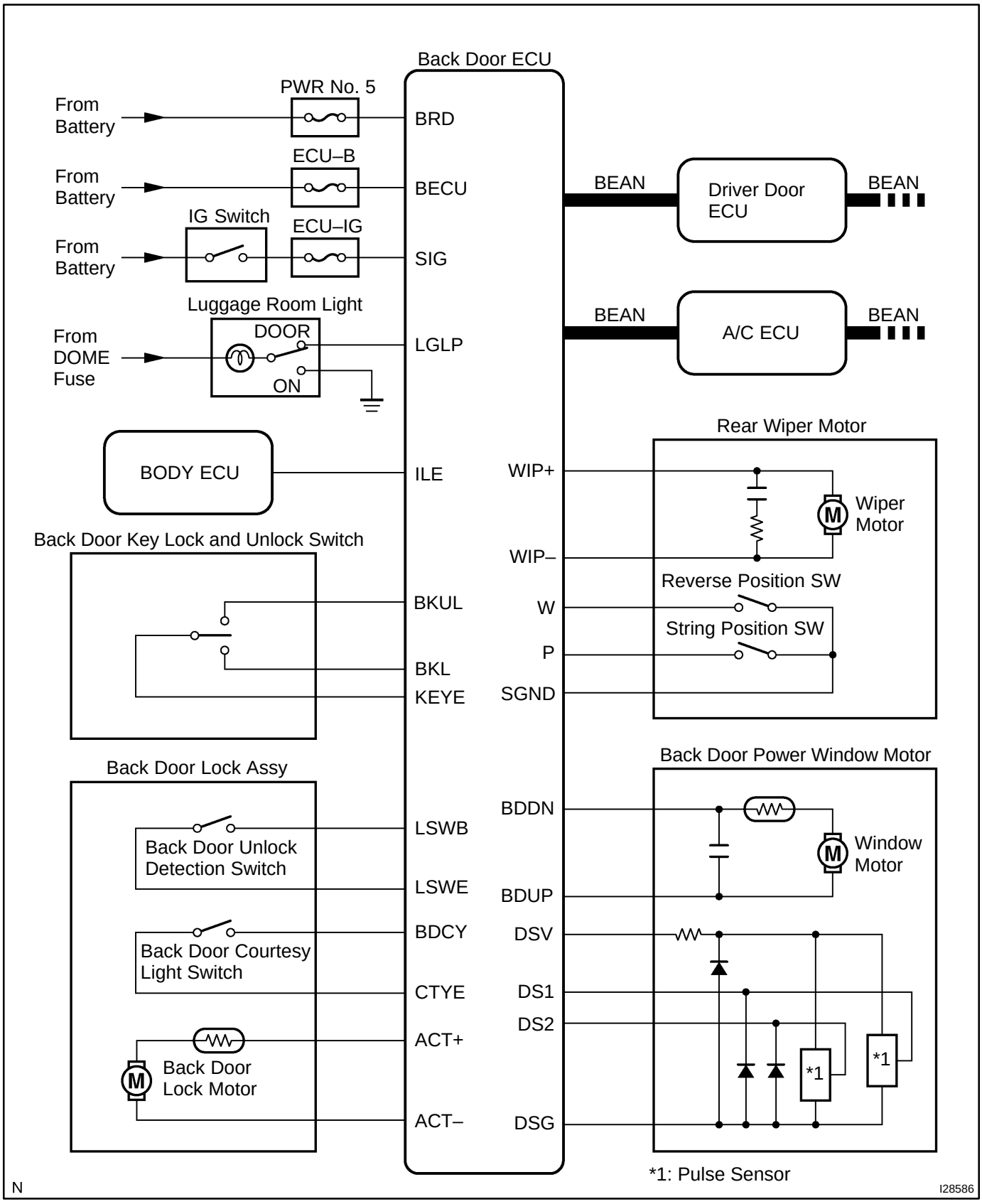
DID9G–01

SYSTEM DIAGRAM



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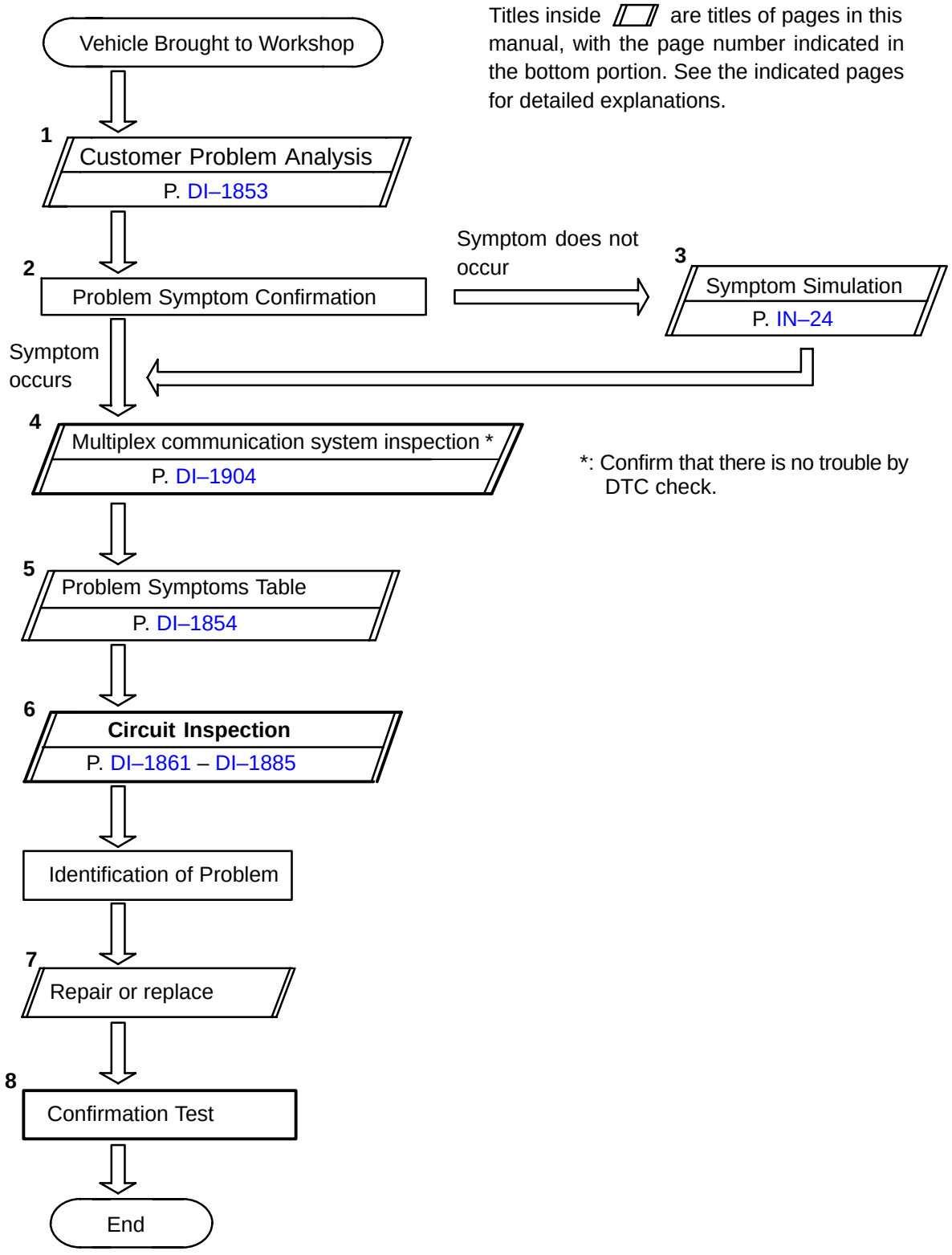
DI57D–06

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

This ECU is connected to the multiplex communication system. Therefore, be sure to check that there is no trouble in the multiplex communication system before performing the troubleshooting.



Step 4, 6, 8: Diagnostic steps permitting use of the hand–held tester.

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DI57E–04

CUSTOMER PROBLEM ANALYSIS CHECK

BACK DOOR CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Licence Plate No.	
		Production Date	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Malfunction System	☐ Power Door Lock Control System
	☐ Theft Deterrent System
	☐ Rear Wiper and Washer System
	☐ Back Door Power Window System
	☐ Luggage Room Light
	☐ Jam Protection System
	☐ Other

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DI57H–07

PROBLEM SYMPTOMS TABLE

REAR WIPER AND WASHER

Symptom	Suspected Area	See page
Rear wiper does not operate.	1. Wiper switch circuit 2. Rear wiper motor circuit 3. Rear wiper limit switch circuit 4. Back door power window pulse sensor circuit 5. Body ECU 6. Back door ECU	DI–1704 DI–1880 DI–1885 DI–1877 IN–35 IN–35
Rear washer does not operate.	1. Washer switch and washer motor circuit 2. Body ECU	DI–1704 IN–35
Wiper does not operate when washer switch is ON.	1. Wiper switch and washer motor circuit 2. Body ECU	DI–1704 IN–35

OTHERS

Symptom	Suspected Area	See page
Back door power window does not operate.	1. Back door power window switch circuit 2. Back door power window pulse sensor circuit 3. Back door power window motor circuit 4. Body ECU 5. Back door ECU	DI–1718 DI–1877 DI–1874 IN–35 IN–35
Back door lock does not operate.	1. Back door key lock and unlock switch circuit 2. Back door lock motor circuit 3. Back door unlock detection switch circuit 4. Back door courtesy light switch circuit 5. Back door key lock and unlock switch circuit 6. Back door ECU	DI–1882 DI–1872 DI–1869 DI–1864 DI–1882 IN–35
Luggage room light does not come on.	1. Luggage room light circuit 2. Back door courtesy light switch circuit 3. Body door ECU	DI–1867 DI–1864 IN–35
Whole functions of the back door control system do not operate.	1. Power source circuit 2. Back door ECU	DI–1861 IN–35

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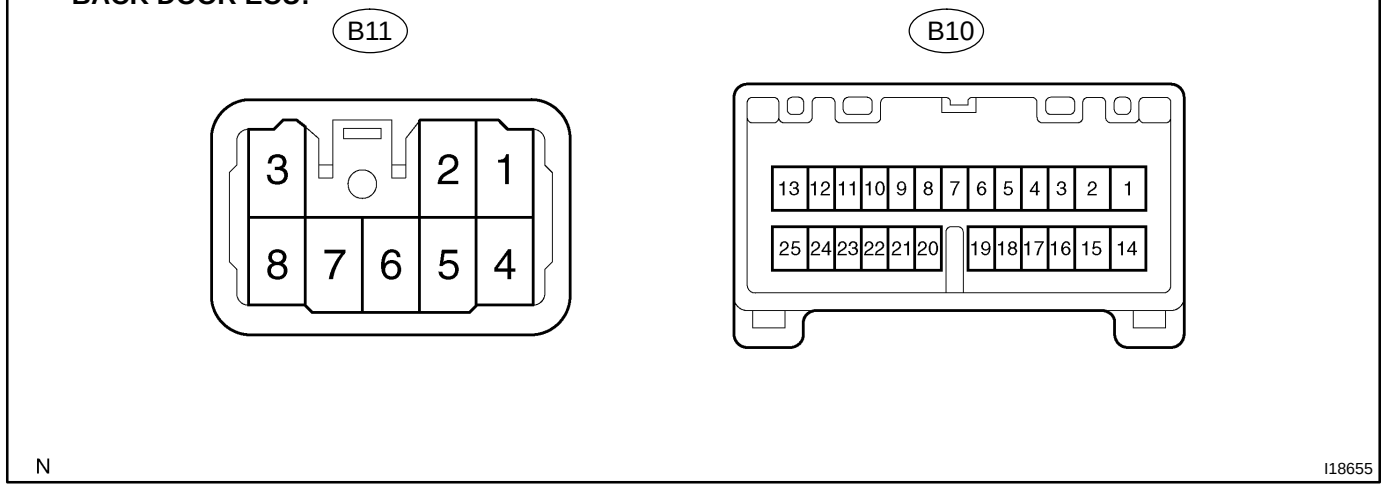
DID9H–01

TERMINALS OF ECU

BACK DOOR ECU:



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BDR ↔ GND (B11–4 ↔ B11–3)	L–W ↔ W–B	Battery	Always	10 to 14 V
BECU ↔ GND (B11–5 ↔ B11–3)	W–R ↔ W–B	Battery	Always	10 to 14 V
SIG ↔ GND (B11–6 ↔ B11–3)	B–R ↔ W–B	Ignition switch	Ignition switch OFF	Below 1.0 V
SIG ↔ GND (B11–6 ↔ B11–3)	B–R ↔ W–B	Ignition switch	Ignition switch ON	10 to 14 V
LGLP ↔ GND (B11–7 ↔ B11–3)	R–L ↔ W–B	Luggage room light	Luggage room light switch OFF or ON	Below 1.0 V
LGLP ↔ GND (B11–7 ↔ B11–3)	R–L ↔ W–B	Luggage room light	Luggage room light switch DOOR, any door open	10 to 14 V
BDCY ↔ CTYE (B10–7 ↔ B10–20)	R ↔ W–B	Back door courtesy light switch	Back door courtesy ON (Back door Open)	Below 1.0 V
BDCY ↔ CTYE (B10–7 ↔ B10–20)	R ↔ W–B	Back door courtesy light switch	OFF (Back door Close)	10 to 14 V
BKUL ↔ KEYE (B10–4 ↔ B10–19)	G ↔ R–W	Back door key lock and unlock switch (UNLOCK)	Back door key lock and unlock switch UNLOCK	Below 1.0 V
BKUL ↔ KEYE (B10–4 ↔ B10–19)	G ↔ R–W	Back door key lock and unlock switch (UNLOCK)	Back door key lock and unlock switch OFF or LOCK	10 to 14 V
BKL ↔ KEYE (B10–5 ↔ B10–19)	L ↔ R–W	Back door key lock and unlock switch (LOCK)	Back door key lock and unlock switch LOCK	Below 1.0 V
BKL ↔ KEYE (B10–5 ↔ B10–19)	L ↔ R–W	Back door key lock and unlock switch (LOCK)	Back door key lock and unlock switch OFF or UNLOCK	10 to 14 V
BDUP ↔ BDDN (B10–13 ↔ B10–25)	P ↔ W	Back door power window motor (UP)	Back door power window not operating	Below 1.0 V

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BDUP ↔ BDDN (B10–13 ↔ B10–25)	P ↔ W	Back door power window motor (UP)	Back door power window operating upward	10 to 14 V
BDDN ↔ BDUP (B10–25 ↔ B10–13)	W ↔ P	Back door power window motor (DOWN)	Back door power window not operating	Below 1.0 V
BDDN ↔ BDUP (B10–25 ↔ B10–13)	W ↔ P	Back door power window motor (DOWN)	Back door power window operating downward	10 to 14 V
LSWB ↔ LSWE (B10–6 ↔ B10–22)	R–L ↔ R–Y	Back door unlock detection switch	Back door unlock detection switch ON (Back door lock unlocked)	Below 1.0 V
LSWB ↔ LSWE (B10–6 ↔ B10–22)	R–L ↔ R–Y	Back door unlock detection switch	Back door unlock detection switch OFF (Back door lock locked)	10 to 14 V
P ↔ SGND (B10–12 ↔ B10–18)	L–W ↔ L–R	Rear wiper position switch	Rear wiper arm not in store position	10 to 14 V
P ↔ SGND (B10–12 ↔ B10–18)	L–W ↔ L–R	Rear wiper position switch	Rear wiper arm in store position	Below 1.0 V
SGND ↔ Body ground (B10–18 ↔ Body ground)	L–R ↔ Body ground	Ground	Always	Below 1.0 V
W ↔ SGND (B10–3 ↔ B10–18)	L–B ↔ L–R	Rear wiper reverse switch	Rear wiper arm not in stopping and reversing position	Below 1.0 V
W ↔ SGND (B10–3 ↔ B10–18)	L–B ↔ L–R	Rear wiper reverse switch	Rear wiper arm between stopping and reversing position	10 to 14 V
WIP– ↔ SGND (B10–1 ↔ B10–18)	L–O ↔ L–R	Rear wiper motor	Rear wiper motor not operating	Below 1.0 V
WIP– ↔ SGND (B10–1 ↔ B10–18)	L–O ↔ L–R	Rear wiper motor	Rear wiper motor rotates reversely	10 to 14 V
WIP+ ↔ SGND (B10–2 ↔ B10–18)	L–Y ↔ L–R	Rear wiper motor	Rear wiper motor not operating	Below 1.0 V
WIP+ ↔ SGND (B10–2 ↔ B10–18)	L–Y ↔ L–R	Rear wiper motor	Rear wiper motor rotates	10 to 14 V
GND ↔ Body ground (B11–3 ↔ Body ground)	W–B ↔ Body ground	Ground	Always	Below 1.0 V
MPX1 ↔ – (B11–2 ↔ –)	LG–R ↔ –	Multiplex communication line	Multiplex communication circuit	–
MPX2 ↔ – (B11–1 ↔ –)	B ↔ –	Multiplex communication line	Multiplex communication circuit	–
ILE ↔ GND (B11–8 ↔ B11–3)	W ↔ W–B	Illumination signal	Rear room light switch OFF	Below 1.0 V
ILE ↔ GND (B11–8 ↔ B11–3)	W ↔ W–B	Illumination signal	Rear room light switch ON or DOOR	10 to 14 V
ACT– ↔ ACT+ (B10–14 ↔ B10–15)	L–R ↔ L–B	Back door lock motor	Back door lock motor not operating	Below 1.0 V
ACT– ↔ ACT+ (B10–14 ↔ B10–15)	L–R ↔ L–B	Back door lock motor	Back door lock motor rotates reversely	10 to 14 V
ACT+ ↔ ACT– (B10–15 ↔ B10–14)	L–B ↔ L–R	Back door lock motor	Back door lock motor not operating	Below 1.0 V
ACT+ ↔ ACT– (B10–15 ↔ B10–14)	L–B ↔ L–R	Back door lock motor	Back door lock motor rotates reversely	10 to 14 V

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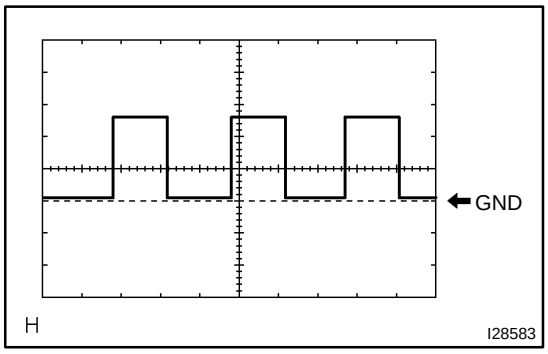
DSV ↔ DSG (B10–11 ↔ B10–23)	LG–B ↔ W–R	Back door power window pulse sensor	Ignition switch ON	10 to 14 V
DS1 ↔ GND (B10–17 ↔ B11–3)	LG–R ↔ W–B	Back door power window pulse sensor	Back door power window operating	Pulse generation (See waveform 1)
DS2 ↔ GND (B10–16 ↔ B11–3)	P ↔ W–B	Back door power window pulse sensor	Back door power window operating	Pulse generation (See waveform 1)
DSG ↔ Body ground (B10–23 ↔ Body ground)	W–R ↔ Body ground	Back door power window pulse sensor ground	Always	Below 1 V



Waveform 1

Item	Condition
Tool setting	5 V/DIV, 10 ms/DIV
Vehicle condition	Back door power window operating

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DID9I–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the hand–held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one of the methods to shorten labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on the tester, read the DATA LIST.

BACK–DOOR:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
COURTSY SW	Back door courtesy light SW signal/ON or OFF	ON: Back door is open OFF: Back door is closed	–
LOCK POS SW	Lock position SW signal/ON or OFF	ON: Door lock is in unlock position OFF: Door lock is in lock position	–
WIPER TURN SW	Rear wiper reversing position switch/ON or OFF	ON: Rear wiper reverse position OFF: Rear wiper non–reverse position	–
WIPER RTRCT SW	Rear wiper position switch/ON or OFF	ON: Rear wiper arm in store position OFF: Rear wiper arm not in store position	–
KEY SW (UNLOCK)	Unlock SW linked with the key/ON or OFF	ON: Back door lock is in unlock position OFF: Back door lock is in lock position	–
KEY SW (LOCK)	Unlock SW linked with the key/ON or OFF	ON: Back door lock is in lock position OFF: Back door lock is in unlock position	–
UP/DOOR KEY	Back door key lock and unlock switch linked window open and close/AVAIL or NOT AVL	AVAIL: Key–linked open and close SET NOT AVL: Key–linked open and close UNSET	*1
DOWN/DOOR KEY	Back door key lock and unlock switch linked window open and close/AVAIL or NOT AVL	AVAIL: Key–linked open and close SET NOT AVL: Key–linked open and close UNSET	*1
P/W POSITION	Back door power window position/CLOSE or OPEN	CLOSE: Back door power window is fully closed OPEN: Back door power window is opened	–
GLASS POS–1/4	Back door power window glass position (Fully closed – 1/4 open): OK or CAUTION	OK: Power window is going UP by manual operation CAUTION: CAUTION may be displayed even when no resistance is applied in each position. In this case there is a foreign object stuck in that position.	–
GLASS POS–2/4	Back door power window glass position (Fully closed – 2/4 open): OK or CAUTION	OK: Power window is going UP by manual operation CAUTION: CAUTION may be displayed even when no resistance is applied in each position. In this case there is a foreign object stuck in that position.	–
GLASS POS–3/4	Back door power window glass position (Fully closed – 3/4 open): OK or CAUTION	OK: Power window is going UP by manual operation CAUTION: CAUTION may be displayed even when no resistance is applied in each position. In this case there is a foreign object stuck in that position.	–

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*1: When the ignition key is not in the key cylinder and the back door is locked, turning and holding the back door key in the lock position for 1.5 seconds or more activates the back door ECU to operate the power window motor and close the power window.
Similarly, turning and holding the back door key in the unlock position for 1.5 seconds or more when the back door is unlocked will open the power window.

2. ACTIVE TEST

HINT:
Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one of the methods to shorten labor time.
It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) According to the display on the tester, perform the ACTIVE TEST.

BACK–DOOR:

Item	Test details	Diagnostic note
P/W UP/DOWN	Operate the back door power window motor UP/DOWN	During this ACTIVE TEST, jam protection caught detection can be monitored. (Refer to the DATA LIST for details)
DOOR LOCK	Operate the door lock motor at rear door LOCK/UNLOCK	–
REAR WIPER	Operate the rear wiper motor ON/OFF	–

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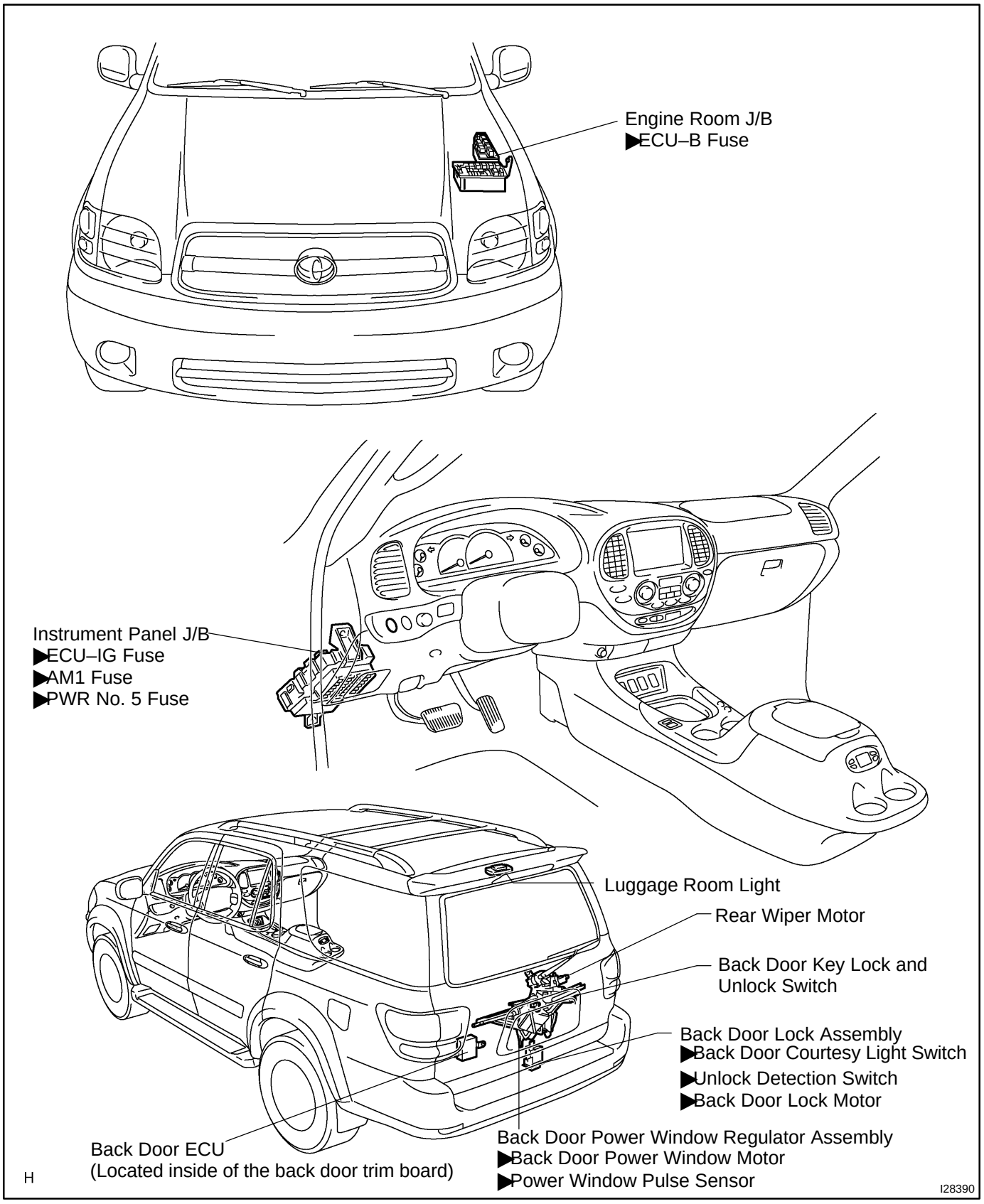
DI57F–07

PARTS LOCATION



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DI571–08

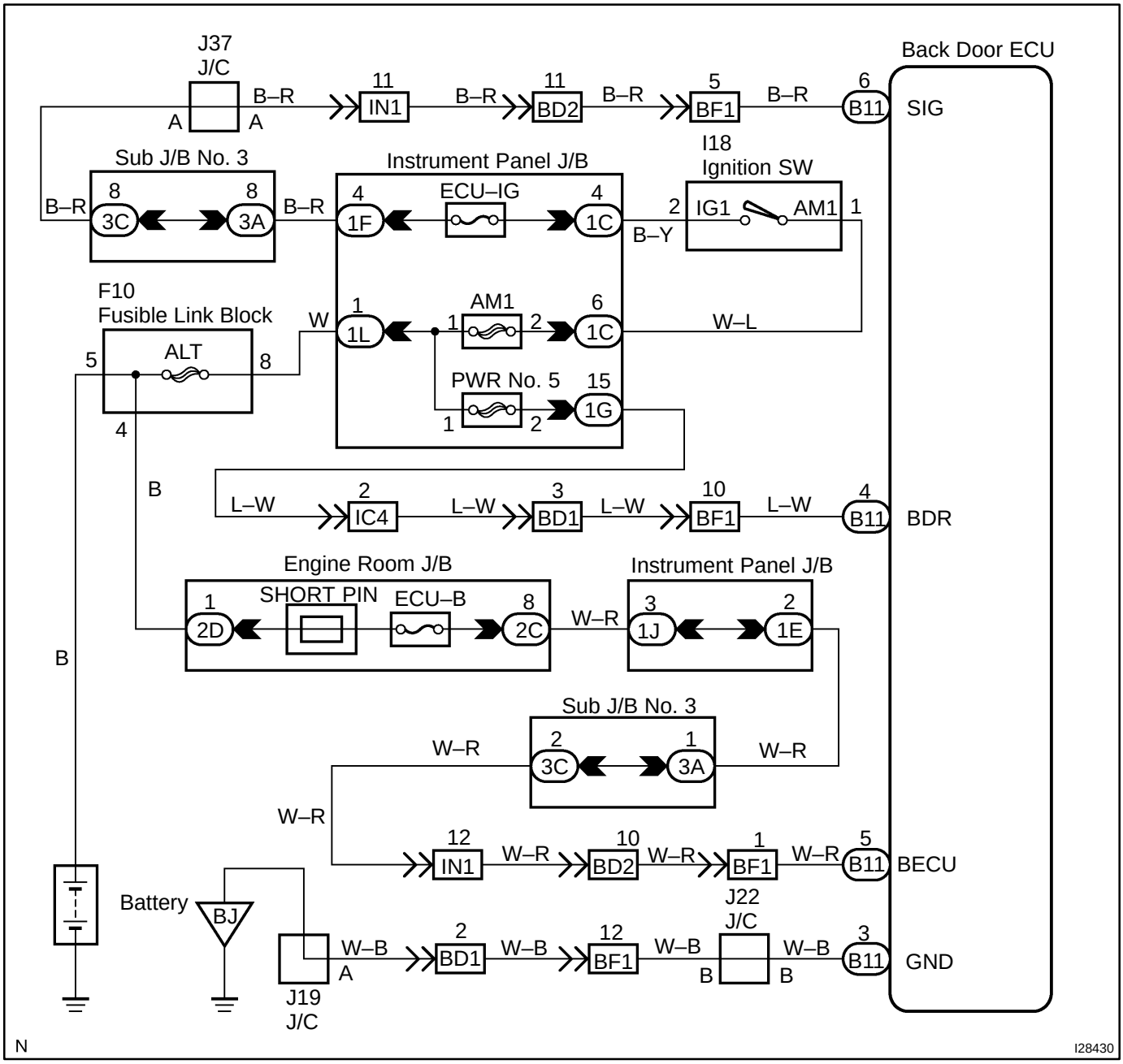
CIRCUIT INSPECTION

Power source circuit

CIRCUIT DESCRIPTION

This circuit provides power to operate the back door ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check PWR No. 5, ECU–B, AM1 and ECU–IG fuse.**

CHECK:

Check continuity of the PWR No. 5, ECU–B, AM1 and ECU–IG fuse.

OK:

Continuity

NG → **Replace the faulty fuse.**

OK

2	**Check voltage between terminals, SIG, BDR, BECU and GND of back door ECU connector.**

PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the back door ECU connector.

CHECK:

Measure the voltage between terminals SIG, and GND of the back door ECU of the wire harness connector.

OK:

Voltage: 10 to 14V

PREPARATION:

Turn the ignition switch OFF.

CHECK:

Measure the voltage between terminals BDR, BECU and GND of the back door ECU of the wire harness connector.

OK:

Voltage: 10 to 14V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).**

NG

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3	**Check wire harness and connector between back door ECU and battery (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

4	**Check wire harness and connector between back door ECU and body ground (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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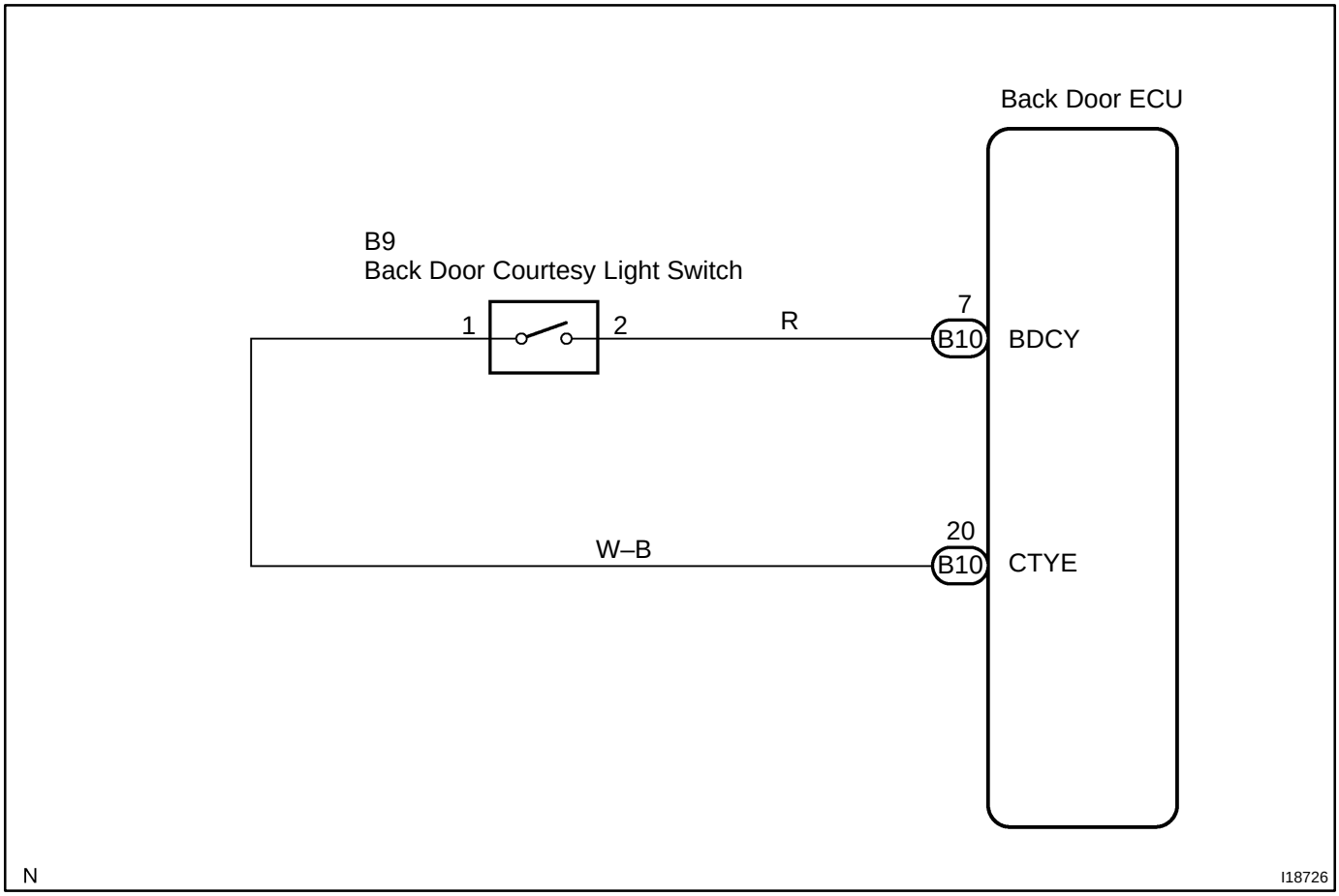
DI57K–07

Back door courtesy light switch circuit

CIRCUIT DESCRIPTION

The back door courtesy light switch is built in the back door lock assembly.
This switch comes on when the back door is opened and goes off when the back door is closed.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check the back door courtesy light switch using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, read the DATA LIST.
BACK–DOOR:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
COURTSY SW	Back door courtesy light SW signal/ON or OFF	ON: Back door is open OFF: Back door is closed	–

OK:
Indication on the tester switches between ON and OFF in accordance with the courtesy light switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).**

NG

2	**Check back door courtesy light switch (See page BE–40).**

NG → **Replace the back door lock assy.**

OK

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3	**Check wire harness and connector between back door courtesy light switch and back door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

Dardoor.com

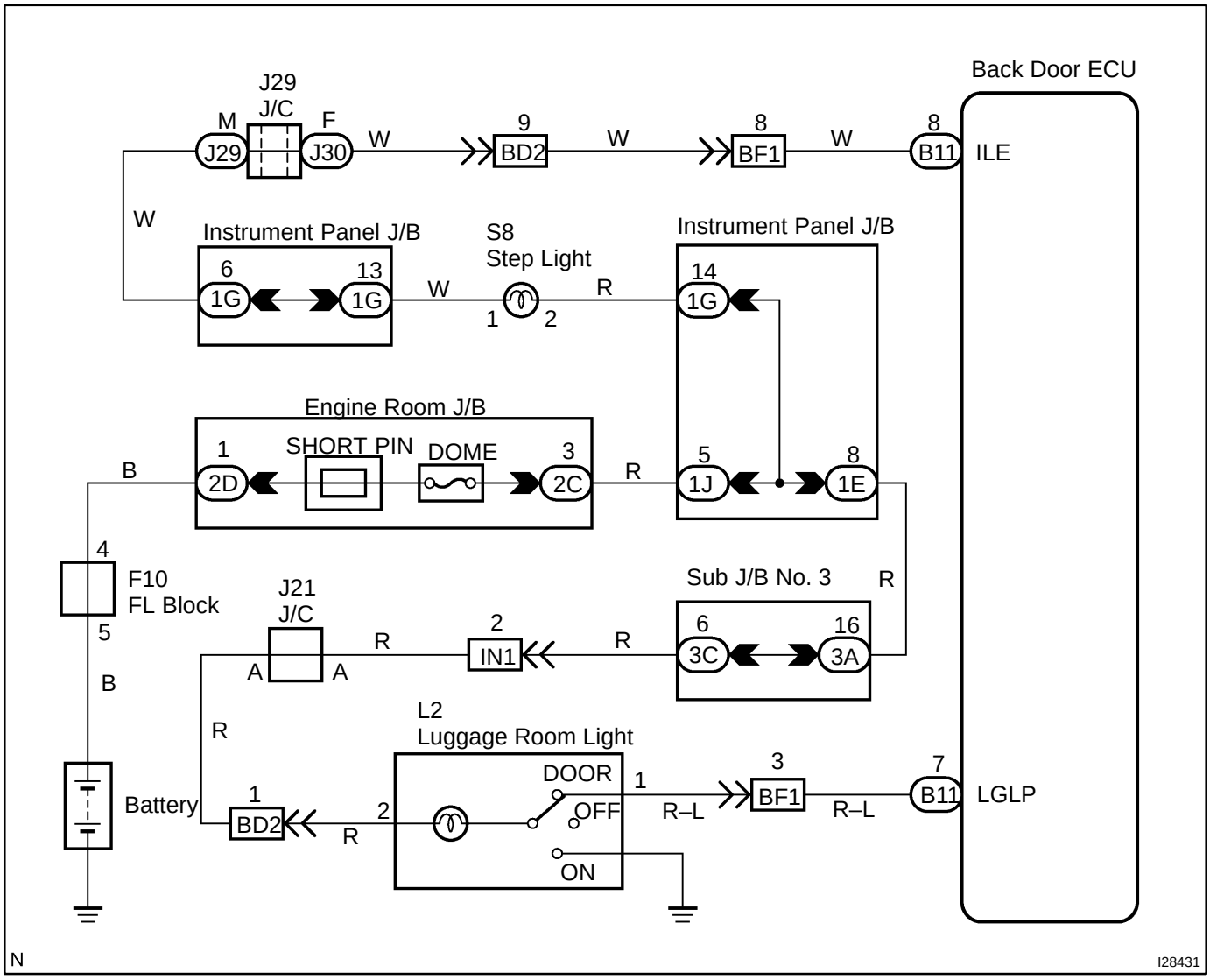
DI57L–11

Luggage Room Light Circuit

CIRCUIT DESCRIPTION

When the luggage room light and the rear room light are turned to the DOOR position, and any door is opened, voltage is applied to the LGLP terminal of the back door ECU, and voltage is output from the ILE terminal.

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	Check luggage room light (See page BE–40).

NG → Replace the luggage room light.

OK

2	Check wire harness and connector between luggage room light and back door ECU (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

3	Check wire harness and connector between luggage room light and battery (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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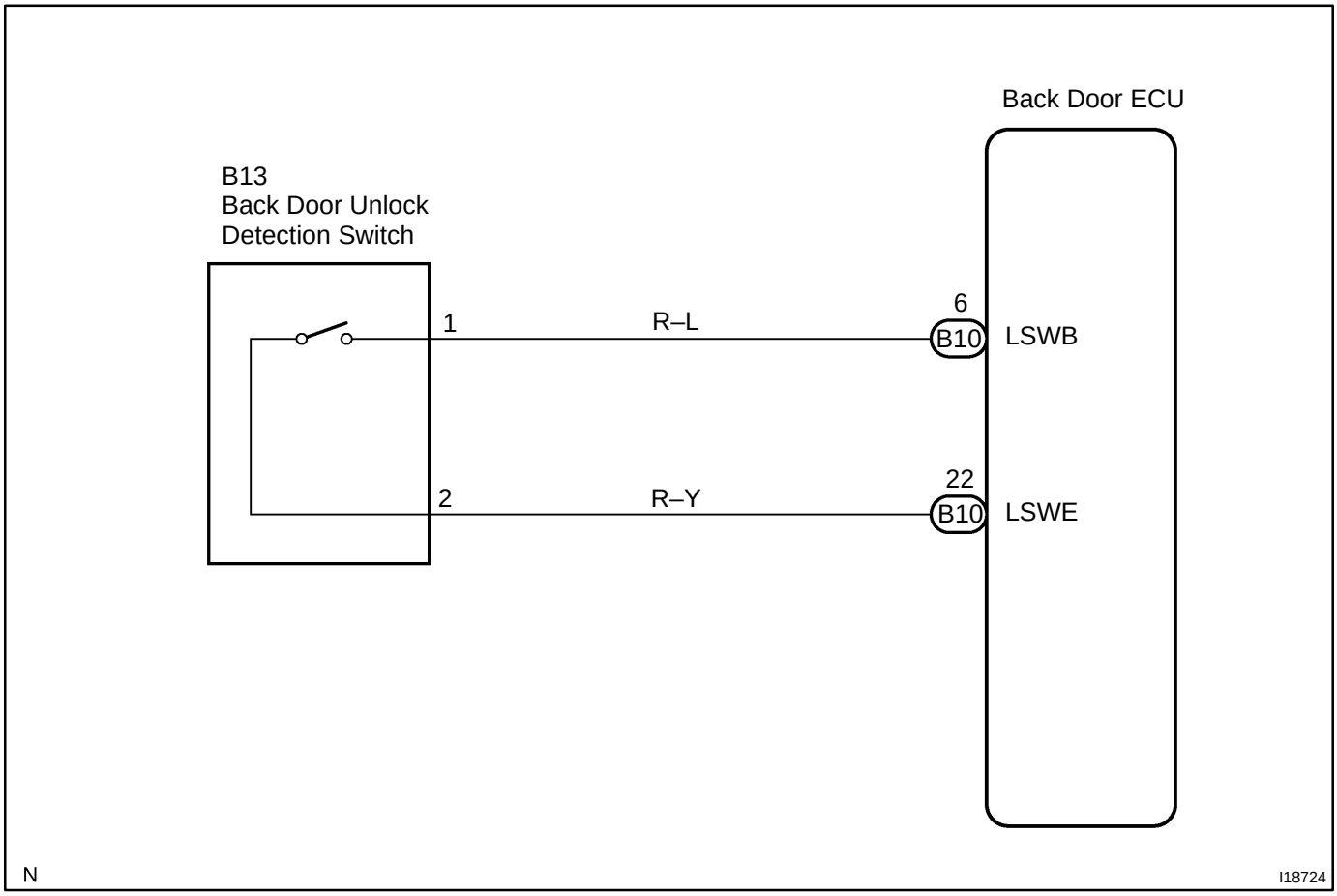
DI57L–12

Back door unlock detection switch circuit

CIRCUIT DESCRIPTION

The door unlock detection switch is built in the door lock motor. This switch is ON when the door lock is in the unlock position and OFF when the door lock is in the lock position. The ECU detects the door lock conditions in this circuit. It is used as one of the operating conditions for the theft deterrent system.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check the back door unlock detection switch using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, read the DATA LIST.
BACK–DOOR:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
LOCK POS SW	Back door lock position SW signal/ON or OFF	ON: Back door lock is in unlock position OFF: Back door lock is in lock position	–

OK:
Indication on the tester switches between ON and OFF in accordance with the back door unlock detection switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).**

NG

2	**Check back door unlock detection switch (See page BE–79).**

NG → **Replace the back door unlock detection switch.**

OK

Dardoor.com

3	**Check wire harness and connector between back door unlock detection switch and back door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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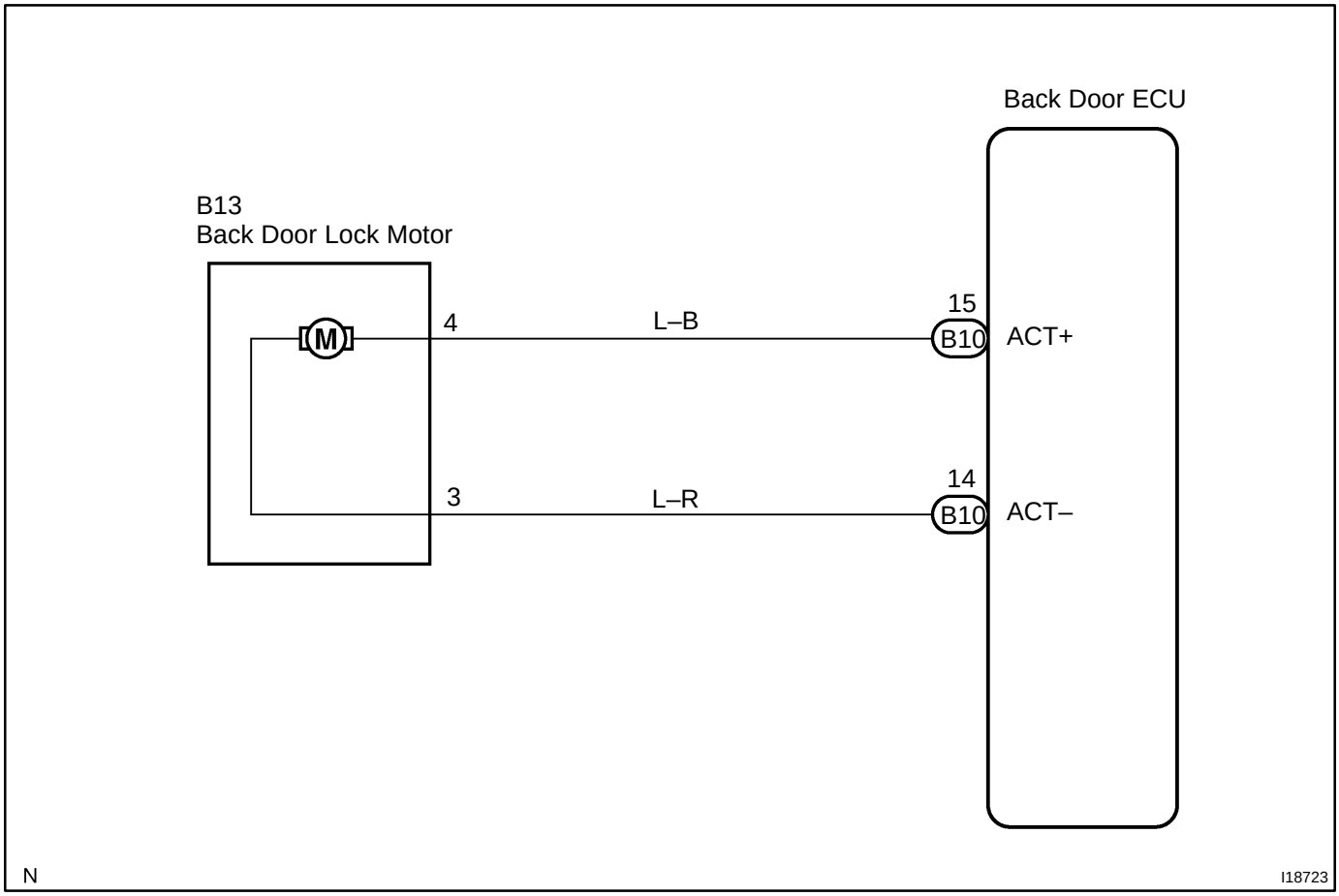
DI94G–05

Back door lock motor circuit

CIRCUIT DESCRIPTION

When the back door ECU receives a LOCK/UNLOCK demand signal from the body ECU or back door key lock and unlock switch, etc., it operates the back door lock motor based on the signal.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check the back door lock motor using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, perform the ACTIVE TEST.
BACK–DOOR:

Item	Test details	Diagnostic note
DOOR LOCK	Operate the door lock motor at rear door LOCK/ UNLOCK	–

OK:
Back door lock motor operates normally.

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–1854).**

NG

2	**Check back door lock motor (See page BE–79).**

NG → **Replace the back door lock motor.**

OK

3	**Check wire harness and connector between back door lock motor and back door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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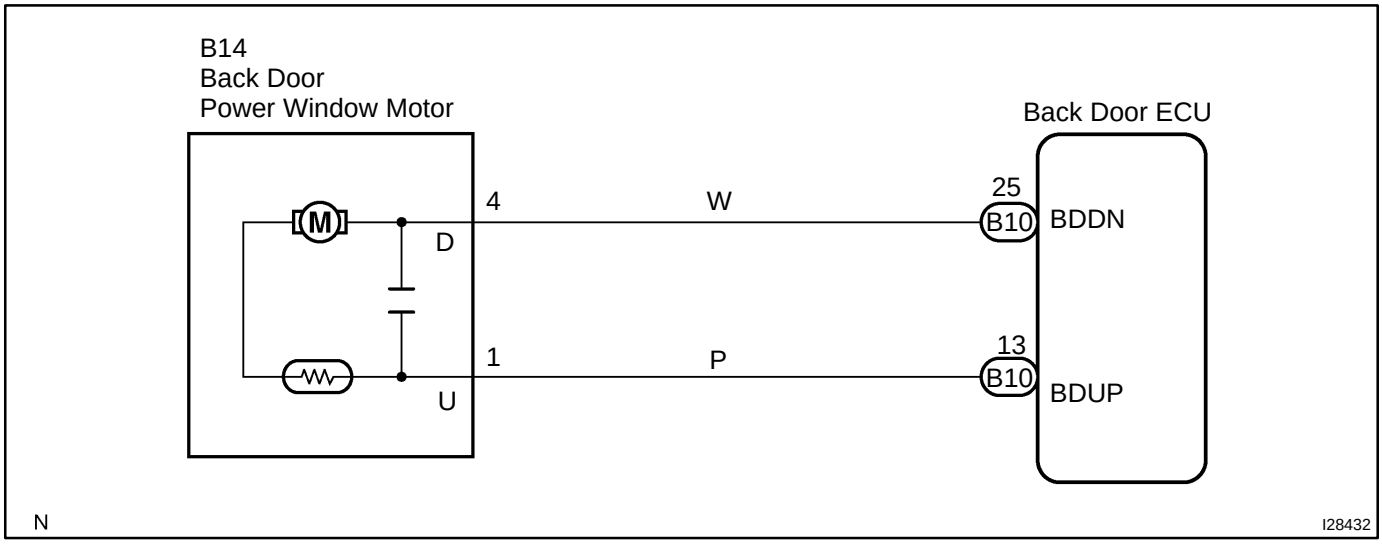
DI94H–05

Back door power window motor circuit

CIRCUIT DESCRIPTION

The back door power window goes down when voltage is applied to the BDDN terminal of the back door ECU, and the window goes up when voltage is applied to the BDUP terminal.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check the back door power window motor using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, perform the ACTIVE TEST.
BACK–DOOR:

Item	Test details	Diagnostic note
P/W UP/DOWN	Operate the back door power window Motor UP/DOWN	During this ACTIVE TEST, jam protection caught detection can be monitored.

OK:
Back door power window operates normally.

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–1854).**

NG

2	**Check back door power window motor (See page BE–75).**

NG → **Replace the back door power window motor.**

OK

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3	**Check wire harness and connector between back door power window motor and back door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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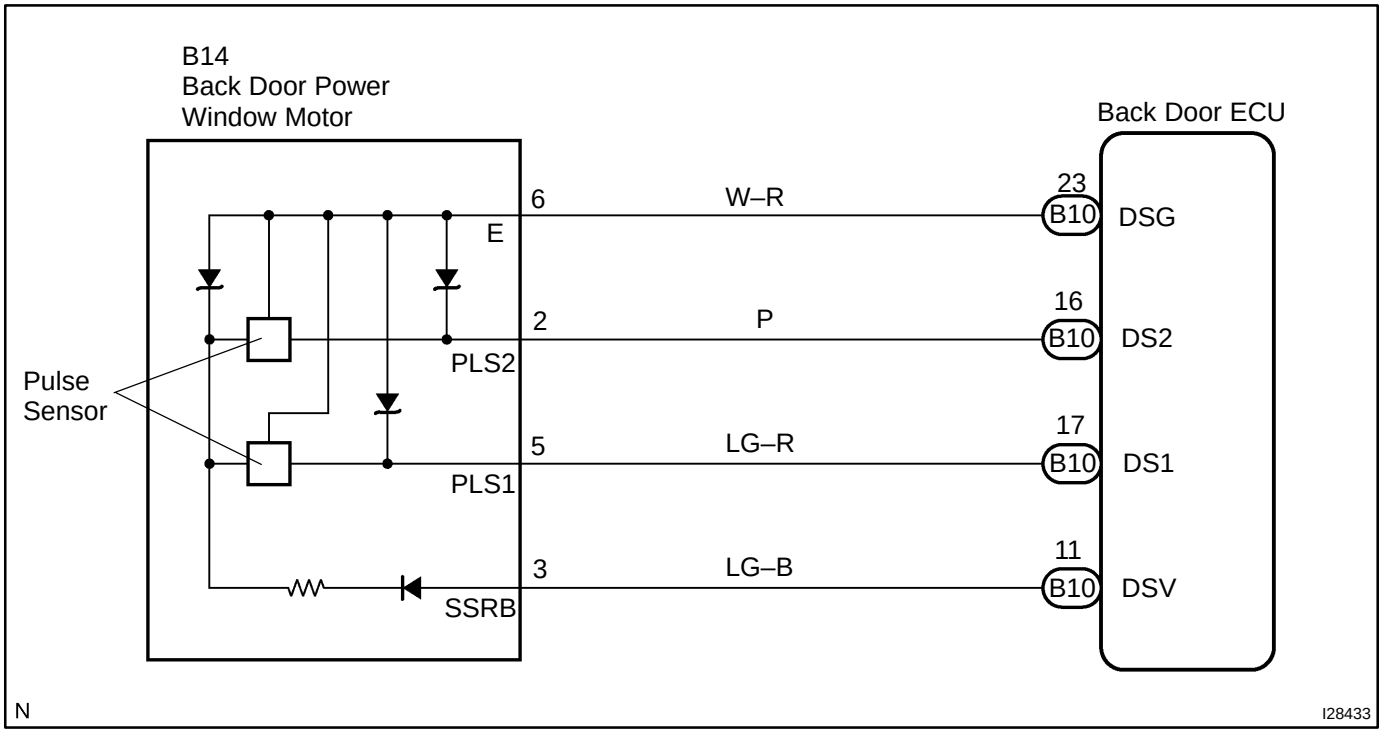
DI94I–04

Back door power window pulse sensor circuit

CIRCUIT DESCRIPTION

Two pulse sensors are built into the back door power window motor. The back door ECU detects movement and position of the back door window based on information from these pulse sensors.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check the back door power window pulse sensor using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, read the DATA LIST.
BACK–DOOR:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
P/W POSITION	Back door power window position/CLOSE or OPEN	CLOSE: Back door power window is fully closed OPEN: Back door power window is opened	–

OK:

Indication on the tester switches between CLOSE and OPEN in accordance with the back door power window status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).**

NG

2	**Check back door power window pulse sensor (See page BE–75).**

NG → **Replace the back door power window regulator assembly.**

OK

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3	**Check wire harness and connector between back door power window pulse sensor and back door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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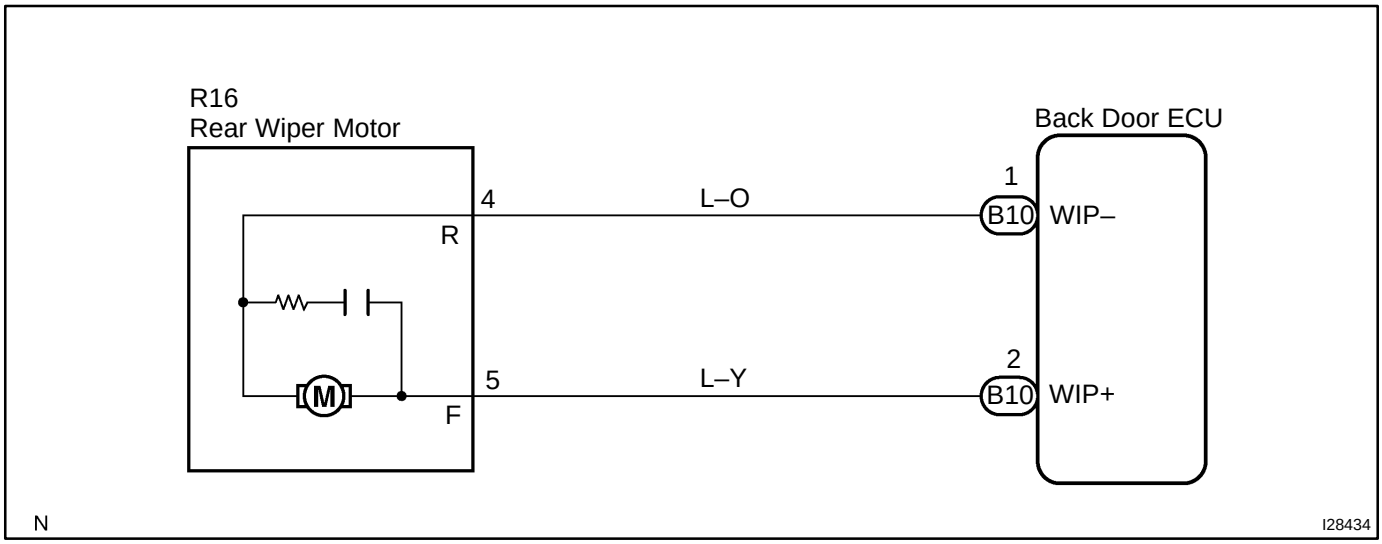
DI94K–04

Rear wiper motor circuit

CIRCUIT DESCRIPTION

The wiper motor is controlled by the back door ECU.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check the rear wiper motor using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, perform the ACTIVE TEST.
BACK–DOOR:

Item	Test details	Diagnostic note
REAR WIPER	Operate the rear wiper motor ON/OFF	–

OK:
Rear wiper motor operates normally.

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–1854).**

NG

2	**Check rear wiper motor (See page BE–49).**

NG → **Replace the rear wiper motor.**

OK

3	**Check wire harness and connector between wiper motor and back door ECU (See page IN–35).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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DI94L–05

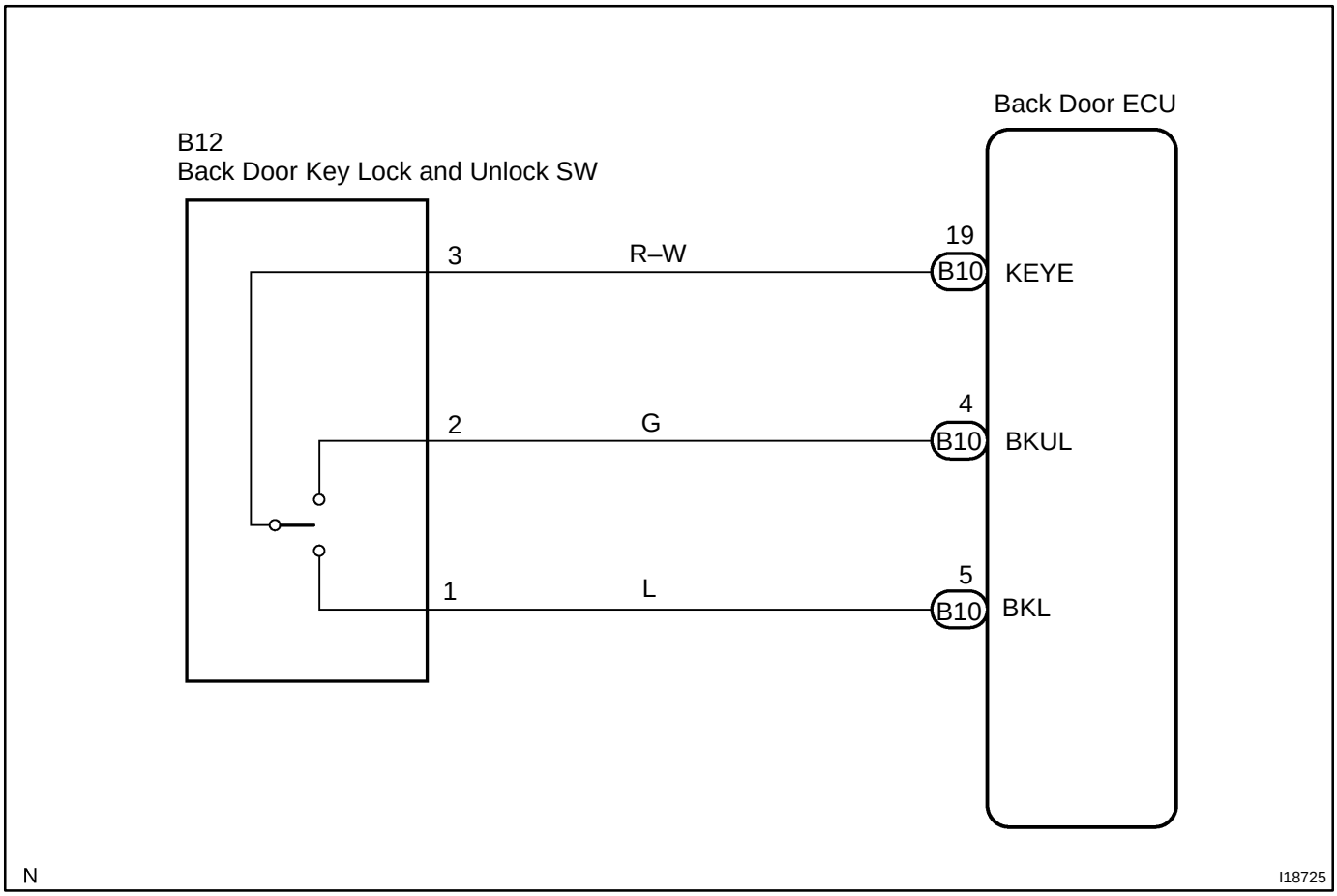
Back door key lock and unlock switch circuit

CIRCUIT DESCRIPTION

The back door ECU operates the back door lock motor based on information from the back door key lock and unlock switch.

The back door power window goes up when the key is inserted into the cylinder and turned to the LOCK position. The window goes down when the key is turned to the UNLOCK position.

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:
When using the hand–held tester, start the inspection from step 1 and when not using the hand–held tester, start from step 2.

1	**Check the back door key lock and unlock switch using hand–held tester.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON.
CHECK:
According to the display on the tester, read the DATA LIST.
BACK–DOOR:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
KEY SW (UNLOCK)	Unlock SW linked with the key/ON or OFF	ON: Back door lock is in unlock position OFF: Back door lock is in lock position	–
KEY SW (LOCK)	Unlock SW linked with the key/ON or OFF	ON: Back door lock is in lock position OFF: Back door lock is in unlock position	–
UP/DOOR KEY	Back door key lock and unlock switch linked window open and close/AVAIL or NOT AVL	AVAIL: Key–linked open and close SET NOT AVL: Key–linked open and close UNSET	*1
DOWN/DOOR KEY	Back door key lock and unlock switch linked window open and close/AVAIL or NOT AVL	AVAIL: Key–linked open and close SET NOT AVL: Key–linked open and close UNSET	*1

*1: When the ignition key is not in the key cylinder and the back door is locked, turning and holding the back door key in the lock position for 1.5 seconds or more activates the back door ECU to operate the power window motor and close the power window.
Similarly, turning and holding the back door key in the unlock position for 1.5 seconds or more when the back door is unlocked will open the power window.
OK:

Indication on the tester switches between ON and OFF in accordance with the back door key lock and unlock switch status.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).**

NG

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2	Check the back door key lock and unlock switch (See page BE–79).

NG → Replace the back door key lock and unlock switch.

OK

3	Check wire harness and connector between back door key lock and unlock switch and back door ECU (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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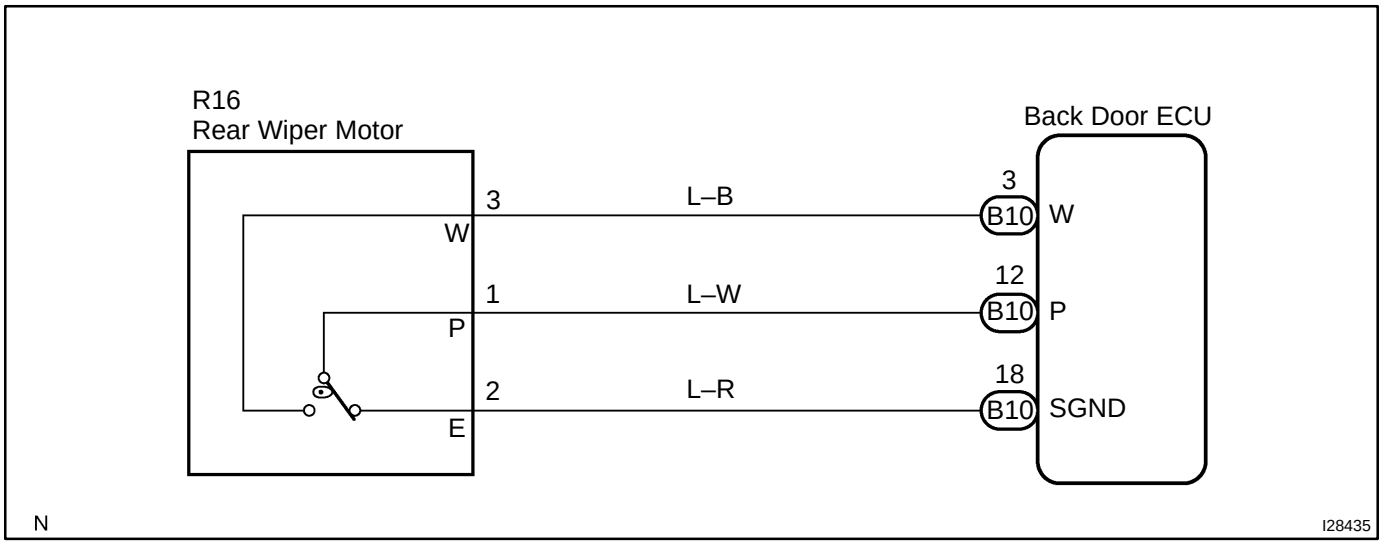
DI94J–04

Rear wiper limit switch circuit

CIRCUIT DESCRIPTION

The rear wiper limit switch is built in to the rear wiper motor. The W built in switch of the rear wiper motor is ON when the rear wiper arm is in the position between stop and reverse and OFF when the rear wiper arm is in any other position. The P built in switch of the rear wiper motor is OFF when the rear wiper arm is in any position except stored and ON when the rear wiper arm is in the stored position.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check rear wiper motor (See page BE–49).

NG → Replace the rear wiper motor.

OK

2	Check wire harness and connector between rear wiper motor and back door ECU (See page IN–35).

NG → Repair or replace wire harness or connector.

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1854).

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MULTIPLEX COMMUNICATION SYSTEM

DIDF6–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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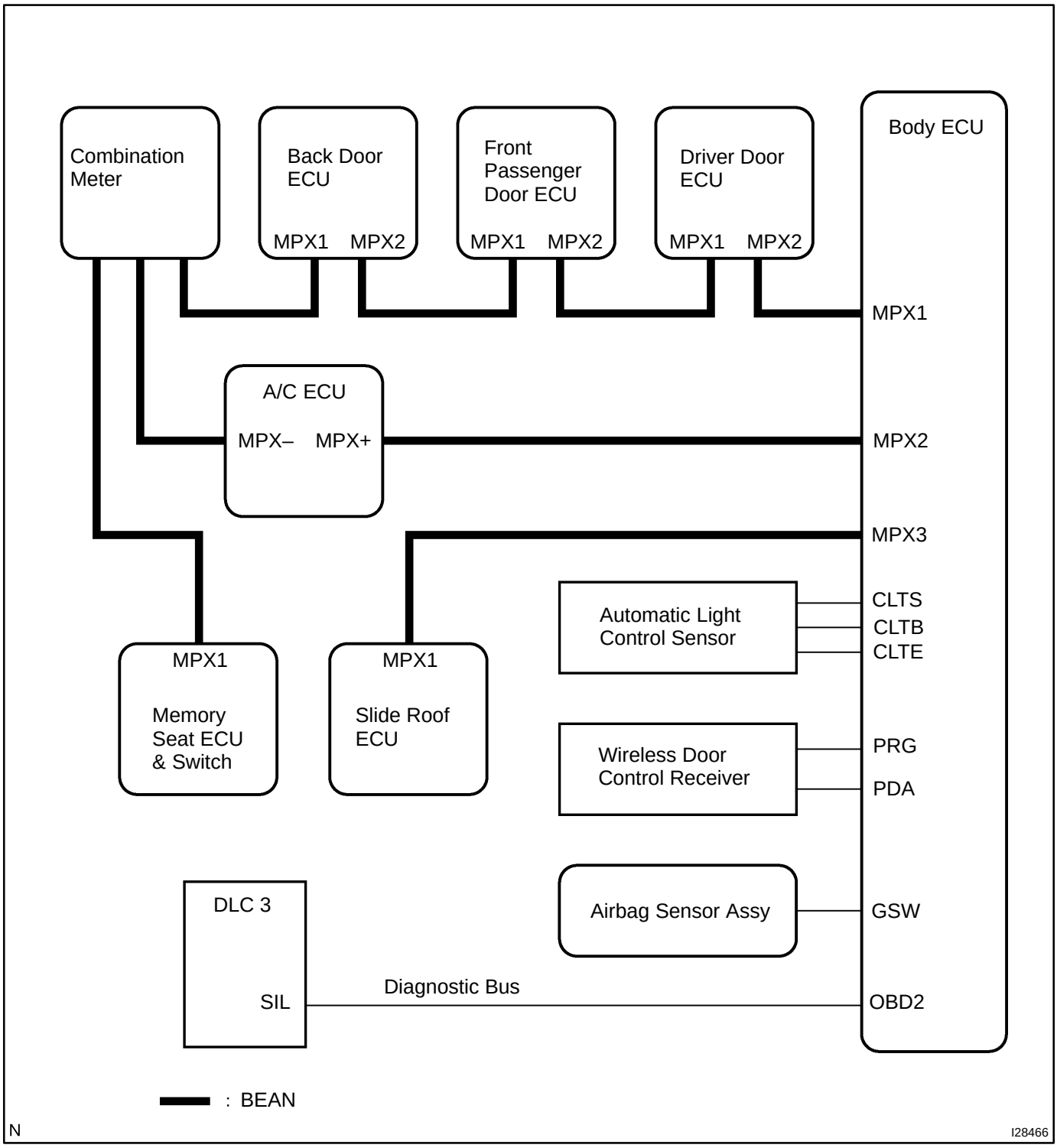
DIDF7–01

SYSTEM DIAGRAM



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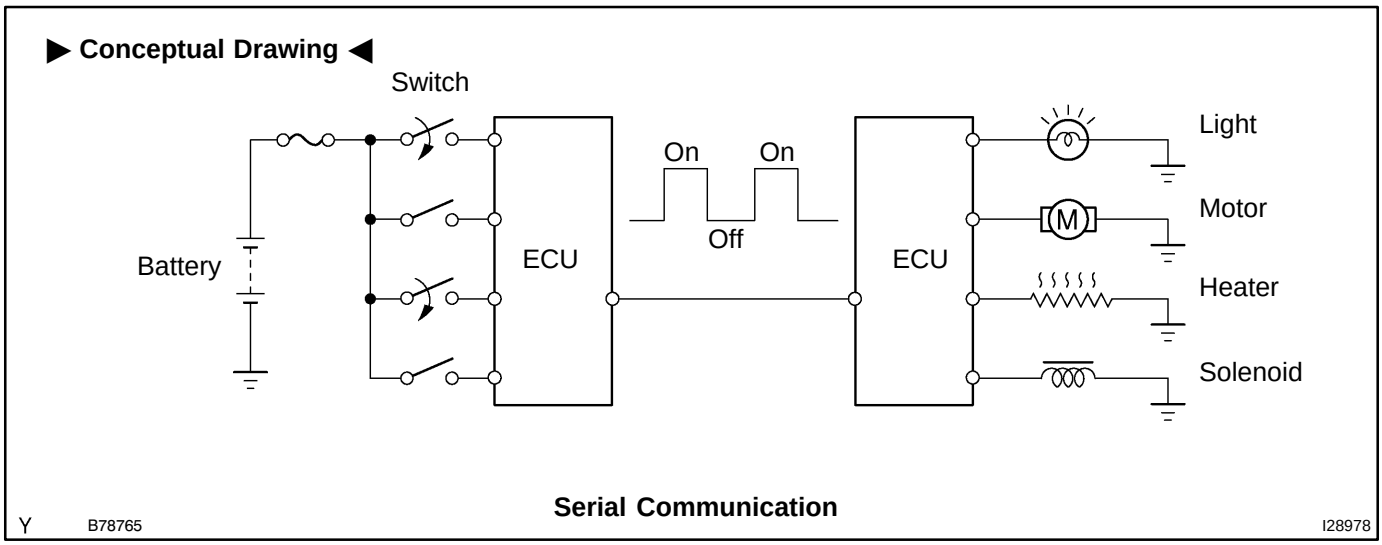
DIDFN–01

SYSTEM DESCRIPTION

Basic of MPX (Multiplex Communication)

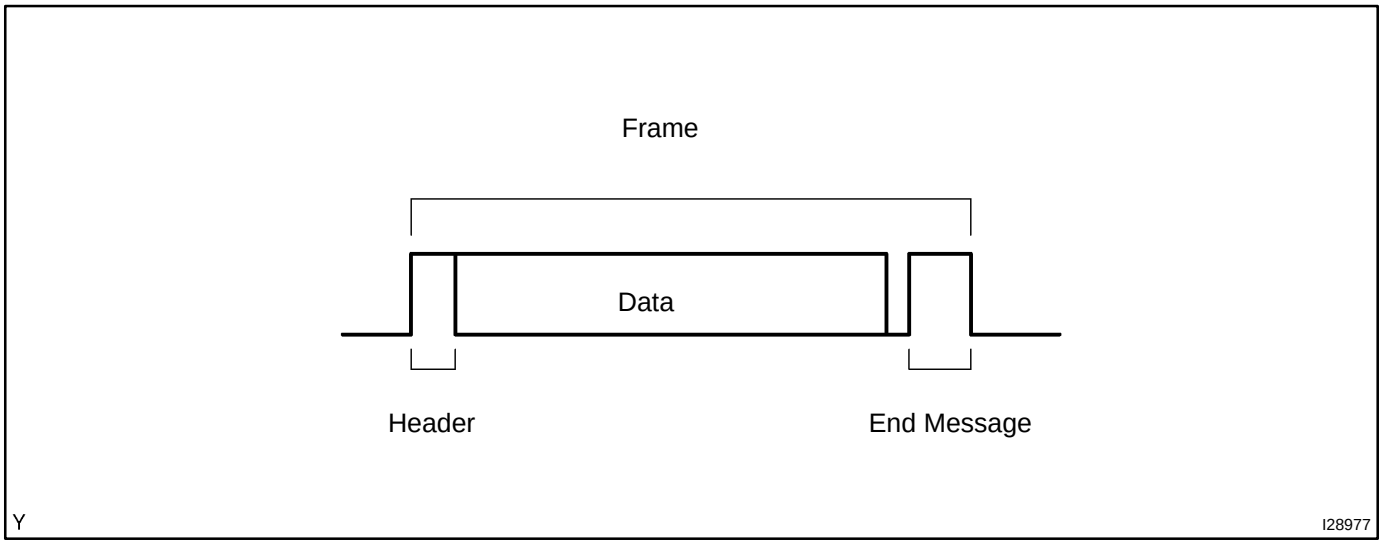
1. General

The SEQUOIA multiplex communication system uses serial communication, which converts multiple pieces of information into serial communication data. As a result, they can be transmitted through a single communication wire.



Serial Communication

Serial communication data consists of bits and frames. A bit is the basic unit that represents the amount of information. A bit is represented by a binary value ”0” or ”1”. A frame is a body of data that is transmitted together. A frame contains a ”header” that indicates the beginning of the data and an ”end message” that indicates the end of the data.



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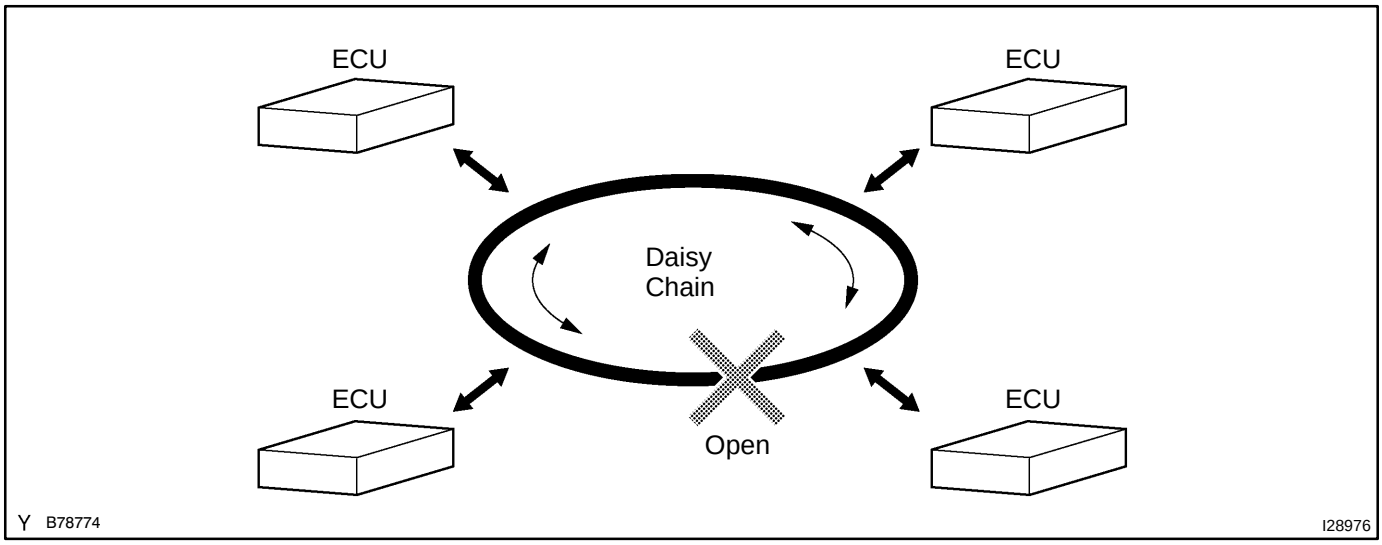
2. Network Style

Based on serial communication, various ECUs are connected on a network to exchange various pieces of information. Such a system is called a multiplex communication system.

○ The BEAN (Body Electronics Area Network) uses the ring and bus styles of networks to connect ECUs. This connection style is called a daisy chain. In the daisy chain, communication can be maintained even if there is an area that has an open circuit.



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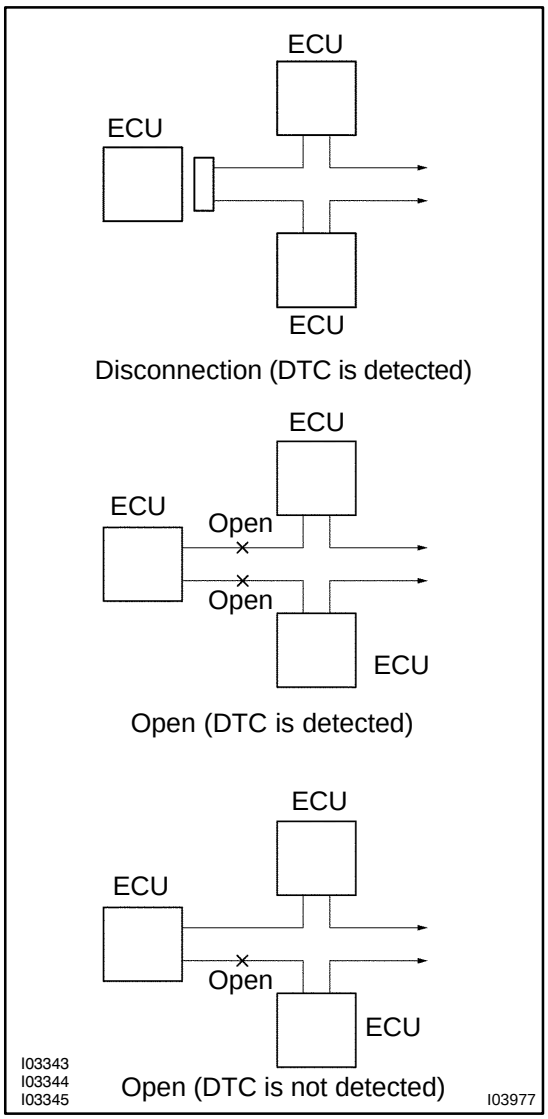
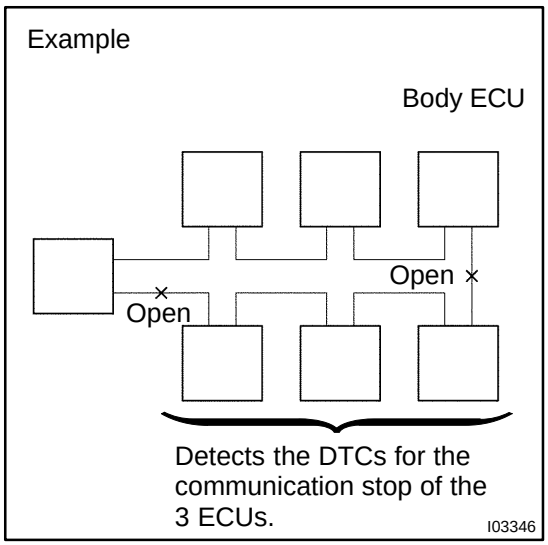


3. DIAGNOSIS SYSTEM

(a) If a DTC for an ECU communication stop is indicated, a connector may be disconnected or there may be open circuits on 2 or more communication buses. When there is an open circuit on only 1 communication bus, no DTC will be detected.



(b) If 2 communication buses are open at the position shown in the illustration, DTCs for the ECU communication stop between these 2 buses are indicated.

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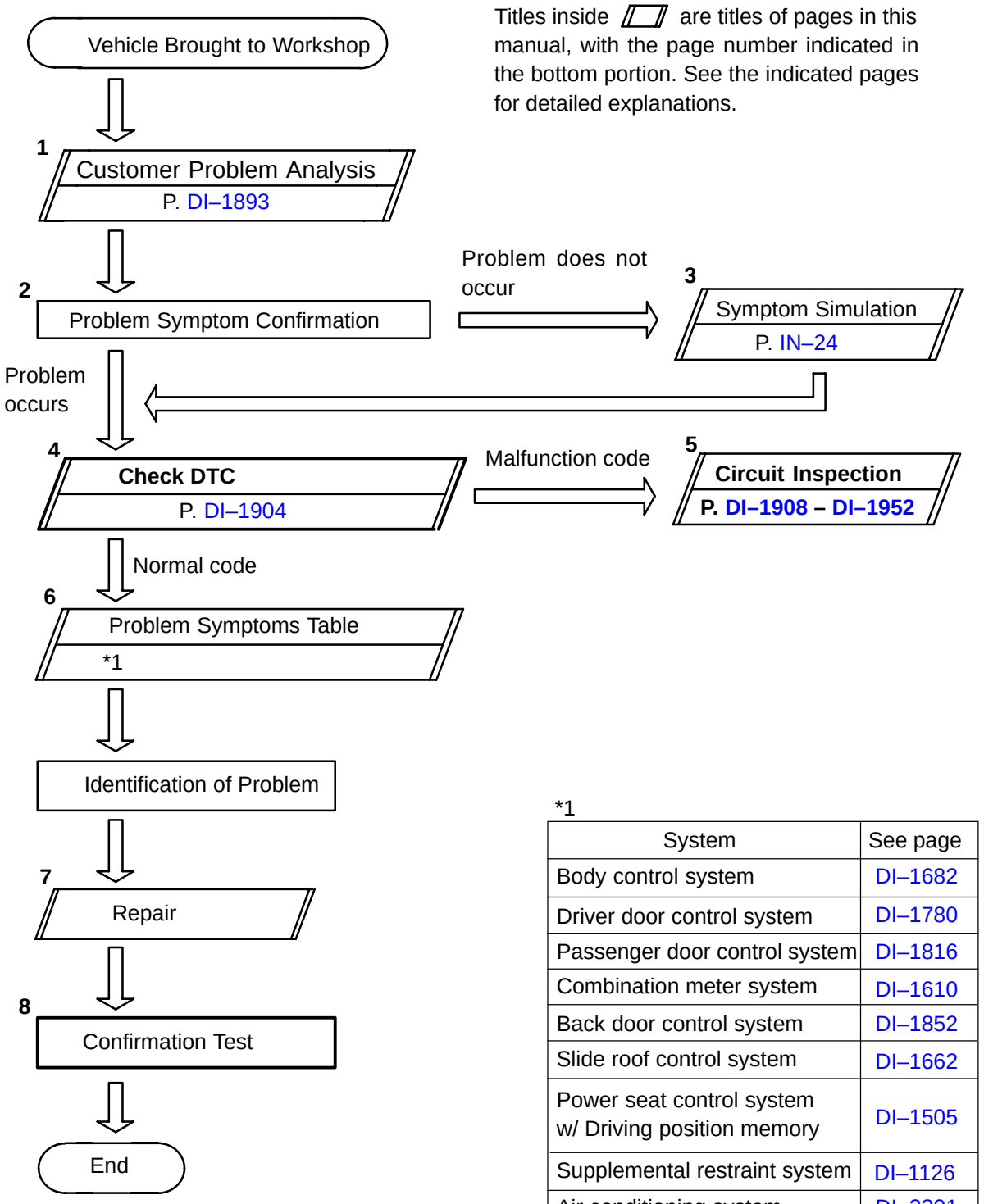
DI3IO–11

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting in accordance with the procedure on the following page.



Titles inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.

*1

System	See page
Body control system	DI–1682
Driver door control system	DI–1780
Passenger door control system	DI–1816
Combination meter system	DI–1610
Back door control system	DI–1852
Slide roof control system	DI–1662
Power seat control system w/ Driving position memory	DI–1505
Supplemental restraint system	DI–1126
Air conditioning system	DI–2301

Step 4, 8: Diagnostic steps permitting the use of the hand–held tester.

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DI3IP–10

CUSTOMER PROBLEM ANALYSIS CHECK

MULTIPLEX COMMUNICATION SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F (°C))

Malfunction System	☐ Body Control System
	☐ Driver Door Control System
	☐ Passenger Door Control System
	☐ Combination Meter System
	☐ Back Door Control System
	☐ Slide Roof Control System
	☐ Power Seat Control System (w/ Driving Position Memory)
	☐ Supplemental Restraint System
	☐ Air Condition System

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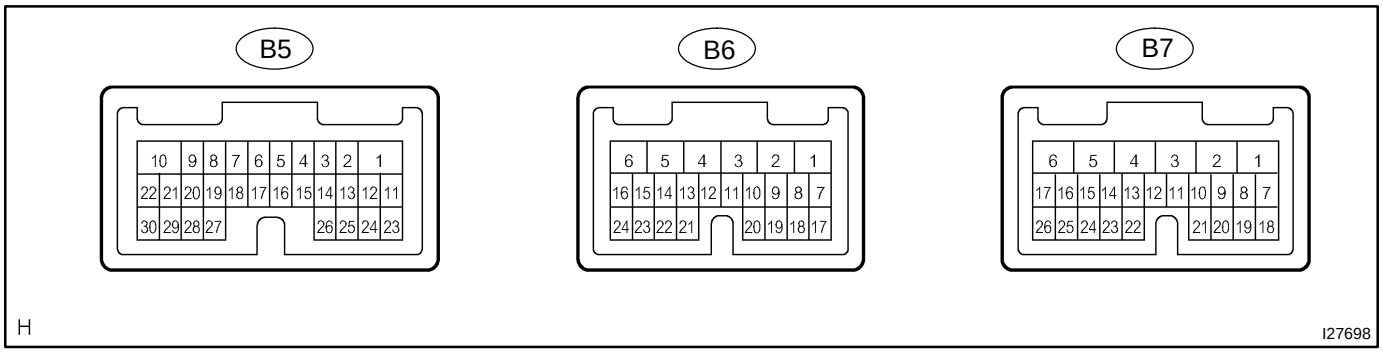
DIDFA–01

TERMINALS OF ECU

1. CHECK BODY ECU



(a) Disconnect the B5, B6 and B7 ECU connectors.

(b) Measure the resistance or voltage of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BDR (B6–2) – Body ground	L–W – Body ground	+B (BATT) power supply	Always	10 to 14 V
IG (B7–6) – Body ground	B–R – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
ACC (B7–10) – Body ground	GR – Body ground	ACC power supply	Ignition switch ACC	10 to 14 V
OBD2 (B5–2) – Body ground	G–R – Body ground	Bus "+" line	During transmission	Pulse generation
S+B (B6–1) – Body ground	W–L – Body ground	+B (BATT) power supply	Always	10 to 14 V
BECU (B6–5) – Body ground	W–R – Body ground	+B (BATT) power supply	Always	10 to 14 V
WIG (B7–5) – Body ground	L–Y – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
MPX3 (B7–20) – Body ground	G–O – Body ground	MPX line	Always	10 kΩ or higher
MPX2 (B5–24) – Body ground	L–Y – Body ground	MPX line	Always	10 kΩ or higher
MPX1 (B7–22) – Body ground	W–L – Body ground	MPX line	Always	10 kΩ or higher
GND1 (B6–6) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω
PRG – GND1 (B5–5 – B6–6)	V – W–B	Wireless transmitter signal ground	Wireless door look receiver communication circuit	–
RDA – GND1 (B5–4 – B6–6)	R–G – W–B	Wireless transmitter signal input	Wireless door lock control system is operated	Below 1 V
RDA – GND1 (B5–4 – B6–6)	R–G – W–B	Wireless transmitter signal input	Wireless door lock control system is not operated	10 to 14 V
GSW (B6–16)	GR–R	Air bag sensor communication signal	Air bag sensor communication circuit	–
CLTS (*1) – GND1 (B6–12 – B6–6)	Y – W–B	Automatic light control sensor (Signal)	Ignition switch OFF	Below 1 V
CLTS (*1) – GND1 (B6–12 – B6–6)	Y – W–B	Automatic light control sensor (Signal)	Ignition switch ON	Signal waveform
CLTE (*1) – GND1 (B6–3 – B6–6)	BR – W–B	Automatic light control sensor (Ground)	Always	Below 1 V

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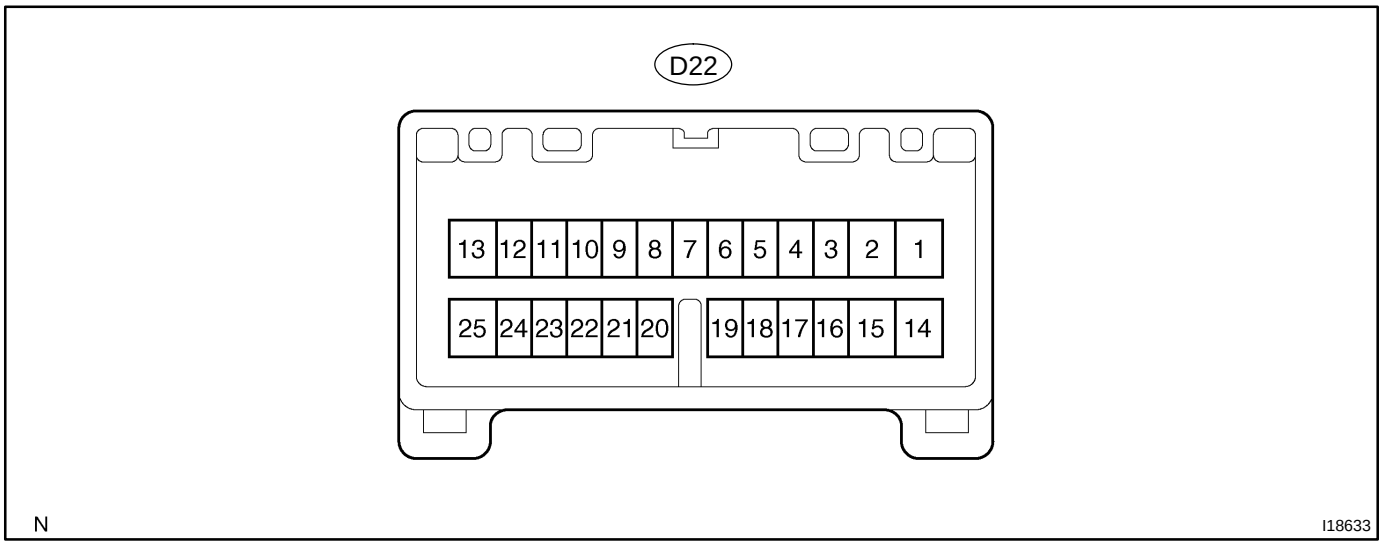
CLTB (*1) – GND1 (B6–4 – B6–6)	R–G – W–B	Automatic light control sensor (IG)	Ignition switch OFF	Below 1 V
CLTB (*1) – GND1 (B6–4 – B6–6)	R–G – W–B	Automatic light control sensor (IG)	Ignition switch ON	10 to 14 V

(*1): w/ Automatic Light Control

If the result is not as specified, there may be a malfunction on the wire harness side.

2. CHECK DRIVER DOOR ECU



(a) Disconnect the D22 ECU connector.

(b) Measure the resistance or voltage of each terminal of the wire harness side connector.

Standard:

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SIG (D22–21) – Body ground	B–R – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
CPUB (D22–23) – Body ground	W–R – Body ground	+B (BATT) power supply	Always	10 to 14 V
MPX1 (D22–20) – Body ground	G–B – Body ground	MPX line	Always	10 kΩ or higher
MPX2 (D22–8) – Body ground	W–L – Body ground	MPX line	Always	10 kΩ or higher
BDR (D22–25) – Body ground	L–W – Body ground	+B (BATT) power supply	Always	10 to 14 V
GND (D22–13) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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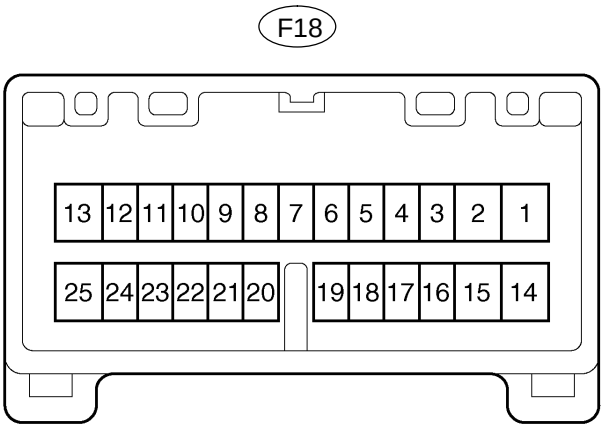
3. CHECK FRONT PASSENGER DOOR ECU

w/ Driving Position Memory:



(a) Disconnect the F18 ECU connector.

(b) Measure the resistance or voltage of each terminal of the wire harness side connector.

Standard:

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SIG (F18–21) – Body ground	B–R – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
BDR (F18–25) – Body ground	L–Y – Body ground	+B (BATT) power supply	Always	10 to 14 V
MPX1 (F18–20) – Body ground	B – Body ground	MPX line	Always	10 kΩ or higher
MPX2 (F18–8) – Body ground	G–B – Body ground	MPX line	Always	10 kΩ or higher
CPUB (F18–23) – Body ground	W–R – Body ground	+B (BATT) power supply	Always	10 to 14 V
GND (F18–13) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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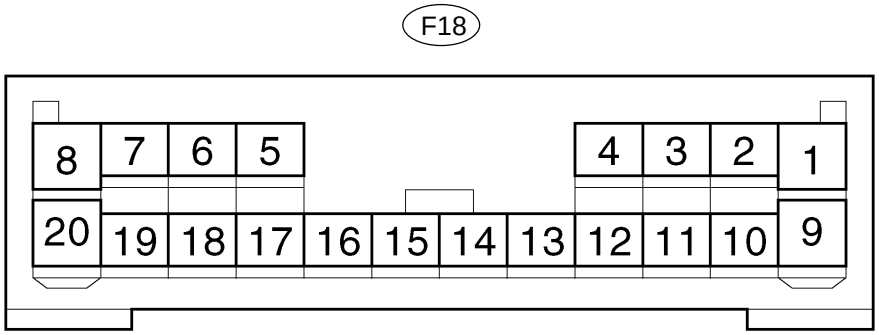
w/o Driving Position Memory:



N I18630

(a) Disconnect the F18 ECU connector.
(b) Measure the resistance or voltage of each terminal of the wire harness side connector.
Standard:

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SIG (F18–19) – Body ground	B–R – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
BDR (F18–20) – Body ground	L–Y – Body ground	+B (BATT) power supply	Always	10 to 14 V
MPX1 (F18–10) – Body ground	B – Body ground	MPX line	Always	10 kΩ or higher
MPX2 (F18–11) – Body ground	G–B – Body ground	MPX line	Always	10 kΩ or higher
CPUB (F18–12) – Body ground	W–R – Body ground	+B (BATT) power supply	Always	10 to 14 V
GND (F18–8) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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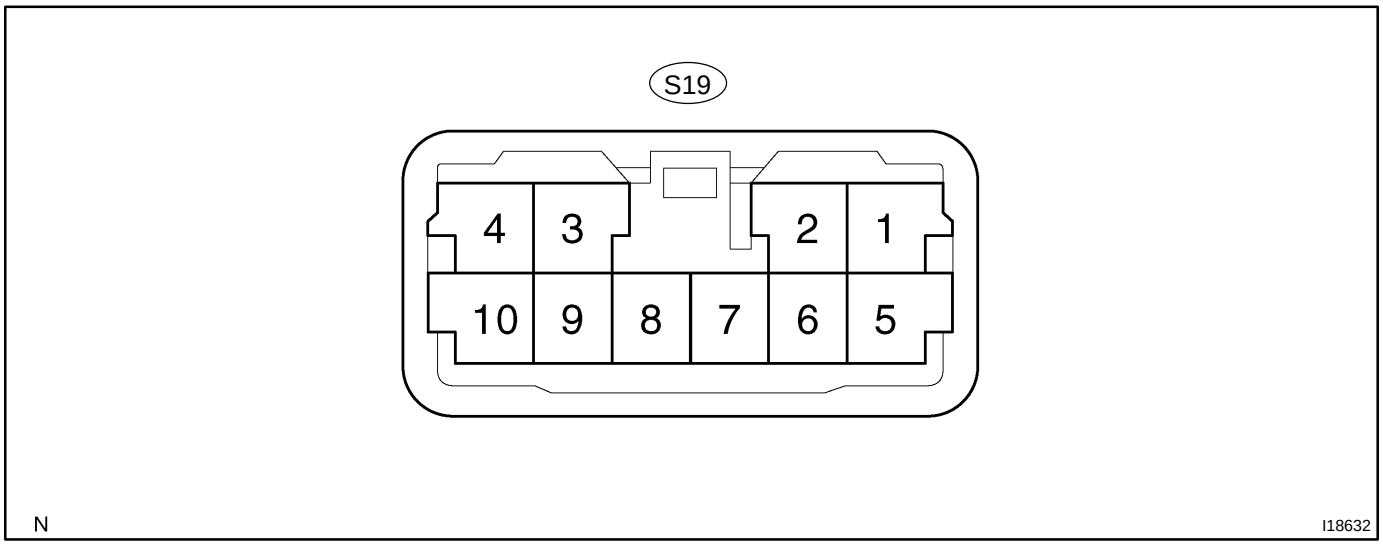
4. CHECK SLIDING ROOF ECU



(a) Disconnect the S19 ECU connector.
(b) Measure the resistance or voltage of each terminal of the wire harness side connector.
Standard:

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (S19–8) – Body ground	B–R – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
B (S19–5) – Body ground	L–W – Body ground	+B (BATT) power supply	Always	10 to 14 V
MPX1 (S19–2) – Body ground	G–O – Body ground	MPX line	Always	10 kΩ or higher
E (S19–7) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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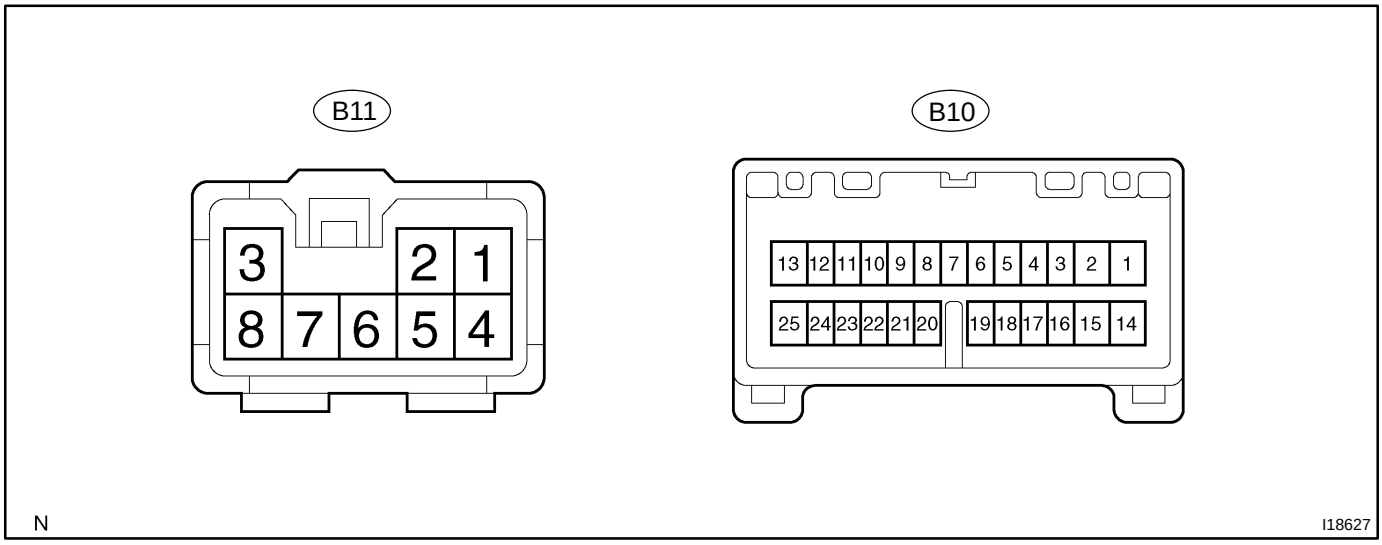
5. CHECK BACK DOOR ECU



(a) Disconnect the B10 and B11 ECU connectors.
(b) Measure the resistance or voltage of each terminal of the wire harness side connector.
Standard:

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
MPX2 (B11–1) – Body ground	B – Body ground	MPX line	Always	10 kΩ or higher
MPX1 (B11–2) – Body ground	LG–R – Body ground	MPX line	Always	10 kΩ or higher
GND (B11–3) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω
BDR (B11–4) – Body ground	L–W – Body ground	+B (BATT) power supply	Always	10 to 14 V
BECU (B11–5) – Body ground	W–R – Body ground	+B (BATT) power supply	Always	10 to 14 V
SIG (B11–6) – Body ground	B–R – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.

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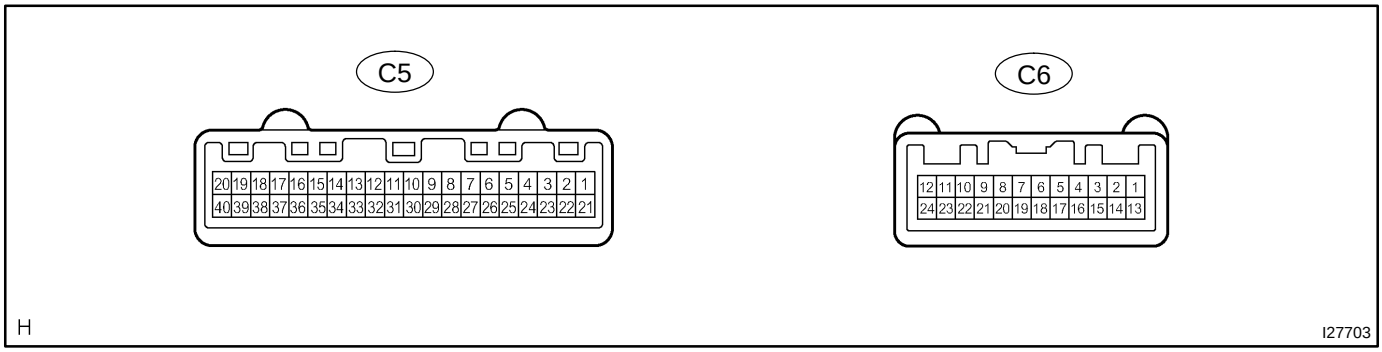
6. CHECK COMBINATION METER



(a) Disconnect the C5 and C6 meter connectors.

(b) Measure the resistance or voltage of each terminal of the wire harness side connector.

Standard:

Terminals No.	Wiring Color	Terminal Description	Condition	Specified Condition
C6–24 – Body ground	B–O – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
C6–23 – Body ground	W–R – Body ground	+B (BATT) power supply	Always	10 to 14 V
C5–30 – Body ground	W – Body ground	MPX line	Always	10 kΩ or higher
C5–31 – Body ground	LG–R – Body ground	MPX line	Always	10 kΩ or higher
C5–32 – Body ground	LG–B – Body ground	MPX line	Always	10 kΩ or higher
C6–12 – Body ground	BR – Body ground	Ground	Always	Below 1 Ω
C5–28 – Body ground	B–R – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.

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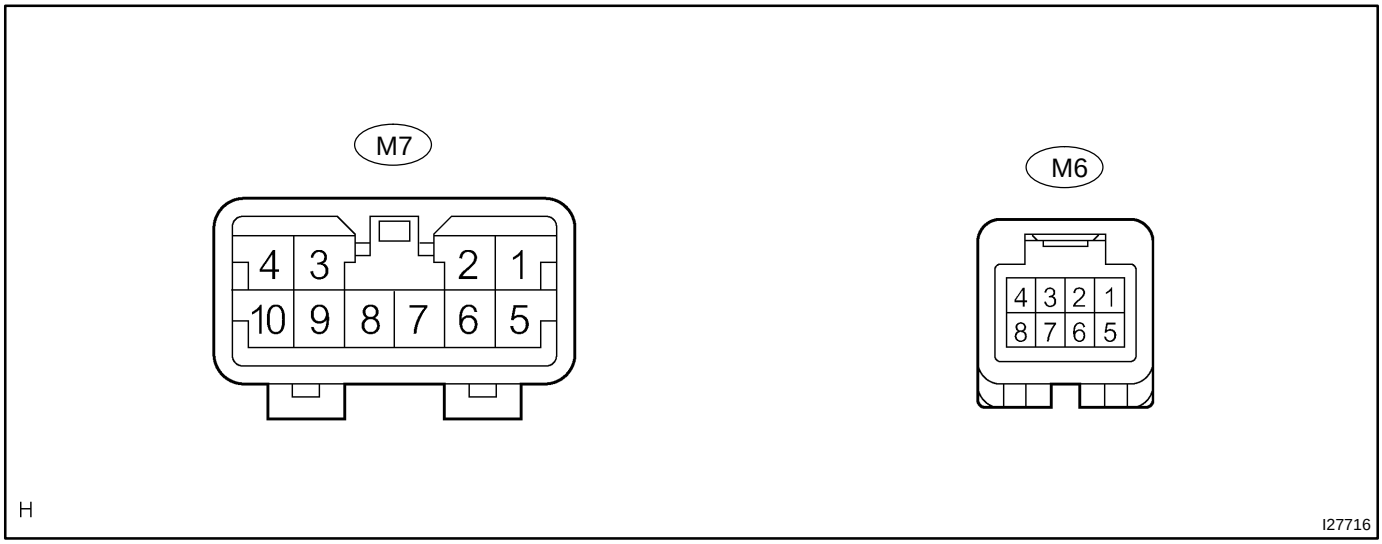
7. CHECK MEMORY SEAT ECU & SWITCH (w/ Driving Position Memory)



(a) Disconnect the M6 and M7 ECU connectors.
(b) Measure the resistance or voltage of each terminal of the wire harness side connector.
Standard:

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
MPX1 (M6–1) – Body ground	W – Body ground	MPX line	Always	10 kΩ or higher
IG (M6–4) – Body ground	B–R – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
SYSB (M6–8) – Body ground	W–R – Body ground	+B (BATT) power supply	Always	10 to 14 V
GND (M7–1) – Body ground	W–B – Body ground	Ground	Always	Below 1 Ω
+B (M7–5) – Body ground	L–O – Body ground	+B (BATT) power supply	Always	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.

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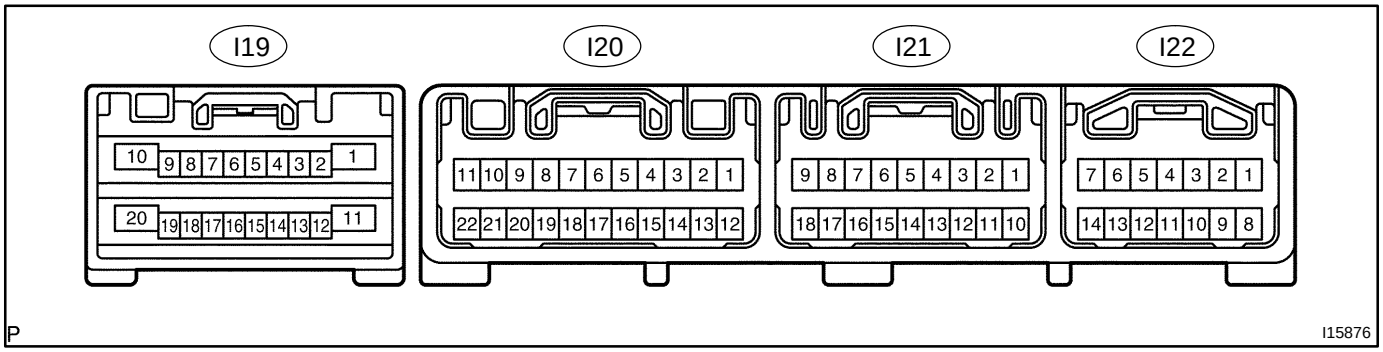
8. CHECK A/C ECU (INTEGRATION CONTROL AND PANEL)



(a) Disconnect the I19 ECU connector.

(b) Measure the resistance or voltage of each terminal of the wire harness side connector.

Standard:

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (I19–1) – Body ground	R – Body ground	+B (BATT) power supply	Always	10 to 14 V
IG+ (I19–2) – Body ground	R–L – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
ACC (I19–11) – Body ground	P – Body ground	ACC power supply	Ignition switch ACC	10 to 14 V
MPX+ (I19–3) – Body ground	L–Y – Body ground	MPX line	Always	10 kΩ or higher
MPX– (I19–13) – Body ground	LG–B – Body ground	MPX line	Always	10 kΩ or higher
GND (I19–10) – Body ground	O – Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

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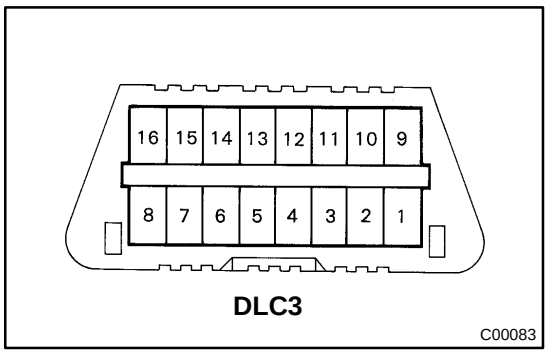
DIDF8–01



DLC3

DIAGNOSIS SYSTEM

1. DIAGNOSIS SYSTEM

(a) Inspect the battery voltage.

Battery voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(b) Check the DLC3.

The body ECU uses ISO 9141–2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Verify the conditions listed in the table below:

Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL(7) – SG(5)	Bus "+" line	During communication	Pulse generation
SG(5) – Body ground	Signal ground	Always	Below 1 Ω
BAT(16) – Body ground	Battery positive	Always	11 to 14 V

HINT:

If the hand–held tester display shows UNABLE TO CONNECT TO VEHICLE when the cable of the hand–held tester is connected to the DLC3, the ignition switch is turned to the ON position and the tester is operated, there is a problem on either the vehicle side or the tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tester itself, so consult the Service Department listed in the tester's instruction manual.

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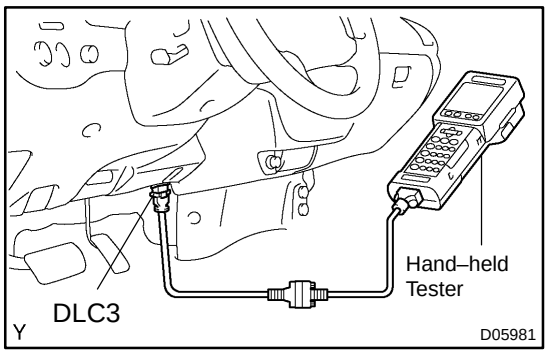
DIDF9–01



DTC CHECK / CLEAR

1. DTC CHECK

(a) Checking DTCs using the hand–held tester.
  (1) Connect the hand–held tester to the DLC3.
  (2) Turn the ignition switch ON.
  (3) Read DTCs by following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator's manual for further details.

2. DTC CLEARANCE

A multiplex DTC indicates that a problem has been detected in the multiplex communication system. Once the problem is solved and the system begins to operate as designed, the DTC will be cleared automatically. There is no need to manually clear a multiplex DTC using the hand–held tester.

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DI3IR–10

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is indicated during the DTC check, check the components listed for that code in the table below (proceed to the page given for that code).

DTC No. (See Page)	Detection Item	Trouble Area
B1211 (DI–1908)	Driver door ECU communication stop	▶Driver door ECU ▶Wire harness ▶Body ECU
B1212 (DI–1911)	Front passenger door ECU communication stop	▶Passenger door ECU ▶Wire harness ▶Body ECU
B1214 B1215 (DI–1914)	Communication bus malfunction (Short to B+) Communication bus malfunction (Short to ground)	▶Driver door ECU ▶Passenger door ECU ▶Back door ECU ▶A/C ECU (Integration control panel) ▶Combination meter ▶Memory seat ECU & switch ▶Wire harness ▶Body ECU
B1221 (DI–1924)	Power window switch circuit on driver door	▶Power window master switch (Built in driver door ECU) ▶Wire harness ▶Body ECU
B1222 (DI–1925)	Door lock switch circuit on driver door	▶Door lock control switch front LH (Built in driver door ECU) ▶Door unlock detection switch front LH ▶Wire harness ▶Body ECU
B1223 (DI–1926)	Power window switch circuit on passenger door	▶Power window switch (Built in passenger door ECU) ▶Wire harness ▶Body ECU
B1224 (DI–1927)	Door lock switch circuit on passenger door	▶Door lock control switch front RH (Built in passenger door ECU) ▶Door unlock detection switch front RH ▶Wire harness ▶Body ECU
B1231 (DI–1928)	Jam protection limit switch circuit on driver door	▶Limit switch (Built in power window motor) ▶Driver door ECU ▶Wire harness ▶Body ECU
B1232 (DI–1929)	Jam protection pulse switch circuit on driver door	▶Pulse switch (Built in power window motor) ▶Driver door ECU ▶Wire harness ▶Body ECU
B1233 (DI–1930)	Jam protection limit switch circuit on passenger door	▶Limit switch (Built in power window motor) ▶Passenger door ECU ▶Wire harness ▶Body ECU
B1234 (DI–1931)	Jam protection pulse switch circuit on passenger door	▶Pulse switch (Built in power window motor) ▶Passenger door ECU ▶Wire harness ▶Body ECU
B1241 (DI–1932)	Body ECU switch circuit diagnosis	▶Back door power window switch ▶Rear wiper and washer switch ▶Wire harness ▶Body ECU

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B1242 (DI–1933)	Wireless door lock tuner circuit malfunction	▶Wireless door lock control receiver ▶Wire harness ▶Body ECU
B1243 (DI–1935)	GSW terminal circuit malfunction	▶Airbag sensor assembly ▶Wire harness ▶Body ECU
B1244 (DI–1937)	Light sensor circuit malfunction	▶Automatic light control sensor ▶Wire harness ▶Body ECU
B1262 (DI–1940)	A/C ECU communication stop	▶A/C ECU (Integration control and panel) ▶Wire harness ▶Body ECU
B1271 (DI–1943)	Combination meter ECU communication stop	▶Combination meter ▶Wire harness ▶Body ECU
B1272 (DI–1946)	Memory seat ECU communication stop (w/ Driving position memory)	▶Memory seat ECU & switch ▶Wire harness ▶Body ECU
B1273 (DI–1949)	Sliding roof ECU communication stop (w/ Sliding roof)	▶Sliding roof ECU ▶Wire harness ▶Body ECU
B1287 (DI–1952)	Back door ECU communication stop	▶Back door ECU ▶Wire harness ▶Body ECU

HINT:

- ▶ When either DTC B1214 or B1215 is output, a DTC for another ECU communication stop may also be output. In this case, perform troubleshooting for DTC B1214 or B1215 first. DTC B1214 or B1215 is output when a short to +B or short to ground occurs on a communication bus.
- ▶ DTCs from B1221 to B1241 do not indicate that the corresponding switch is abnormal. They notify how the switch is operating.
  If the corresponding DTC is not indicated when operating a switch, there is a problem with the switch contact.
  If a DTC is indicated when not operating switches, the corresponding switch is stuck.

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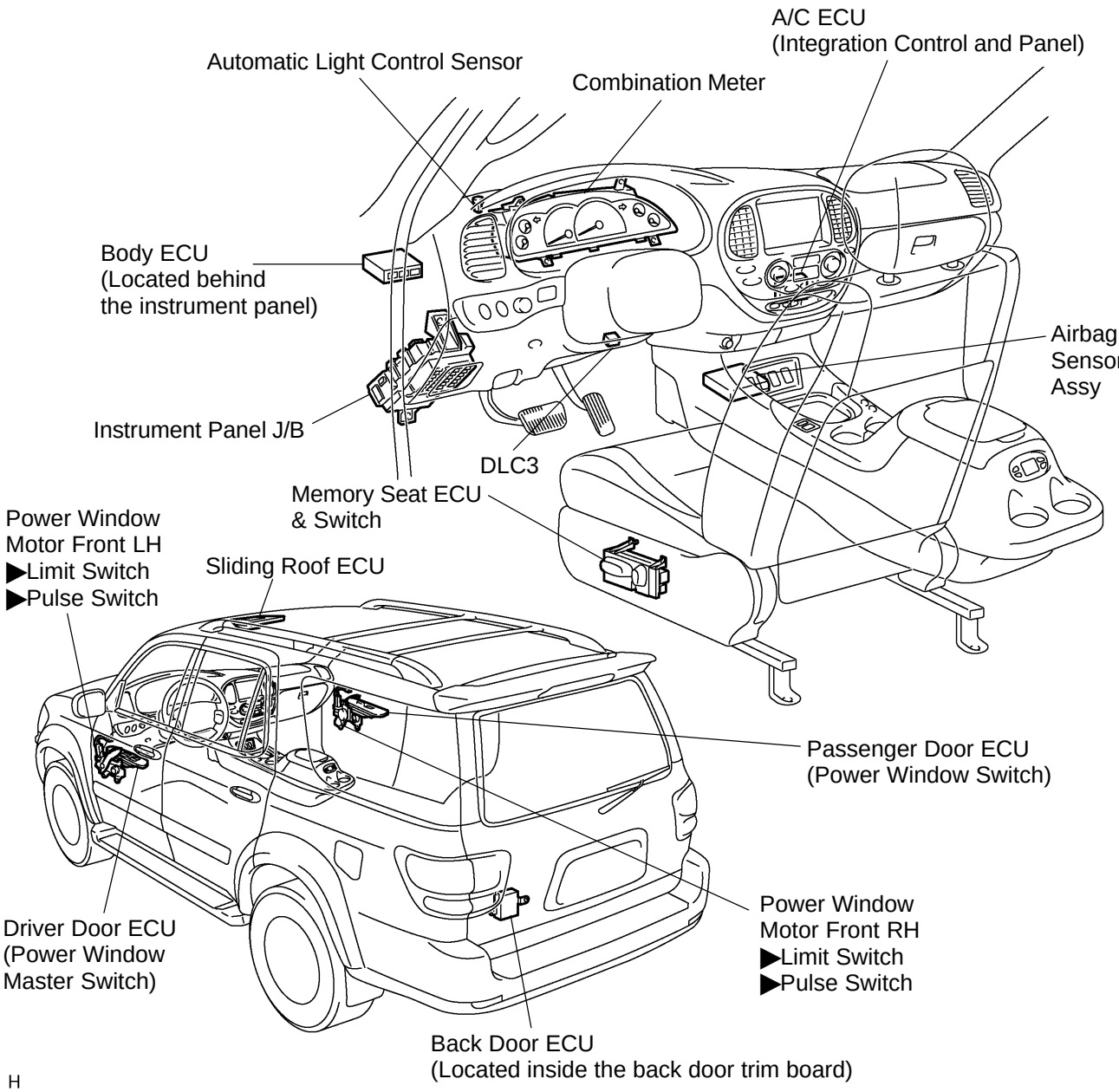
DI3IS–11

PARTS LOCATION



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DIDFB–01

CIRCUIT INSPECTION

DTC	B1211	Driver door ECU communication stop

CIRCUIT DESCRIPTION

This DTC is indicated when communication fails between the driver door ECU and body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B1211	No communication from driver door ECU for more than 10 seconds.	▶Driver door ECU ▶Wire harness ▶Body ECU

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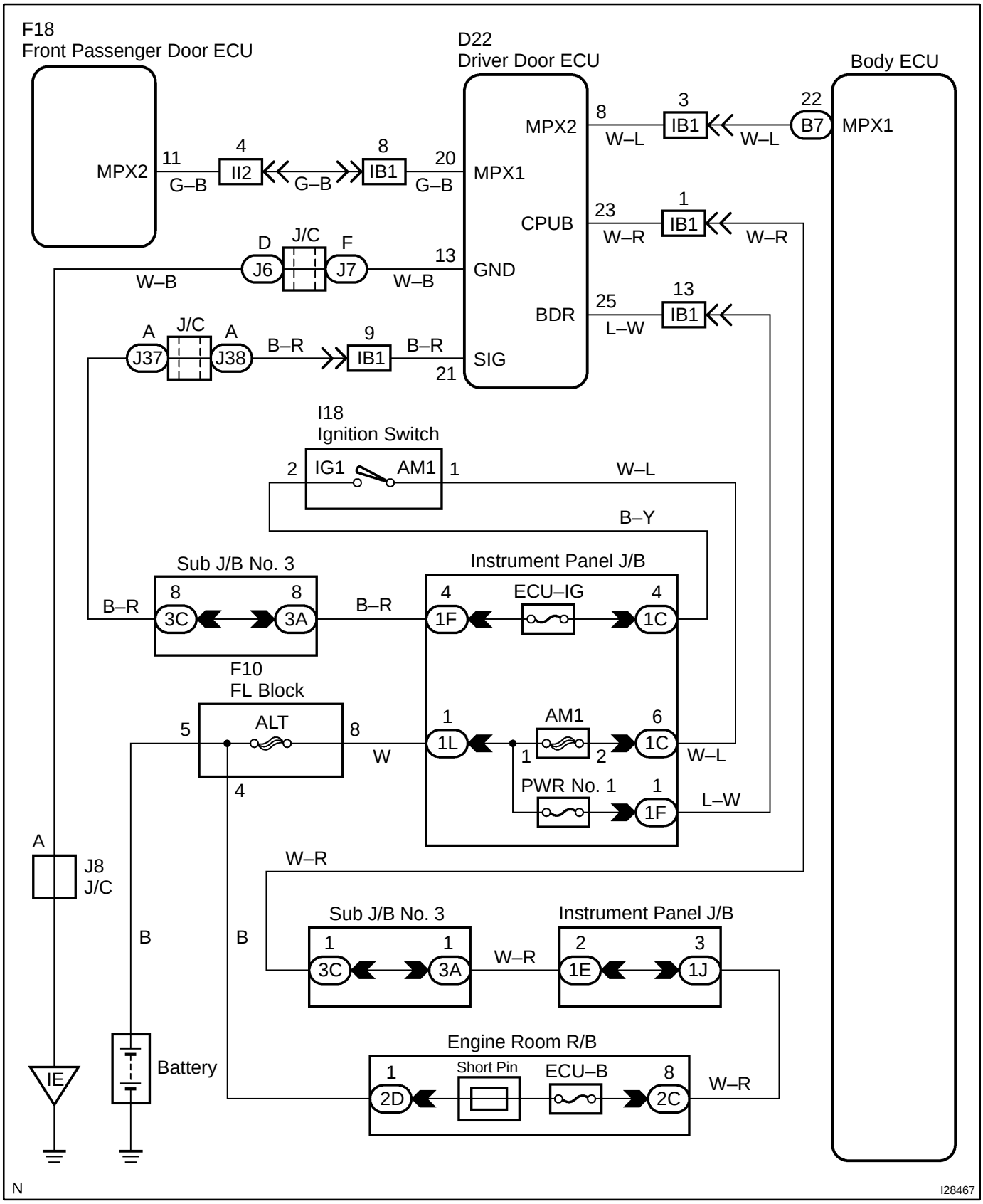
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check driver door ECU.**

CHECK:

Check if the driver door window glass auto up function operates normally through the power window master switch.

HINT:

With this inspection, the driver door ECU CPU can be diagnosed if it works normally or not.

OK:

Driver door side power window auto up function operates normally.

NG → **Go to power source circuit (See page DI–1788).**

OK ↓

2	**Check wire harness and connector (Driver door ECU – body ECU and driver door ECU – passenger door ECU).**

PREPARATION:

Disconnect connector ”B7” of the body ECU, ”D22” of the driver door ECU and ”F18” the passenger door ECU.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Symbols (Tester connection)	Condition	Specified condition
MPX1 (B7–22) – MPX2 (D22–8)	Always	Below 1 Ω
MPX1 (D22–20) – MPX2 (F18–11)	Always	Below 1 Ω
MPX1 (B7–22) – Body ground	Always	10 kΩ or higher
MPX1 (D22–20) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness.**

OK ↓

Replace the driver door ECU.

If the problem reoccurs even after replacement, replace the body ECU.

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DIDFC–01

DTC	B1212	Front passenger door ECU communication stop

CIRCUIT DESCRIPTION

This DTC is indicated when communication fails between the passenger door ECU and body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B1212	No communication from passenger door ECU for more than 10 seconds.	▶Passenger door ECU ▶Wire harness ▶Body ECU

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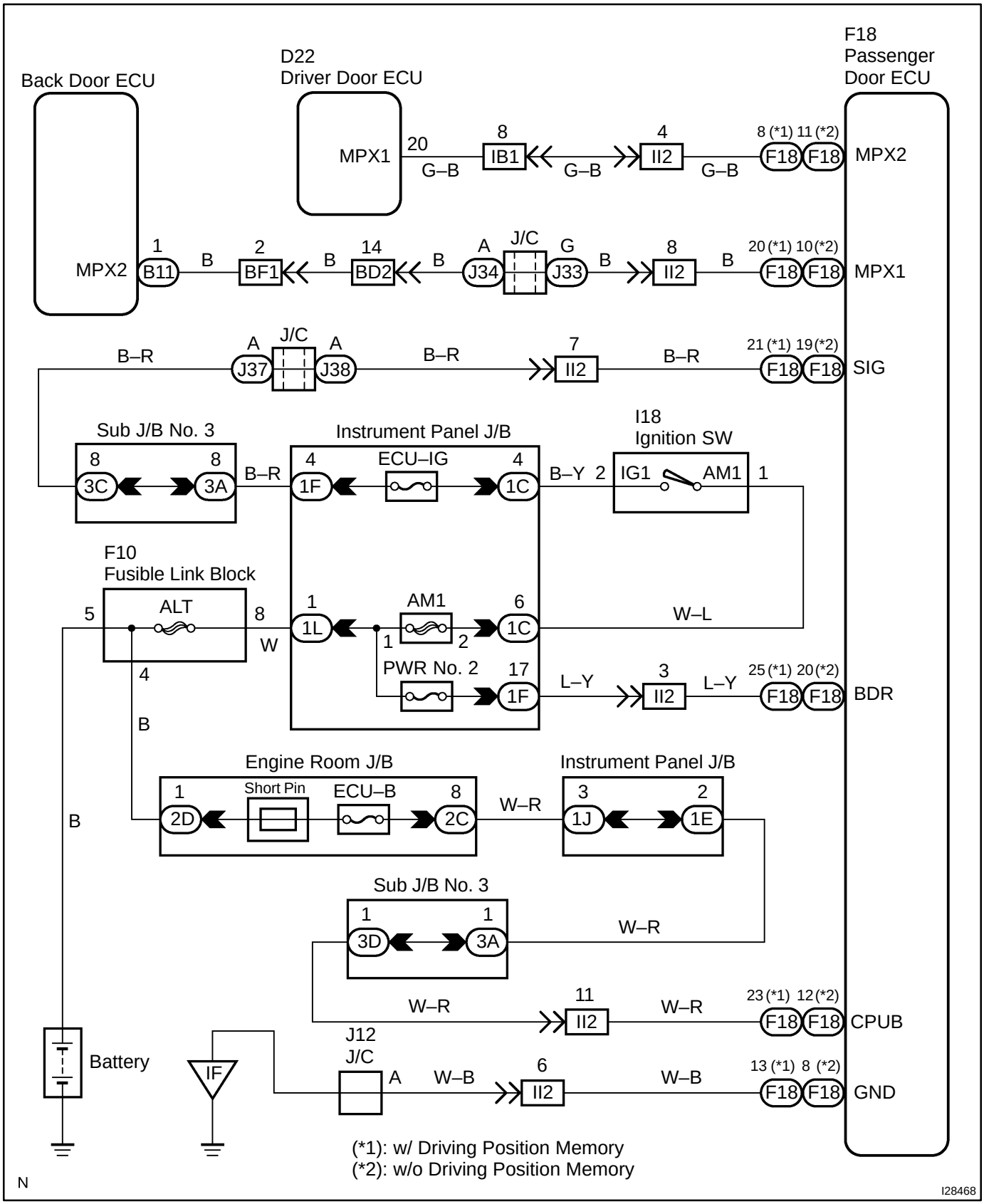
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check passenger door ECU.**

CHECK:

Check if the passenger door window glass auto up function operates normally through the front passenger door window switch.

HINT:

With this inspection, the passenger door ECU CPU can be diagnosed if it works normally or not.

OK:

Front passenger side power window auto up function operates normally.

NG → **Go to power source circuit (See page DI–1826).**

OK

2	**Check wire harness and connector (Passenger door ECU – driver door ECU, back door ECU).**

PREPARATION:

Disconnect connector ”D22” of the driver door ECU, ”F18” of the passenger door ECU and ”B11” of the back door ECU.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Symbols (Tester connection)	Condition	Specified condition
MPX1 (D22–20) – MPX2 (F18–8) (*1)	Always	Below 1 Ω
MPX1 (D22–20) – MPX2 (F18–11) (*2)	Always	Below 1 Ω
MPX2 (B11–1) – MPX1 (F18–20) (*1)	Always	Below 1 Ω
MPX2 (B11–1) – MPX1 (F18–10) (*2)	Always	Below 1 Ω
MPX1 (D22–20) – Body ground	Always	10 kΩ or higher
MPX1 (B11–1) – Body ground	Always	10 kΩ or higher

*1: w/ Driving Position Memory

*2: w/o Driving Position Memory

NG → **Repair or replace wire harness.**

OK

Replace the passenger door ECU.

If the problem reoccurs even after replacement, replace the body ECU.

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DI94Y–07

DTC	B1214	Communication bus malfunction (Short to B+)

DTC	B1215	Communication bus malfunction (Short to ground)

CIRCUIT DESCRIPTION

DTC B1214 or B1215 is detected when a short to +B or short to ground occurs on the multiplex communication bus (BEAN). Detecting this condition will disable the multiplex communication bus (BEAN) and output the corresponding DTC.

DTC NO.	DTC detecting condition	Trouble area
B1214	Short to B+ in multiplex communication system communication circuit	▶Driver door ECU ▶Passenger door ECU ▶Back door ECU ▶A/C ECU (Integration control panel) ▶Combination meter ▶Memory seat ECU & switch ▶Wire harness ▶Body ECU
B1215	Short to ground in multiplex communication system communication circuit	▶Driver door ECU ▶Passenger door ECU ▶Back door ECU ▶A/C ECU (Integration control panel) ▶Combination meter ▶Memory seat ECU & switch ▶Wire harness ▶Body ECU

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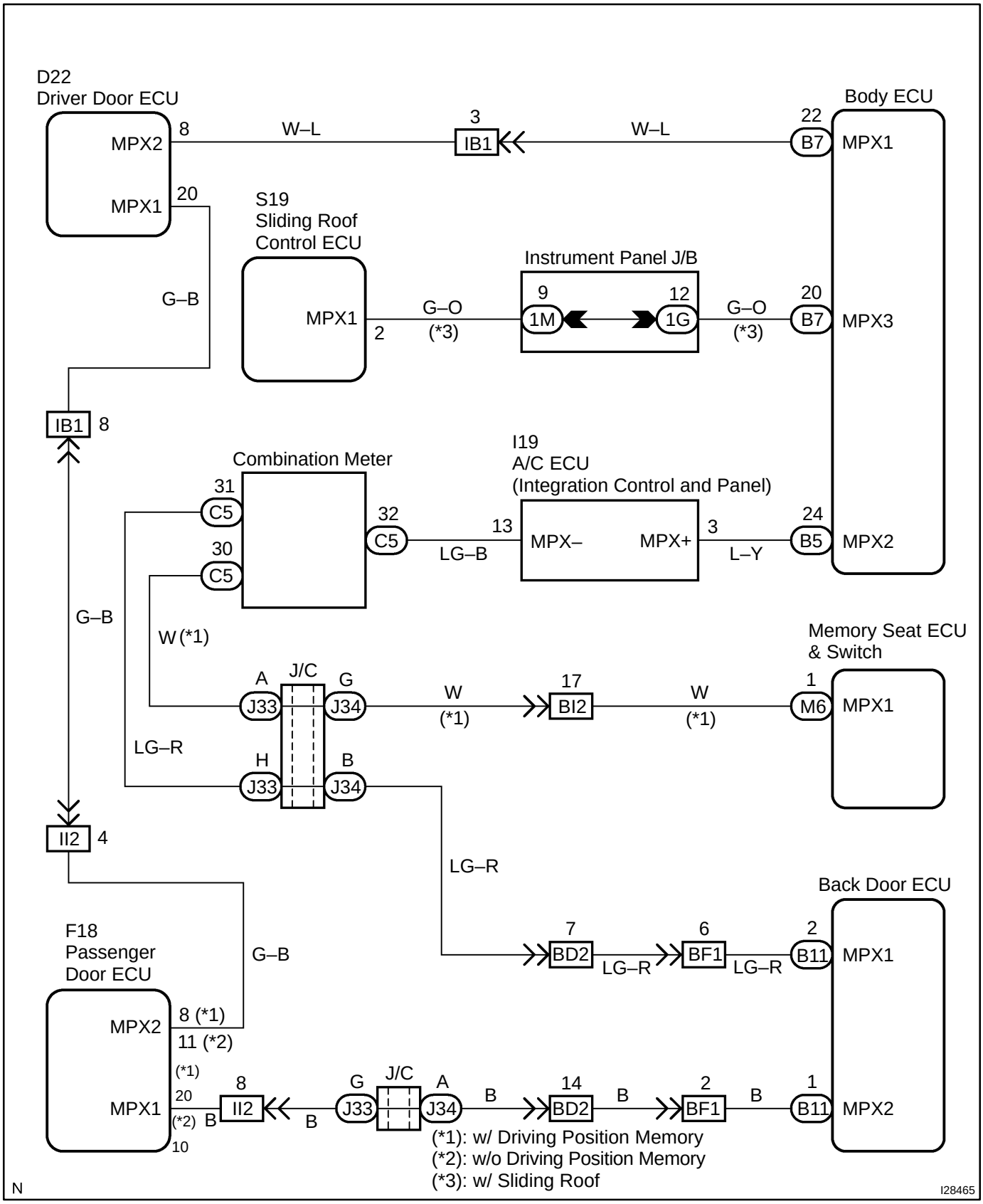
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check apparatus.**

CHECK:

Choose the apparatus to be inspected.

Apparatus	Go to step
w/ Sliding roof	A
w/o Sliding roof	B

B → **Go to step 4.**

A

2	**Check the communication circuit inside the sliding roof control ECU.**

PREPARATION:

Disconnect connector ”S19” of the sliding roof control ECU.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK → **Replace sliding roof control ECU.**

NG

3	**Check for a short circuit between the sliding control ECU and body ECU.**

PREPARATION:

(a) Reconnect connector ”S19” of the sliding roof control ECU (only vehicles w/ sliding roof).

(b) Disconnect connector ”B7” of the body ECU.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

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OK	Repair or replace the wire harness between the sliding roof control ECU and body ECU.

NG

4	Check the communication circuit inside the driver door ECU.

PREPARATION:

(a) Reconnect connector ”B7” of the body ECU (only vehicles w/ sliding roof).

(b) Disconnect connector ”D22” of the driver door ECU.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK	Replace the driver door ECU.

NG

5	Check the communication circuit inside the front passenger door ECU.

PREPARATION:

(a) Reconnect connector ”D22” of the driver door ECU.

(b) Disconnect connector ”F18” of the front passenger door ECU.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK	Replace the front passenger door ECU.

NG

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6	**Check for a short circuit between the driver door ECU and front passenger door ECU.**

PREPARATION:
Disconnect connector ”D22” of the driver door ECU.
CHECK:
Check the DTC (See page DI–1904).
OK:
DTCs B1214 and/or B1215 are not indicated.
HINT:
Ignore any codes other than DTCs B1214 and B1215.

OK → **Repair or replace the wire harness between the driver door ECU and front passenger door ECU.**

NG

7	**Check communication circuit inside the back door ECU.**

PREPARATION:
(a) Reconnect connector ”D22” of the driver door ECU.
(b) Reconnect connector ”F18” of the passenger door ECU.
(c) Disconnect connector ”B11” of the back door ECU.
CHECK:
Check the DTC (See page DI–1904).
OK:
DTCs B1214 and/or B1215 are not indicated.
HINT:
Ignore any codes other than DTCs B1214 and B1215.

OK → **Replace the back door ECU.**

NG

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8	**Check for a short circuit between the front passenger door ECU and back door ECU.**

PREPARATION:

Disconnect connector ”F18” of the front passenger door ECU.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK	**Repair or replace the wire harness between the front passenger door ECU and back door ECU.**

NG

9	**Check the communication circuit inside the integration control and panel.**

PREPARATION:

(a) Reconnect connector ”F18” of the passenger door ECU.

(b) Reconnect connector ”B11” of the back door ECU.

(c) Disconnect connector ”I19” of the integration control and panel.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK	**Replace the integration control and panel.**

NG

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10	**Check for a short circuit between the integration control and the panel and the body ECU.**

PREPARATION:

Disconnect connector ”B5” of the body ECU.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK → **Repair or replace the wire harness between the integration control and panel and the body ECU.**

NG

11	**Check apparatus.**

CHECK:

Choose the apparatus to be inspected.

Apparatus	Go to step
w/ Driving position memory	A
w/o Driving position memory	B

B → **Go to step 14.**

A

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12	Check the communication circuit inside the memory seat ECU & switch.

PREPARATION:

(a) Reconnect connector ”I19” of the integration control and panel.
(b) Reconnect connector ”B5” of the body ECU.
(c) Disconnect connector ”M6” of the memory seat ECU & switch.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK → **Replace the memory seat ECU & switch.**

NG

13	Check for a short circuit between the memory seat ECU and switch & combination meter.

PREPARATION:

Disconnect connector ”C5” of the combination meter.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbols (Tester connection)	Condition	Specified condition
MPX1 (M6–1) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace the wire harness between the memory seat ECU & switch and combination meter.**

OK

Dardoor.com

14	**Check the communication circuit inside the combination meter ECU.**

PREPARATION:

(a) Reconnect connector ”M6” of the memory seat ECU & switch (only vehicles w/ driving position memory).
(b) Reconnect connector ”I19” of the integration control and panel (only vehicles w/o driving position memory).
(c) Reconnect connector ”B5” of the body ECU (only vehicles w/o driving position memory).
(d) Disconnect connector ”C5” of the combination meter ECU (only vehicles w/o driving position memory).

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK	**Replace the combination meter ECU.**

NG

15	**Check for a short circuit between the combination meter ECU and back door ECU.**

PREPARATION:

Disconnect connector ”B11” of the back door ECU.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK	**Repair or replace the wire harness between the combination meter ECU and back door ECU.**

NG

Dardoor.com

16	**Check for a short circuit between the combination meter and the integration control and panel.**

PREPARATION:

(a) Reconnect connector ”B11” of the back door ECU.

(b) Disconnect connector ”I19” of the integration control and panel.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK → **Repair or replace the wire harness between the combination meter and the integration control and panel.**

NG

17	**Check for a short circuit between the body ECU and driver door ECU.**

PREPARATION:

(a) Reconnect connector ”I19” of the integration control and panel.

(b) Reconnect connector ”C5” of the combination meter.

(c) Disconnect connector ”D22” of the driver door ECU.

(d) Disconnect connector ”B6” of the body ECU.

CHECK:

Check the DTC (See page DI–1904).

OK:

DTCs B1214 and/or B1215 are not indicated.

HINT:

Ignore any codes other than DTCs B1214 and B1215.

OK → **Repair or replace the wire harness between the body ECU and driver door ECU.**

NG

Replace the body ECU.

Dardoor.com

DTC	B1221	Power window switch circuit on driver door

CIRCUIT DESCRIPTION

This DTC is output only if the power window master switch AUTO UP/DOWN operation is performed.
If the DTC is not output, the following may be malfunctioning:

DTC No.	DTC Detecting Condition	Trouble Area
B1221	Does not operate either of the power window master switch (except window lock switch)	▶Power window master switch (Built in driver door ECU) ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1782.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DIDFD–01

DTC	B1222	Door lock switch circuit on driver door

CIRCUIT DESCRIPTION

This DTC is output while the body ECU senses the door unlock state through the door unlock detection switch, which is built into the door lock motor.
If the DTC is not output, the following may be malfunctioning:

DTC No.	DTC Detecting Condition	Trouble Area
B1222	Does not operate door key lock and unlock switch	▶Door lock control switch front LH (Built in driver door ECU) ▶Door unlock detection switch front LH ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1782.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DTC	B1223	Power window switch circuit on passenger door

CIRCUIT DESCRIPTION

This DTC is output only if the power window switch AUTO UP/DOWN operation is performed.
If the DTC is not output, the following may be malfunctioning:

DTC No.	DTC Detecting Condition	Trouble Area
B1223	Does not operate power window switch or door lock control	▶Power window switch (Built in passenger door ECU) ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1818.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DIDFF–01

DTC	B1224	Door lock switch circuit on passenger door

CIRCUIT DESCRIPTION

This DTC is output while the body ECU senses the door lock state through the door unlock detection switch, which is built into the door lock motor.
If the DTC is output, the following may be malfunctioning:

DTC No.	DTC Detecting Condition	Trouble Area
B1224	Does not operate door key lock and unlock switch	▶Door lock control switch front RH (Built in passenger door ECU) ▶Door unlock detection switch front RH ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1818.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DTC	B1231	Jam protection limit switch circuit on driver door

CIRCUIT DESCRIPTION

This DTC is output while the body ECU senses the limit position through the limit switch, which is built into the power window motor.
If the DTC is not output, the following may be malfunctioning:

DTC No.	DTC Detection Condition	Trouble Area
B1231	No change in limit switch position for more than 2.0 seconds even if moving the glass down when limit switch is OFF (window glass is fully closed)	▶Limit switch (Built in power window motor) ▶Driver door ECU ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1782.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DTC	B1232	Jam protection pulse switch circuit on driver door

CIRCUIT DESCRIPTION

This DTC is output while the body ECU senses switch position information through the pulse switch, which is built into the power window motor.
If the DTC is not output when the power window operates, the following may be malfunctioning:

DTC No.	DTC Detecting Condition	Trouble Area
B1232	No change in pulse switch position information for more than 2.0 seconds even if moving the glass down when limit switch is OFF (window glass is fully closed).	▶Pulse switch (Built in power window motor) ▶Driver door ECU ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1782.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DIDFG–01

DTC	B1233	Jam protection limit switch circuit on passenger door

CIRCUIT DESCRIPTION

This DTC is output while the body ECU senses the limit position through the limit switch, which is built into the power window motor.
If the DTC is not output, the following may be malfunctioning:

DTC No.	DTC Detection Condition	Trouble Area
B1233	No change in limit switch position for more than 2.0 seconds even if moving the glass down when limit switch is OFF (window glass is fully closed)	▶Limit switch (Built in power window motor) ▶Passenger door ECU ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1818.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DTC	B1234	Jam protection pulse switch circuit on passenger door

CIRCUIT DESCRIPTION

This DTC is output while the body ECU senses switch position information through the pulse switch, which is built into the power window motor.
If the DTC is not output when the power window operates, the following may be malfunctioning:

DTC No.	DTC Detecting Condition	Trouble Area
B1234	No change in pulse switch position information for more than 2.0 seconds even if moving the glass down when limit switch is OFF (window glass is fully closed).	▶Pulse switch (Built in power window motor) ▶Passenger door ECU ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1818.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DI637–05

DTC	B1241	Body ECU switch circuit diagnosis

CIRCUIT DESCRIPTION

This DTC notifies how the switch works as follows:
If the DTC is not indicated when operating the back door power window switch or rear wiper and washer switch, it means failure of switch contact. If the DTC is indicated when not operating the back door power window switch or rear wiper and washer switch, it means the switch is stick. When something wrong is found by this diagnosis, inspect each switch. Replace the switch if there is a problem, or check the wire harness if there is no problem.

DTC No.	DTC Detecting Condition	Trouble Area
B1241	Back door power window switch and rear wiper and washer switch operate normally.	▶Back door power window switch ▶Rear wiper and washer switch ▶Wire harness ▶Body ECU

HINT:
For details of inspection, see page DI–1686.
If the problem reoccurs even after replacement, replace the body ECU.

Dardoor.com

DI638–10

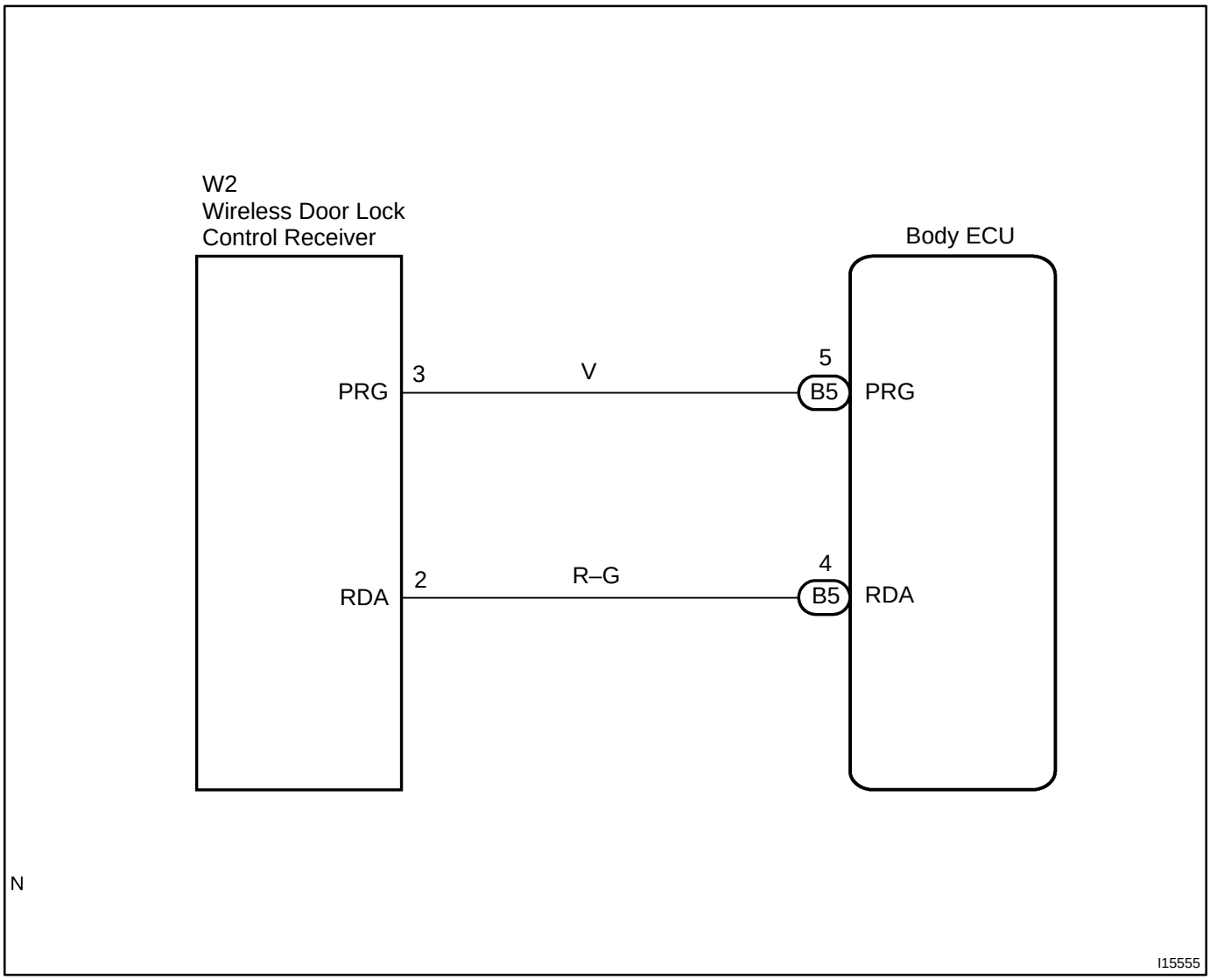
DTC	B1242	Wireless door lock tuner circuit malfunction

CIRCUIT DESCRIPTION

This DTC is indicated when ground short of the RDA terminal is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1242	Ground short of RDA circuit	▶Wireless door lock control receiver ▶Wire harness ▶Body ECU

WIRING DIAGRAM



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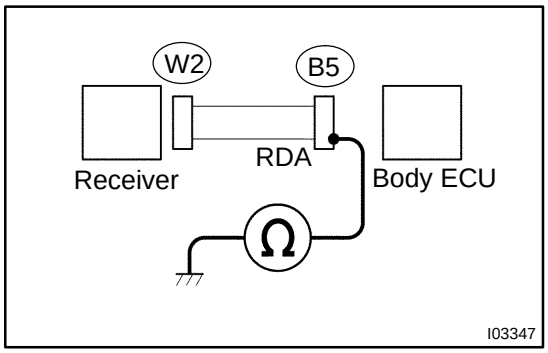
INSPECTION PROCEDURE

1	Check wire harness and connector (Wireless door lock control receiver – body ECU).



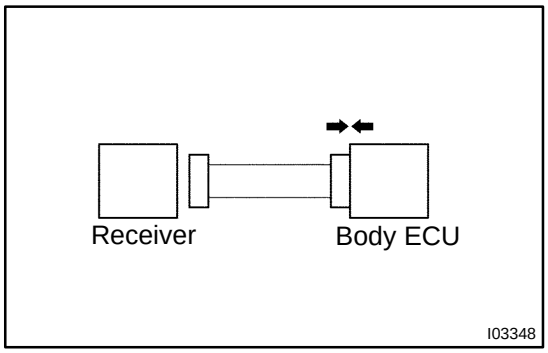
PREPARATION:
Disconnect the receiver and body ECU connectors.
CHECK:
Measure the resistance according to the value(s) in the table below.
OK:

Tester connection (Symbol)	Condition	Specification
B5–4 (RDA) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace the wire harness.**

OK

2	Check body ECU.



PREPARATION:
Reconnect the body ECU connector.
CHECK:
Check the DTC (See page DI–1904).
OK:
DTC B1242 is not indicated.
HINT:
Ignore any codes other than DTC B1242.

NG → **Replace the body ECU.**

OK

Replace the wireless door lock control receiver.

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DI1T3–09

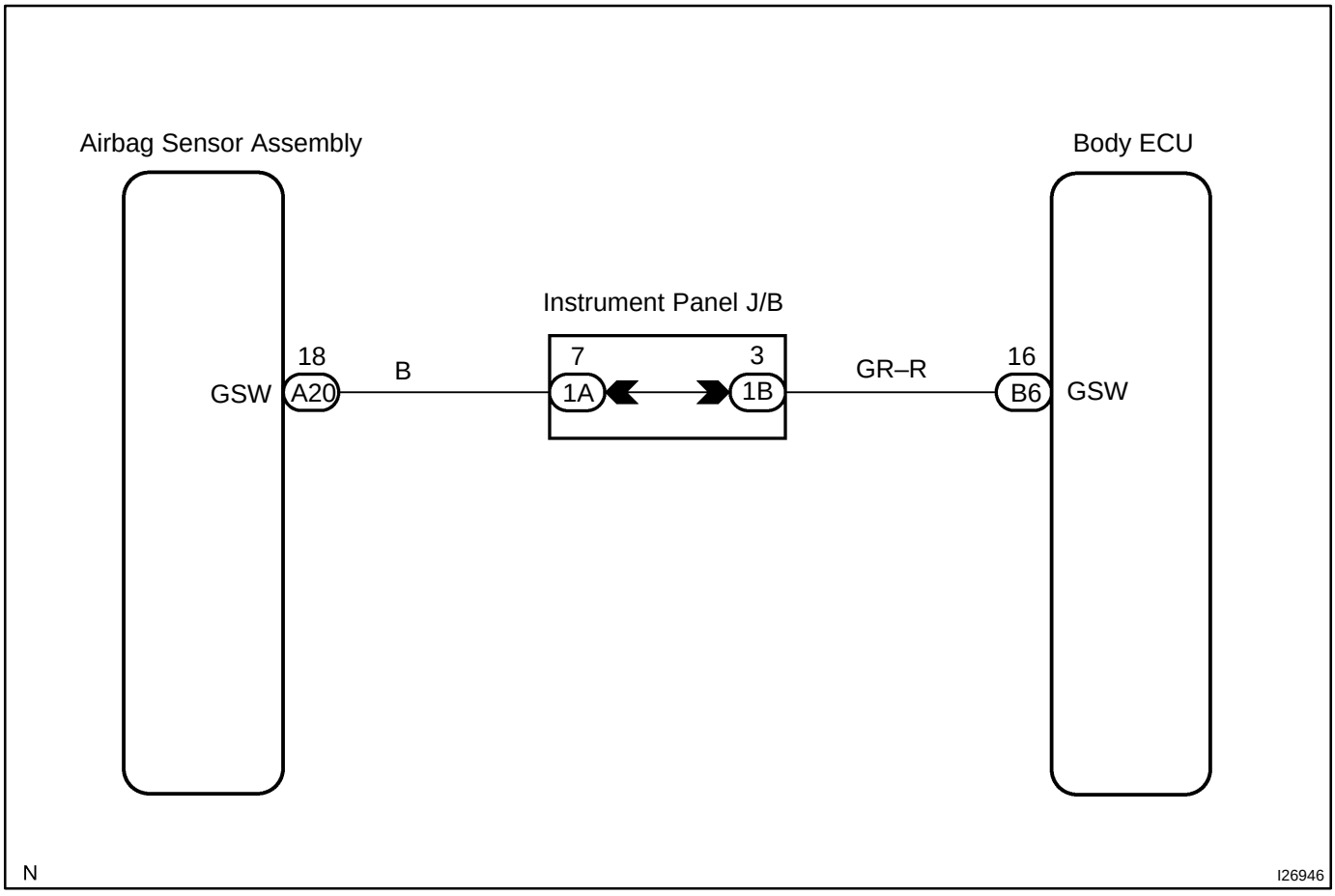
DTC	B1243	GSW terminal circuit malfunction

CIRCUIT DESCRIPTION

This DTC is indicated when open or ground short of the GSW terminal is detected.

DTC No.	DTC Detection Condition	Trouble Area
B1243	Open or ground short of GSW circuit	▶Airbag sensor assembly ▶Wire harness ▶Body ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check for open and short in wire harness and connector between body ECU and airbag sensor assembly.**

PREPARATION:
Disconnect connector ”A20” of the airbag sensor assembly and connector ”B6” of the body ECU.
CHECK:
Check for an open or short circuit in the harness and connector between the airbag sensor assembly and body ECU.
OK:

There is no open or short circuit in the wire harness.

NG → **Repair or replace wire harness or connector.**

OK

2	**Check the body ECU.**

PREPARATION:
Check that DTC B1243 is indicated when another body ECU in good condition is installed.
CHECK:
Check if DTC B1243 is indicated after replacing the body ECU.
OK:

DTCs B1243 is not indicated.

NG → **Replace the airbag sensor assembly.**

OK

Replace the body ECU (Original body ECU is failure).

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DI639–08

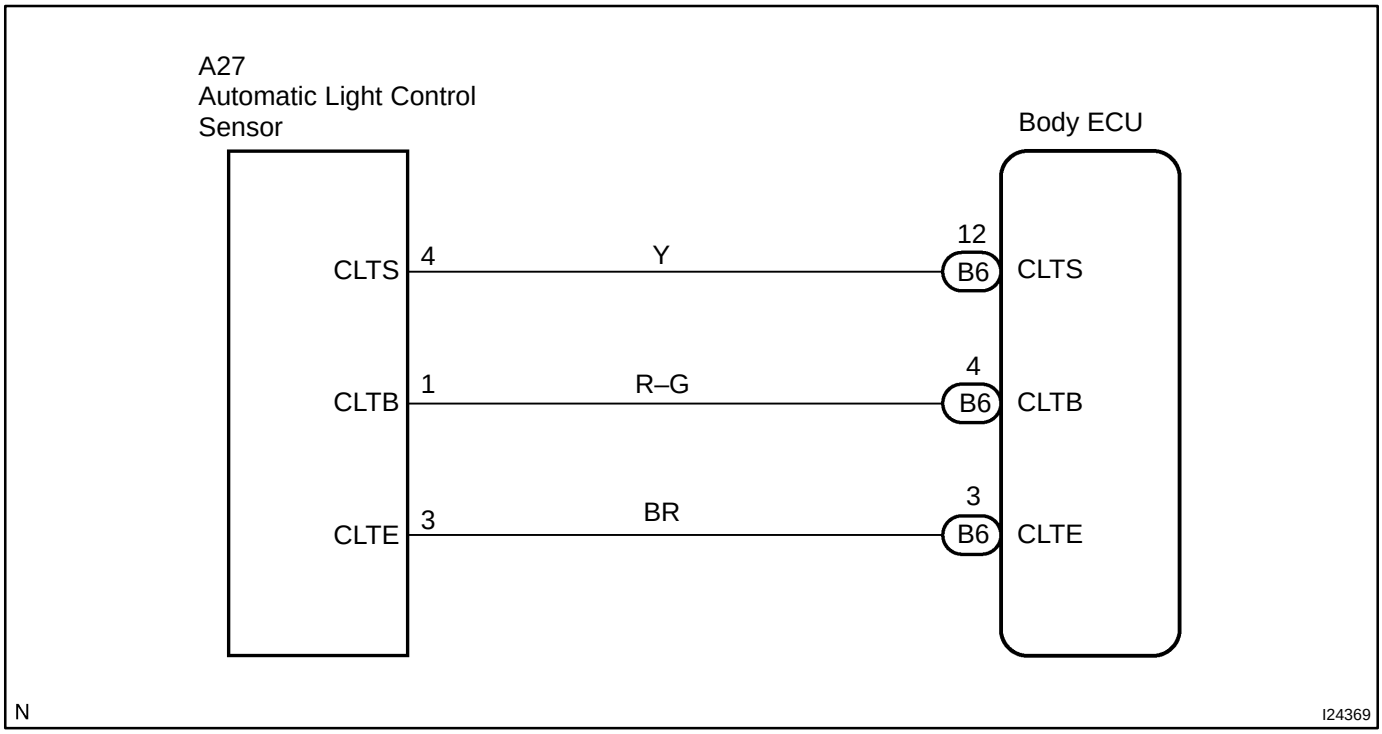
DTC	B1244	Light sensor circuit malfunction

CIRCUIT DESCRIPTION

This DTC is indicated when failure of the light sensor circuit is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1244	▶Malfunction of automatic light control sensor ▶Open or short in automatic light control sensor circuit	▶Automatic light control sensor ▶Wire harness ▶Body ECU

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check automatic light control sensor.**

Using hand–held tester:

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and hand–held tester main switch ON.

BODY ECU:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
ILLUMINATE RATE	Illumination rate information/ MIN: 0 MAX: 99.99	Condition value will be displayed	Normal value: 0.8 ms to 22.0 ms

CHECK:

The value of the illumination rate should change in the following range when the light sensor is exposed to the light or covered by a hand.

OK:

0.8 ms to 22.0 ms

HINT:

This is the time to be taken for the light sensor to generate one cycle of frequency according to the brightness.

When not using hand–held tester (See page BE–27):

NG → **Replace the automatic light control sensor.**

OK

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2	**Check wire harness and connector between automatic light control sensor and body ECU.**

PREPARATION:

Disconnect connector ”A27” of the automatic light control sensor and connector ”B6” of the body ECU.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Tester connection (Symbols)	Condition	Specified condition
A27–4 – B6–12 (CLTS)	Always	Below 1 Ω
A27–1 – B6–4 (CLTB)	Always	Below 1 Ω
A27–3 – B6–3 (CLTE)	Always	Below 1 Ω
A27–4 – Body ground	Always	10 kΩ or higher
A27–1 – Body ground	Always	10 kΩ or higher
A27–3 – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness or connector.**

OK

Replace the body ECU.

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DIDFI–01

DTC	B1262	A/C ECU communication stop

CIRCUIT DESCRIPTION

This DTC is indicated when communication fails between the integration control and panel and the body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B1262	No communication from integration control and panel for more than 10 seconds.	▶A/C ECU (Integration control and panel) ▶Wire harness ▶Body ECU

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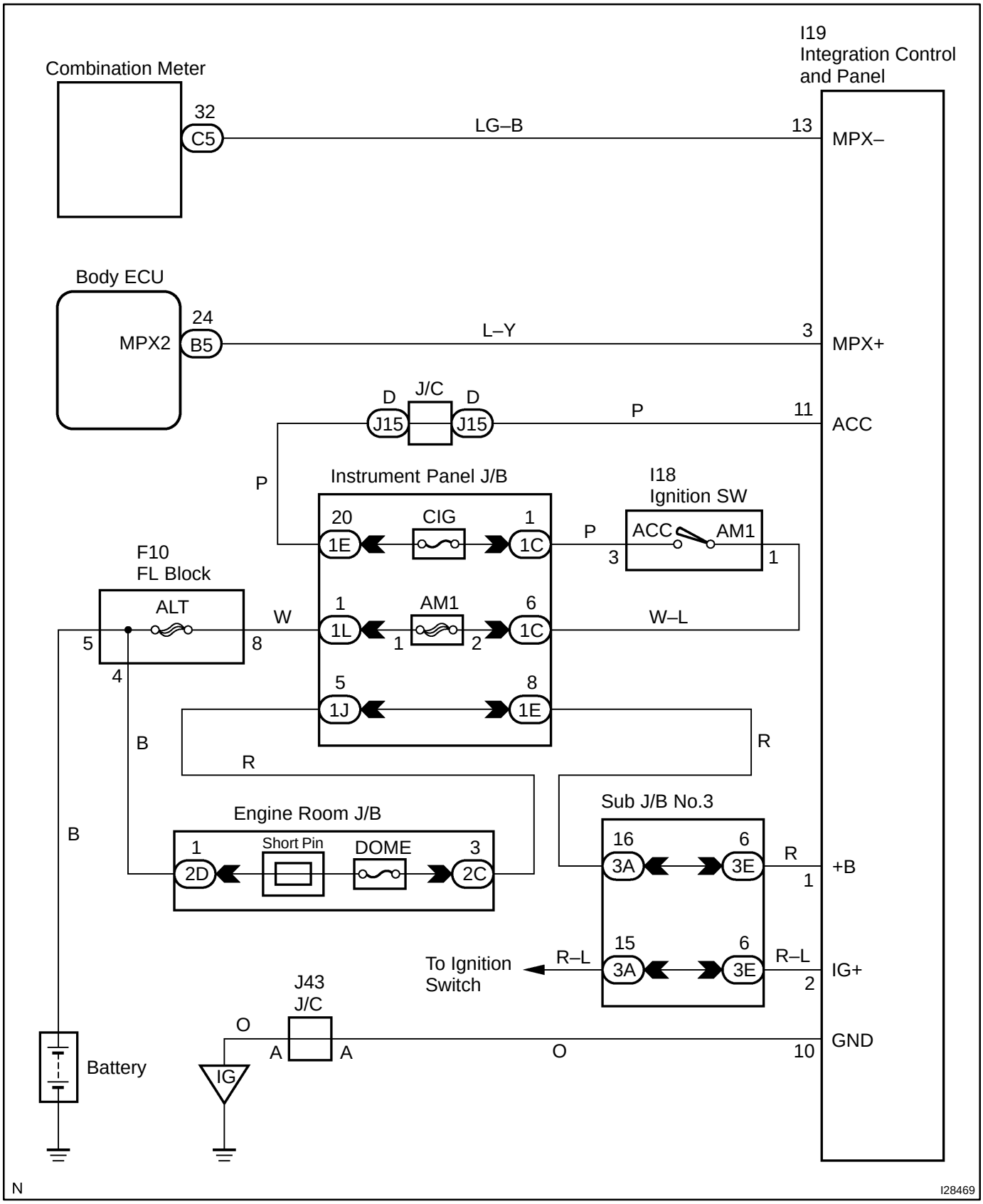
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check air conditioning system.**

CHECK:

Check the operation of the air conditioning system.

OK:

The air conditioning system operates normally.

NG → **Go to air conditioning system (See page DI–2301).**

OK ↓

2	**Check wire harness (Integration control and panel – combination meter, integration control and panel – body ECU).**

PREPARATION:

Disconnect connector ”B5” of the body ECU connector, ”I19” of the integration control and panel and connector ”C5” of the combination meter.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Tester connection (Symbols)	Condition	Specified condition
C5–32 – I19–13 (MPX–)	Always	Below 1 Ω
B5–24 (MPX2) – I19–3 (MPX+)	Always	Below 1 Ω
C5–32 – Body ground	Always	10 kΩ or higher
B5–24 (MPX2) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness.**

OK ↓

Replace integration control and panel.

If the problem recurs even after replacement, replace the body ECU.

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DIDFJ–01

DTC	B1271	Combination meter ECU communication stop

CIRCUIT DESCRIPTION

This DTC is indicated when communication fails between the combination meter and body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B1271	No communication from combination meter for more than 10 seconds.	▶Combination meter ▶Wire harness ▶Body ECU

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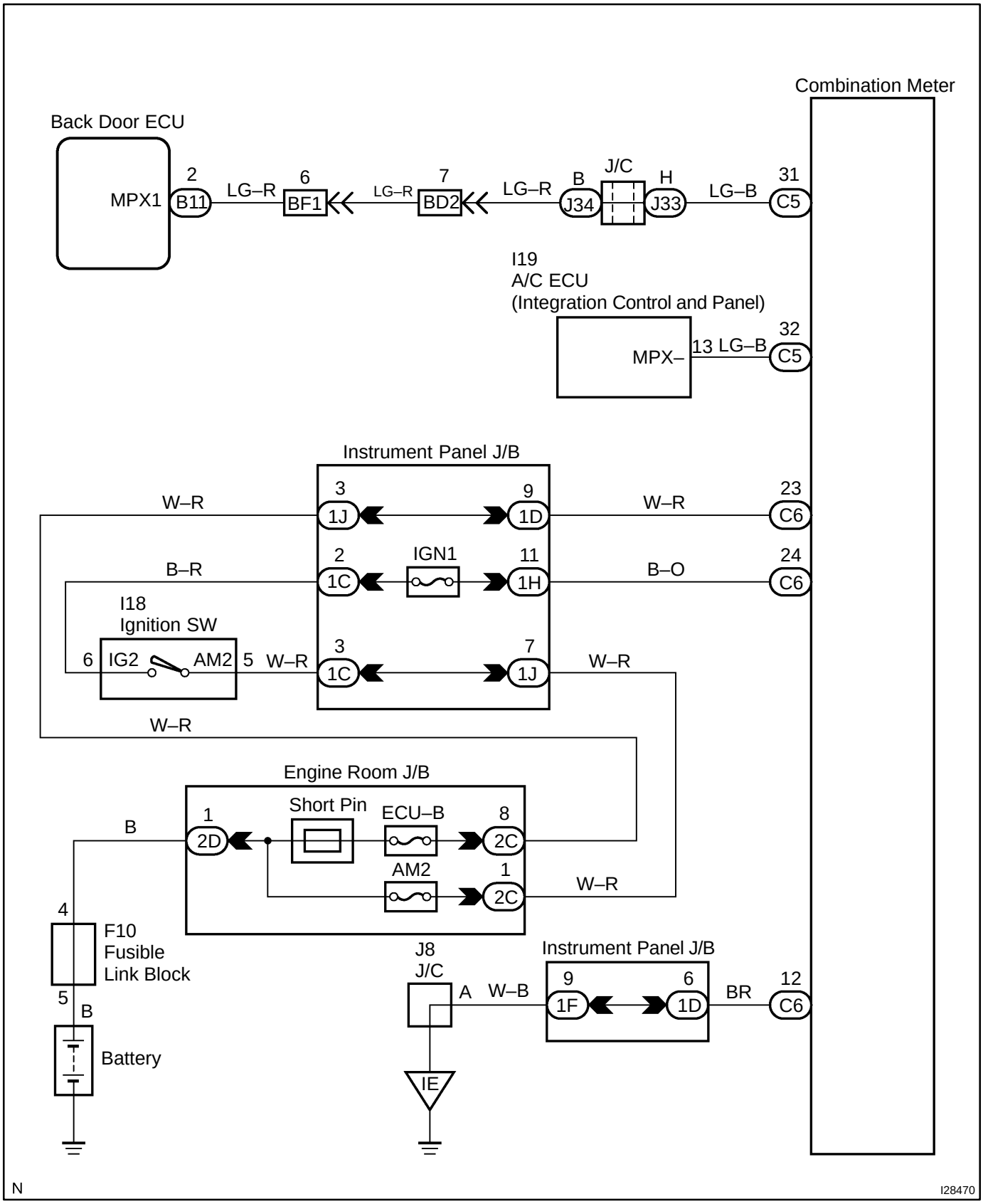
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check combination meter.**

CHECK:

Start the engine and check that the speed meter and tachometer operate normally.

HINT:

With this inspection, the combination meter CPU can be diagnosed if it works normally or not.

OK:

Speed meter and tachometer operate normally.

NG → **Go to combination system (See page DI–1610).**

OK

2	**Check wire harness and connector (Combination meter – back door ECU, combination meter – integration control and panel).**

PREPARATION:

Disconnect connector ”B11” of the back door ECU, connector ”C5” of the combination meter and connector ”I19” of the integration control and panel.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Tester connection (Symbols)	Condition	Specified condition
B11–2 (MPX1) – C5–31	Always	Below 1 Ω
I19–13 (MPX–) – C5–32	Always	Below 1 Ω
B11–2 (MPX1) – Body ground	Always	10 kΩ or higher
I19–13 (MPX–) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness.**

OK

Replace the combination meter.

If the problem recurs even after replacement, replace the body ECU.

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DIDFK–01

DTC	B1272	Memory seat ECU communication stop (w/ Driving position memory)

CIRCUIT DESCRIPTION

This DTC is indicated when communication fails between the memory seat ECU & switch and body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B1272	No communication from memory seat ECU & switch for more than 10 seconds.	▶Memory seat ECU & switch ▶Wire harness ▶Body ECU

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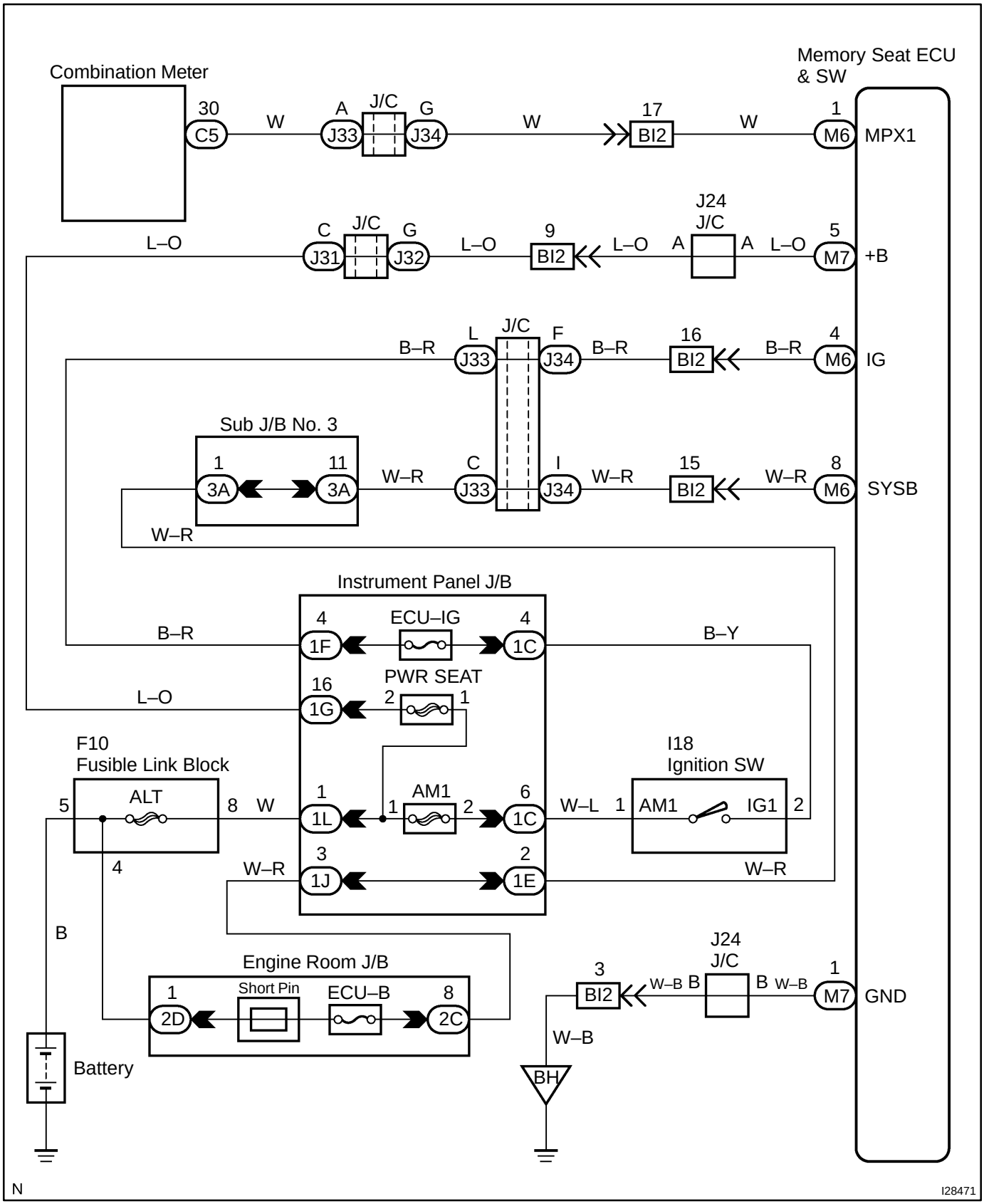
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check power seat control system (w/ driving position memory).**

CHECK:

Check the operation of the power seat.

OK:

The power seat control system operates normally.

NG → **Go to power source circuit (See page DI–1514).**

OK ↓

2	**Check wire harness (Memory seat ECU & switch – combination meter).**

PREPARATION:

Disconnect connector ”M6” of the memory seat ECU and ”C5” of the combination meter.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Tester connection (Symbols)	Condition	Specified condition
M6–1 (MPX1) – C5–30	Always	Below 1 Ω
M6–1 (MPX1) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness or connector.**

OK ↓

Replace memory seat ECU & switch.

If the problem recurs even after replacement, replace the body ECU.

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DIDFL–01

DTC	B1273	Sliding roof ECU communication stop (w/ Sliding roof)

CIRCUIT DESCRIPTION

This DTC is indicated when communication fails between the sliding roof ECU and body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B1273	No communication from sliding roof ECU for more than 10 seconds.	▶Sliding roof ECU ▶Wire harness ▶Body ECU

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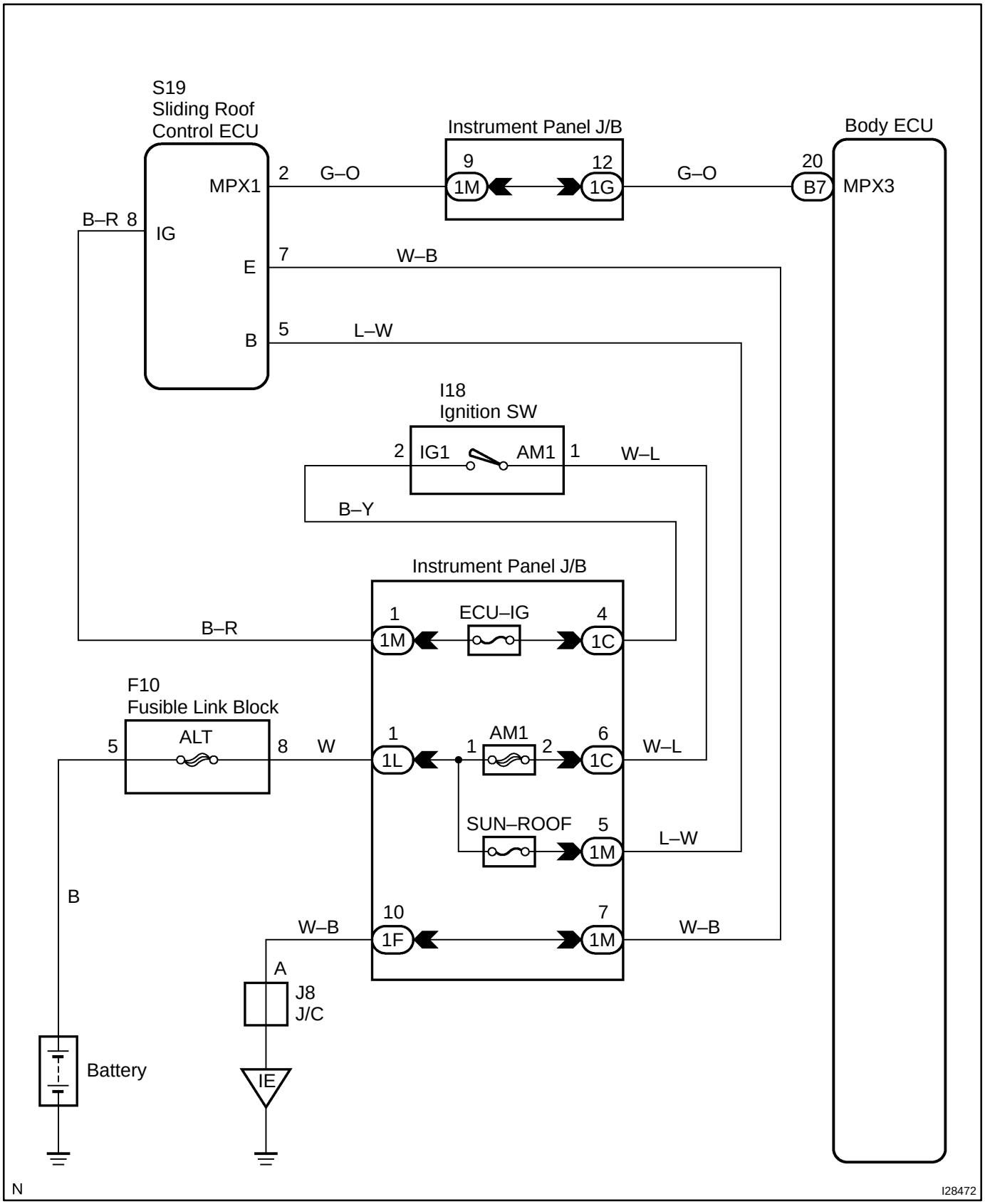
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check sliding roof ECU.**

CHECK:

Check that the operation of the sliding roof function is normal.

HINT:

The operating condition of the sliding roof ECU CPU can be diagnosed with this check.

OK:

The sliding roof operates normally.

NG → **Go to power source circuit (See page DI–1668).**

OK

2	**Check wire harness and connector (Sliding roof control ECU – body ECU).**

PREPARATION:

Disconnect connector ”B7” of the body ECU and connector ”S19” of the sliding roof ECU.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Tester connection (Symbols)	Condition	Specified condition
S19–2 (MPX1) – B7–20 (MPX3)	Always	Below 1 Ω
S19–2 (MPX1) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness.**

OK

Replace the sliding roof ECU.

If the problem recurs even after replacement, replace the body ECU.

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DIDFM–01

DTC	B1287	Back door ECU communication stop

CIRCUIT DESCRIPTION

This DTC is indicated when communication fails between the back door ECU and body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B1287	No communication from back door ECU for more than 10 seconds.	▶Back door ECU ▶Wire harness ▶Body ECU

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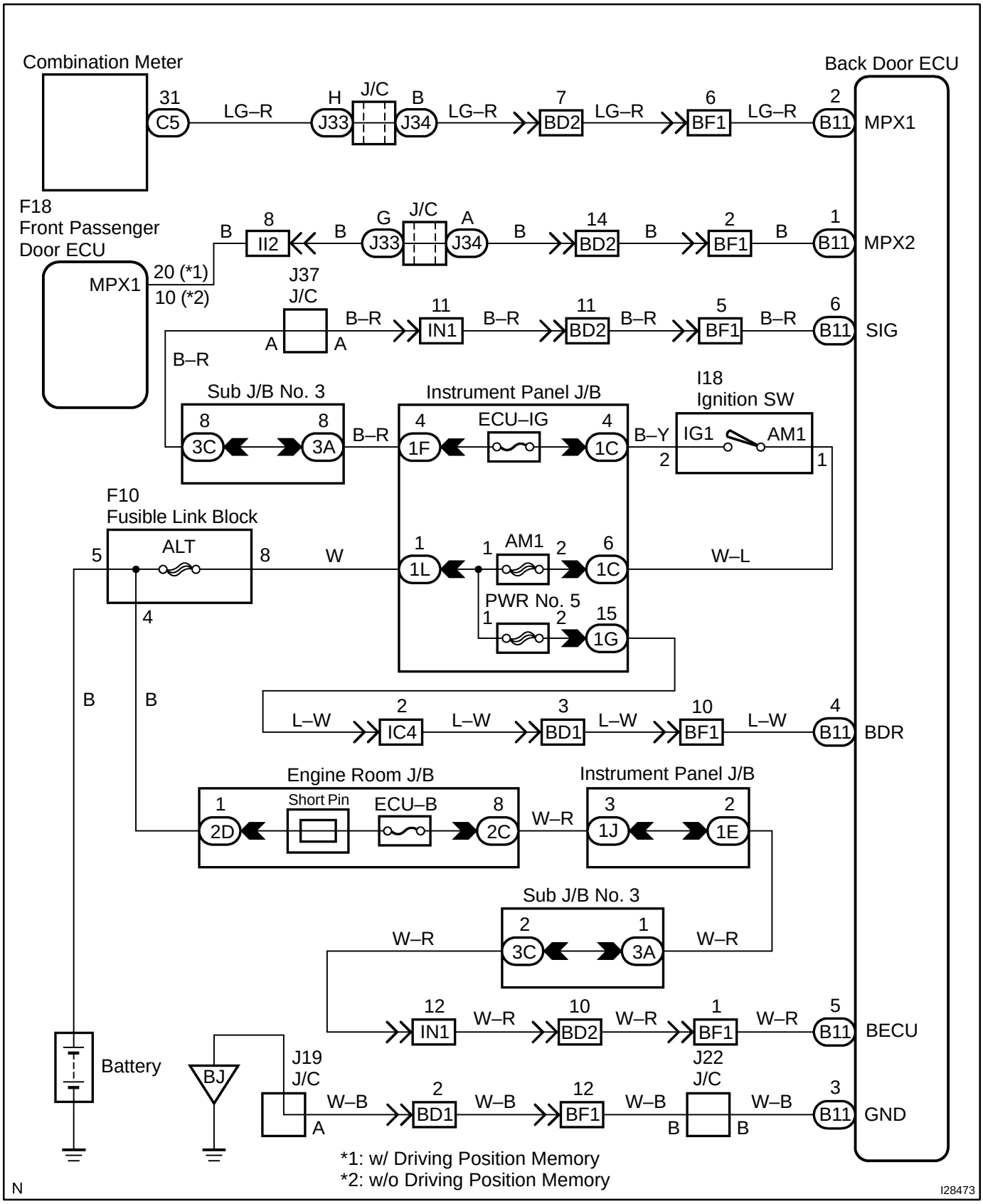
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check back door ECU.**

CHECK:

Check that the operation of the rear wiper motor function is normal.

HINT:

With this inspection, the back door ECU CPU can be diagnosed if it works normally or not.

OK:

Rear wiper motor operates normally.

NG → **Replace the back door ECU.**

OK

2	**Check wire harness and connector (Back door ECU – combination meter, back door ECU – passenger door ECU).**

PREPARATION:

Disconnect connector ”F18” of the passenger door ECU, connector ”B11” of the back door ECU and connector ”C5” of the combination meter ECU.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Tester connection (Symbols)	Condition	Specified condition
B11–2 (MPX1) – C5–31	Always	Below 1 Ω
B11–1 (MPX2) – F18–10 (*1)	Always	Below 1 Ω
B11–1 (MPX2) – F18–20 (*2)	Always	Below 1 Ω
B11–1 (MPX2) – Body ground	Always	10 kΩ or higher
B11–2 (MPX1) – Body ground	Always	10 kΩ or higher

*1: w/ Driving Position Memory

*2: w/o Driving Position Memory

NG → **Repair or replace wire harness.**

OK

Replace the back door ECU.

If the problem recurs even after replacement, replace the body ECU.

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AUDIO SYSTEM

DID9J–01

PRECAUTION

NOTICE:

When disconnect the battery terminal, initialize the following systems after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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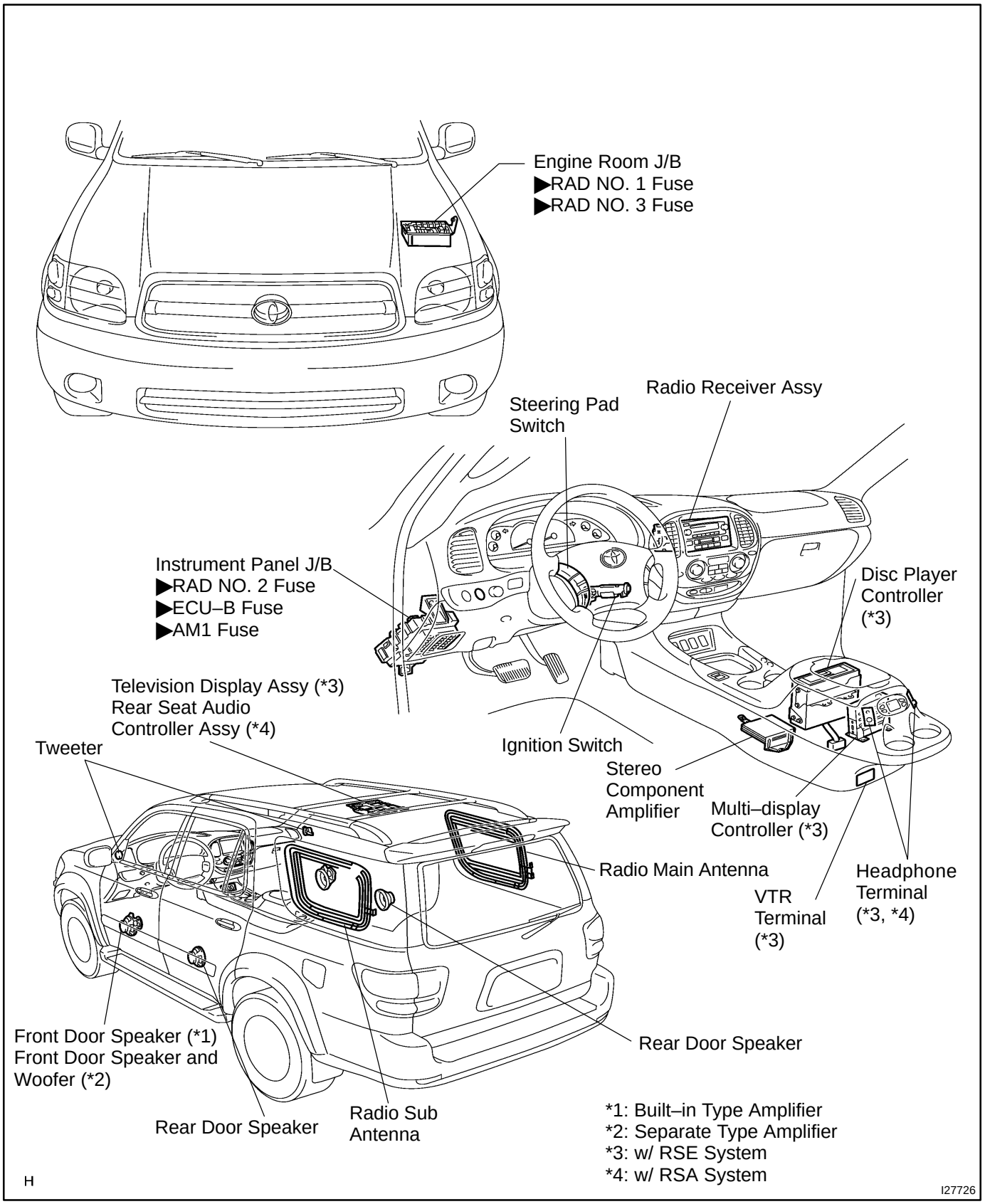
DID9K–01

LOCATION



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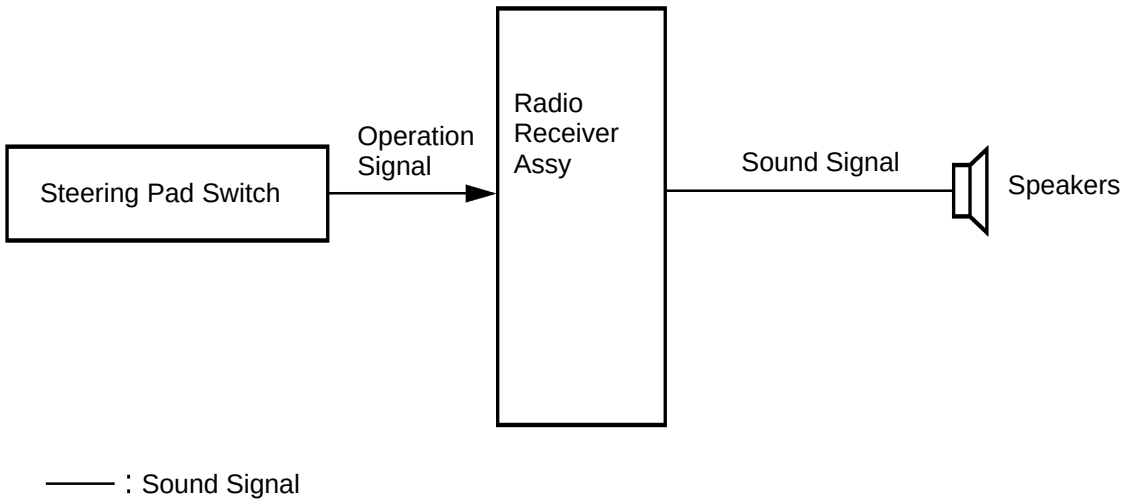
DID9L–01

SYSTEM DIAGRAM

Built–in Type Amplifier:



——: Sound Signal

N

I28760

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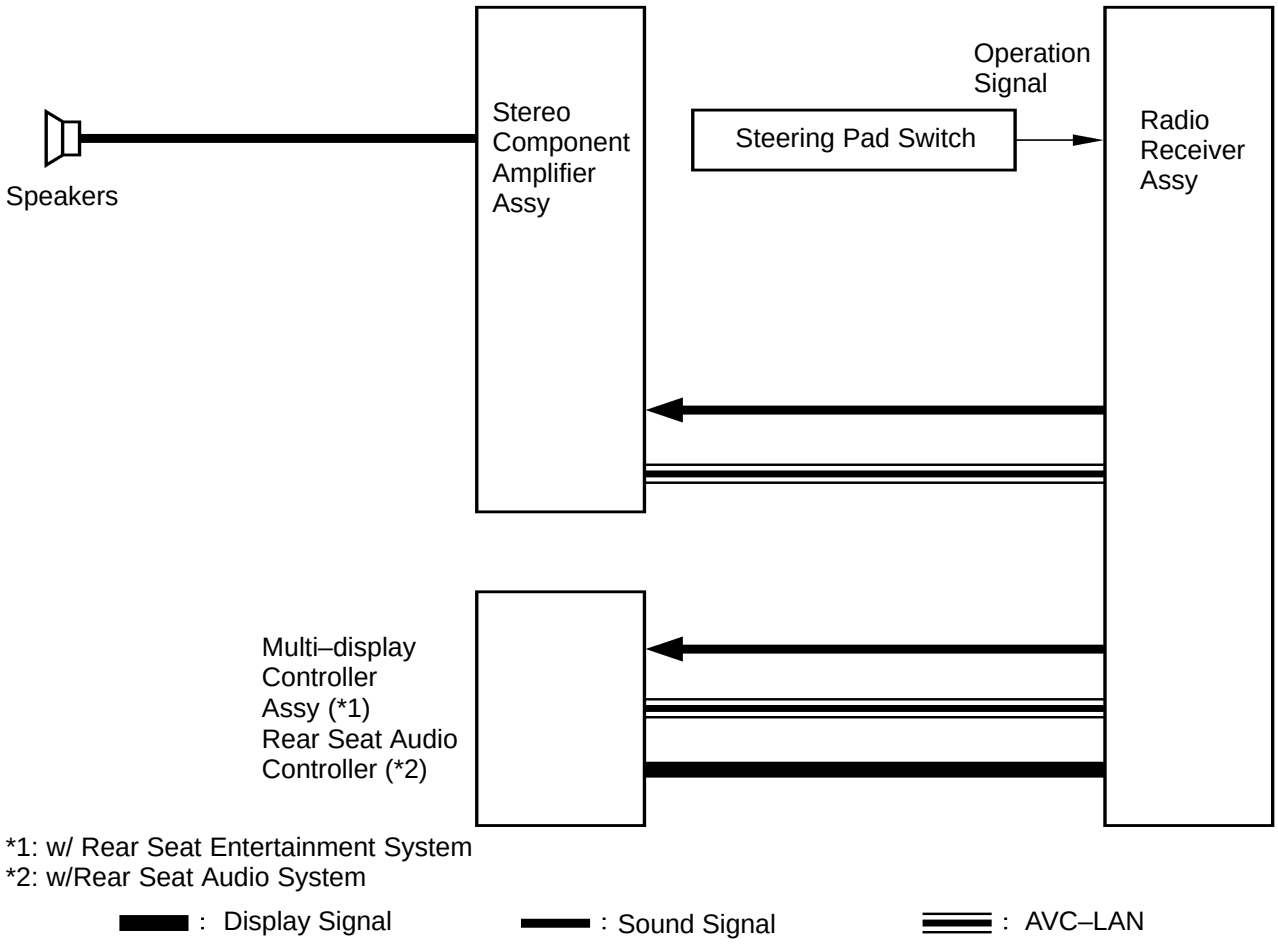
Separate Type Amplifier:



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DID9M–01

SYSTEM DESCRIPTION

1. COMPACT DISC PLAYER

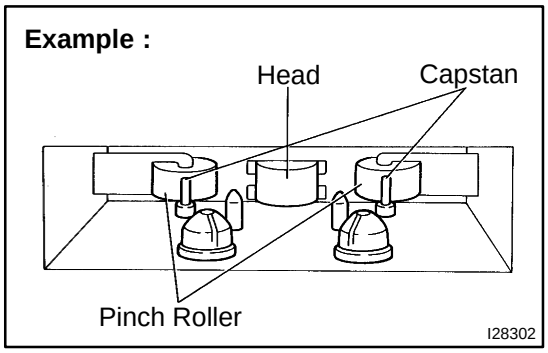
Compact Disc (hereafter called ”CD”) Players use a laser beam pick–up to read the digital signals recorded on the CD and reproduce analog signals of the music, etc. 4.7 in. (12 cm) and 3.2 in. (8 cm) discs are available for the CD player.

HINT:

Never disassemble or apply oil to any part of the player unit. Do not insert any object other than a disc, into the CD player.

NOTICE:

CD players use an invisible laser beam which could cause hazardous radiation exposure. Be sure to operate the player correctly as instructed.

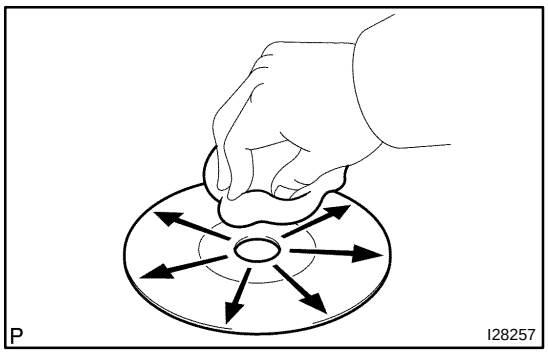


2. MAINTENANCE

Tape Player / Head Cleaning:

(a) Raise the cassette door with your finger.
Using a pencil or similar object, push in the guide.

(b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.



3. MAINTENANCE

CD Player / Disc Cleaning:

If the disc gets dirty, clean the disc by wiping the surface from the center to outside in a radial directions with a soft cloth.

NOTICE:

Do not use a conventional record cleaner or anti–static preservative.

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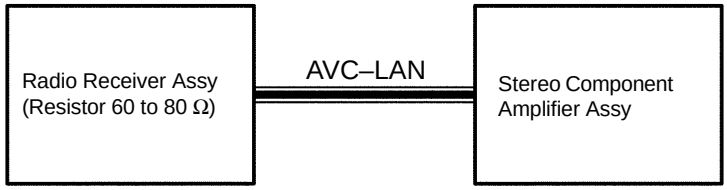
4. OUTLINE OF AVC–LAN

(a) What is AVC–LAN?

AVC–LAN is the abbreviation for Audio Visual Communication–Local Area Network. This is a unified standard co–developed by 6 audio manufacturers associated with Toyota Motor Corporation.

The unified standard includes signals, such as audio, visual and signals for switch indication and communication.

Example :



P I28193

(b) Objectives

Recently development in car audio systems has been rapid and functions have been changed drastically. The conventional system has been switched to a multi–media type such as a navigation system. At the same time customers wants to upgrade their audio systems. This is the factor that lies behind this standardization.

The concrete objectives are explained below.

(1) When products by different manufacturers were combined together, malfunctions such as sound failure occurred. This problem can be solved by standardization of signals.

(2) Various types of after market products are available.

(3) In general, a new product developed by a particular manufacturer could not be used due to a lack of compatibility with other manufacturer's products. By developing this new standard, users can enjoy a range of compatible products from different manufacturers.

HINT:

- When +B short or GND short is detected in the AVC–LAN circuit, communication stops, and the audio system will not function.
- When the audio system is not equipped with a navigation system, the audio head unit is the master unit. When the audio system is equipped with a navigation system, the multi–display is the master unit.
- The radio receiver assy is equipped with a resistor (60 to 80 Ω) for communication.
- All car audio systems using an AVC–LAN circuit have a diagnostic function.
- Each unit has its own specified number called a physical address (three–digit number). Numbers are also allotted to each function, which are called logical addresses (two–digit number).

5. COMMUNICATION SYSTEM

(a) Components in the audio system communicate with each other through the AVC–LAN. (Radio receiver with CD changer control function)

(b) When a short circuit or circuit breakdown occurs in the AVC–LAN circuit, the audio system does not operate normally due to the communication cutoff.

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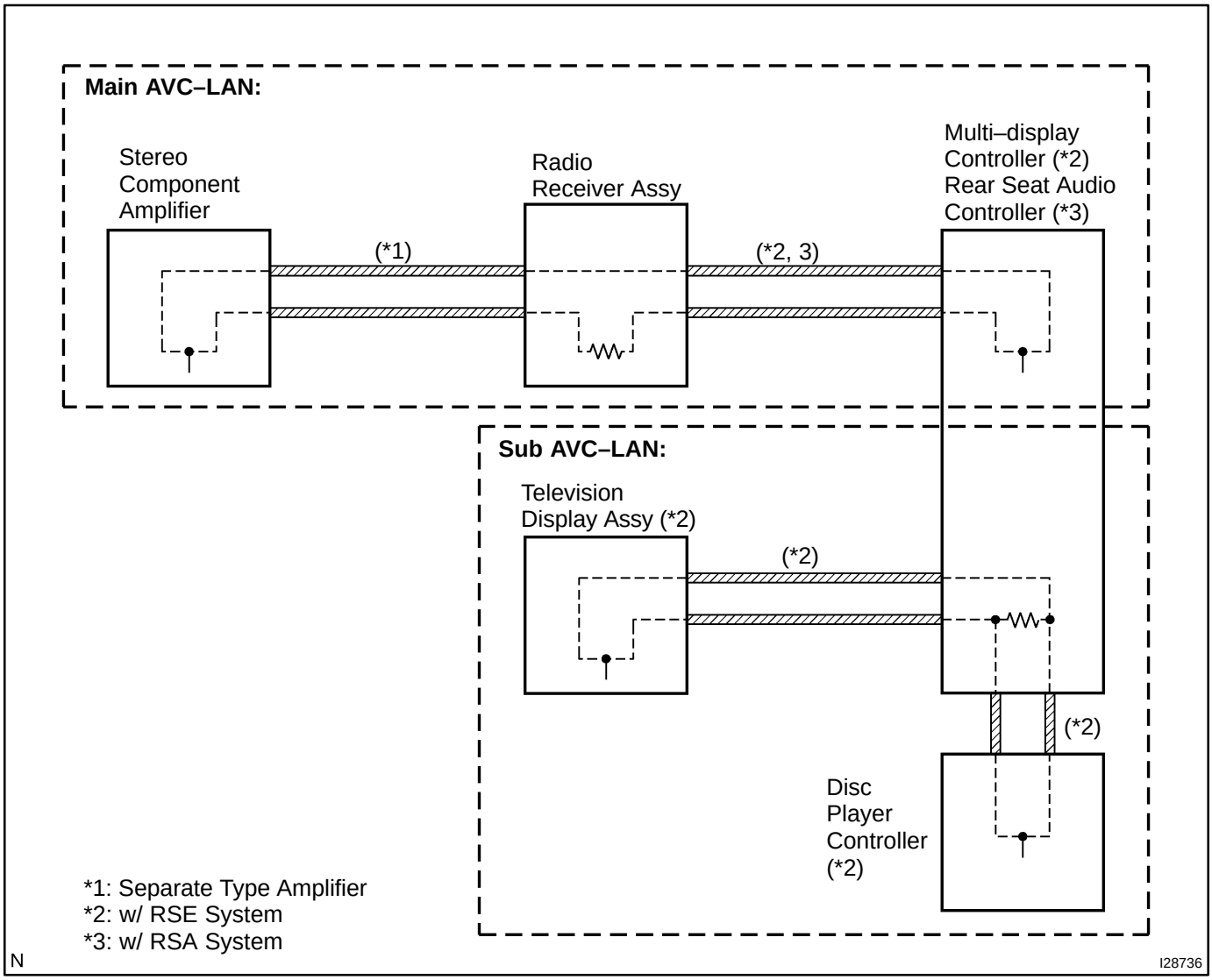
6. DIAGNOSTIC FUNCTION

(a) The audio system has diagnostic function (The diagnostic result is displayed on the LCD of the radio receiver assy). (Radio receiver with CD changer control function)

(b) The component code (physical address), or three–digit number (in hexadecimal) is set for each component comprising AVC–LAN.

(c) The logical address, or two–digit number (in hexadecimal) is set for each function and component unit in each component.



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DID9N–01

HOW TO PROCEED WITH TROUBLESHOOTING

Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Vehicle brought into a workshop

⇩

1. Customer problem analysis
P. DI–1963

⇩ (a) Interview and confirm the trouble.
(1) Confirm the condition of the trouble.

2. Basic inspection. → Display does not appear (Proceed to problem symptom table) P. DI–1967

Display appears ⇩

(a) Basic inspection
(1) Check the battery voltage.
Standard: 11 to 14 V
(b) Check the power supply to the radio receiver assy.
(1) Turn the ignition switch to the ACC position.
(2) Check whether or not the display appears on the radio receiver assy.

3. Check the diagnostic trouble codes
P. DI–1974 → DTC is not output (Go to step 5)

DTC is output ⇩

4. Diagnostic trouble code chart.
P. DI–1979 → Go to step 6

5. Problem symptoms table
P. DI–1967

⇩

6. Circuit inspection and part inspection
P. DI–1990 – DI–2042

⇩

7. Identification of problem

⇩

8. Perform confirmation test

⇩

END

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CUSTOMER PROBLEM ANALYSIS CHECK

AUDIO SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Brought–in Date	/ /	**Odometer Reading**	**km mile**

Date of First Occurrence	/ /
Frequency of Problem Occurrence	▶ Constant ▶ Intermittent (Times a day)

Problem Symptom	**▶ Switch**
	▶ Radio
	▶ CD
	▶ Noise

	Parts name	**DTC (1st time).**	**DTC (2nd time).**
DTC Check	Radio receiver assy		
	Stereo component amplifier assy		
	Multi–display controller		
	Rear seat audio controller		

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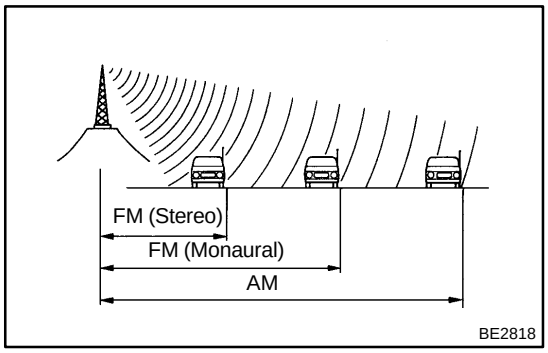
IDENTIFICATION OF NOISE SOURCE

1. RADIO WAVE BAND

The radio wave bands used in radio broadcasting are as follows:

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM ⟷		FM ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency
MF: Medium Frequency
HF: High Frequency
VHF: Very High Frequency



2. SERVICE AREA

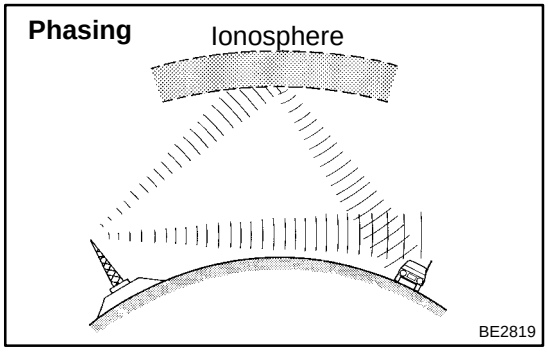
There is a great difference in the size of the service areas for AM and FM broadcasting. Sometimes an FM stereo broadcast cannot be received even though AM can be received very clearly.

FM stereo has the smaller service area, it also picks up static and other types of interference (”noise”) easily.

3. RECEPTION PROBLEMS

HINT:

Besides the problem of static, there are other problems, such as ”phasing”, ”multipath” and ”fade out”. These problems are caused not by electrical noise but by the nature of the radio waves themselves.



(a) Phasing

Besides electrical interference, AM broadcasts are also susceptible to other types of interference, especially at night. This is because AM radio waves bounce off the ionosphere at night. These radio waves then interfere with the signals that reach the vehicle’s antenna directly from the same transmitter. This type of interference is called ”phasing”.

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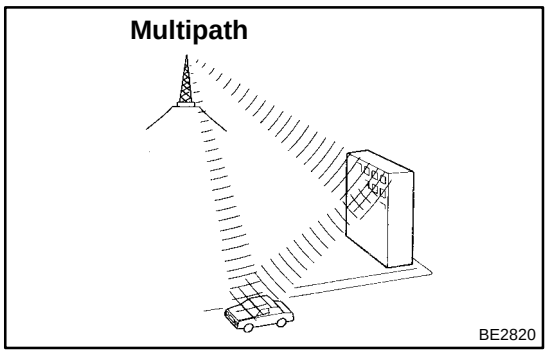
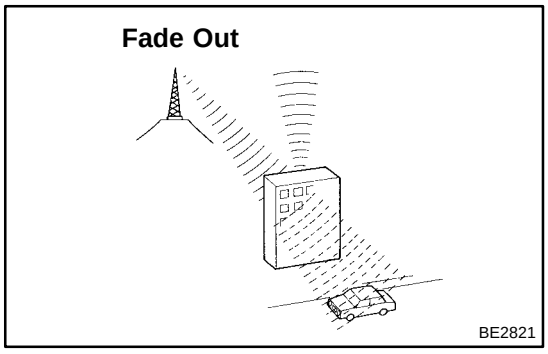


(b) Multipath
Interference caused by reflection of radio waves against obstructions is called ”Multipath”. Multipath occurs when radio signals emitted from the broadcast transmitter antenna are reflected against tall buildings or mountains and interferes with other signals which are to be received directly.



(c) Fade Out
FM radio wave tends to be reflected against obstructions such as tall buildings or mountains because FM frequency is higher than AM. For this reason, FM signals often seem to gradually disappear or fade away as the vehicle goes behind those obstructions. This phenomenon is called ”fade out”.

4. NOISE PROBLEMS

It is very important for technicians to clearly understand a customer’s claim about noise. Use the following table to diagnose the phenomena.

Radio wave	Condition in which noise occurs	Probable cause
AM	Noise occurs at a specific place.	Strong possibility of foreign noise.
	Noise occurs when listening to faint broadcasting.	The same program may be broadcasted from some local stations. If the program is the same, one of those may be tuned in.
	Noise occurs only at night.	Strong possibility of beat from a distant broadcasting.
FM	Noise occurs at a specific place during driving.	Strong possibility of multipath noise and fading noise caused by changes of FM frequency.

HINT:
If the condition when the noise occurs does not meet any of the above, find out the cause based on ”Reception Problems”. Refer to the description about Multipath and Phasing mentioned previously.

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5. Identify the condition in which the noise occurs, and check the noise filter on the related part.

Condition in which noise occurs	Noise Source
Depressing the acceleration pedal increases the noise, and stopping the engine stops the noise immediately.	Generator
Noise occurs during A/C or the heater operation.	Blower motor
Rapid acceleration while driving on an unpaved road or after the ignition switch is turned on makes noise.	Fuel pump
Pressing and then releasing the horn switch, and keeping pressing the horn switch makes unusual noise.	Horn
Quiet noise is heard while the engine is running, but stops with the engine.	Ignition
Noise occurs synchronously with the turn signal flash.	Flasher
Noise occurs during window washer operation.	Washer
Noise occurs while the engine is running, and it continues even after the engine stops.	Engine coolant temperature sensor
Noise occurs during wiper operation.	Wiper
Noise occurs when the brake pedal is depressed.	Stop light switch
Others.	Static electricity stored on the vehicle

Reference:

- Make sure first that there is no noise from outside. Failing to do so makes the noise source detection difficult and leads to misdiagnosis.
- The noise should be removed in descending order of loudness.
- Tuning the radio so that no station is received wakes the noise more noticeable, making the recognition of the phenomenon easier.

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PROBLEM SYMPTOMS TABLE

NOTICE:

For the troubleshooting procedures of the audio system with a navigation system, refer to the navigation system (See page DI–2184).

RADIO RECEIVER ASSY

HINT:

Inspect the ”Fuse” and ”Relay” before confirming the suspected area as shown in the charts below.

Symptom	Suspected Area	See page
Pressing power switch does not start system.	3. Power source circuit (radio receiver assy) 4. Radio receiver assy	DI–1990 –
A audio system cannot be operated.	1. Steering pad switch circuit 2. Radio receiver assy	DI–1995 –
No sound cannot be heard (Separate type amplifier).	1. Power source circuit (stereo component amplifier assy) 2. Sound signal circuit 3. Speaker circuit 4. AVC–LAN circuit (radio receiver assy – stereo component amplifier) 5. AVC–LAN circuit (radio receiver assy – rear seat audio controller) w/ RSA system 6. AVC–LAN circuit (radio receiver assy – multi–display controller) w/ RSE system 7. Mute signal circuit 8. Stereo component amplifier assy 9. Radio receiver assy	DI–1993 DI–2011 DI–2013 DI–2023 DI–2061 DI–2139 DI–2008 – –
No sound cannot heard (Built–in type amplifier).	1. Power source circuit (radio receiver assy) 2. Speaker circuit 3. Radio receiver assy	DI–1990 DI–2013 –
Sound quality is bad in all modes (volume is too low). (Separate type amplifier)	1. Power source circuit (radio receiver assy) 2. Power source circuit (stereo component amplifier assy) 3. Speaker circuit 4. Sound signal circuit 5. Sound quality is bad in all modes (volume is too low) 6. Stereo component amplifier assy	DI–1990 DI–1993 DI–2013 DI–2011 DI–2026 –
Sound quality is bad in all modes (volume is too low). (Built–in type amplifier)	1. Power source circuit (radio receiver assy) 2. Speaker circuit 3. Sound quality is bad in all modes (volume is too low)	DI–1990 DI–2013 DI–2026
Noise occurs.	–	DI–2027
Radio broadcast cannot be received (bad reception).	–	DI–2028
CD cannot be inserted or is ejected right after insertion.	1. Power source circuit (radio receiver assy) 2. CD cannot be inserted or is ejected right after insertion	DI–1990 DI–2030
CD cannot be ejected.	1. Power source circuit (radio receiver assy) 2. CD cannot be ejected	DI–1990 DI–2032
Sound quality is bad only when playing CD (volume is too low).	–	DI–2033
CD sound skips.	–	DI–2034
Cassette tape cannot be inserted or played.	1. Power source circuit (radio receiver assy) 2. Cassette tape cannot be inserted or played	DI–1990 DI–2036
Cassette tape cannot be ejected.	1. Power source circuit (radio receiver assy) 2. Cassette tape cannot be ejected	DI–1990 DI–2038
Sound quality is bad only when playing tape.	–	DI–2040
Tape is tangled due to incorrect tape speed or auto–reverse malfunction.	–	DI–2042

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STEERING PAD SWITCH

Symptom	Suspected Area	See page
A audio system cannot be operated with steering pad switch.	1. Steering pad switch circuit 2. Radio receiver assy	DI–1995 –

OTHERS

Symptom	Suspected Area	See page
Radio receiver cannot be dimmer in night time.	1. Illumination circuit 2. Radio receiver assy	DI–1999 –

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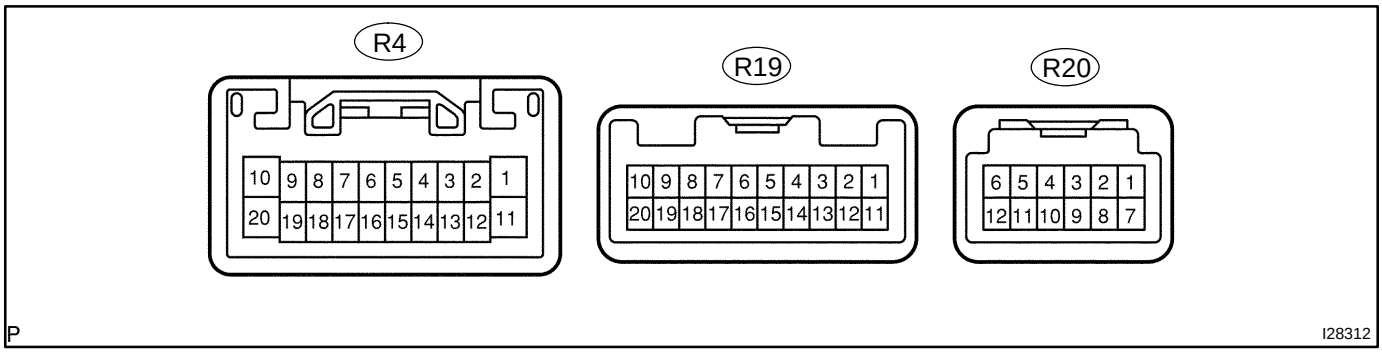
DID9R–01

TERMINALS OF ECU

1. RADIO RECEIVER ASSY (SEPARATE TYPE AMPLIFIER)



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
BU+B (R4–1) – GND (R4–20)	L–Y – BR	Battery	Always	10 to 14 V
ILL+ (R4–2) – GND (R4–20)	G – BR	Illumination (dimmer) signal	Light control switch OFF → TAIL or HEAD	Below 1 V → 10 to 14 V
TX+ (R4–5) – GND (R4–20)	V – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
MUTE (R4–7) – GND (R4–20)	R–W – BR	MUTE signal	Audio system is playing → changing mode	Above 3.5 V → Below 1 V
R+ (R4–8) – GND (R4–20)	W – BR	Sound signal (Right output)	Audio system is playing	A waveform synchronized with sounds is output
L+ (R4–9) – GND (R4–20)	B – BR	Sound signal (Left output)	Audio system is playing	A waveform synchronized with sounds is output
GND (R4–10) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
ACC+B (R4–11) – GND (R4–20)	GR – BR	Accessory (ON)	Turn ignition switch to OFF → ACC	10 to 14 V
ILL– (R4–12) – GND (R4–20)	W–G – BR	Illumination (rheostat) signal	Light control switch TAIL	Below 1 V → 10 to 14 V
ANT+B (R4–13) – GND (R4–20)	B–R – BR	Power source of antenna	Radio switch ON and AM or FM	10 to 14 V
TX– (R4–15) – GND (R4–20)	P – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
R– (R4–18) – GND (R4–20)	G – BR	Sound signal (Right output)	Audio system is playing	A waveform synchronized with sounds is output
L– (R4–19) – GND (R4–20)	R – BR	Sound signal (Left output)	Audio system is playing	A waveform synchronized with sounds is output
GND (R4–20) – Body ground	BR – Body ground	Ground	Always	Below 1 V
GND (R19–6) – GND (R4–20)	BR–W – BR	Steering pad switch ground	Always	Below 1 V
SW1 (R19–7) – GND (R4–20)	LG–R – BR	Steering pad switch signal	Steering pad switch not operating. →SEEK+ switch push →SEEK– switch push →VOL+ switch push →VOL– switch push	4 V or more →Approx. 0.5 V →Approx. 0.9 V →Approx. 2.0 V →Approx. 3.4 V
SW2 (R19–8) – GND (R4–20)	GR–R – BR	Steering pad switch signal	Steering pad switch not operating →MODE switch push	4 V or more → Below 2.5 V

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(*1) TX1+ (R19–9) – GND (R4–20)	L – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
(*1) TX1– (R19–10) – GND (R4–20)	LG – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
(*1) SLD1 (R19–14) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
(*1) RSR+ (R19–15) – GND (R4–20)	W – BR	Sound signal (Right output)	Audio system is playing	A waveform synchronized with sound is output
(*1) RSR– (R19–16) – GND (R4–20)	G – BR	Sound signal (Right output)	Audio system is playing	A waveform synchronized with sound is output
(*1) RSL+ (R19–17) – GND (R4–20)	B – BR	Sound signal (Left output)	Audio system is playing	A waveform synchronized with sound is output
(*1) RSL– (R19–18) – GND (R4–20)	R – BR	Sound signal (Left output)	Audio system is playing	A waveform synchronized with sound is output
(*1) RMU (R19–19) – GND (R4–20)	R–W – BR	MUTE signal	Audio system is playing → changing mode	Above 3.5 V → Below 1 V
(*1) S–GND (R20–1) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
(*1) R+ (R20–2) – GND (R4–20)	W – BR	Sound signal (Right input)	Rear seat entertainment system is playing	A waveform synchronized with sound is output
(*1) R– (R20–3) – GND (R4–20)	G – BR	Sound signal (Right input)	Rear seat entertainment system is playing	A waveform synchronized with sound is output
(*1) L+ (R20–4) – GND (R4–20)	B – BR	Sound signal (Left input)	Rear seat entertainment system is playing	A waveform synchronized with sound is output
(*1) L– (R20–5) – GND (R4–20)	R – BR	Sound signal (Left input)	Rear seat entertainment system is playing	A waveform synchronized with sound is output
(*1) MUTE (R20–6) – GND (R4–20)	R–G – BR	MUTE signal	Rear seat entertainment system is playing → changing mode	Above 3.5 V → Below 1 V
(*2) TX1+ (R19–9) – GND (R4–20)	L – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
(*2) TX1– (R19–10) – GND (R4–20)	LG – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
(*2) SLD1 (R19–14) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
(*2) RSR+ (R19–15) – GND (R4–20)	W – BR	Sound signal (Right output)	Audio system is playing	A waveform synchronized with sound is output
(*2) RSR– (R19–16) – GND (R4–20)	G – BR	Sound signal (Right output)	Audio system is playing	A waveform synchronized with sound is output
(*2) RSL+ (R19–17) – GND (R4–20)	B – BR	Sound signal (Left output)	Audio system is playing	A waveform synchronized with sound is output
(*2) RSL– (R19–18) – GND (R4–20)	R – BR	Sound signal (Left output)	Audio system is playing	A waveform synchronized with sound is output
(*2) RMU (R19–19) – GND (R4–20)	R–W – BR	MUTE signal	Audio system is playing → changing mode	Above 3.5 V → Below 1 V

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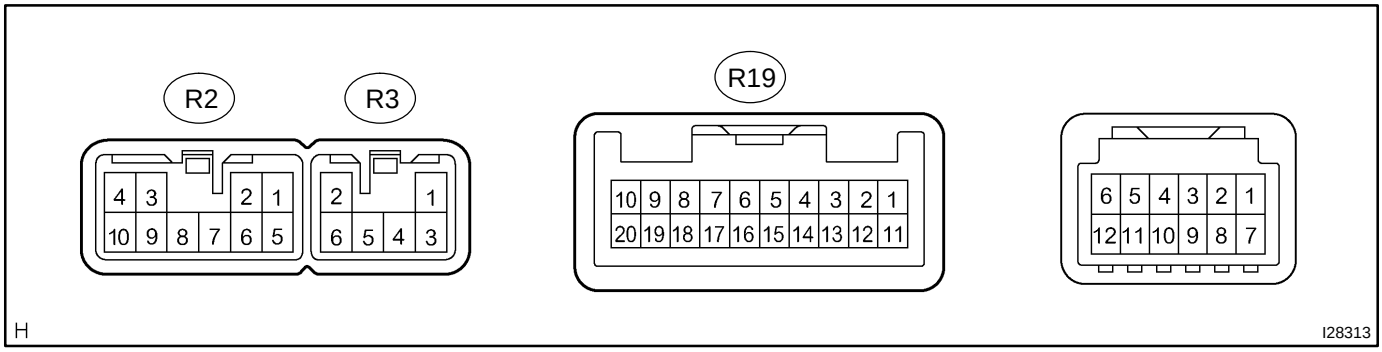
*1: w/ Rear seat entertainment system
*2: w/ Rear seat audio system

2. RADIO RECEIVER ASSY (BUILT–IN TYPE AMPLIFIER)



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
FR+ (R2–1) – GND (R2–7)	LG – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
FL+ (R2–2) – GND (R2–7)	P – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
ACC+B (R2–3) – GND (R2–7)	GR – BR	Accessory (ON)	Turn ignition switch to OFF → ACC	Below 1 V → 10 to 14 V
BU+B (R2–4) – GND (R2–7)	L–Y – BR	Battery	Always	10 to 14 V
FR– (R2–5) – GND (R2–7)	L – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
FL– (R2–6) – GND (R2–7)	V – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (R2–7) – Body ground	BR – Body ground	Ground	Always	Below 1 V
ANT+B (R2–8) – GND (R2–7)	B–R – BR	Power source of antenna	Radio switch ON and AM or FM	10 to 14 V
ILL+ (R2–10) – GND (R2–7)	G – BR	Illumination (rheostat) signal	Light control switch OFF → TAIL or HEAD	Below 1 V → 10 to 14 V
RR+ (R3–1) – GND (R2–7)	R – BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
RL+ (R3–2) – GND (R2–7)	B – BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
RR– (R3–3) – GND (R2–7)	W – BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
ILL– (R3–5) – GND (R2–7)	W–G – BR	Illumination (rheostat) signal	Light control switch OFF → TAIL or HEAD	Below 1 V → 10 to 14 V
RL– (R3–6) – GND (R2–7)	Y – BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (R19–6) – GND (R2–7)	BR–W – BR	Steering pad switch ground	Always	Below 1 V

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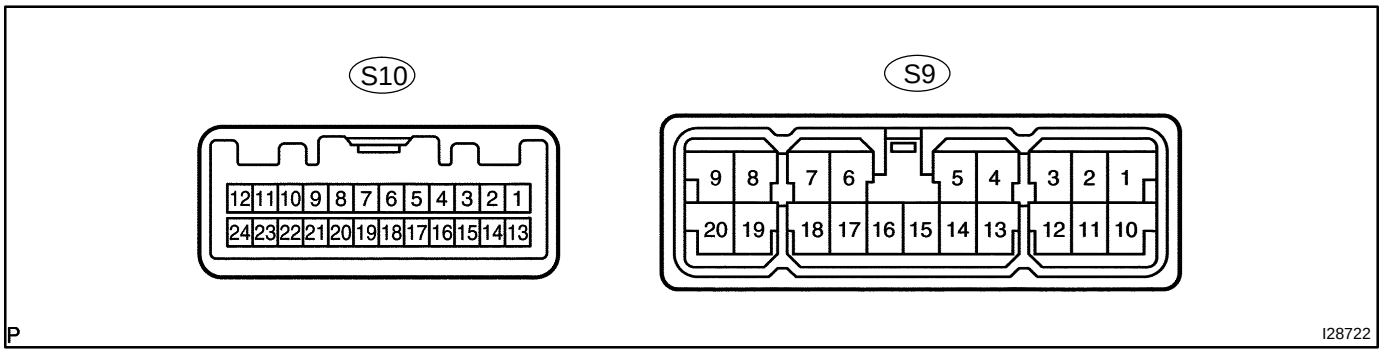
SW1 (R19–7) – GND (R2–70)	LG–R – BR	Steering pad switch signal	Steering pad switch not operating. →SEEK+ switch push →SEEK– switch push →VOL+ switch push →VOL– switch push	4 V or more →Approx. 0.5 V →Approx. 0.9 V →Approx. 2.0 V →Approx. 3.4 V
SW2 (R19–8) – GND (R2–7)	GR–R – BR	Steering pad switch signal	Steering pad switch not operating →MODE switch push	4 V or more → Below 2.5 V

3. STEREO COMPONENT AMPLIFIER ASSY



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
B+ (S9–1) – E (S9–16)	L–W – BR	Battery	Always	10 to 14 V
RL+ (S9–4) – E (S9–16)	B – BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
RR+ (S9–5) – E (S9–16)	R – BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
FL+ (S9–2) – E (S9–16)	P – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
FR+ (S9–3) – E (S9–16)	LG – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
WFL+ (S9–6) – E (S9–16)	L–W – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
WFR+ (S9–7) – E (S9–16)	R – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
B2+ (S9–10) – E (S9–16)	L–W – BR	Battery	Always	10 to 14 V
RL– (S9–13) – E (S9–16)	Y – BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
RR– (S9–14) – E (S9–16)	W – BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
GND (S9–15) – Body ground	BR – Body ground	Ground	Always	Below 1 V
E (S9–16) – Body ground	BR – Body ground	Ground	Always	Below 1 V
FL– (S9–11) – E (S9–16)	V – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
FR– (S9–12) – E (S9–16)	L – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output

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WFL– (S9–17) – E (S9–16)	G – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
WFR– (S9–18) – E (S9–16)	Y – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
MUTE (S10–1) – E (S9–16)	R–W – BR	Mute signal from radio receiver	Audio system is sounding → changing mode	Above 3.5 V → Below 1 V
L– (S10–2) – E (S9–16)	R – BR	Sound signal from radio receiver (Left)	Audio system is playing	A waveform synchronized with sounds is output
L+ (S10–3) – E (S9–16)	B – BR	Sound signal from radio receiver (Left)	Audio system is playing	A waveform synchronized with sounds is output
R– (S10–4) – E (S9–16)	G – BR	Sound signal from radio receiver (Right)	Audio system is playing	A waveform synchronized with sounds is output
R+ (S10–5) – E (S9–16)	W – BR	Sound signal from radio receiver (Right)	Audio system is playing	A waveform synchronized with sounds is output
SGND (S10–6) – Body ground	Shielded – Body ground	Ground	Always	Below 1 V
ACC (S10–12) – E (S9–16)	GR – BR	Accessory (ON)	Turn ignition switch OFF → ACC	Below 1 V → 10 to 14 V
TX– (S10–19) – E (S9–16)	P – BR	AVC–LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX+ (S10–20) – E (S9–16)	V – BR	AVC–LAN communication signal	Turn ignition switch to ACC	2 to 3 V

4. MULTI–DISPLAY CONTROLLER ASSY

See page DI–2090

5. REAR SEAT AUDIO CONTROLLER

See page DI–2051

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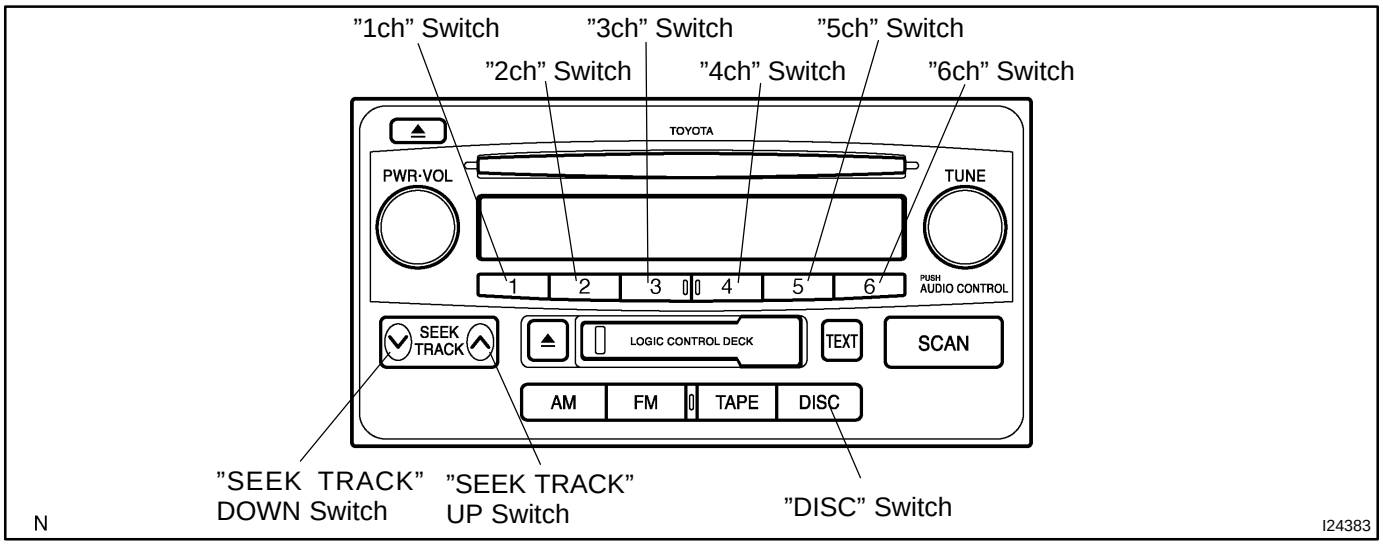
DTC CHECK / CLEAR

1. DIAGNOSTIC CHECK

(a) Starting Diagnostic Mode (All elements come on during the SW check mode).

(1) Turn off the audio system and turn the ignition switch to the ACC position. While pressing the preset switches ”1” and ”6” at the same time, press the ”DISC” 3 times.



(2) Reference:

- When the system enters the Diagnosis Mode, a beep sound is emitted 3 times and all the elements come on during the SW check mode.
- It takes about 40 seconds to complete the check.
- Turn all the elements in the LCD on.
- When pressing the switch, confirm beep sound is emitted.

(b) Service Check Screen.

(1) Press the ”SEEK TRACK” switch to enter the ”Service Check Screen”.

(2) In the service check mode, the system check and the diagnostic memory check are performed, and the check results are displayed in ascending order of the component codes (physical address.)

Terms	Meaning
Component code (Physical address)	Three–digit code (In hexadecimal) given to each device comprising AVC–LAN. Corresponding to its function, individual symbol is provided.
Logical address	Two–digit code (In hexadecimal) given to each function and device unit in each device comprising AVC–LAN.

Code No. (physical address) List

Code No. (physical address)	Equipment name
190	Radio receiver assy (Audio head unit)
440	Stereo component amplifier assy
1F6	Multi–display controller (RSE ECU)
1F4	Rear seat audio controller

(c) Finishing Diagnostic Mode.

Press the ”DISC” for 2 seconds or more, or turn the ignition switch off.

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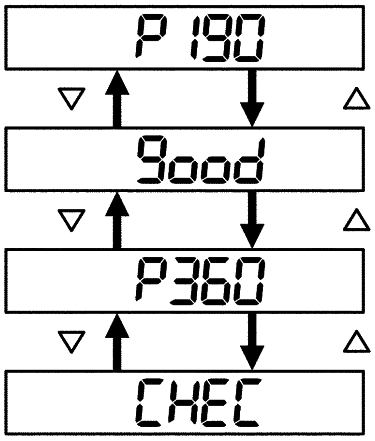
(d) Service Check Mode Result Display (for checking the current and the past system conditions).
(1) Press the ”SEEK TRACK” switch to see the check result of each component.



P——indicates physical address
190——physical address

good——”The component is normal”.

P——indicates physical address
360——physical address

CHEC——”Check needed”.

△ : TUNE/TRACK UP

▽ : TUNE/TRACK DOWN

The illustration shows the case that the system has 2 devices with codes 190 and 360, and the device (code 360) has a trouble.
The check result is displayed in ascending order of device code. The device code is displayed first, and then the check result.

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(2) Check Result Display.

Display	Original Language	Meaning	Action to be taken
good	Good (normal)	No DTCs are detected in both ”System Check Mode” and ”Diagnostic Memory Mode”.	–
NCON	No connection	The system recognized the component when it was registered, but the component gives no response to the ”Diagnostic Mode ON Request”.	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).
ECHN	Exchange	One or more DTCs for ”Exchange” are detected in either ”System Check Mode” or ”Diagnostic Memory Mode”.	Go to the detailed information mode to check the trouble area referring to the DTC list.
CHEC	Check	When no DTCs are detected for ”Exchange”, one or more DTCs for ”Check” are detected in either ”System Check Mode” or ”Diagnostic Memory Mode”.	Go to the detailed information mode to check the trouble area referring to the DTC list.
OLD	Old version	Old DTC application is identified and DTC is detected in either ”System Check Mode” or ”Diagnostic Memory Mode”.	–
NRES	No response	The device gives no response to any one of ”System Check Mode ON Request”, ”System Check Result Request” and ”Diagnostic Memory Request”.	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).

(3) To perform the Service Check again, press the preset switch ”1”.

(e) Detailed Information Mode (when displaying the DTC for a trouble component)

(1) With ”CHEC” or ”ECHN” being displayed, press the preset switch ”2” to go to the detailed information mode.

(2) Press the ”SEEK TRACK” switch to display the ”System Check Result (SYS)” and ”Diagnostic Memory Response (CODE)”.

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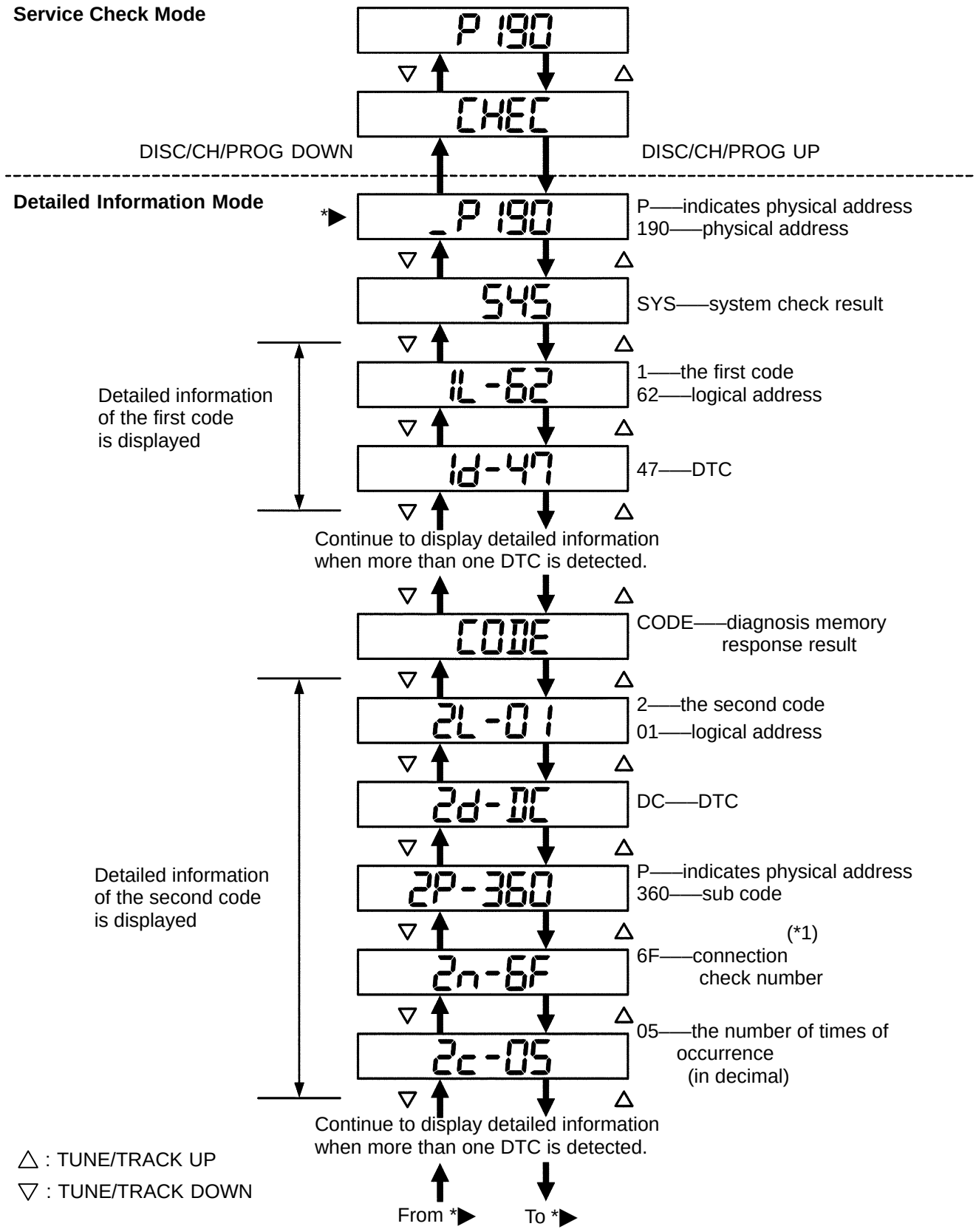

The illustration shows the case that the component with code 190 has DTC ”47” and ”dC” as a result of the system check and the diagnosis memory response.
The detailed information mode shows the system check result first, then the diagnosis memory response result.
(*1): As for DTC that does not have any sub code, sub code is not displayed.

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(3) Displayed Items in Detailed Information Mode

Division Code for DTC display	Meaning	The order of detailed information displayed when the ”TUNE UP” switch is pressed. (The order is reversed when the ”TUNE DOWN” switch is pressed.)
SYS	System check result is displayed.	Logical address → DTC
CODE	Diagnostic memory check result is displayed.	Logical address→ DTC→ Sub code→ Connection confirmation number→ The number of times of occurrence

(4) Check the trouble area referring to the DTC list.

(5) To return to the service check mode, press the preset switch ”3”.

2. DTC CLEAR

(a) Clearing Individual DTC Memory (when clearing the memory of the DTC detected in the past individually)

Press the preset switch ”5” for 2 seconds or more while the ”ECHN” is displayed in the service check mode or during the detailed information mode.

HINT:

- Beep sound is emitted once when the DTC memory is completely cleared.
- When the DTC memory is cleared, only the component code (physical address) is displayed for the target component.
- To check DTCs, press the preset switch ”1” and perform the service check again.

(b) Clearance of all the DTC memory (when clearing all the memory of the DTCs detected in the past)

(1) Start the diagnostic mode after repairing the trouble area.

(2) Press the preset switch ”5” for 2 seconds or more (”CLR” is displayed at this time).

HINT:

- Beep sound is emitted once when the DTC memory is completely cleared.
- When the DTC memory for all the component is cleared, only the component codes (physical address) are displayed.

(3) Press the preset switch ”1” to perform the service check again, and check that no DTCs are displayed for all the component codes (physical address).

(c) Finishing Diagnostic Mode.

Press the ”DISC” for 2 seconds or more, or turn the ignition switch off.

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DID9T–01

DIAGNOSTIC TROUBLE CODE CHART

Terms	Meaning
Physical address	Three–digit code (shown in hexadecimal) which is given to each component comprising the AVC–LAN. Corresponding to the function, individual symbols are specified.
Logical address	Two–digit code (shown in hexadecimal) which is given to each function comprising the inner system of the AVC–LAN.

HINT:

Titles for each unit are stated in the following order: parts name (physical address) and [Name indicated on the DTC display]

1. Radio receiver assy (physical address: 190) [AUDIO H/U]

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D6 *1	Absence of Master	Component in which this code is recorded was disconnected from system or master component with ignition switch in ACC or ON.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy) *7 4. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 5. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 6. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–1993 DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –
D8 *2 *5	No Response to Connection Check	Component shown by sub code is or was disconnected from system after engine start.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy) *7 4. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 5. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 6. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–1993 DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –

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D9 *1	Last Mode Error	Audio or visual component operated before engine stop is or was disconnected with ignition switch in ACC or ON.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy) *7 4. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 5. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 6. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–1993 DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –
DA *5	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Sound and picture does not change by button operation.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy) *7 4. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 5. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 6. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–1993 DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –

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DB *1	Mode Status Error	Dual alarm is detected.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy) *7 4. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 5. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 6. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–1993 DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –
DC *3	Transmission Error	Transmission to component shown by auxiliary code has been failed. (Detecting this DTC does not necessarily mean actual failure.)	1. Power source circuit (Rear seat audio controller). *6 2. Power source circuit (Multi–display controller sub–assy) *7 3. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 4. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 5. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 6. Replace stereo component amplifier assy. 7. Replace rear seat audio controller. *6 8. Replace multi–display controller sub–assy. *7	DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –
DD *4	Master Reset (Momentary Interruption)	After the engine was started, master component was disconnected from system.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy) *7 4. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 5. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 6. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–1993 DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –

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DE *4	Slave Reset (Momentary Interruption)	After the engine was started, component shown by sub code was disconnected from system.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy) *7 4. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 5. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 6. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–1993 DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –
DF *4	Master Error	Due to defective cognition of component with a display, master function is switched to audio equipment.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy) *7 4. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 5. AVC–LAN (Radio receiver assy – Rear seat audio controller). *6 6. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–1993 DI–2058 DI–2110 DI–2023 DI–2061 DI–2139 – – –

HINT:

- ▶ *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.
- ▶ *2: If the power connector is disconnected after the engine starts, this code is recorded after 180 seconds.
- ▶ *3: This code may be stored if the ignition key is turned to the START position again with the engine running.
- ▶ *4: This code may be stored if the ignition key is held in the START position for 1 minute or more before returning to the ON position.
- ▶ *5: If the device is reported as not existing during verification, check the power source circuit and AVC–LAN circuit for the device.
- ▶ *6: w/ Rear seat audio system only.
- ▶ *7: w/ Rear seat entertainment system only.

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Logical address: 01 (Communication control) continued

DTC	Name	Diagnosis	Verification	See page
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.	–
E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from master component.	Replace radio receiver assy.	–
E3 *1	Registration Request Transmission	Registration Request command is output from component shown by sub code. Receiving Connection Check Instruction, Registration Request command is output from sub–master component.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.	–
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.	–

HINT:

▶ *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.

(b) Logical address: 61 (Cassette switch)

DTC	Name	Diagnosis	Verification	See page
40	Mechanical Error of Media	Malfunction due to mechanical failure is identified. Either that, or cassette tape is cut or entangled.	1. Inspect cassette tape. 2. Replace radio receiver assy.	– –

(c) Logical address: 62 (CD player)

DTC	Name	Diagnosis	Verification	See page
42	No Disc Readout	Disc cannot be read.	1. Inspect CD. 2. Replace radio receiver assy.	– –
44	CD player Error	Error is detected in CD player.	Replace radio receiver assy.	–
47	Detection of high temperature	High temperature is detected in CD player.	With ignition switch off, leave vehicle in cool shaded place for a while and recheck. After deleting the DTC memory, if same code detected, replace radio receiver assy.	–
48	Detection of excess current	Over current is present in CD player.	Replace radio receiver assy.	–

(d) Logical address: 63 (In–dash CD changer)

DTC	Name	Diagnosis	Verification	See page
42	No Disc Readout	Disc cannot be read.	1. Inspect CD. 2. Replace radio receiver assy.	– –
44	CD player Error	Error is detected in CDDH.	Replace radio receiver assy.	–
47	Detection of high temperature	High temperature is detected in CDCH.	With ignition switch off, leave vehicle in cool shaded place for a while and recheck. After deleting the DTC memory, if same code detected, replace radio receiver assy.	–
48	Detection of excess current	Over current is present in CDCH.	Replace radio receiver assy.	–

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2. Stereo component amplifier assy (physical address: 440) [DSP–AMP]

Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D6 *1	Absence of Master	Component in which this code is recorded was disconnected from system with ignition in ACC or ON. Either that, or radio receiver assy was disconnected when this code was recorded.	1. Power source circuit (Radio receiver assy). 2. Power source circuit (Stereo component amplifier assy). 3. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 4. AVC–LAN (Radio receiver assy – Rear seat audio controller). *5 5. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *6 6. Replace radio receiver assy. 7. Replace stereo component amplifier assy.	DI–1990 DI–1993 DI–2023 DI–2061 DI–2139 – –
D7	Communication Check Error	Component in which this code is recorded is or was disconnected from system after engine start. Either that, or radio receiver assy was disconnected when this code was recorded.	1. Power source circuit (Radio receiver assy). 2. Power source circuit (Stereo component amplifier assy). 3. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 4. AVC–LAN (Radio receiver assy – Rear seat audio controller). *5 5. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *6 6. Replace radio receiver assy. 7. Replace stereo component amplifier assy.	DI–1990 DI–1993 DI–2023 DI–2061 DI–2139 – –
DC *2	Transmission Error	Transmission to component shown by auxiliary code failed. (Detecting this DTC does not necessarily mean actual failure.)	If same auxiliary code is recorded in other components, check harness for power supply and communication system of all components shown by code.	–
DD *3	Master Reset (Momentary Interruption)	After engine was started, radio receiver assy was disconnected from system.	1. Power source circuit (Radio receiver assy). 2. Power source circuit (Stereo component amplifier assy). 3. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 4. AVC–LAN (Radio receiver assy – Rear seat audio controller). *5 5. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *6 6. Replace radio receiver assy. 7. Replace stereo component amplifier assy.	DI–1990 DI–1993 DI–2023 DI–2061 DI–2139 – –

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Logical address: 01 (Communication control) continued

DTC	Name	Diagnosis	Verification	See page
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (Radio receiver assy). 2. Power source circuit (Stereo component amplifier assy). 3. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 4. AVC–LAN (Radio receiver assy – Rear seat audio controller). *5 5. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *6 6. Replace radio receiver assy. 7. Replace stereo component amplifier assy.	DI–1990 DI–1993 DI–2023 DI–2061 DI–2139 – –
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.	–
E1 *1	Audio processor ON error	While source equipment is operating, AMP output stops.	1. Power source circuit (Radio receiver assy). 2. Power source circuit (Stereo component amplifier assy). 3. AVC–LAN circuit (Radio receiver assy – Stereo component amplifier assy). 4. AVC–LAN (Radio receiver assy – Rear seat audio controller). *5 5. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). *6 6. Replace radio receiver assy. 7. Replace stereo component amplifier assy.	DI–1990 DI–1993 DI–2023 DI–2061 DI–2139 – –
E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from radio receiver assy.	Replace radio receiver assy.	–
E3 *1	Registration Request Transmission	Registration Request command is output from slave component.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.	–

HINT:

- ▶ *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.
- ▶ *2: This code may be stored if the ignition key is turned to the START position again with the engine running.
- ▶ *3: This code may be stored if the ignition key is held in the START position for one minute or more before returning to the ON position.
- ▶ *4: If the device is reported as not existing during verification, check the power source circuit and AVC–LAN circuit for the device.
- ▶ *5: w/ Rear seat audio system only.
- ▶ *6: w/ Rear seat entertainment system only.

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3. Multi–display controller sub–assy (Physical address: 1F6) [RSE ECU, MAIN]

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
21	ROM Error	Abnormal condition of ROM is detected.	Replace multi–display controller sub–assy.	–
22	ROM Error	Abnormal condition of RAM is detected.	Replace multi–display controller sub–assy.	–
D1 *1	Registered component disconnected AVC–LAN transmitting abnormalities	Component shown by sub–code is or was disconnected from system with ignition switch in ACC or ON. Communication with component shown by sub–code is not ensured when engine is started.	1. Power source circuit (Multi–display controller sub–assy). 2. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–2110 DI–2139 –
D7 *2	No response to connection check	Component shown by sub–code is or was disconnected from system after engine started.	1. Power source circuit (Multi–display controller sub–assy). 2. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–2110 DI–2139 –
D7 *2	AVC–LAN Communication Check Error	Component in which this code is recorded is or was disconnected from system after engine start. Or, when recording this code, multi–display controller was disconnected.	1. Power source circuit (Radio receiver assy). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). 4. Replace Multi–display controller sub–assy.	DI–1990 DI–2110 DI–2139 –
D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, multi–display controller was disconnected.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–1990 DI–2139 –
D7 *2	Connection Check Error	Component in which this code is recorded has been disconnected from system after engine start. Or, when this code was recorded, multi–display controller was disconnected.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–1990 DI–2139 –
DC *3	Transmission Error	Transmission to component shown by sub–code has been failed. (This code does not necessarily mean actual failure.)	If same sub–code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.	–
DD *4	Master Reset (Momentary Interruption)	Component that is to be master has been disconnected after engine start.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–1990 DI–2139 –

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E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.	–
E3 *1	Registration Request Transmission	▶Registration Request command is output from slave component. ▶Registration Request command is output from sub–master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.	–
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–1990 DI–2139 –
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.	–

HINT:

- ▶ *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting an engine.
- ▶ *2: This code is stored when 180 sec. has passed after the power supply connector is pulled out after engine start.
- ▶ *3: This code may be stored when the engine key is turned back to the ON position and then turned again to the START position in 1 minute after engine start.
- ▶ *4: This code may be stored when the engine key is turned back to the ON position and then turned again to the START position after engine start.

Rear seat audio controller (Physical address: 1F4) [RSA]

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, RSA panel was disconnected.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –
D7 *2	Connection Check Error	Component in which this code is recorded has been disconnected from system after engine start. Or, when this code was recorded, RSA panel was disconnected.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –
DC *3	Transmission Error	Transmission to component shown by sub–code has been failed. (This code does not necessarily mean actual failure.)	If same sub–code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.	–
DD *4	Master Reset (Momentary Interruption)	Component that is to be master has been disconnected after engine start.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –

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E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.	–
E3 *1	Registration Request Transmission	▶Registration Request command is output from slave component. ▶Registration Request command is output from sub–master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.	–
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.	–
D8 *2	No Response To Connection Check	Component shown by sub–code is or had been disconnected from system after engine start.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –
D9 *1	Last Mode Error	Component operated (sound and/or image was provided) before engine stop is or was disconnected with ignition switch in ACC or ON.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –
DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Detected when sound and picture does not change by button operation	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –
DB *1	Mode Status Error	Dual alarm is detected.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –
DC *4	Transmission Error	Transmission to component shown by sub–code has been failed. (This code does not necessarily mean actual failure.)	If same sub–code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.	–
DE *3	Slave Reset (Momentary Interruption)	After engine start, slave component has been disconnected.	1. Power source circuit (Radio receiver assy). 2. AVC–LAN (Radio receiver assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–1990 DI–2061 –

HINT:

▶ *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting the engine.

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- *2: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.
- *3: This code may be stored when the engine key is turned 1 min. again after engine start.
- *4: This code may be stored when the engine key is turned again after engine start.

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CIRCUIT INSPECTION

DID9U–01

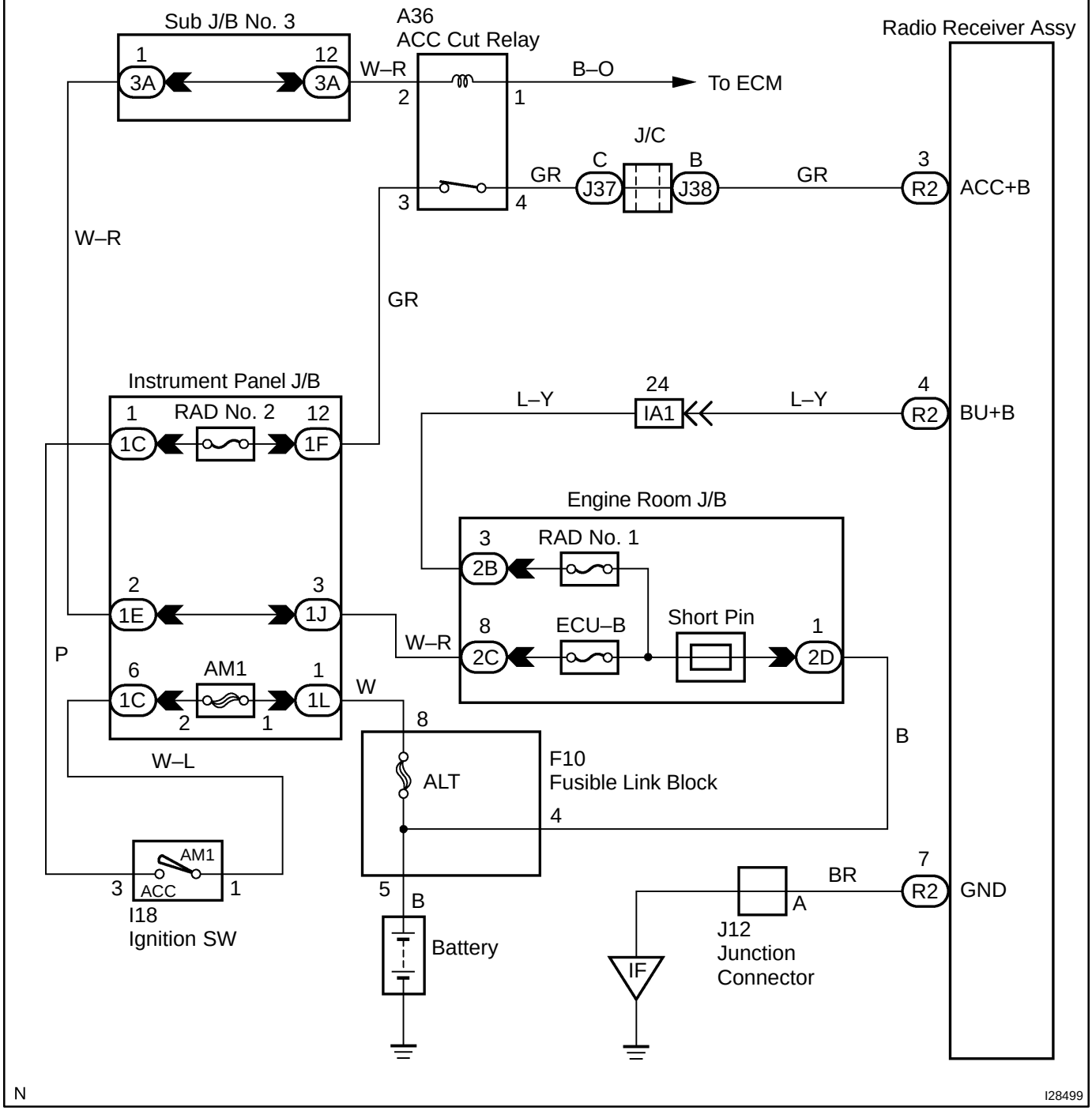
Power source circuit (Radio receiver assy)

CIRCUIT DESCRIPTION

This circuit provides power to the radio receiver assy.

WIRING DIAGRAM

Built–in Type Amplifier:



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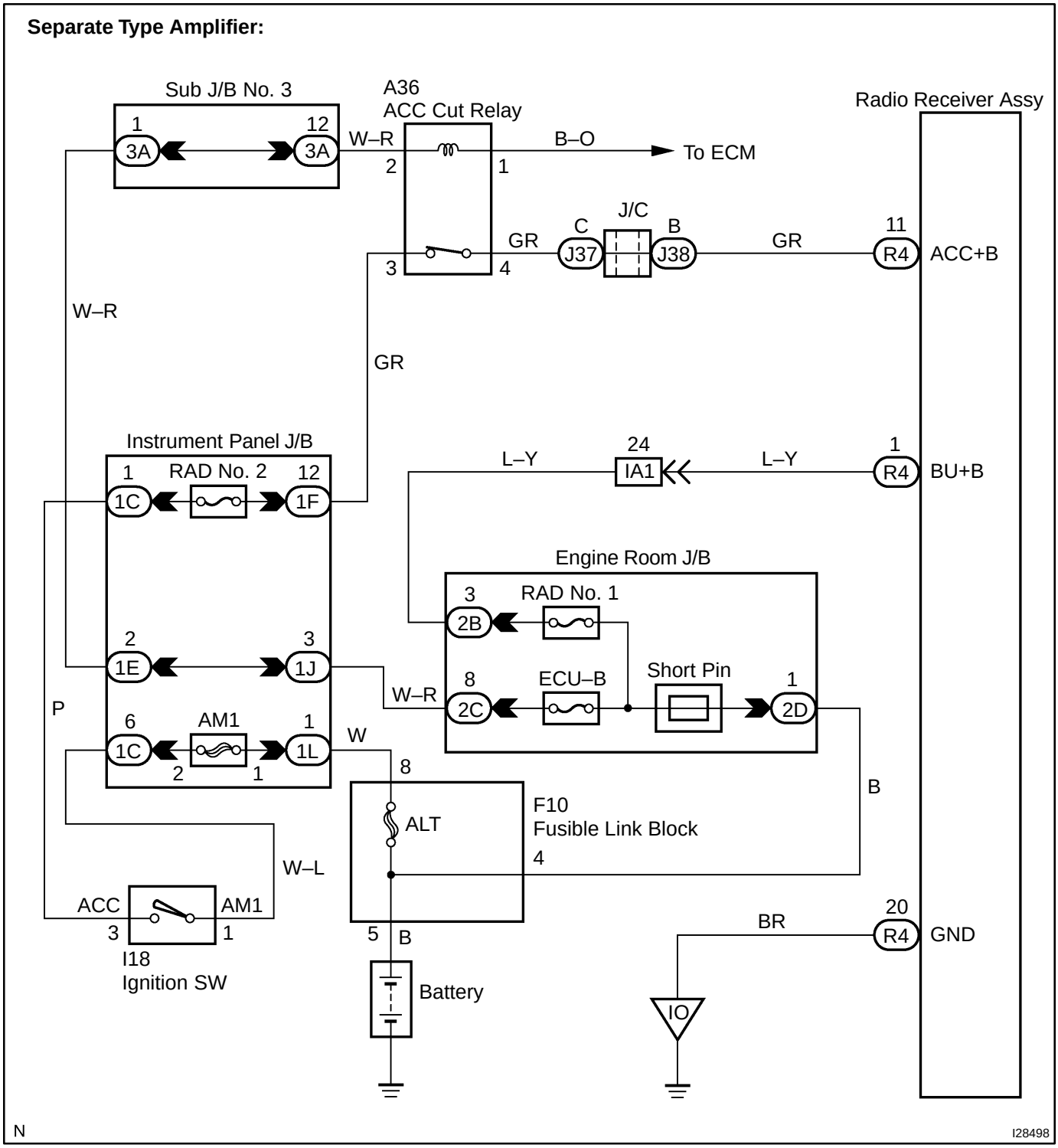
Separate Type Amplifier:



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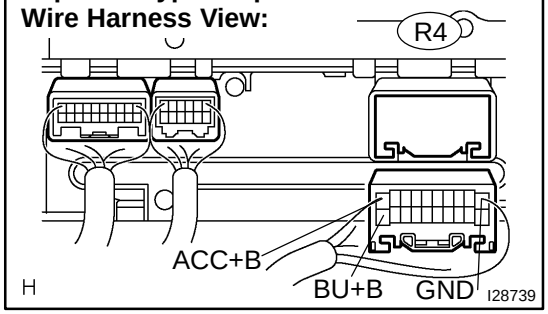
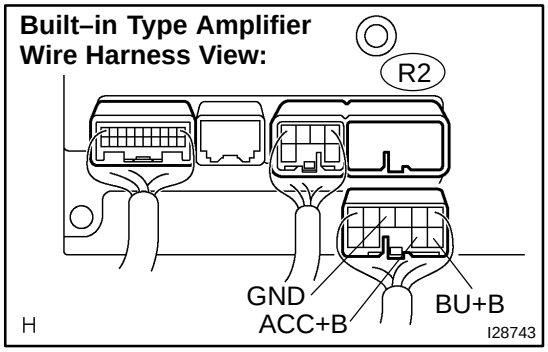
INSPECTION PROCEDURE

1	Inspect radio receiver assy.

Separate Type Amplifier Wire Harness View:



Built–in Type Amplifier Wire Harness View:



PREPARATION:

Disconnect the radio receiver assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
GND (R2–7, R4–20) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
BU+B (R2–4, R4–1) – GND (R2–7, R4–20)	Always	10 to 14 V
ACC+B (R2–3, R4–11) – GND (R2–7, R4–11)	Ignition SW ACC	10 to 14 V

NG → **Repair or replace harness or connector (Radio receiver assy – battery or body ground).**

OK

Proceed to next circuit inspection shown in problem symptoms table or diagnostic trouble code chart (See page DI–1967 or DI–1979).

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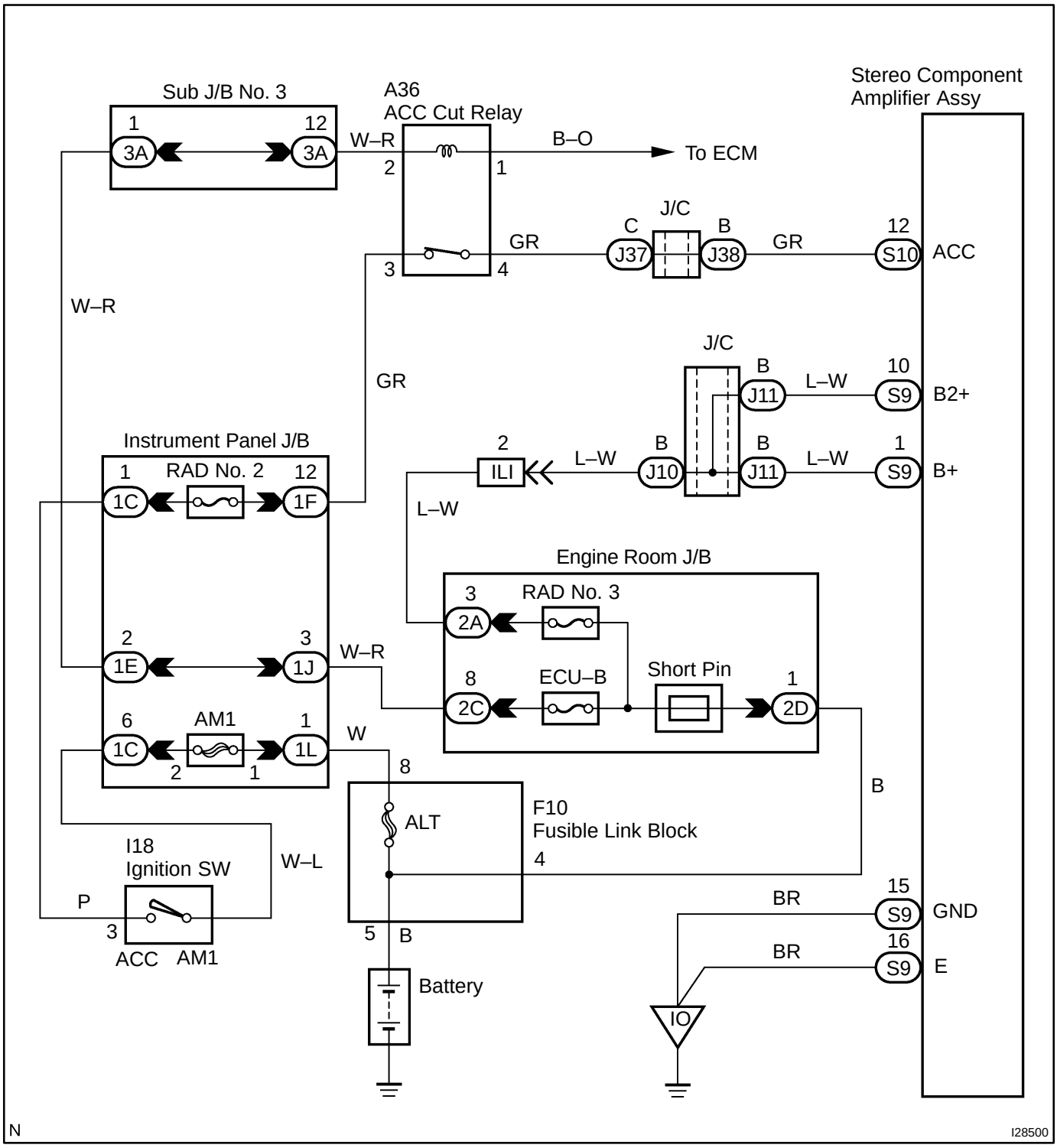
DID9V–01

Power source circuit (Stereo component amplifier assy)

CIRCUIT DESCRIPTION

This circuit provides power to the stereo component amplifier assy.

WIRING DIAGRAM



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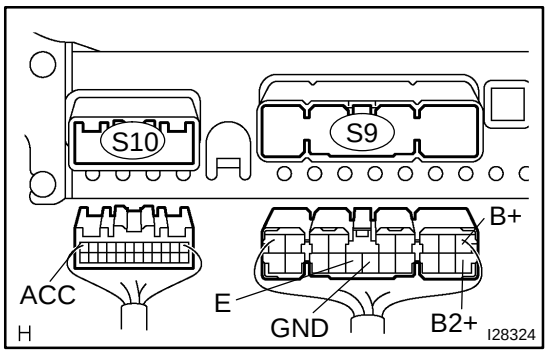
INSPECTION PROCEDURE

1	**Inspect stereo component amplifier assy (B+, B2+, ACC, GND, E).**



PREPARATION:

Disconnect the stereo component amplifier assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
E (S9–16) – Body ground	Always	Below 1 Ω
GND (S9–15) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
B+ (S9–1) – GND (S9–15)	Always	10 to 14 V
B2+ (S9–10) – GND (S9–15)	Always	10 to 14 V
ACC (S10–12) – GND (S9–15)	Ignition SW ACC	10 to 14 V

NG → **Repair or replace harness or connector (Stereo component amplifier assy – battery or body ground).**

OK

Proceed to next circuit inspection shown in problem symptoms table or diagnostic trouble code chart (See page DI–1967 or DI–1979).

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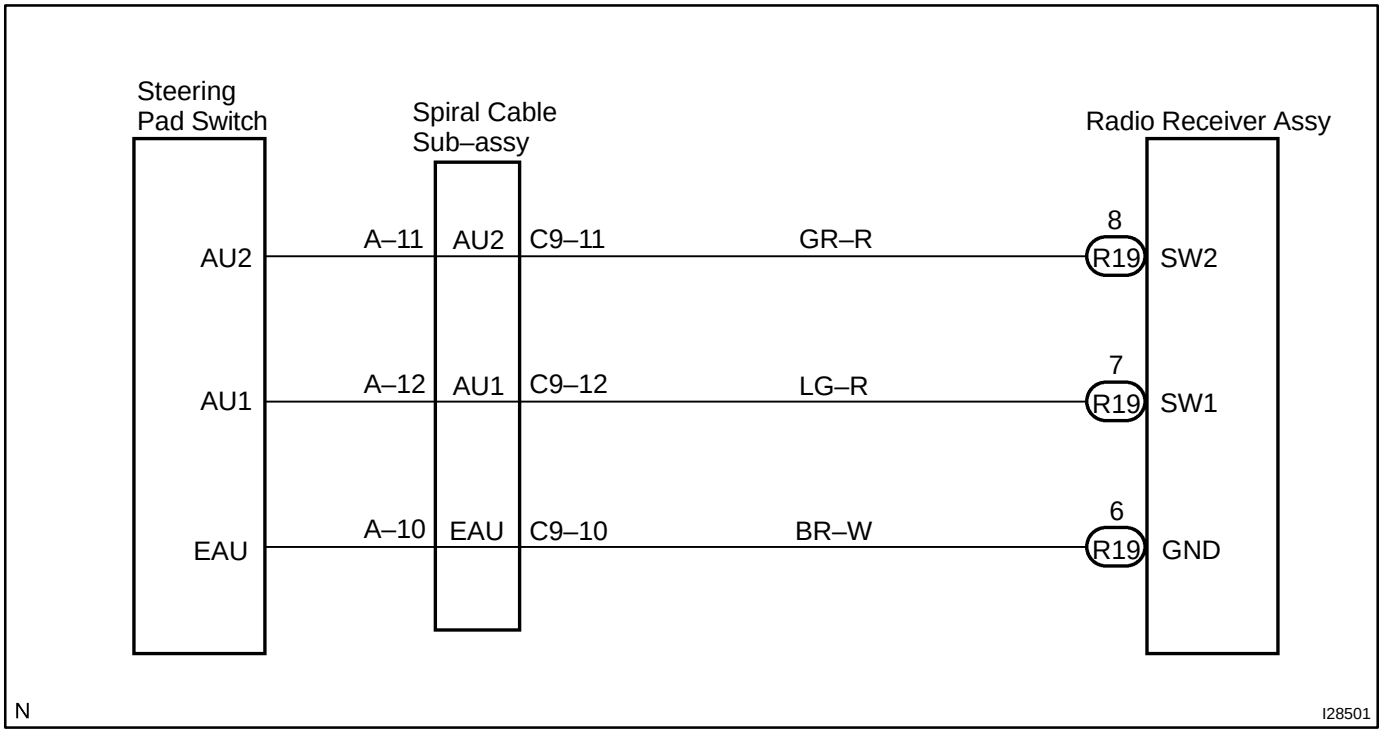
DID9W–01

Steering pad switch circuit

CIRCUIT DESCRIPTION

This circuit sends an operation signal from the steering pad switch to the radio receiver assy.
If there is an open in the circuit, the audio system cannot be operated by the steering pad switch.
If there is a short in the circuit, the same condition as when the switch is continuously depressed occurs.
Therefore, not only the steering pad switch cannot operate the radio receiver assy, but also the radio receiver assy itself cannot function.

WIRING DIAGRAM



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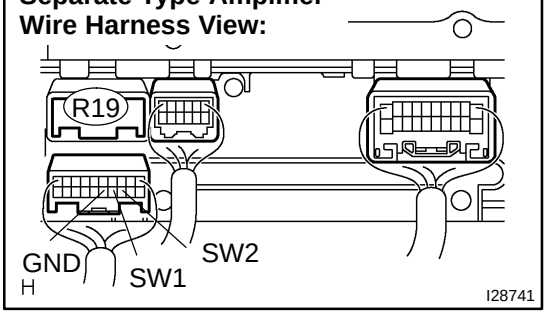
INSPECTION PROCEDURE

NOTICE:

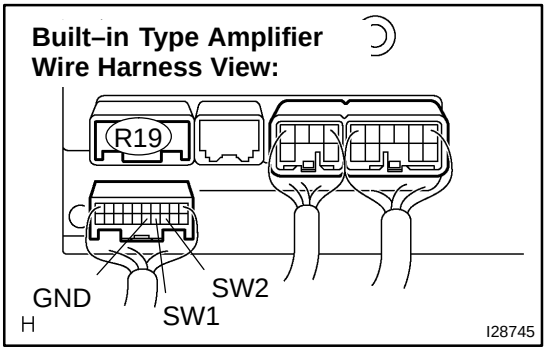
The vehicle is equipped with SRS (Supplemental Restraint System) such as airbags. Before servicing (including removal or installation of parts), be sure to read the precautionary notice for the supplemental restraint system (see page RS–1).

1	**Inspect steering pad switch assy.**

Separate Type Amplifier Wire Harness View:



Built–in Type Amplifier Wire Harness View:



PREPARATION:

Disconnect the radio receiver assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
SW1 (R19–7) – GND (R19–6)	No switch is pushed	Approx. 100 kΩ
SW1 (R19–7) – GND (R19–6)	SEEK+ switch: push	Approx. 0 Ω
SW1 (R19–7) – GND (R19–6)	SEEK– switch: push	Approx. 0.3 kΩ
SW1 (R19–7) – GND (R19–6)	VOL+ switch: push	Approx. 1 kΩ
SW1 (R19–7) – GND (R19–6)	VOL– switch: push	Approx. 3.2 kΩ
SW2 (R19–8) – GND (R19–6)	No switch is pushed	Approx. 100 kΩ
SW2 (R19–8) – GND (R19–6)	MODE switch: push	Approx. 0 Ω

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1967).

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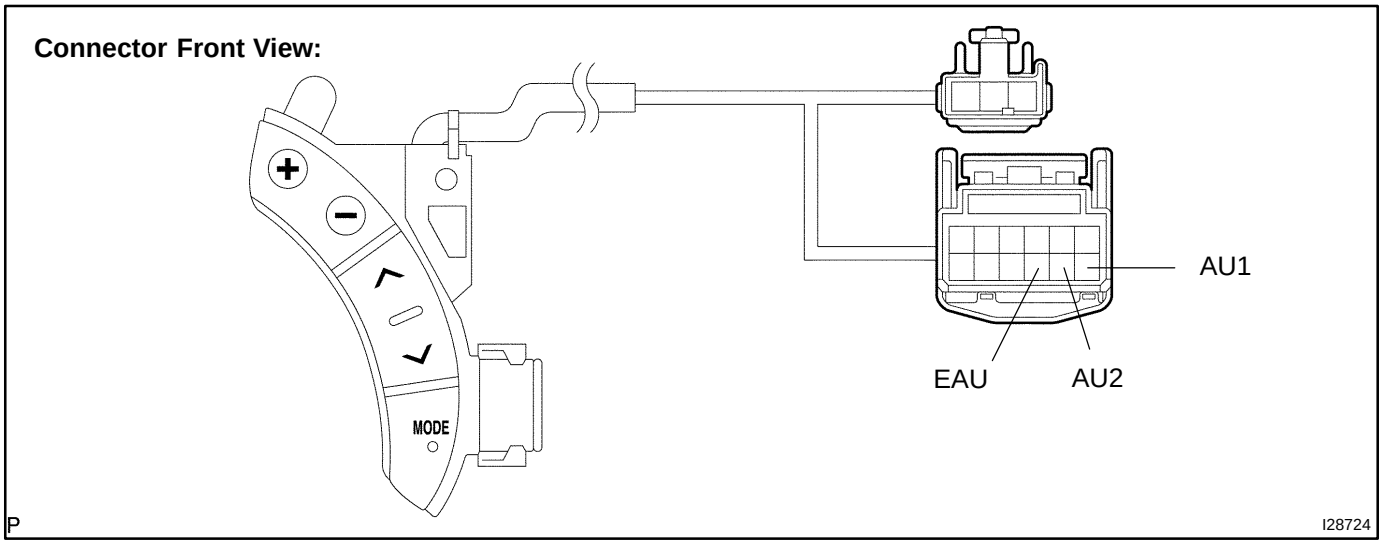
2	Inspect steering pad switch assy.



PREPARATION:

Disconnect the steering pad switch assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
AU1 (A–12) – EAU (A–10)	No switch is pushed	Approx. 100 kΩ
AU1 (A–12) – EAU (A–10)	SEEK+ switch: push	Approx. 0 Ω
AU1 (A–12) – EAU (A–10)	SEEK– switch: push	Approx. 0.3 kΩ
AU1 (A–12) – EAU (A–10)	VOL+ switch: push	Approx. 1 kΩ
AU1 (A–12) – EAU (A–10)	VOL– switch: push	Approx. 3.2 kΩ
AU2 (A–11) – EAU (A–10)	No switch is pushed	Approx. 100 kΩ
AU2 (A–11) – EAU (A–10)	MODE switch: push	Approx. 0 Ω

NG → **Replace steering pad switch assy.**

OK

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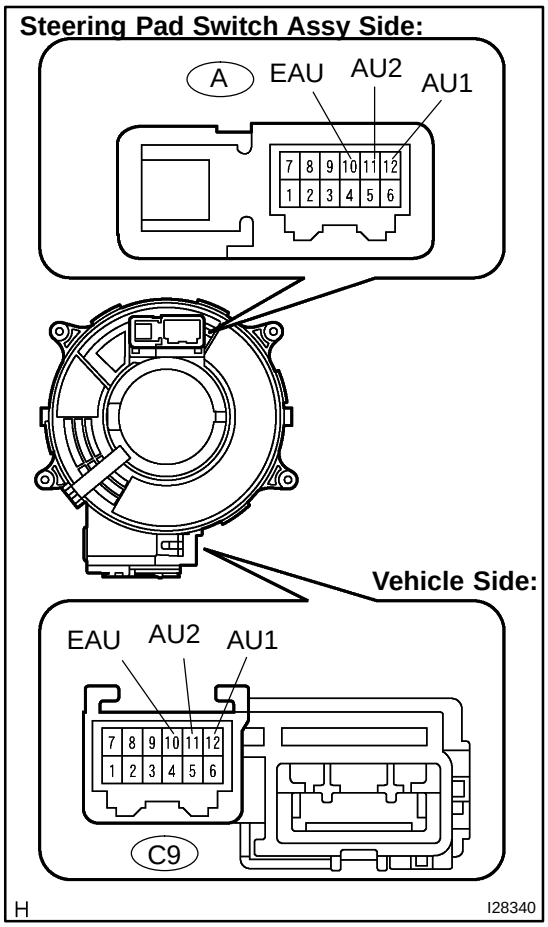
3	Inspect spiral cable sub–assy.



PREPARATION:

Disconnect the spiral cable sub–assy connector.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Symbol (Tester connection)	Specified condition
EAU (A–10) – EAU (A–10)	Below 1 Ω
AU1 (A–12) – AU1 (A–12)	Below 1 Ω
AU2 (A–11) – AU2 (A–11)	Below 1 Ω

NG → **Replace spiral cable sub–assy.**

OK →

Repair or replace harness or connector (Radio receiver assy – spiral cable).

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DID9X–01

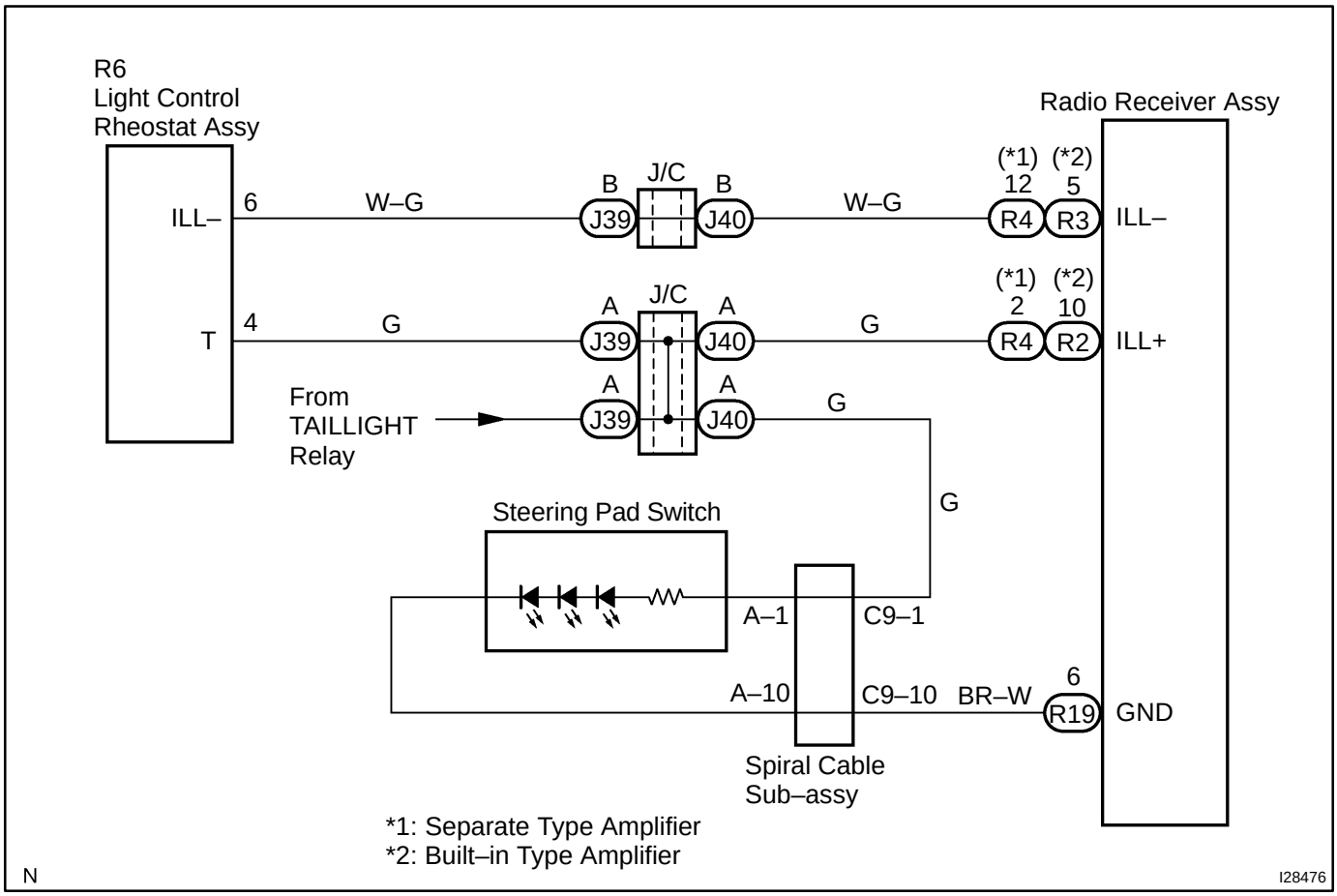
Illumination circuit

CIRCUIT DESCRIPTION

Power is supplied to the radio receiver panel illumination when the light control switch is in the TAIL or HEAD position. The body ECU determines the external brightness based on the brightness level detected by the automatic light control sensor, and then operates the tail relay. Power can also be supplied by operating the relay.

The intensity of the radio receiver panel illumination can be adjusted by the rheostat switch.

WIRING DIAGRAM



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INSPECTION PROCEDURE

NOTICE:

The vehicle is equipped with SRS (Supplemental Restraint System) such as airbags. Before servicing (including removal or installation of parts), be sure to read the precautionary notice for the supplemental restraint system (See page RS–1).

1	**Check illumination.**

CHECK:

Check if the illumination for the radio receiver assy, steering pad switch assy or others (A/C switch, cigarette lighter, etc.) comes on when the light control switch is turned to the HEAD or TAIL position.

RESULT:

Components with illumination	Go to step
Illumination comes on for all components except radio receiver assy.	A
Illumination comes on for all components except steering pad switch does not come on.	B
Illumination comes on for all components except radio receiver assy, steering pad switch, Rear heater control panel, each switch, etc.	C
All illumination does not come on. (Radio receiver assy, steering pad switch, Combination meter, Rear heater control panel, each switch, etc.)	D

HINT:

If the illuminations have malfunctions, check the rheostat switch.

B	**Go to step 4.**
C	**Go to step 8.**
D	**Go to combination meter system (See page DI–1645).**

A

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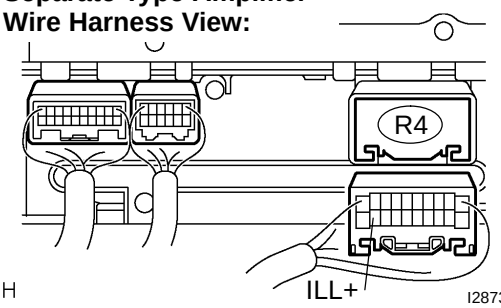
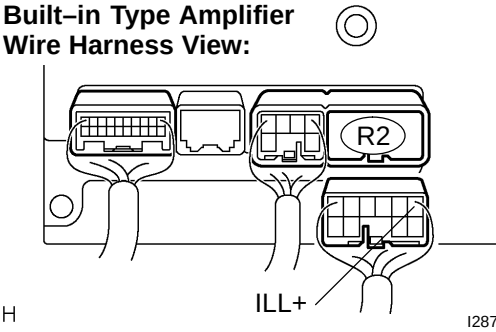
2	Check radio receiver assy (ILL+).

Separate Type Amplifier Wire Harness View:



Built–in Type Amplifier Wire Harness View:



PREPARATION:

Disconnect the radio receiver assy connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
ILL+ (R2–10) – Body ground (*2)	Light control switch TAIL	10 to 14 V
ILL+ (R4–2) – Body ground (*1)	Light control switch TAIL	10 to 14 V

*1: Separate Type Amplifier

*2: Built–in Type Amplifier

NG → **Repair or replace harness or connector (Radio receiver assy – battery).**

OK

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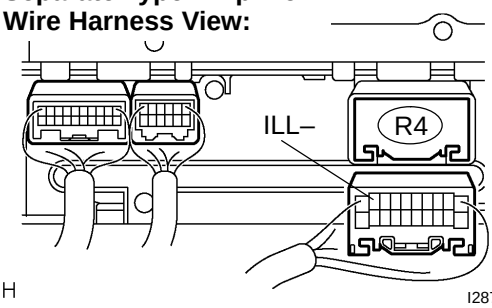
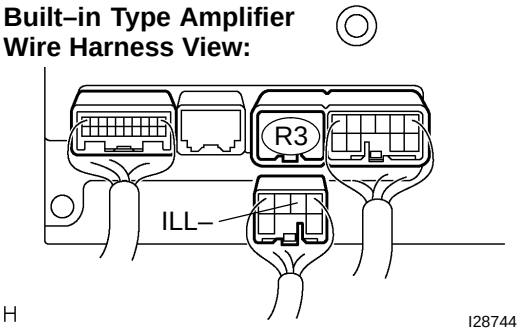
3	Check harness and connector (Radio receiver assy – Light control rheostat).

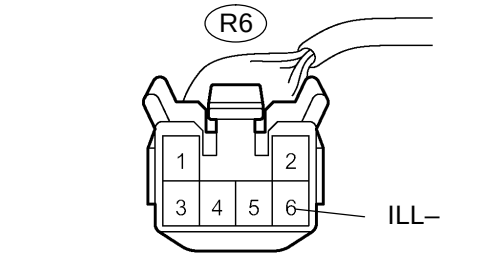
Separate Type Amplifier Wire Harness View:



Built–in Type Amplifier Wire Harness View:



Light Control Rheostat Wire Harness View:



PREPARATION:

Disconnect the radio receiver assy connector and light control rheostat connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Specified condition
ILL– (R3–5) – ILL– (R6–6) (*2)	Below 1 Ω
ILL– (R4–12) – ILL– (R6–6) (*1)	Below 1 Ω
ILL– (R6–6) – Body ground (*1)	10 kΩ or higher

*1: Separate Type Amplifier

*2: Built–in Type Amplifier

NG → **Repair or replace harness or connector.**

OK

Replace radio receiver assy.

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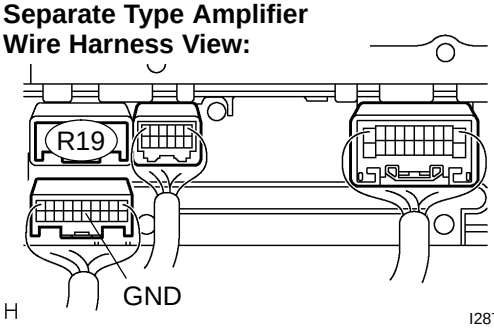
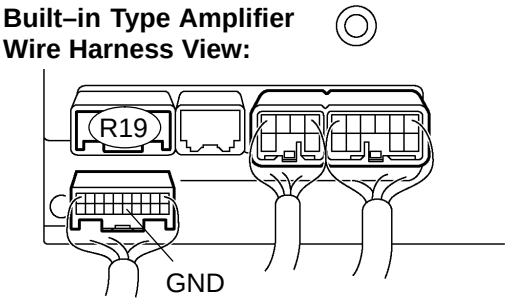
4	Check radio receiver assy.

Separate Type Amplifier Wire Harness View:



Built–in Type Amplifier Wire Harness View:



NG

PREPARATION:

Disconnect the radio receiver assy connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
GND (R19–6) – Body ground	Light control switch TAIL	10 to 14 V

OK → **Replace radio receiver assy.**

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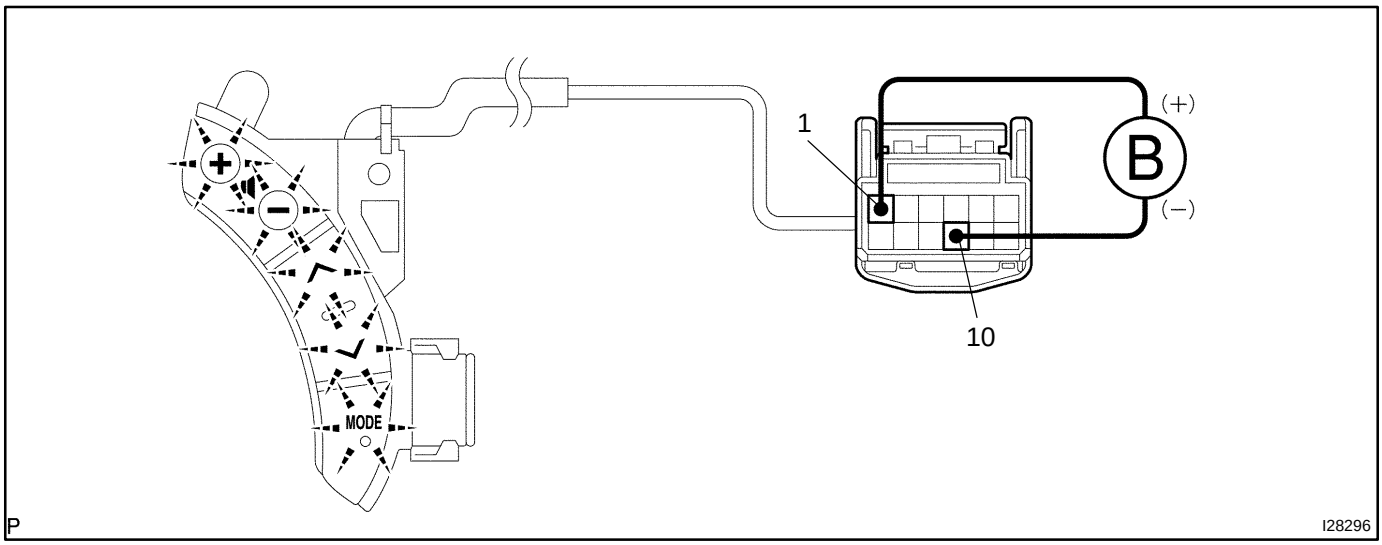
5	Inspect steering pad switch assy.



PREPARATION:

(a) Disconnect the steering pad switch connector.

(b) Connect the positive (+) lead to terminal 1 and the negative (–) lead to terminal 10 of steering pad switch assy connector.

CHECK:

Check if the illumination for the steering pad switch assy comes on.

OK:

Illumination for the steering pad switch assy comes on.

NG → **Replace steering pad switch assy.**

OK

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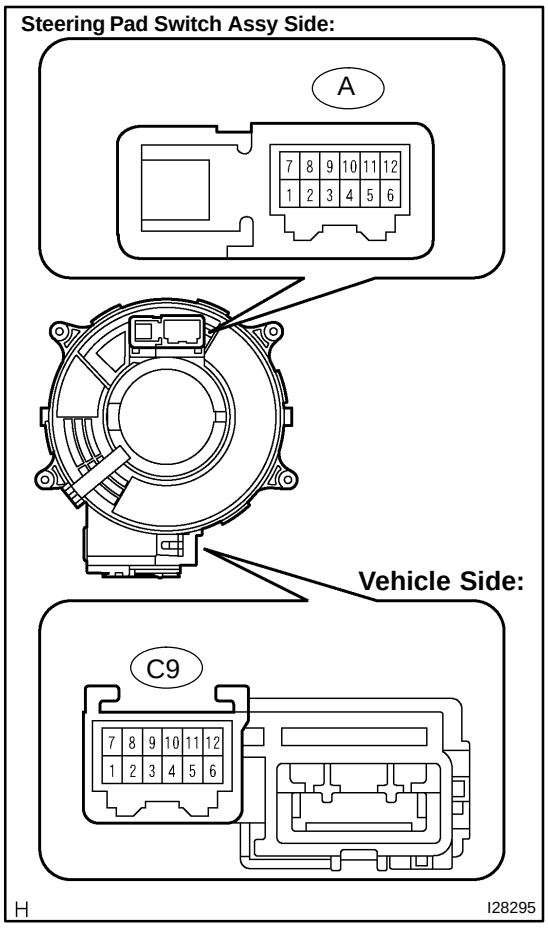
6	Inspect spiral cable sub–assy.



PREPARATION:

Remove the spiral cable sub–assy.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
A–1 – C9–1	Always	Below 1 Ω
A–10 – C9–10	Always	Below 1 Ω

NG → **Replace spiral cable sub–assy.**

OK

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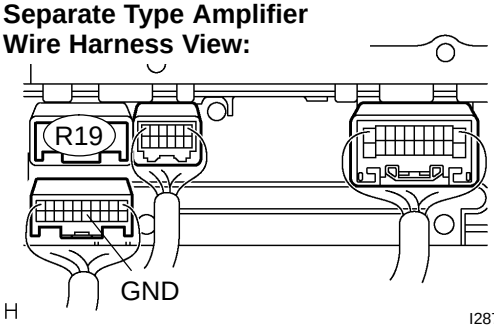
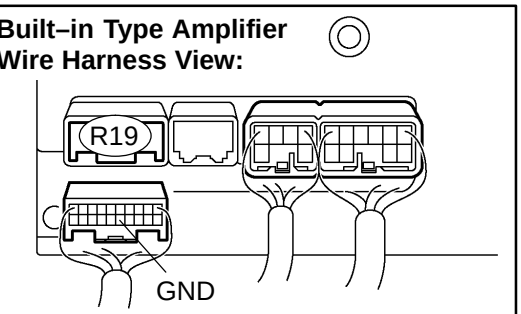
7	Check harness and connector (Radio receiver assy – Spiral cable sub–assy).

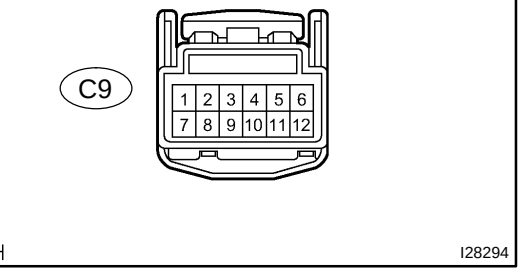
Separate Type Amplifier Wire Harness View:



Built–in Type Amplifier Wire Harness View:



Spiral Cable Sub–assy Connector Front View:



PREPARATION:

Disconnect the spiral cable sub–assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
GND (R19–6) – Spiral cable terminal 10	Always	Below 1 Ω
GND (R19–6) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness or connector (Radio receiver assy – spiral cable sub–assy).**

OK

Repair or replace wire harness or connector (Battery – spiral cable sub–assy).

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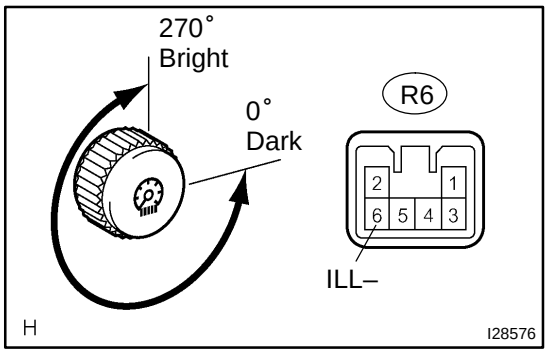
8	Check light control rheostat.



PREPARATION:

(a) Reconnect the light control rheostat switch connector.
(b) Ignition switch is ON.
(c) Light control switch is TAIL or HEAD.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

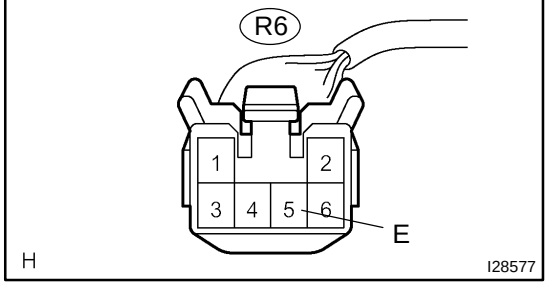
Symbol (Tester connection)	Condition	Specified condition
ILL– (R6–6) – Body ground	Rheostat knob to fully counterclockwise → fully clockwise	Below 1 V → 10 to 14 V

NG → **Replace light control rheostat.**

OK

9	Check harness and connector (Light control rheostat – Body ground).

Light Control Rheostat Wire Harness View:



PREPARATION:

Disconnect the light control rheostat connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Specified condition
E (R6–5) – Body ground	Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Repair or replace wire harness or connector (Battery – spiral cable sub–assy).

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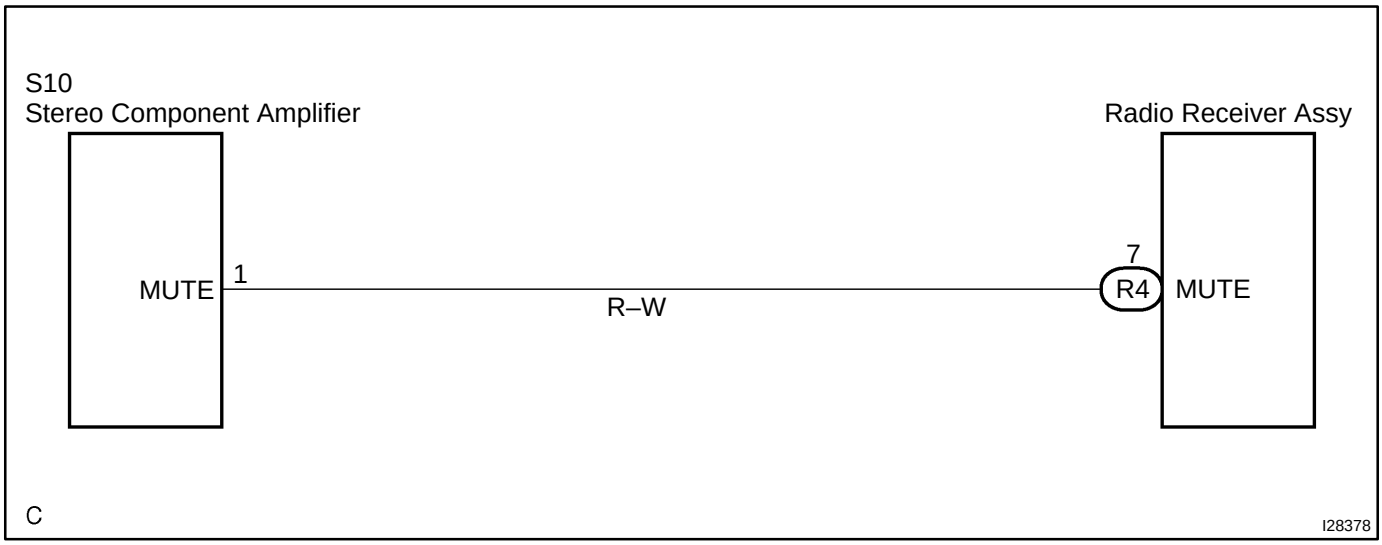
DID9Y–01

Mute signal circuit

CIRCUIT DESCRIPTION

This circuit sends a signal to the stereo component amplifier to mute noise. Because of that, the noise produced by changing the sound source ceases.
If there is an open in the circuit, noise can be heard from the speakers when changing the sound source.
If there is a short in the circuit, even though the stereo component amplifier assy is normal, no sound or only an extremely small sound can be produced.

WIRING DIAGRAM



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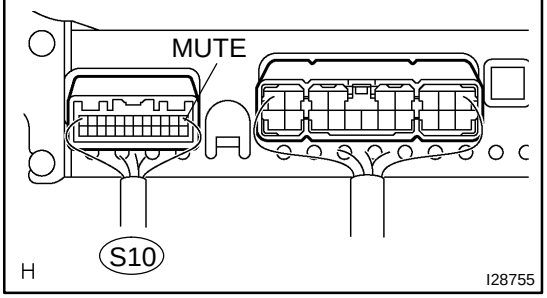
INSPECTION PROCEDURE

1	Inspect stereo component amplifier assy.

Stereo Component Amplifier Assy:



PREPARATION:

Make sure that the stereo component amplifier assy connector is connected.

CHECK:

Measure the voltage according to the value in the table below.

OK:

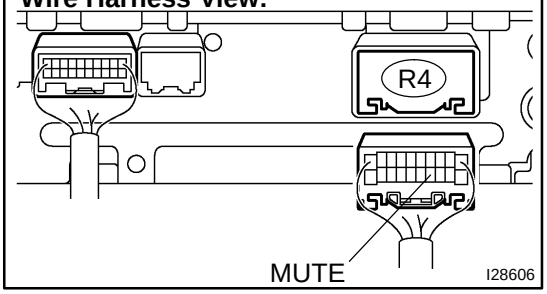
Symbol (Tester connection)	Condition	Specification
MUTE (S10–1) – Body ground	Turn ignition switch to ACC, Audio system is playing → Changing mode	Above 3.5 V → Below 1 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–1967).**

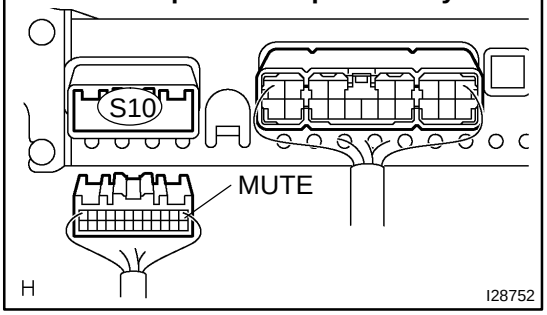
NG

2	Check harness and connector (Radio receiver assy – Stereo component amplifier assy).

Radio Receiver Assy Wire Harness View:



Stereo Component Amplifier Assy:



PREPARATION:

Disconnect the radio receiver assy and stereo component amplifier assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
MUTE (R4–7) – MUTE (S10–1)	Always	Below 1 Ω
MUTE (R4–7) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

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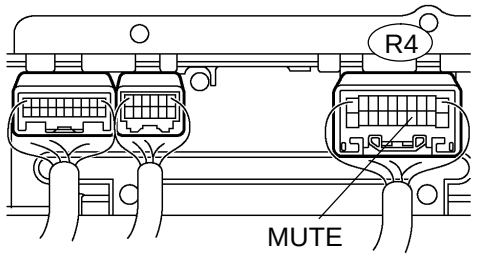
OK

3	Inspect radio receiver assy.

Wire Harness View:



PREPARATION:

Reconnect the radio receiver assy connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
MUTE (R4–7) – Body ground	Ignition switch ON	Above 3.5 V

OK → **Replace stereo component amplifier assy.**

NG

Replace radio receiver assy.

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DID9Z–01

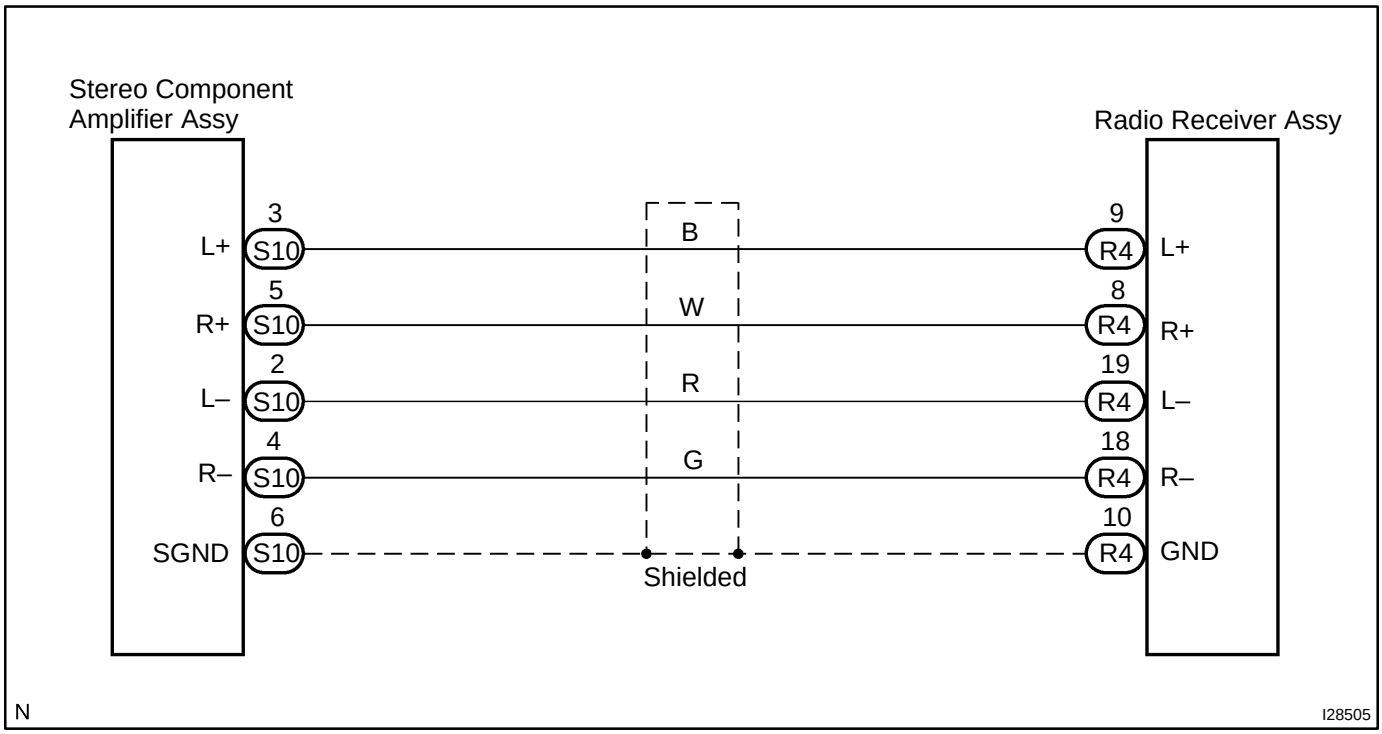
Sound signal circuit

CIRCUIT DESCRIPTION

The radio receiver assy sends a sound signal to the stereo component amplifier assy through this circuit. The sound signal that has been sent is amplified by the stereo component amplifier assy, and then sent to the speakers.

If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier assy or the speakers.

WIRING DIAGRAM



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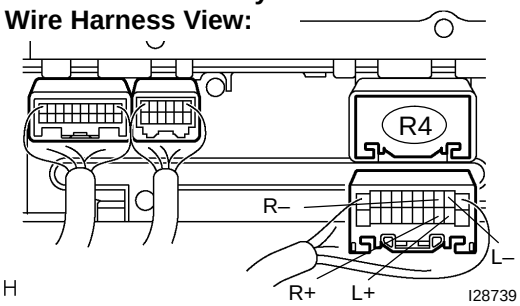
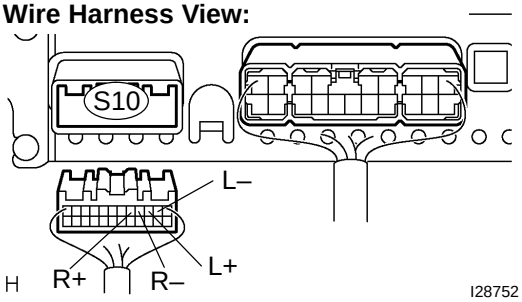
INSPECTION PROCEDURE

1	**Check harness and connector (Radio receiver assy – Stereo component amplifier assy).**

Radio Receiver Assy Wire Harness View:



Stereo Component Amplifier Assy Wire Harness View:



PREPARATION:

Disconnect the radio receiver assy and stereo component amplifier assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Specified condition
L+ (R4–9) – L+ (S10–3)	Below 1 Ω
L– (R4–19) – L– (S10–2)	Below 1 Ω
R+ (R4–8) – R+ (S10–5)	Below 1 Ω
R– (R4–18) – R– (S10–4)	Below 1 Ω
L+ (R4–9) – Body ground	10 kΩ or higher
L– (R4–19) – Body ground	10 kΩ or higher
R+ (R4–8) – Body ground	10 kΩ or higher
R– (R4–18) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1967).

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DIDA0–01

Speaker circuit

CIRCUIT DESCRIPTION

The sound signal that has been amplified by the stereo component amplifier is sent to the speakers from the stereo component amplifier through this circuit.

If there is a short in this circuit, the stereo component amplifier assy (built–in amp) detects it and stops output to the speakers.

Thus sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier assy (built–in amp) or the speakers.

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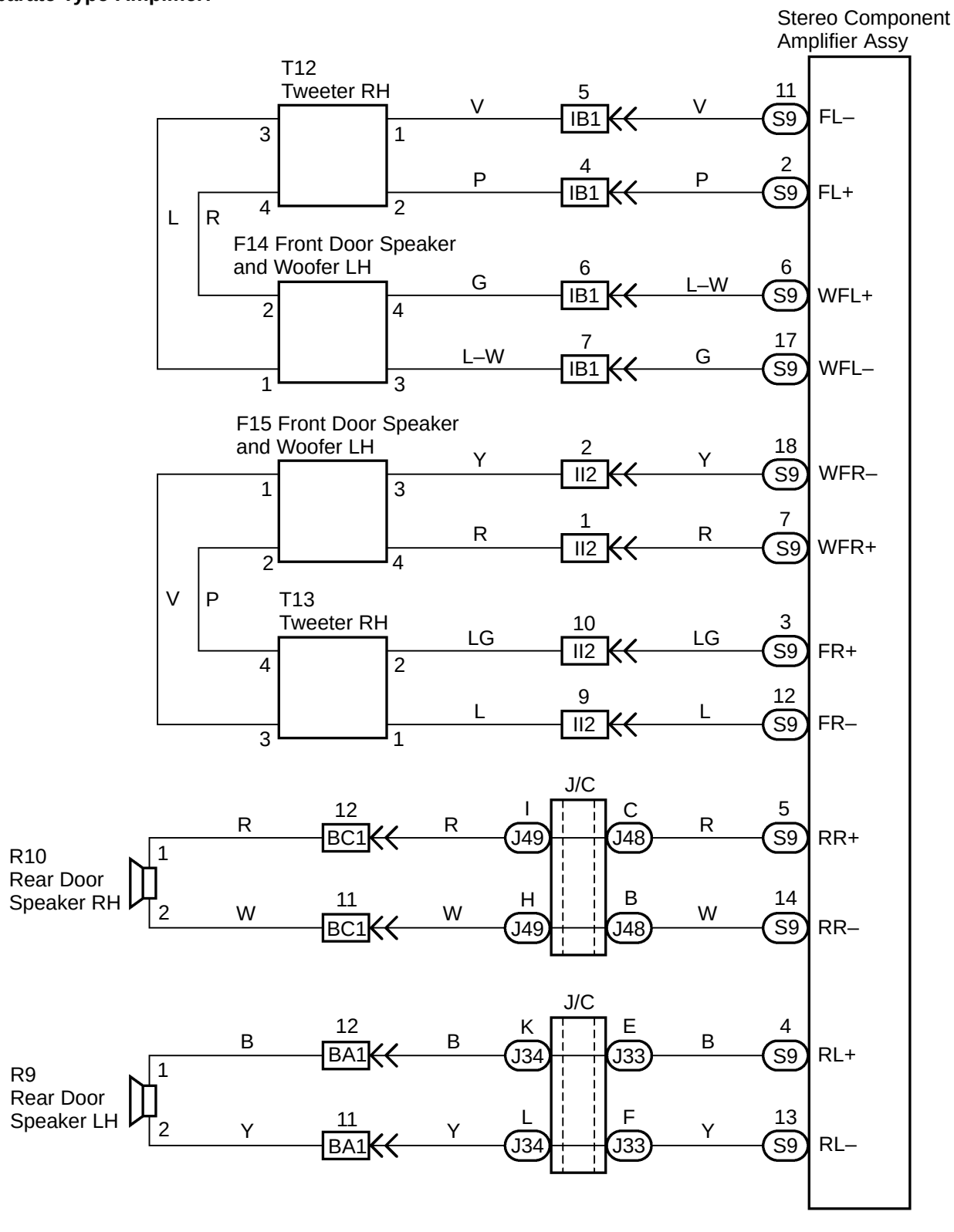
WIRING DIAGRAM

Separate Type Amplifier:



N

I28503

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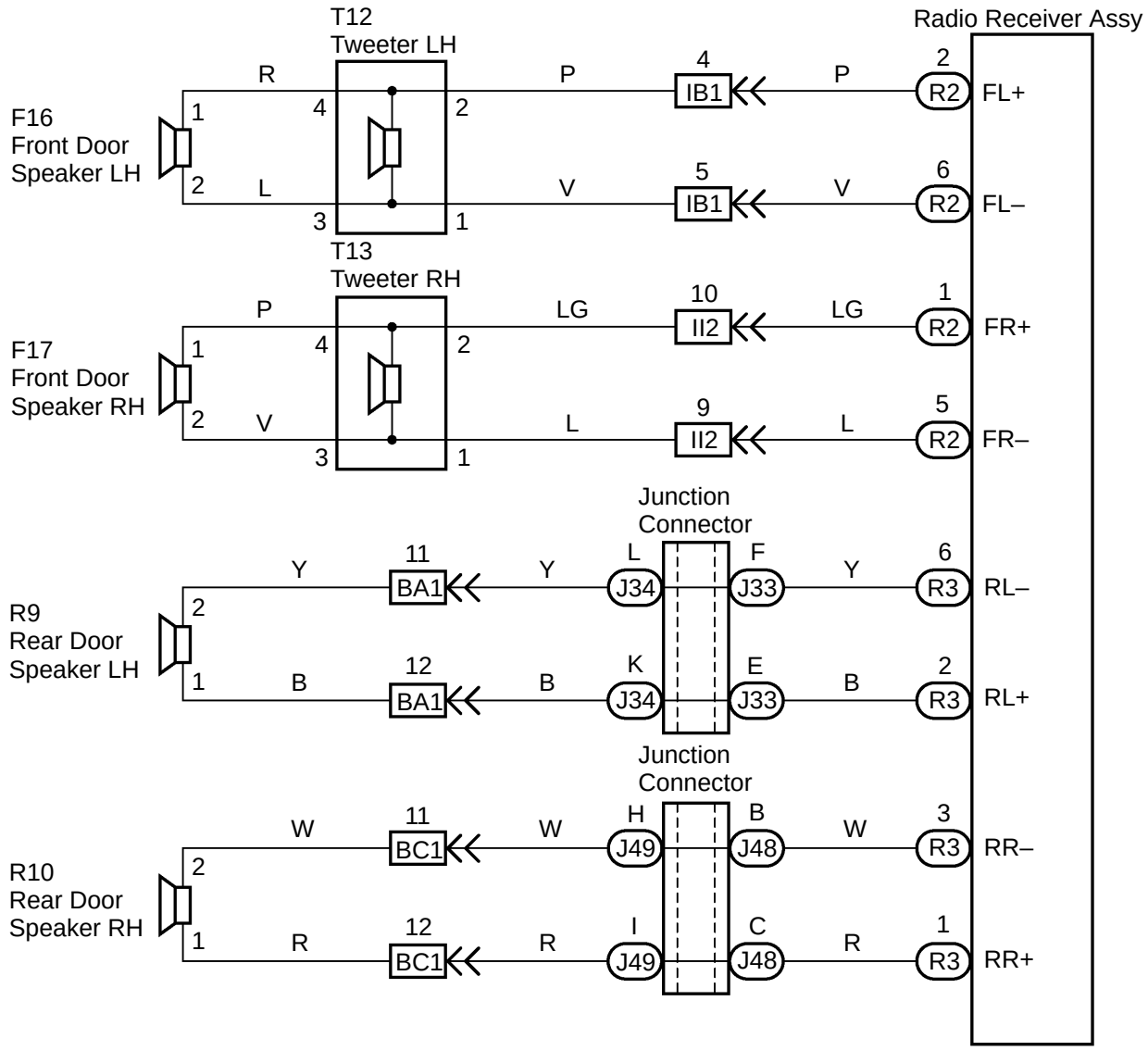
Built–in Type Amplifier:



N

I28504

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INSPECTION PROCEDURE

1	**Check apparatus.**

CHECK:

Choose the apparatus to be inspected.

Apparatus	Go to step
Separate type amplifier	A
Built–in type amplifier	B

B → **Go to step 6.**

A

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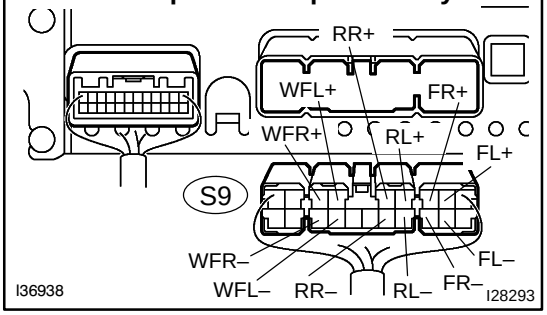
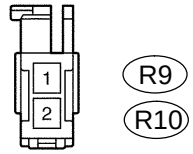
2	Check harness and connector (Stereo component amplifier assy – Speaker assy).

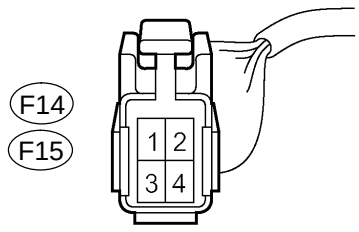
Stereo Component Amplifier Assy:



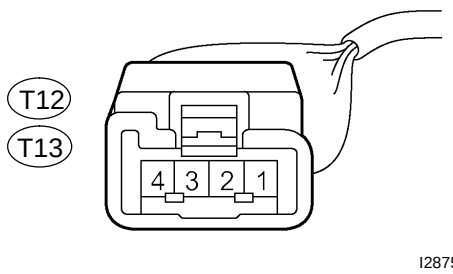
Rear Speaker Connector Front View:



Front Door Speaker Assy and Woofer Connector Front View:



Tweeter Connector Front View:



PREPARATION:

Disconnect the connectors from the radio receiver assy and speakers.

CHECK:

Measure the resistance between the speaker and the stereo component amplifier to check for an open circuit in the wire harness.

OK:

Below 1 Ω

CHECK:

Measure the resistance between each speaker and body ground to check for a short circuit in wire harness.

OK:

10 kΩ or higher

HINT:

Refer to the wiring diagram for connection of each terminal.

NG → **Repair or replace harness or connector.**

OK

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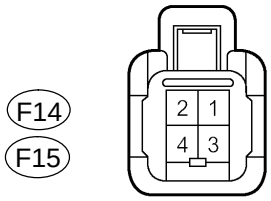
3	Inspect front door speaker and woofer.

Front Door Speaker Assy and Woofer Connector Front View:



CHECK:

Measure the resistance according to the value(s) in the table below.

NOTICE:

The speaker should not be removed for checking.

OK:

Tester connection	Specified condition
1 – 2	Approx. 3.15 Ω
3 – 4	Approx. 2.78 Ω

NG → **Replace front door speaker and woofer.**

OK

4	Inspect tweeter.

CHECK:

Check that malfunction disappears when another tweeter in good condition is installed.

OK:

Malfunction disappears.

HINT:

- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one and the left one.

OK → **Replace tweeter.**

NG

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5	**Inspect rear speaker assy.**

CHECK:

Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

OK:

2.6 ± 0.2 Ω

NG → **Replace rear speaker assy.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1967).

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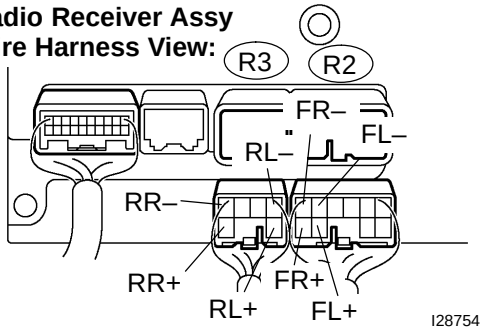
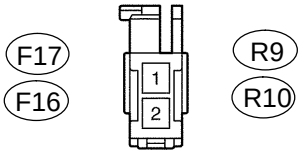
6	Check harness and connector (Radio receiver assy – Speaker assy).

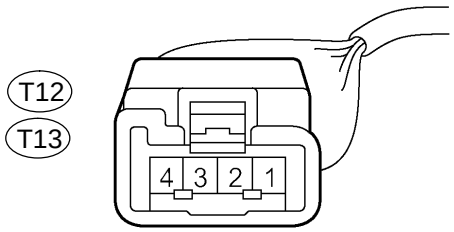
Radio Receiver Assy Wire Harness View:



Front Door Speaker Assy and Rear Speaker Connector Front View:



Tweeter Assy Connector Front View:



PREPARATION:

Disconnect the connectors from the radio receiver assy and speakers.

CHECK:

Measure the resistance between the speaker and the radio receiver assy to check for an open circuit in the wire harness.

OK:

Below 1 Ω

CHECK:

Measure the resistance between each speaker and body ground to check for a short circuit in wire harness.

OK:

10 kΩ or higher

HINT:

Refer to the wiring diagram for connection of each terminal.

NG → **Repair or replace harness or connector.**

OK

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7	**Inspect front door speaker assy.**

CHECK:

Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

OK:

Approximately 4 Ω

NG → **Replace front door speaker assy.**

OK

8	**Inspect tweeter assy.**

CHECK:

Check that malfunction disappears when another tweeter in good condition is installed.

OK:

Malfunction disappears.

HINT:

- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one and the left one.

OK → **Replace tweeter.**

NG

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9	**Inspect rear speaker assy.**

CHECK:

Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

OK:

Approximately 4 Ω

NG → **Replace rear speaker assy.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–1967).

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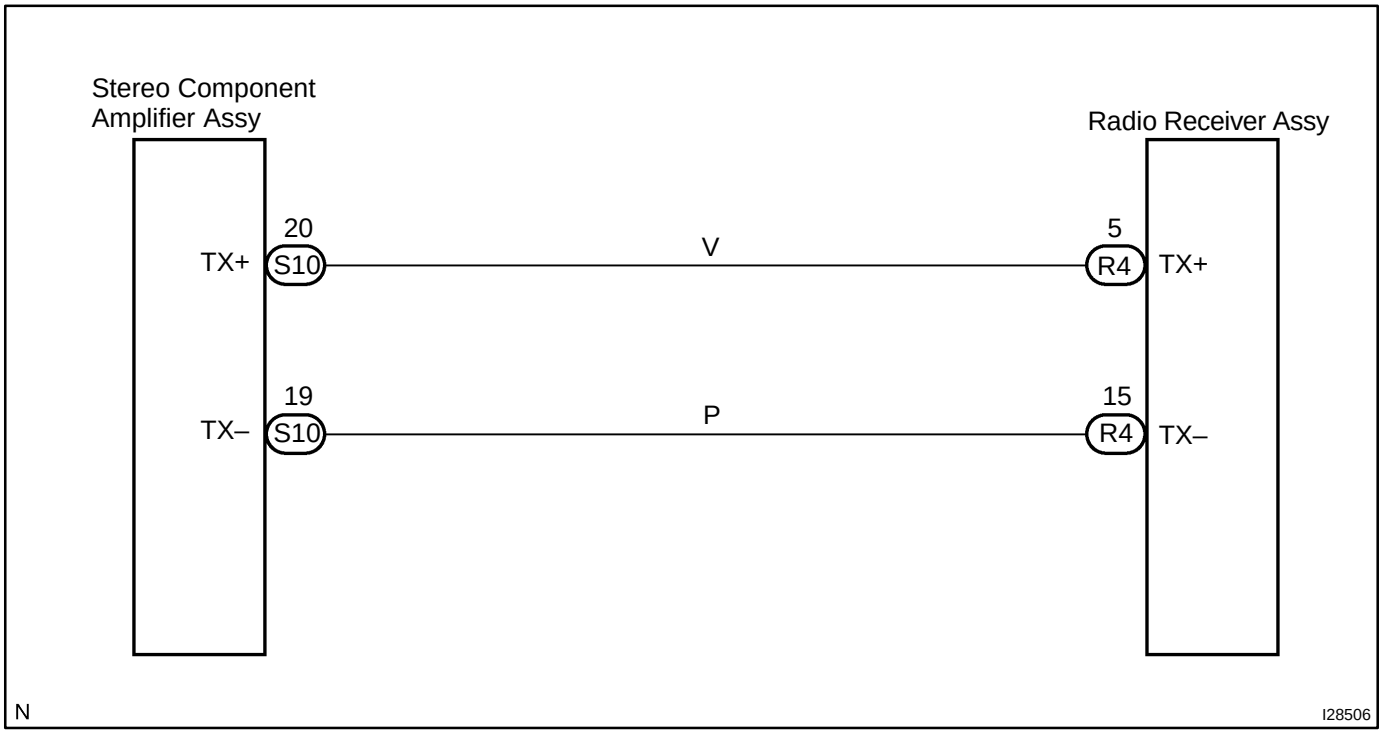
AVC–LAN circuit (Radio receiver assy – stereo component amplifier)

CIRCUIT DESCRIPTION

Each unit of the audio system connected to the AVC–LAN (communication bus) transfers the signal of each switch by communication.
When a short to +B or short to ground occurs in this AVC– LAN, the audio system will not function normally as communication is discontinued.
In this AVC–LAN, the radio receiver assy becomes the master of the communication, and the radio receiver assy has resistance necessary for communication.

WIRING DIAGRAM



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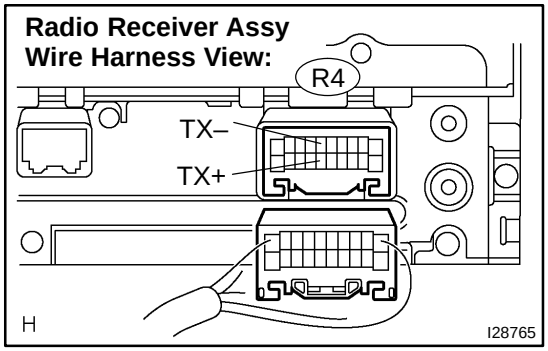
INSPECTION PROCEDURE

1	**Inspect radio receiver assy.**



PREPARATION:

Disconnect the radio receiver assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TX+(R4–5) – TX– (R4–15)	Always	60 to 80 Ω

NG → **Replace radio receiver assy.**

OK

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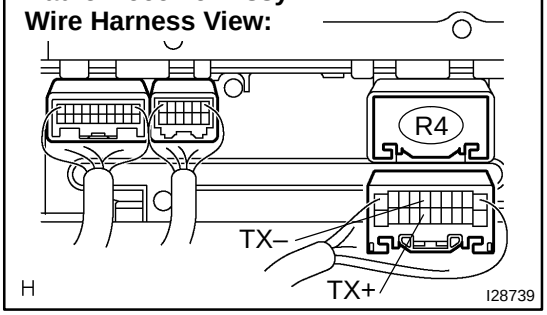
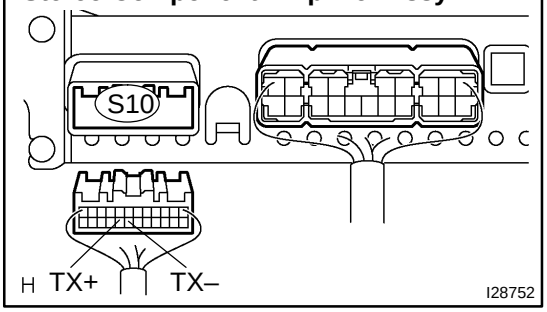
2	Check harness and connector (Radio receiver assy – Stereo component amplifier assy).

Radio Receiver Assy Wire Harness View:



Stereo Component Amplifier Assy:



PREPARATION:

Disconnect the stereo component amplifier assy connector.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Symbol (Tester connection)	Specified condition
TX+ (R4–5) – TX+ (S10–20)	Below 1 Ω
TX– (R4–15) – TX– (S10–19)	Below 1 Ω
TX+ (R4–5) – Body ground	10 kΩ or higher
TX– (R4–15) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table or diagnostic trouble code chart (See page DI–1967 or DI–1979).

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DIDA2–01

Sound quality is bad in all modes (Volume is too low)

INSPECTION PROCEDURE

1	**Adjust sound quality.**

CHECK:

Set ”BASS” and ”TREB” to the initial values and check if sounds is normal.

OK:

Malfunction disappears.

OK → **System is OK.**

NG

2	**Replace stereo component amplifier assy.**

Replace the stereo component amplifier assy and check if it operates normally.

OK:

Malfunction disappears.

NG → **Replace radio receiver assy.**

OK

End.

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DIDA3–01

Noise occurs

INSPECTION PROCEDURE

1	**Check of speaker installation.**

CHECK:

Check if each speaker is securely installed.

OK:

Each speaker is securely installed.

HINT:

The radio is equipped with a noise prevention system that blocks excessively loud noise. If such noise occurs, check the all wiring is proper and that the antenna installation part ground and noise–prevention equipment are installed.

Condition in which noise occurs	Noise type
Noise increases when the accelerator pedal is depressed, but stops when the engine is stopped.	Generator noise
Noise occurs during A/C or the heater operation.	Blower motor noise
Noise occurs when the vehicle accelerates rapidly on an unpaved road or after the ignition switch is turned on.	Fuel pump noise
Noise occurs when the horn switch is pressed and released or when pressed and held.	Horn noise
Quiet noise occurs while the engine is running, but stops when the engine is stopped.	Ignition noise
Noise occurs synchronously with the blink of the turn signal.	Flasher noise
Noise occurs during window washer operation.	Washer noise
Noise occurs while the engine is running, and it continues even after the engine is stopped.	Water temperature sensor noise
Noise occurs during wiper operation.	Wiper noise
Noise occurs when the brake pedal is depressed.	Stop light switch noise
Others.	Static electricity stored on the vehicle

HINT:

- ▶ Identify the condition under which the noise occurs, and check the noise filter on the related part.
- ▶ First ensure that the noise is not coming from the outside. Failure to do so makes noise source detection difficult and may lead to a misdiagnosis.
- ▶ Noise should be removed in descending order of loudness.

NG → **Install it properly.**

OK

Identification of noise source (See page DI–1964).

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DIDA4–01

Radio broadcast cannot be received (Bad reception)

INSPECTION PROCEDURE

1	**Check if radio auto–search functions properly.**

CHECK:

Check if the radio auto–search functions properly.

Perform the auto–search of the radio and check that it functions normally.

OK:

The radio auto–search functions properly.

OK → **Replace radio receiver assy.**

NG

2	**Check optional component.**

CHECK:

Check for any optional component (sun shade film, telephone antenna etc.).

Check whether or not any optional component such as a sun shade film and telephone antenna is installed.

OK:

Optional component is not installed.

NG → **Effect from optional component.**

OK

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3	Check antenna for noise production.

CHECK:

Noise Check with Antenna

(1) With the ignition switch in the ACC position, turn on the radio and choose the AM mode.

(2) Place the tip of a screwdriver on the antenna of the rear glass antenna, and check that noise is heard from the speakers.

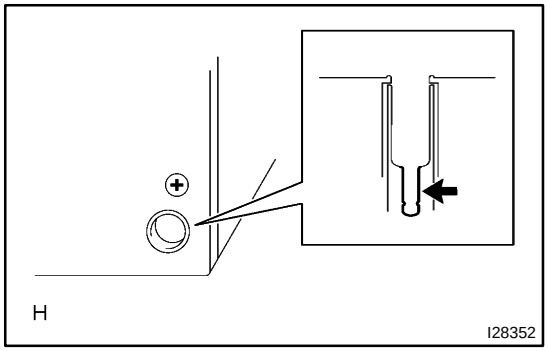
OK:

Noise occurs.

OK	Replace radio receiver assy.

NG

4	Inspect radio receiver assy (Antenna).



CHECK:

(a) Preparation for Check

(1) Remove the antenna plug of the radio receiver assembly.

(b) Noise Check

(1) With the radio receiver assy connector connected, turn the ignition switch to the ACC position.

(2) Turn on the radio and choose the AM mode.

(3) Place a screwdriver or a piece of metal such as thin wire on an antenna jack of the radio receiver assy and check that noise is heard from the speaker.

OK:

Noise occurs.

NG	Replace radio receiver assy.

OK

Replace antenna cord sub–assy.

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DIDA5–01

CD cannot be inserted or is ejected right after insertion

INSPECTION PROCEDURE

1	**Check if a normal CD is inserted.**

CHECK:

Check if a normal CD is inserted.

Make sure that the CD is a normal audio CD, and that there is no deformation, flaw, stain, burr or other defects on the CD.

OK:

Normal audio CD is inserted.

HINT:

- Translucent or oddly–shaped CDs cannot be played.
- Computer CD–ROMs (even those with music) and CD–R discs cannot be played.
- Playing an 8–cm (3.2 in.) CD does not require an adapter.

NG → **End.**

OK

2	**Check if a CD is inserted properly.**

CHECK:

Check if a CD is inserted properly.

Check whether or not the CD is inserted upside down.

OK:

Not upside down.

NG → **Set disc correctly.**

OK

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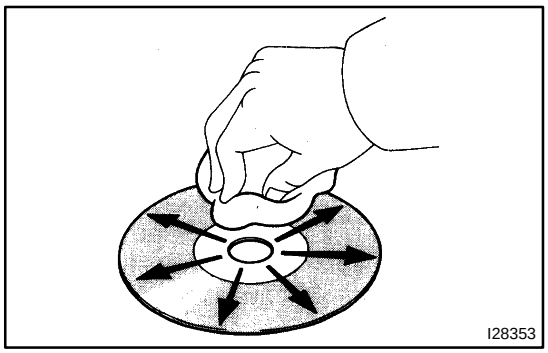
3	Disc cleaning.



PREPARATION:

Disc cleaning

If the disc gets dirty, clean the disc by wiping the surface from the center to outside in a radial direction with a soft cloth.

NOTICE:

Do not use a conventional record cleaner or anti–static preservative.

OK:

Malfunction disappears.

OK	End.

NG

4	Replace CD with another and recheck.

PREPARATION:

Replace the CD with another and recheck.

CHECK:

Replace the CD with another normal one to see if the same trouble occurs again.

OK:

Malfunction disappears.

NG	Replace radio receiver assy.

OK

End.

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DIDA6–01

CD cannot be ejected

INSPECTION PROCEDURE

1	**Press ”EJECT” and check operation.**

CHECK:

Press ”EJECT”and check the operation.

Press the CD EJECT switch of the radio receiver assembly for 2 seconds or more to see if the CD is ejected.

OK:

CD is ejected.

HINT:

If the CD is not ejected, bring the vehicle in for repair.

Do not attempt to remove it by force.

NG → **Replace radio receiver assy.**

OK

2	**Replace CD with another and recheck.**

CHECK:

Insert another CD and check if it is ejected.

OK:

The disc is ejected.

NG → **Replace radio receiver assy.**

OK

End.

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DIDA7–01

Sound quality is bad only when CD is played (Volume is too low)

INSPECTION PROCEDURE

1	**Replace CD with another and recheck.**

CHECK:

Insert another CD and check if it is ejected.

OK:

Malfunction disappears.

NG → **Replace radio receiver assy.**

OK

End.

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DIDA8–01

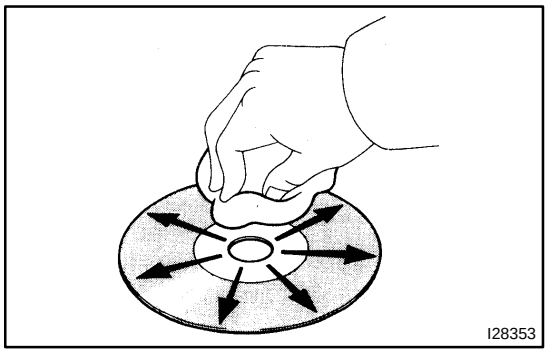
CD sound skips

HINT:

- The sound may skid when driving on an unpaved road.
- Sudden temperature changes in the cabin will cause condensation inside the CD player and prevent it from playing.

INSPECTION PROCEDURE

1	**Disc cleaning.**



PREPARATION:

Disc cleaning

If the disc gets dirty, clean the disc by wiping the surface from the center to outside in a radial direction a with a soft cloth.

NOTICE:

Do not use a conventional record cleaner or anti–static preservative.

OK:

Malfunction disappears.

OK → **End.**

NG

2	**Replace CD with another and recheck.**

CHECK:

Replace the CD with another and recheck.

Replace the CD with another normal one to see if the same trouble occurs again.

OK:

Malfunction disappears.

OK → **End.**

NG

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3	**Check of radio receiver assembly installation.**

CHECK:

Check that the radio receiver assembly is installed properly.

OK:

Installed properly.

NG → **Install the radio receiver assembly properly.**

OK

4	**Did temperature in cabin change rapidly?**

CHECK:

Check whether or not rapid temperature change occurred in the cabin.

OK:

A rapid temperature change occurred.

HINT:

A rapid temperature change creates condensation inside the CD player, which may prevent the CD from being played.

NG → **Replace radio receiver assy.**

OK

Let it sit for a while before using (Condensation due to temperature change).

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DIDA9–01

Cassette tape cannot be insert or played

INSPECTION PROCEDURE

1	**Check for any foreign object.**

CHECK:

Check for any foreign objects.

Check that no foreign objects or defects are detected in the cassette tape player of the radio receiver assembly.

OK:

No foreign objects or defects are detected.

NG → **Remove foreign object.**

OK

2	**Check cassette tape.**

CHECK:

Check the cassette tape.

Check that the cassette tape is a normal tape with music or voice recorded.

OK:

Proper cassette tape with music or voice recorded.

NG → **End.**

OK

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3	**Replace cassette tape with another and recheck.**

CHECK:

Replace the cassette tape with another one and recheck.

Replace the cassette tape with another normal one to see if the same trouble occurs again.

OK:

The function returns to be normal.

NG → **Replace radio receiver assy.**

OK

End.

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DIDAA–01

Cassette tape cannot be ejected

INSPECTION PROCEDURE

1	**Press ”EJECT” and check operation.**

CHECK:

Press ”EJECT” and check the operation.

Press the cassette tape EJECT switch of the radio receiver assembly for 2 seconds or more and check that the cassette tape is ejected.

OK:

The cassette tape is ejected.

NG → **Replace radio receiver assy.**

OK

2	**Check cassette tape.**

CHECK:

Check the cassette tape.

Check that the ejected cassette tape does not have a peeled label, a cassette body deformation or any other defect.

OK:

No fault on the cassette tape.

NG → **End.**

OK

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3	**Replace cassette tape with another and recheck.**

CHECK:

Replace the cassette tape with another and recheck.

Replace the cassette tape with another normal one to see if the same trouble occurs again.

OK:

Malfunction disappears.

NG → **Replace radio receiver assy.**

OK

End.

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DIDAB–01

Sound quality is bad only when playing tape

INSPECTION PROCEDURE

1	**Replace cassette tape with another and recheck.**

CHECK:

Replace the cassette tape with another one and recheck.

Replace the cassette tape with another normal one to see if the same trouble occurs again.

OK:

Malfunction disappears.

OK → **End.**

NG

2	**Check for any foreign object.**

CHECK:

Check for foreign objects.

Check that no foreign objects or defects are detected in the cassette tape player.

OK:

No foreign objects or defects are detected.

NG → **Remove foreign objects.**

OK

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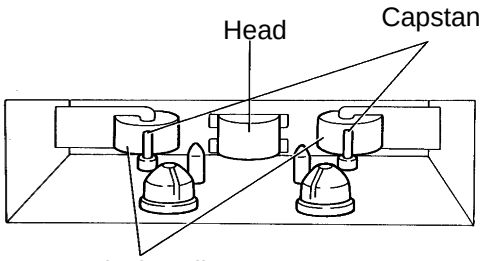
3	Clean head and check operation.



PREPARATION:

Head cleaning

(1) Raise the cassette door with your finger. Using a pencil or similar object, push in the guide.

(2) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.

CHECK:

Check if the same trouble occurs again.

OK:

Malfunction disappears.

NG	Replace radio receiver assy.

OK

End.

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Tape is tangled due to incorrect tape speed or auto–reverse malfunction

INSPECTION PROCEDURE

1	**Check for any foreign object.**

CHECK:

Check for any foreign objects.

Check that no foreign objects or defects are detected in the cassette tape player of the radio receiver assy.

OK:

No foreign objects or defects are detected.

NG → **Remove foreign object.**

OK

2	**Replace cassette tape with another and recheck (90 min. or less).**

CHECK:

Replace the cassette tape with another one and recheck.

Replace the cassette tape with another normal one (90 minutes or less) to see if the same trouble occurs again.

OK:

Malfunction disappears.

OK → **End.**

NG

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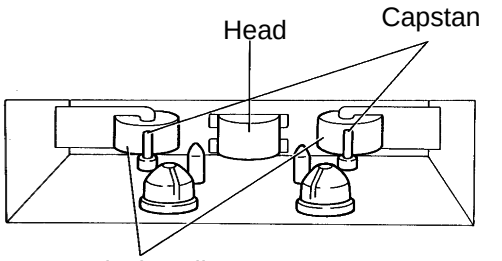
3	Clean head and check operation.



PREPARATION:

Head cleaning

(1) Raise the cassette door with your finger. Using a pencil or similar object, push in the guide.

(2) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.

CHECK:

Check if the same trouble occurs again.

OK:

Malfunction disappears.

NG	Replace radio receiver assy.

OK

End.

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REAR SEAT AUDIO SYSTEM

DIDAD–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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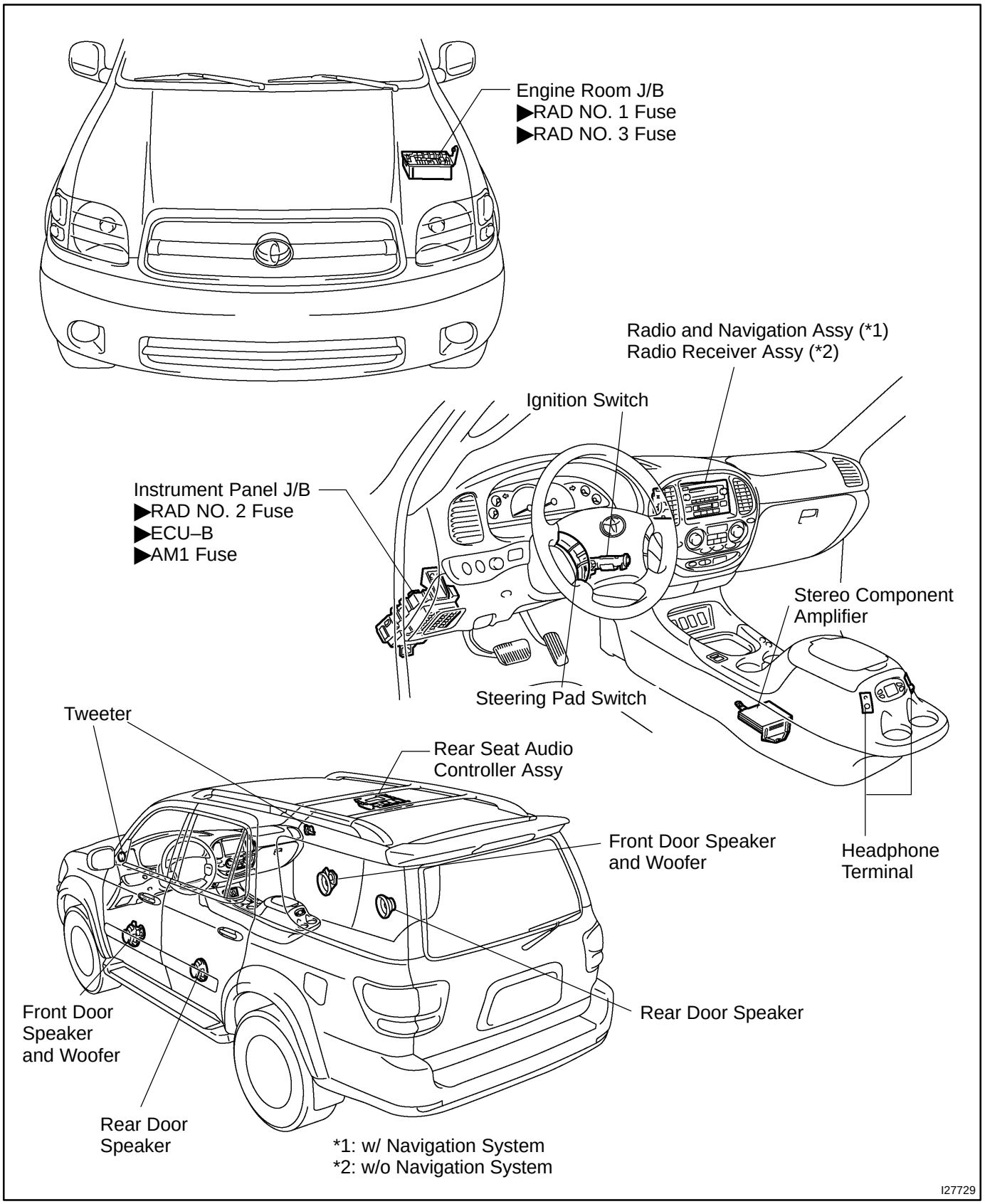
DIDAE–01

LOCATION



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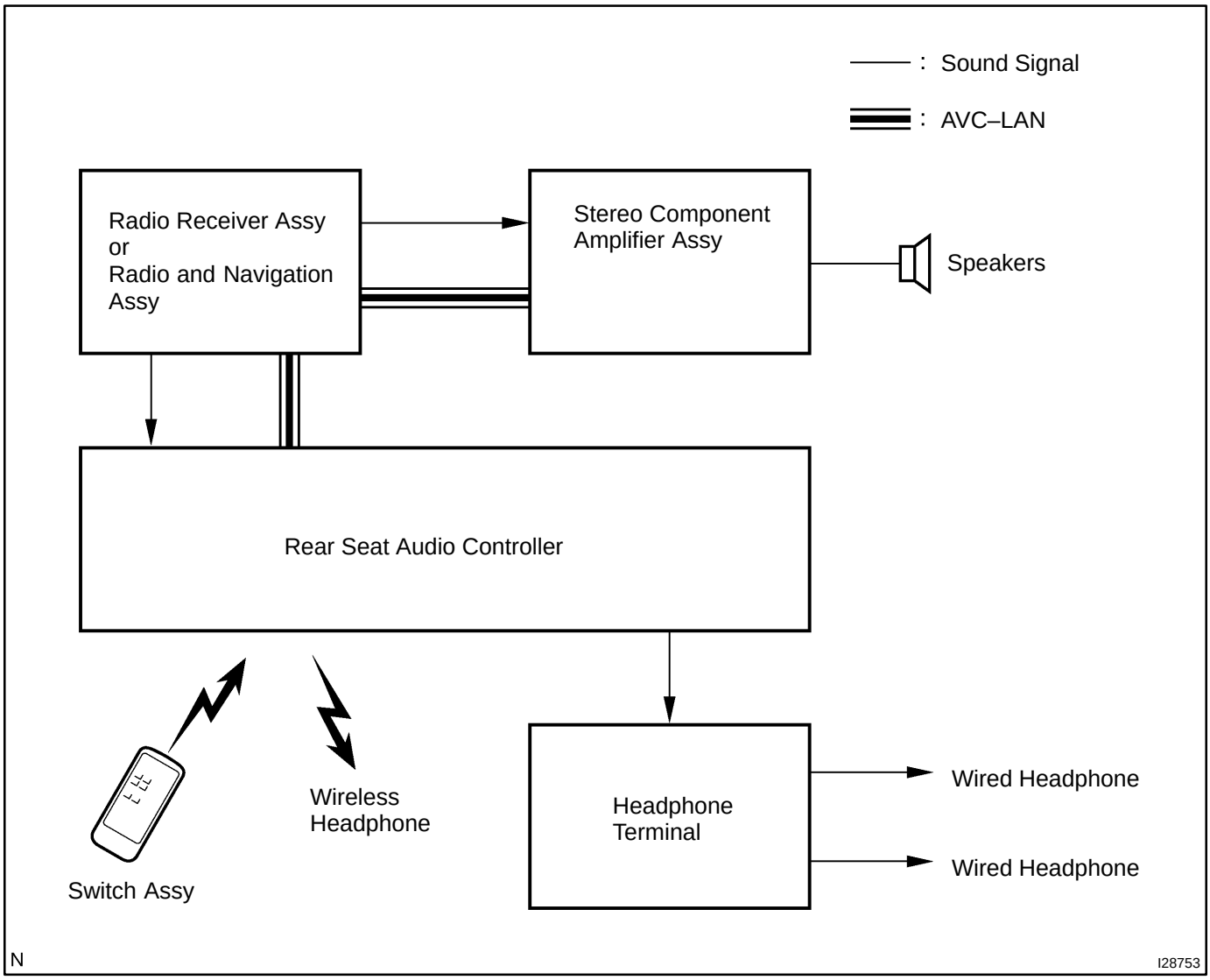
DIDAF–01

SYSTEM DIAGRAM



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DIDAG–01

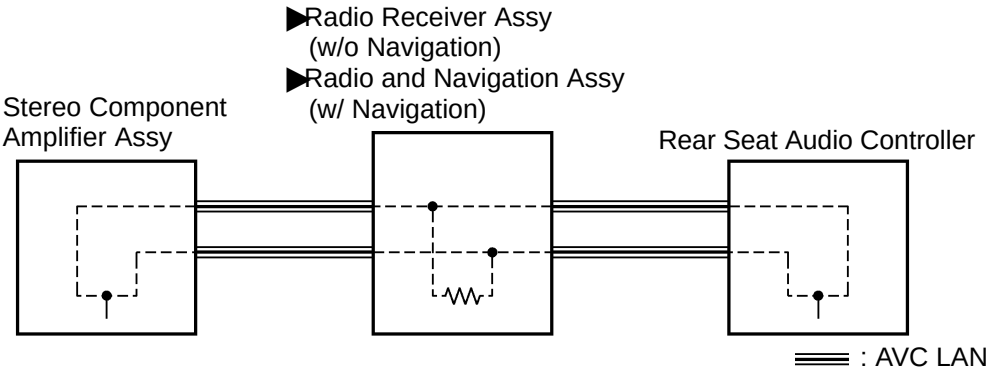
SYSTEM DESCRIPTION

1. OUTLINE

(a) Rear Seat Audio (RSA) system, which consists of a rear seat audio controller and a remote controller (switch assy), enables the rear seat occupants to use headphones to listen simultaneously to a different audio mode than the one that is selected in the front audio head unit.

2. COMMUNICATION SYSTEM

AVC–LAN:



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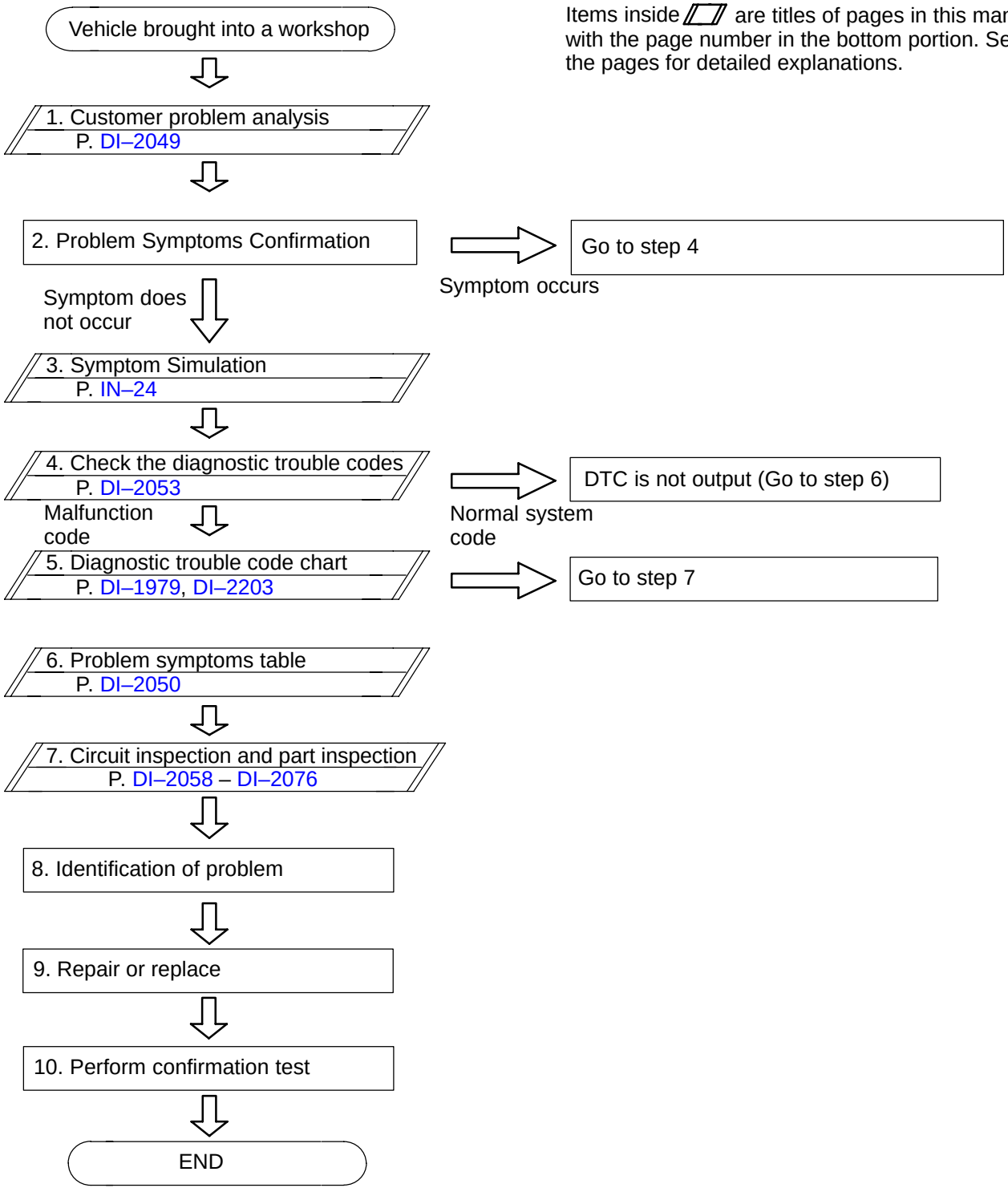
DIDAI–01

HOW TO PROCEED WITH TROUBLESHOOTING

Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.



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DIDAJ–01

CUSTOMER PROBLEM ANALYSIS CHECK

RSA SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Brought–in Date	/ /	**Odometer Reading**	**km mile**

Date of First Occurrence	/ /
Frequency of Problem Occurrence	▶ Constant ▶ Intermittent (Times a day)

Problem Symptom	**▶ Switch Assy**
	▶ Headphone
	▶ Rear Seat Audio Controller Assy
	▶ Headphone Terminal
	▶

DTC Check	**Parts name**	**DTC (1st time)**	**DTC (2nd time)**

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DIDAK–01

PROBLEM SYMPTOMS TABLE

RSA SYSTEM

Symptom	Suspected Areas	See page
RSA system cannot be powered.	1. Power source circuit (rear seat controller assy)	DI–2058
Quality of sound from wireless headphone is poor or no sound can be heard.	1. Power source circuit (rear seat controller assy) 2. Mute signal circuit (to rear seat audio controller) 3. Sound signal circuit (to rear seat audio controller) 4. Rear seat audio controller	DI–2058 DI–2066 DI–2070 –
Quality of sound from headphone connected to headphone terminal is poor or no sound can be heard.	1. Power source circuit (rear seat controller assy) 2. Mute signal circuit (to rear seat audio controller) 3. Sound signal circuit (Rear seat audio controller – headphone terminal) 4. Sound signal circuit (Radio receiver assy / radio and navigation assy – rear seat audio controller)	DI–2058 DI–2066 DI–2073 DI–2070

REMOTE CONTROL

Symptom	Suspected Areas	See page
A remote control system does not operate.	1. Power source circuit (rear seat controller assy) 2. A remote control system does not operate 3. AVC–LAN circuit	DI–2058 DI–2076 DI–2061

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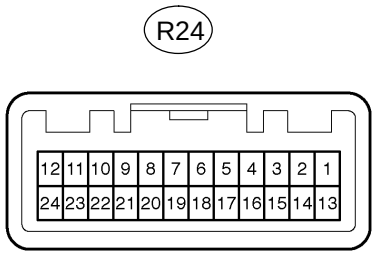
DIDAL–01

TERMINALS OF ECU

1. REAR SEAT AUDIO CONTROLLER



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Terminals No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified value
R24–1 – Body ground (SGN1 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
R24–2 – R24–17 (HP1L – GND)	BR – LG	Sound signal (Output)	RSA system is sounding (Headphone)	A waveform synchronized with sounds is output
R24–3 – R24–17 (HP1R – GND)	BR – LG	Sound signal (Output)	RSA system is sounding (Headphone)	A waveform synchronized with sounds is output
R24–6 – R24–17 (R–L– – GND)	W – LG	Sound signal (Input)	RSA system is sounding	A waveform synchronized with sounds is output
R24–7 – R24–17 (R–L+ – GND)	W – LG	Sound signal (Input)	RSA system is sounding	A waveform synchronized with sounds is output
R24–8 – R24–17 (R–R– – GND)	W – LG	Sound signal (Input)	RSA system is sounding	A waveform synchronized with sounds is output
R24–9 – R24–17 (R–R+ – GND)	W – LG	Sound signal (Input)	RSA system is sounding	A waveform synchronized with sounds is output
R24–10 – Body ground (SG1 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
R24–11 – R24–17 (RMUT – GND)	LG – LG	Mute signal	Audio system is playing → Changing mode	Above 3.5 V → Below 1 V
R24–12 – R24–17 (+B – GND)	LG – LG	Battery	Always	10 to 14 V
R24–13 – Body ground (SGN2 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
R24–14 – R24–17 (HP2L – GND)	BR – LG	Sound signal (Output)	RSA system is sounding (Headphone)	A waveform synchronized with sounds is output
R24–15 – R24–17 (HP2R – GND)	BR – LG	Sound signal (Output)	RSA system is sounding (Headphone)	A waveform synchronized with sounds is output
R24–17 – Body ground (GND – Body ground)	LG – Body ground	Ground	Always	Below 1 Ω

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R24–22 –R24–17 (TX+ – GND)	LG – LG	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
R24–23 –R24–17 (TX– – GND)	LG – LG	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
R24–24 – R24–17 (ACC – GND)	LG – LG	Ignition (ACC)	Ignition switch ON	10 to 14 V

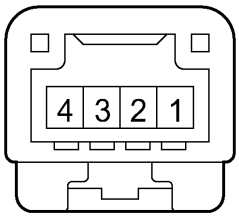
2. HEADPHONE TERMINAL

H10

Headphone Terminal LH

H11

Headphone Terminal RH



H

I28323

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified value
H10–1 – H10–3 (HPR – SGND)	BR – Shielded	Sound signal (Input)	External device system sounding (At that time of headphone terminal use)	A waveform synchronized with sound is output
H10–2 – H10–3 (HPL – SGND)	BR – Shielded	Sound signal (Input)	External device system sounding (At that time of headphone terminal use)	A waveform synchronized with sound is output
H10–3 – Body ground (SGND – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
H11–1 – H11–3 (HPR – SGND)	BR – Shielded	Sound signal (Input)	External device system sounding (At that time of headphone terminal use)	A waveform synchronized with sound is output
H11–2 – H11–3 (HPL – SGND)	BR – Shielded	Sound signal (Input)	External device system sounding (At that time of headphone terminal use)	A waveform synchronized with sound is output
H11–3 – Body ground (SGND – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V

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DIDAH–01

DTC CHECK / CLEAR

1. DIAGNOSIS CHECK

HINT:

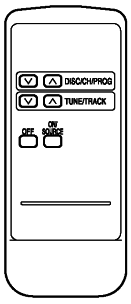
RSA system inspects the devices consisting of Sub AVC–LAN on the rear seat audio controller assy.

(a) Starting Main AVC–LAN (See page DI–1974, DI–2191).

HINT:

○ As starting Main AVC–LAN to operate the diagnosis mode, Sub AVC–LAN also automatically enters the diagnosis mode. Perform the diagnosis mode operation on the rear seat audio controller assy.

Switch Assy:



N I28317

○ Use a switch assy to operate diagnosis mode.

(b) Service Check Screen

Reference

In the service check mode, the system check and the diagnosis memory check are performed, and the check results are displayed in ascending order of the device codes (physical address).

Terms	Meaning
Component code (Physical address)	Three–digit code (In hexadecimal) given to each device comprising AVC–LAN. Corresponding to its function, individual symbol is provided.
Logical address	Two–digit code (In hexadecimal) given to each function and device unit in each device comprising AVC–LAN.

(c) Finishing Diagnosis Mode (See page DI–1974, DI–2191).

(d) Element Check Mode

After the diagnosis start–up, the system enters the element check mode. Check that the all elements come on.

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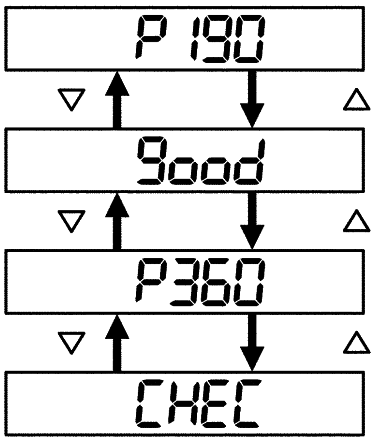
(e) Service Check Mode Result Display (for checking the current and the past system conditions)

(1) Press the ”TUNE/TRACK UP” switch to see the check result of each device.



P——indicates physical address
190——physical address

good——”The component is normal”.

P——indicates physical address
360——physical address

CHEC——”Check needed”.

△ : TUNE/TRACK UP

▽ : TUNE/TRACK DOWN

The illustration shows the case that the system has 2 devices with codes 190 and 360, and the device (code 360) has a trouble.
The check result is displayed in ascending order of device code. The device code is displayed first, and then the check result.

P I28309

(2) Check result display.

Display	Original Language	Meaning	Action to be taken
good	Good (normal)	No DTC is detected in both ”System Check Mode” and ”Diagnosis Memory Mode”.	–
NCON	No connection	The system recognized the component when it was registered, but the component gives no response to the ”Diagnosis Mode ON Request”.	Check the power source circuit and the communication circuit of the device indicated by the device code (physical address).
ECHN	Exchange	One or more DTC for ”Exchange” is detected in either ”System Check Mode” or ”Diagnosis Memory Mode”.	Go to the detailed information mode to check the trouble area by referring to the DTC list.
CHEC	Check	When no DTC is detected for ”Exchange”, one or more DTC for ”Check” is detected in either ”System Check Mode” or ”Diagnosis Memory Mode”.	Go to the detailed information mode to check the trouble area referring to the DTC list.

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OLD	Old version	Old DTC application is identified and DTC is detected in either ”System Check Mode” or ”Diagnosis Memory Mode”.	–
NRES	No response	The device gives no response to any one of ”System Check Mode ON Request”, ”System Check Result Request” and ”Diagnosis Memory Request”.	Check the power source circuit and the communication circuit of the device indicated by the device code (physical code).

(3) To perform the Service Check again, press the preset switch ”1”.

(f) detailed information Mode (when displaying the troubled device’s DTC)

(1) With ”CHEC” or ”ECHN” displayed, press the preset switch ”2” to go to the detailed information mode.

(2) Press the ”TUNE/TRACK” switch to display ”System Check Result (SYS)” and ”Diagnosis Memory Response (CODE)”.

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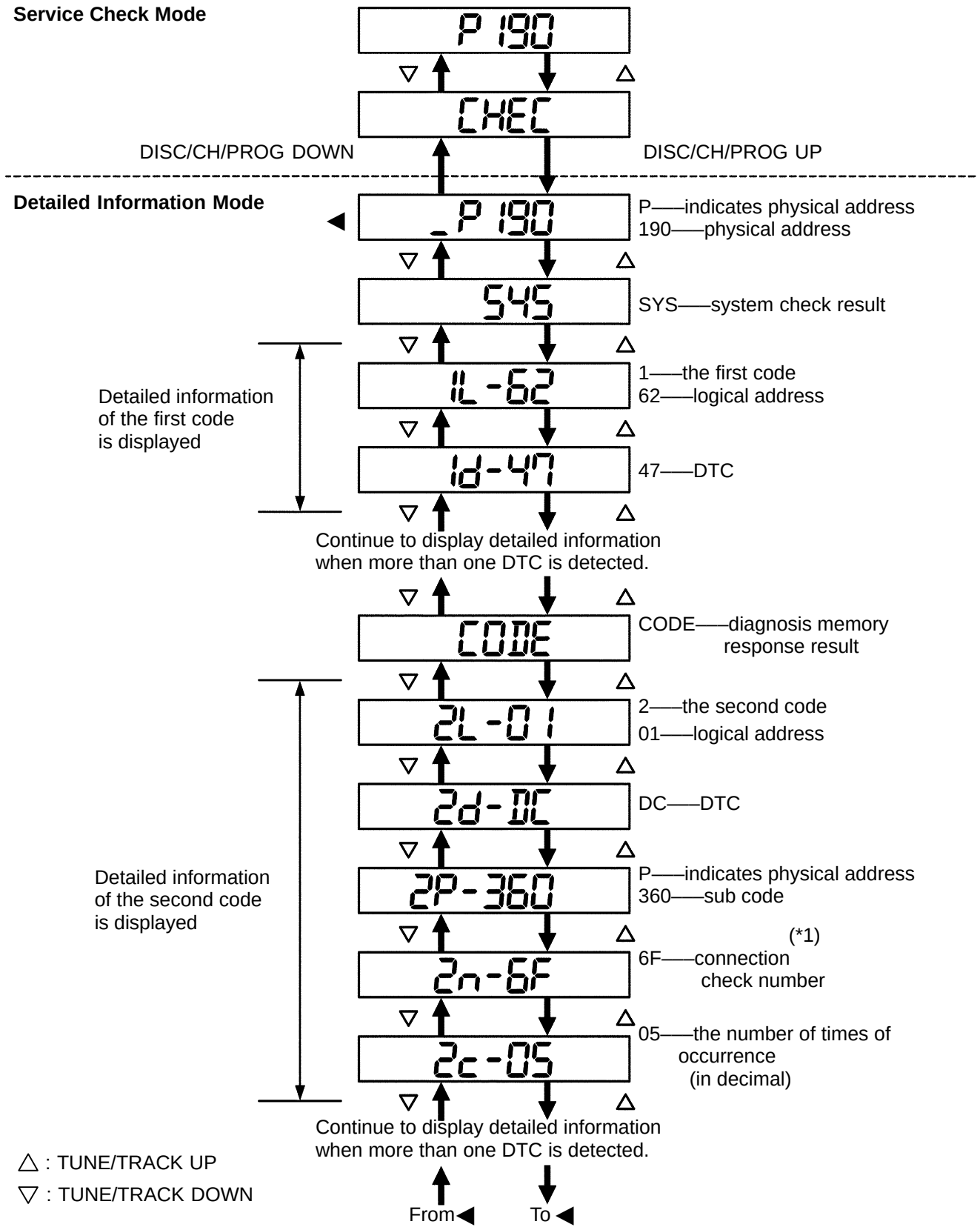

The illustration shows the case that the component with code 190 has DTC ”47” and ”dC” as a result of the system check and the diagnosis memory response.
The detailed information mode shows the system check result first, then the diagnosis memory response result.
(*1): As for DTC that does not have any sub code, sub code is not displayed.

P I28310

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(3) Displayed Items in Detailed Information Mode

Division Code for DTC display	Meaning	Order of detaileded information displayed when the ”TUNE UP” switch is pressed. (The order is reversed when the ”TUNE DOWN” switch is pressed.)
SYS	System check result is displayed.	Logical address → DTC
CODE	Diagnosis memory check result is displayed.	Logical address→ DTC→ Sub code→ Connection confirmation number→ The number of times of occurrence

(4) Check the trouble area referring to the DTC list.

(5) To return to the service check mode, press the preset switch ”3”.

(g) Clearing Individual DTC Memory (See page DI–1974, DI–2199).

(h) Clearance of All DTC Memory (See page DI–1974, DI–2199).

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DIDAM–01

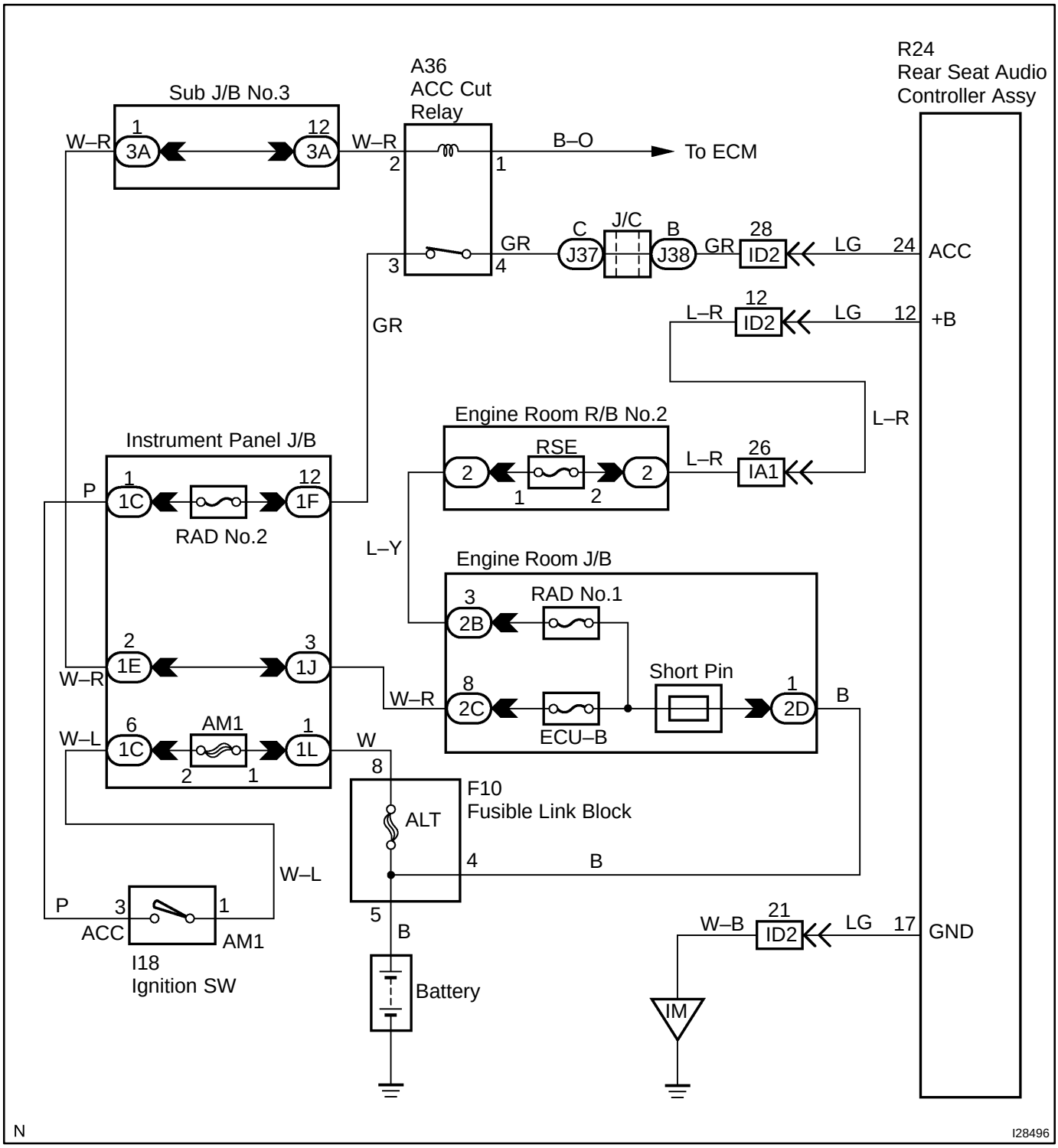
CIRCUIT INSPECTION

Power source circuit (Rear seat audio controller)

CIRCUIT DESCRIPTION

This circuit provides the power to the rear seat audio controller.

WIRING DIAGRAM



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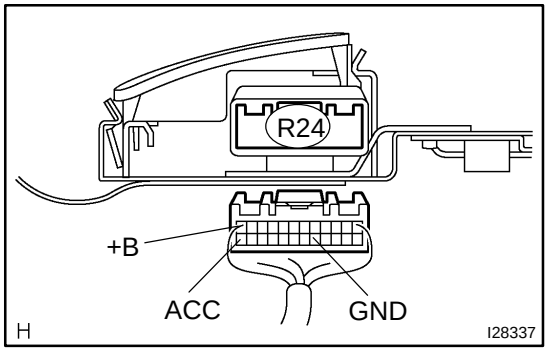
INSPECTION PROCEDURE

1	**Inspect rear seat audio controller (+B, ACC, GND).**



PREPARATION:

Disconnect the rear seat audio controller connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
GND (R24–17) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
+B (R24–12) – GND (R24–17)	Always	10 to 14 V
ACC (R24–24) – GND (R24–17)	Ignition SW ACC	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

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2	**Check problem symptoms table.**

CHECK:

Check the problem symptoms table.

RESULT:

All possible suspected areas have been inspected.	Go to step A
Possible suspected areas still exist.	Go to step B

B

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2050).

A

Replace rear seat audio controller.

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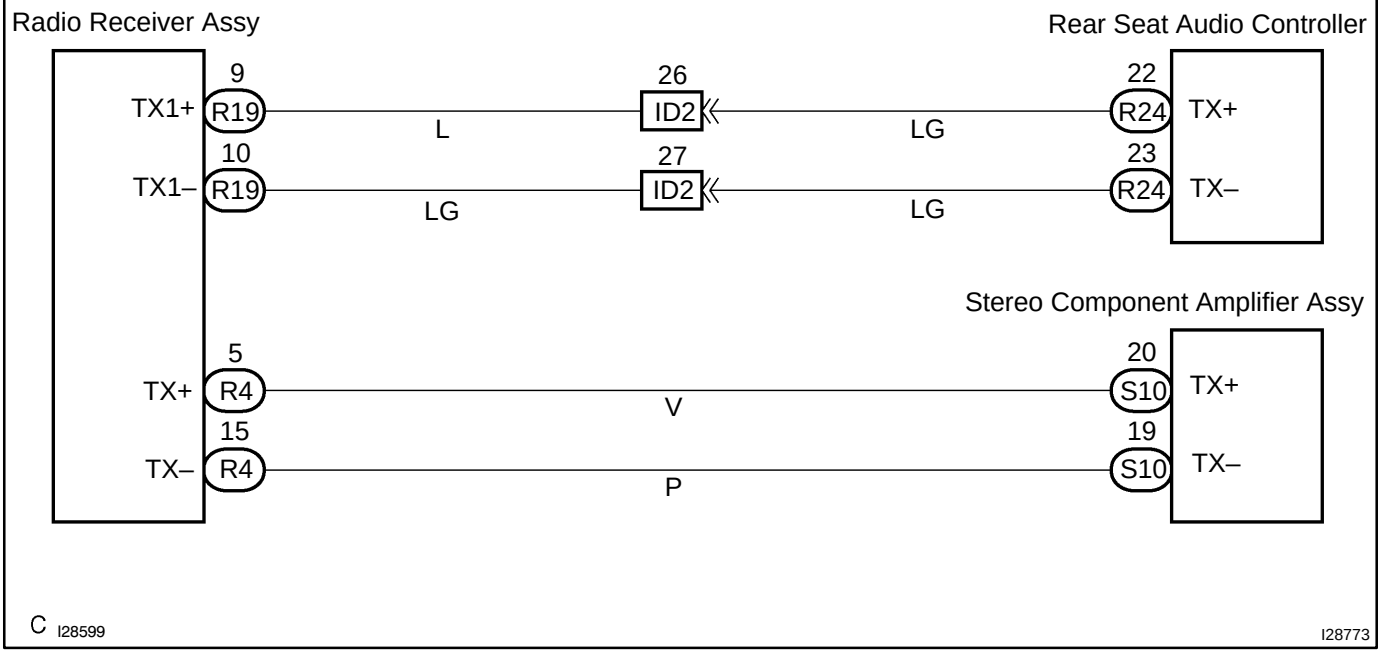
AVC–LAN circuit

CIRCUIT DESCRIPTION

Each unit of the rear seat audio system connected to the AVC–LAN (communication bus) transfers the signal of each switch by communication.
When a short to +B or short to ground occurs in this AVC– LAN, the audio system will not function normally as communication is discontinued.

WIRING DIAGRAM

w/o Navigation:



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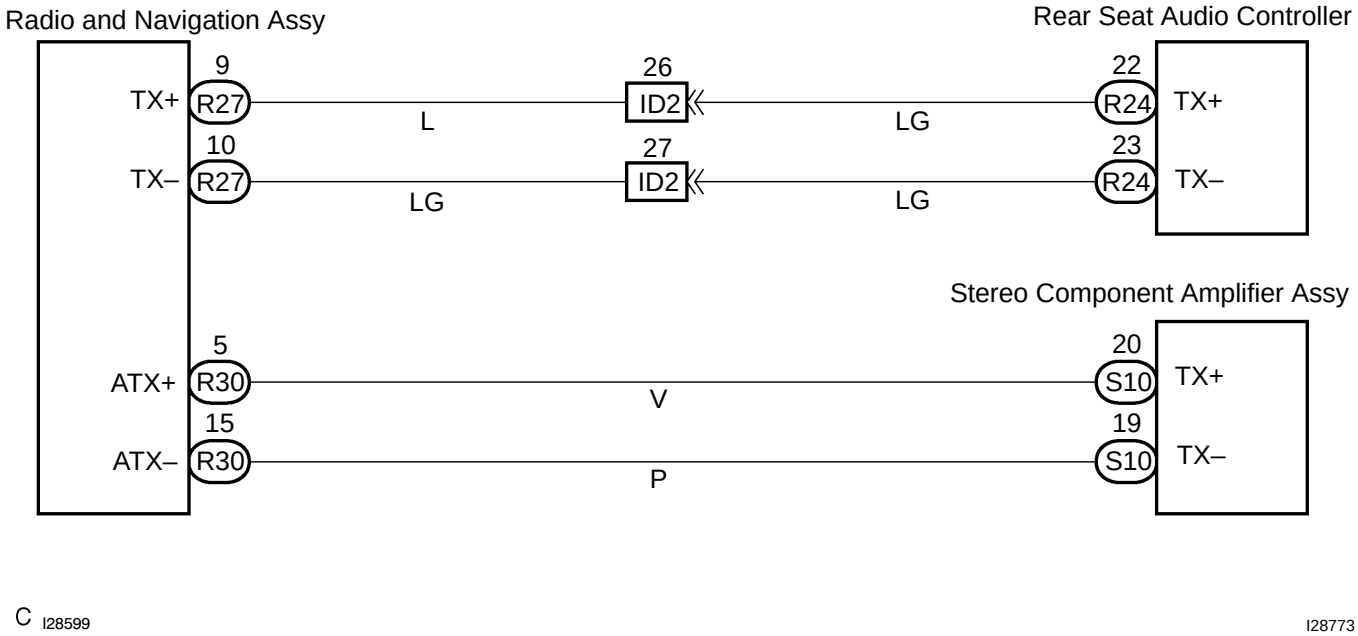
w/ Navigation:



INSPECTION PROCEDURE

1	**Service check mode (Rear seat audio controller).**

CHECK:

Start the diagnosis system and read the check result for the rear seat audio controller (See page DI–1974, DI–2191).

RESULT:

”NCON” is displayed or result is not displayed (w/ navigation)	Go to step A
”NCON” is displayed or result is not displayed (w/o navigation)	Go to step B
”NCON” is displayed or result is not displayed (DSP AMP)	Go to step C
”GOOD” is displayed	Go to step D

B	**Go to step 3.**
C	**Go to step 4.**
D	**Replace radio and navigation assy or radio receiver assy.**

A

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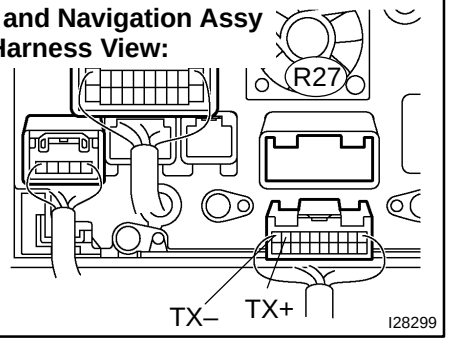
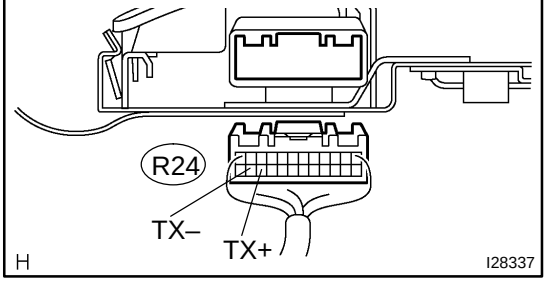
2	**Check harness and connector (Rear seat audio controller – Radio and navigation assy).**

Radio and Navigation Assy Wire Harness View:



Rear Seat Audio Controller Wire Harness View:



PREPARATION:

Disconnect the R24 and R27 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TX+ (R24–22) – TX+ (R27–9)	Always	Below 1 Ω
TX– (R24–23) – TX– (R27–10)	Always	Below 1 Ω
TX+ (R24–22) – Body ground	Always	10 kΩ or higher
TX– (R24–23) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace rear seat audio controller.

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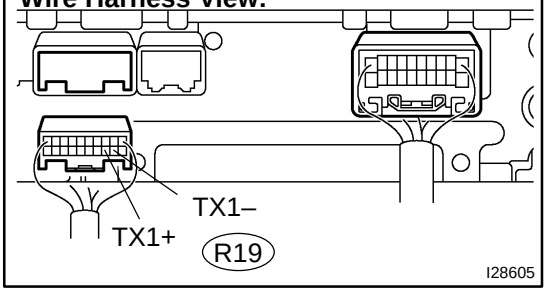
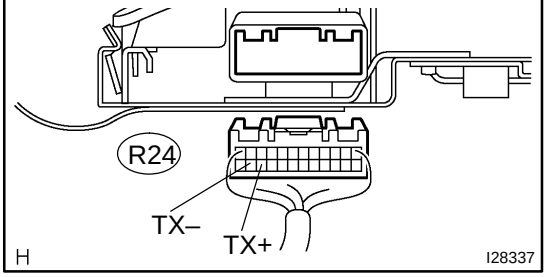
3	Check harness and connector (Rear seat audio controller – Radio receiver assy).

Radio Receiver Assy
Wire Harness View:



Rear Seat Audio Controller
Wire Harness View:



PREPARATION:

Disconnect the R19 and R24 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TX+ (R24–22) – TX1+ (R19–9)	Always	Below 1 Ω
TX– (R24–23) – TX1– (R19–10)	Always	Below 1 Ω
TX+ (R24–22) – Body ground	Always	10 kΩ or higher
TX– (R24–23) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace rear seat audio controller.

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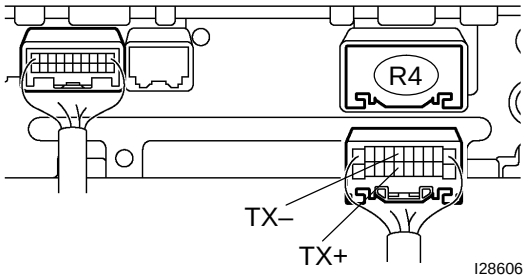
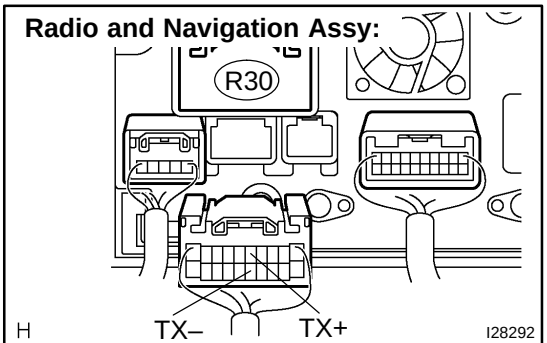
4	**Check harness and connector (Radio receiver assy / radio and navigation assy – Stereo component amplifier assy).**

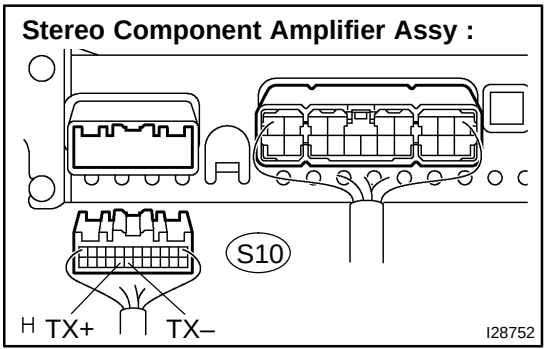
Radio Receiver Assy Wire Harness View:



Radio and Navigation Assy:



Stereo Component Amplifier Assy :



PREPARATION:

Disconnect the radio receiver assy or radio and navigation assy and stereo component amplifier assy connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Radio Receiver Assy:

Symbol (Tester connection)	Condition	Specified condition
TX+ (R4–5) – TX+ (S10–20)	Always	Below 1 Ω
TX– (R4–15) – TX– (S10–19)	Always	Below 1 Ω
TX+ (R4–5) – Body ground	Always	10 kΩ or higher
TX– (R4–15) – Body ground	Always	10 kΩ or higher

Radio And Navigation Assy:

Symbol (Tester connection)	Condition	Specified condition
TX+ (R30–5) – TX+ (S10–20)	Always	Below 1 Ω
TX– (R30–15) – TX– (S10–19)	Always	Below 1 Ω
TX+ (R30–5) – Body ground	Always	10 kΩ or higher
TX– (R30–15) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace rear seat audio controller.

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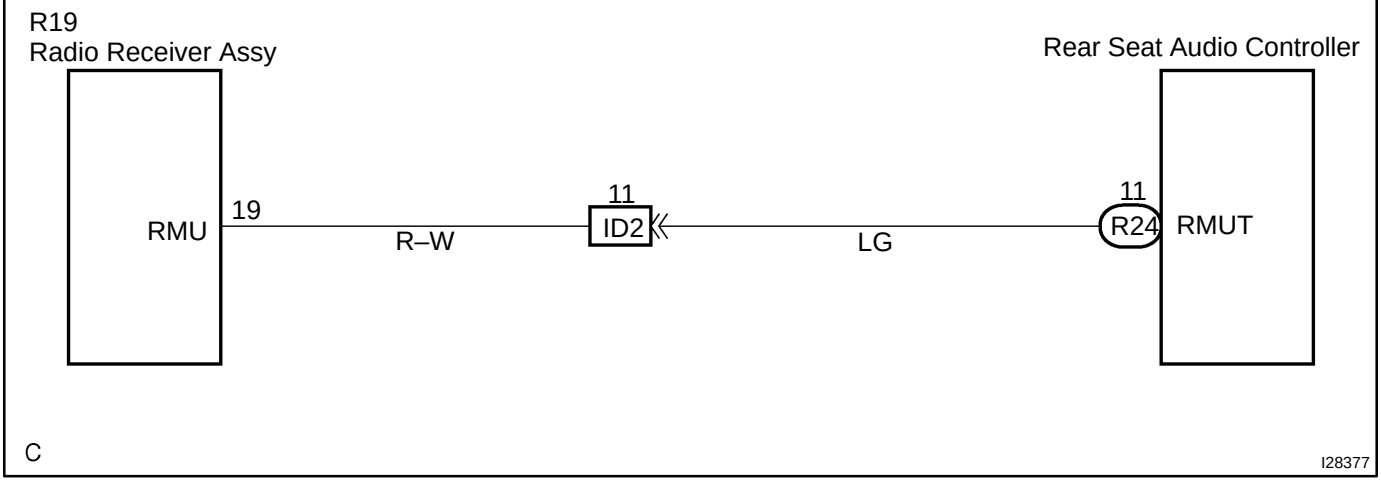
Mute signal circuit (to rear seat audio controller)

CIRCUIT DESCRIPTION

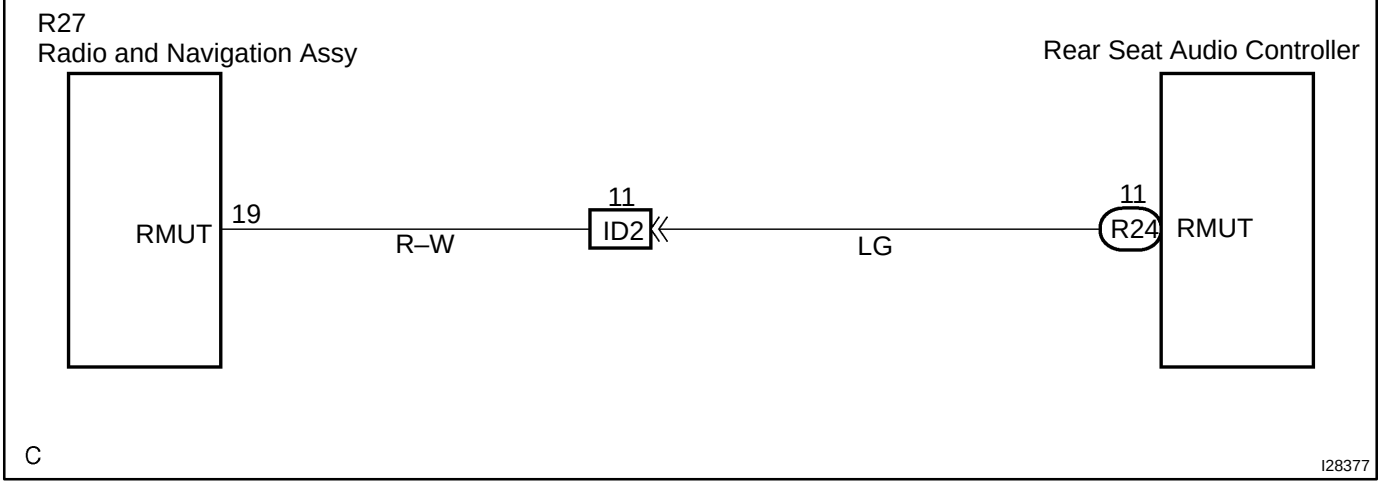
This circuit sends the signal to the rear seat audio controller to mute the noise. Because of that, the noise produced by changing the sound source ceases.
If there is an open in the circuit, noise can be heard from the speaker when changing the sound source.
If there is a short in the circuit, even though the rear seat audio controller is normal, no sound or only extremely small sound can be produced.

WIRING DIAGRAM

w/o Navigation System:



w/ Navigation System:



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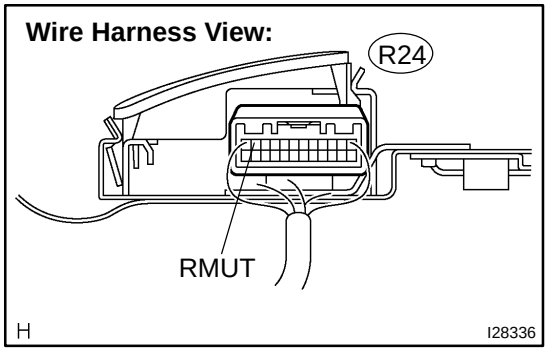
INSPECTION PROCEDURE

1	**Inspect rear seat audio controller.**



PREPARATION:

Make sure that the rear seat audio controller connector is connected.

CHECK:

Measure the voltage according to the value in the table below.

OK:

Symbol (Tester connection)	Condition	Specification
RMUT (R24–11) – Body ground	Turn ignition switch to ACC, Audio system is playing → Changing mode	Above 3.5 V → Below 1 V

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–2050).**

NG

2	**Check system.**

CHECK:

Check whether the vehicle is equipped with a navigation system or not.

RESULT:

w/o Navigation	Go to step A
w/ Navigation	Go to step B

B	**Go to step 5.**

A

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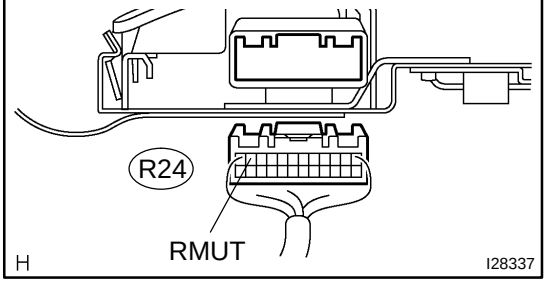
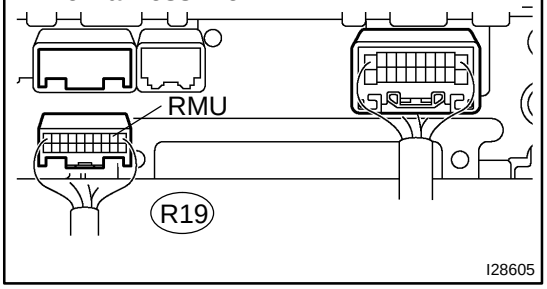
3	Check harness and connector (Radio receiver assy – Rear seat audio controller).

Rear Seat Audio Controller Wire Harness View:



Radio Receiver Assy Wire Harness View:



PREPARATION:

Disconnect the R19 and R24 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
RMUT (R24–11) – RMU (R19–19)	Always	Below 1 Ω
RMUT (R24–11) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

4	Replace rear seat audio controller.

CHECK:

Replace the rear seat audio controller and check if it operates normally.

OK:

The function returns to normal.

OK → **Normal operation.**

NG

Replace radio receiver assy.

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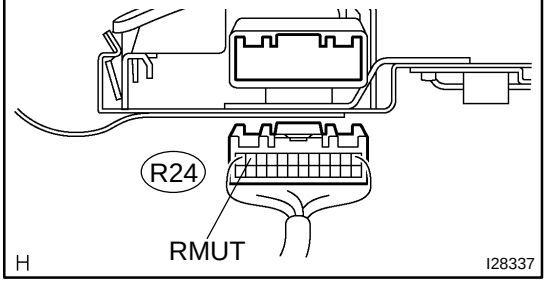
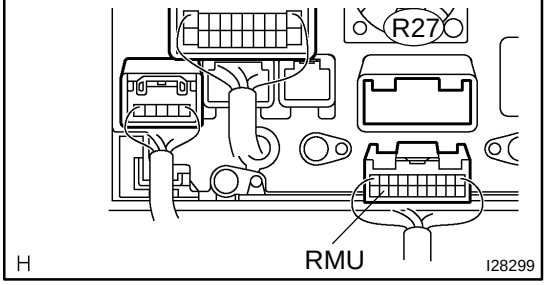
5	Check harness and connector (Radio and navigation assy – Rear seat audio controller).

Rear Seat Audio Controller Wire Harness View:



Radio and Navigation Assy Wire Harness View:



PREPARATION:

Disconnect the R24 and R27 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
RMUT (R24–11) – RMU (R27–19)	Always	Below 1 Ω
RMUT (R24–11) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

6	Replace rear seat audio controller.

CHECK:

Replace the rear seat audio controller and check if it operates normally.

OK:

The function returns to normal.

OK → **Normal operation.**

NG

Replace radio and navigation assy.

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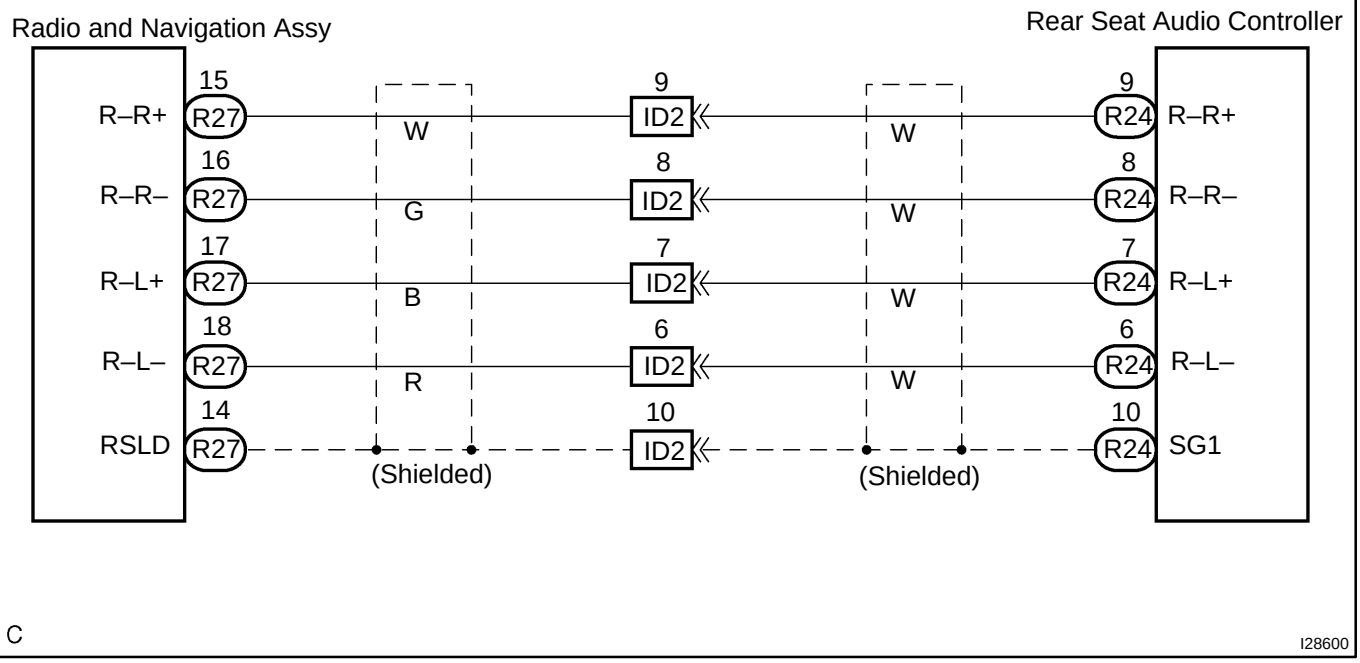
Sound signal circuit (Radio receiver assy / radio and navigation assy – rear seat audio controller)

CIRCUIT DESCRIPTION

The radio receiver assy (radio and navigation assy) sends a sound signal to the rear seat audio controller through this circuit.
The sound signal that has been sent is amplified by the stereo component amplifier assy, and then sent to the speaker.
If there is an open or short in the circuit, sound can not be heard from the speaker even if there is no malfunction in the rear seat audio controller or speaker.

WIRING DIAGRAM

w/ Navigation System:



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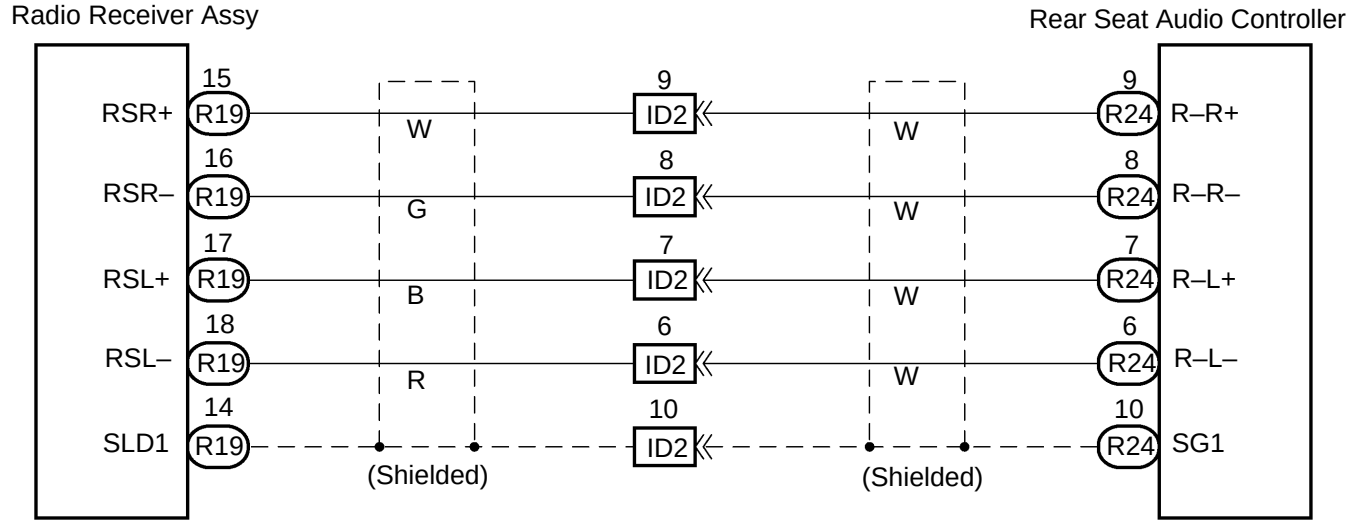
w/o Navigation System:



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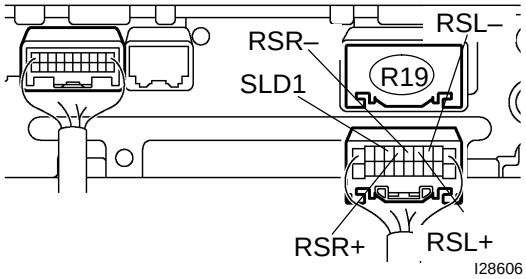
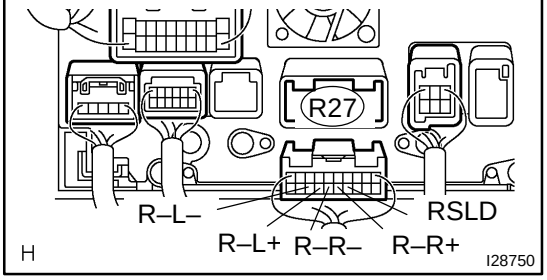
INSPECTION PROCEDURE

1	**Check harness and connector (Radio receiver assy / radio and navigation assy – Rear seat audio controller).**

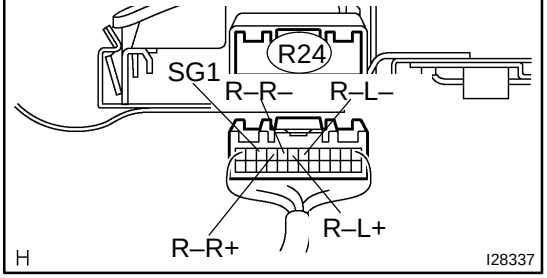
Radio Receiver Assy Wire Harness View:



Radio and Navigation Assy Wire Harness View:



Rear Seat Audio Controller Wire Harness View:



PREPARATION:

Disconnect the radio receiver assy or radio and navigation connector and rear seat audio controller connector.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Symbol (Tester connection)	Specified condition
R–R+ (R24–9) – R–R+ (R27–15) (*1), RSR+ (R19–15) (*2)	Below 1 Ω
R–R– (R24–8) – R–R– (R27–16) (*1), RSR– (R19–16) (*2)	Below 1 Ω
R–L+ (R24–7) – R–L+ (R27–17) (*1), RSL+ (R19–17) (*2)	Below 1 Ω
R–L– (R24–6) – R–L– (R27–18) (*1), RSL– (R19–18) (*2)	Below 1 Ω
SG1 (R24–10) – RSLD (R27–14), SLD1 (R19–14)	Below 1 Ω
R–R+ (R24–9) – Body ground	10 kΩ or higher
R–R– (R24–8) – Body ground	10 kΩ or higher
R–L+ (R24–7) – Body ground	10 kΩ or higher
R–L– (R24–6) – Body ground	10 kΩ or higher
SG1 (R24–10) – Body ground	10 kΩ or higher

*1: w/ Navigation System

*2: w/o Navigation System

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2050).

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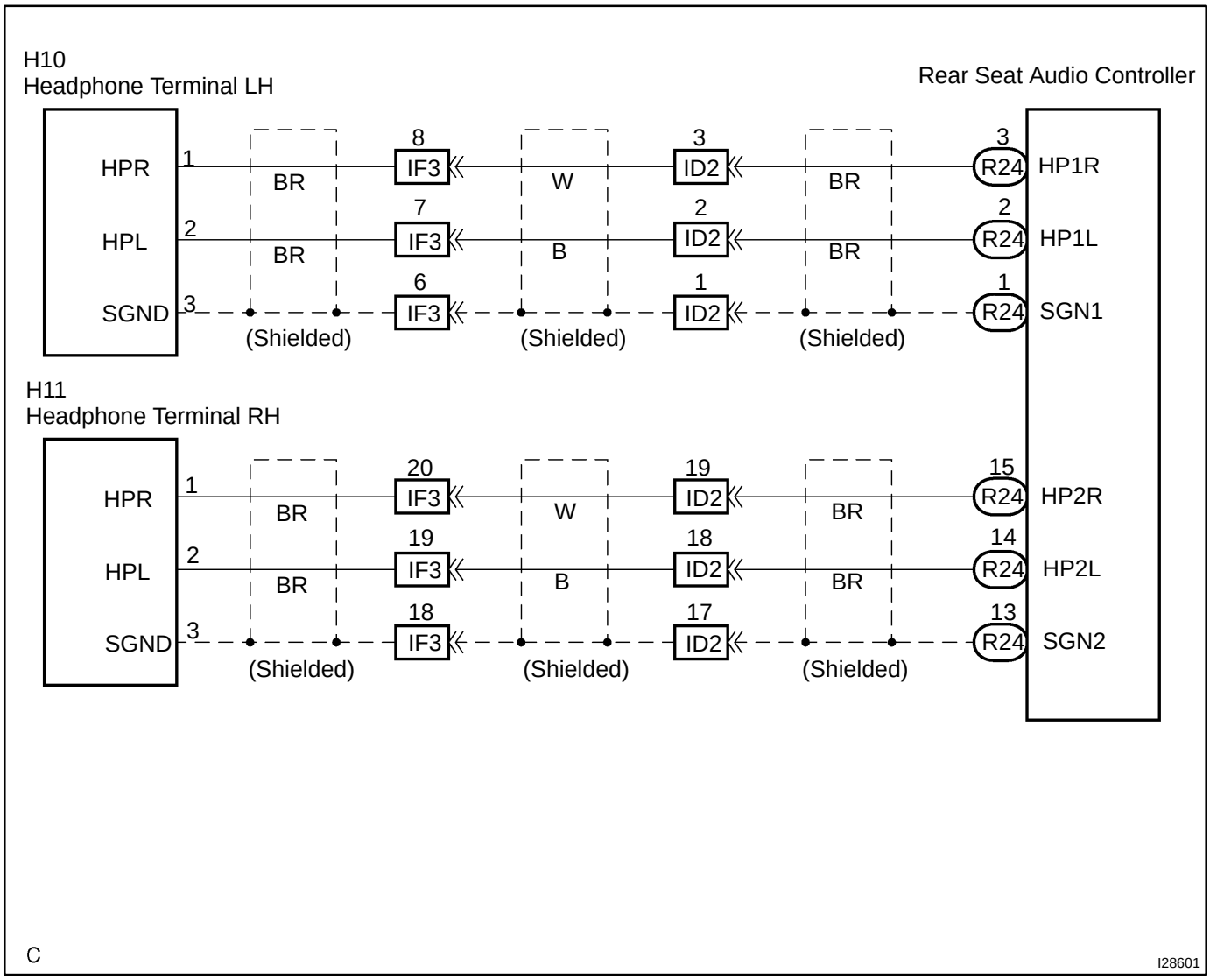
Sound signal circuit (Rear seat audio controller – headphone terminal)

CIRCUIT DESCRIPTION

Music sound which is heard via the headphone terminal of the rear seat audio system is directly sent to the headphones without being sent through the stereo component amplifier.

WIRING DIAGRAM



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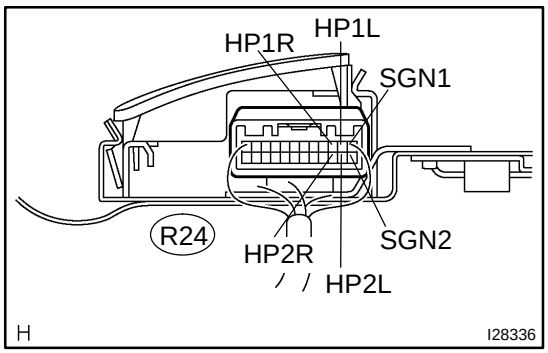
INSPECTION PROCEDURE

1	Inspect rear seat audio controller (Output signal).



PREPARATION:

Make sure that the rear seat audio connector is connected.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
SGN1 (R24–1) – Body ground	Always	Below 1 Ω
SGN2 (R24–13) – Body ground	Always	Below 1 Ω

CHECK:

Check the waveform according to the condition(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
HP1L (R24–2) – Body ground	Voice sound is being produced	A waveform synchronized with sound is output
HP1R (R24–3) – Body ground	Voice sound is being produced	A waveform synchronized with sound is output
HP2L (R24–14) – Body ground	Voice sound is being produced	A waveform synchronized with sound is output
HP2R (R24–15) – Body ground	Voice sound is being produced	A waveform synchronized with sound is output

NG → **Replace rear seat audio controller.**

OK

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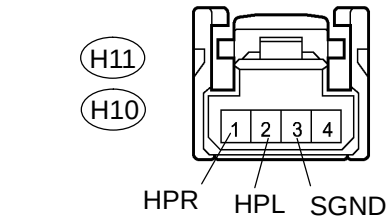
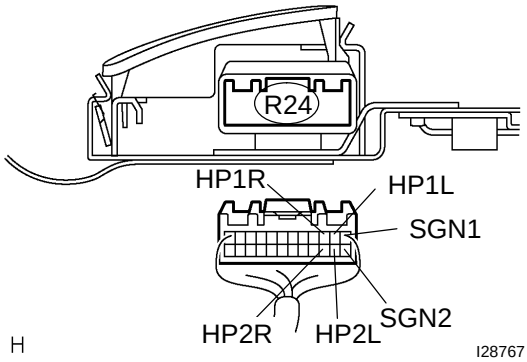
2	Check harness and connector (Rear seat audio controller – headphone terminal).

Headphone Terminal Connector Front View:



Rear Seat Controller Wire Harness View:



PREPARATION:

Disconnect the rear seat audio controller and headphone terminal connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Specified condition
HP1R (R24–3) – HPR (H10–1)	Below 1 Ω
HP1L (R24–2) – HPL (H10–2)	Below 1 Ω
HP2R (R24–15) – HPR (H11–1)	Below 1 Ω
HP2L (R24–14) – HPL (H11–2)	Below 1 Ω
SGN1 (R24–1) – SGND (H10–3)	Below 1 Ω
SGN2 (R24–13) – SGND (H11–3)	Below 1 Ω
HPR (H10–1, H11–1) – Body ground	10 kΩ or higher
HPL (H10–2, H11–2) – Body ground	10 kΩ or higher
SGND (H10–3, H11–3) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace headphone terminal.

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DIDAR–01

Remote control system does not operate

INSPECTION PROCEDURE

1	**Check malfunction symptoms.**

CHECK:

Check obstruction.

Check that there are no obstructions between the switch assy and the infrared ray light emission portion of the rear seat audio controller.

OK:

No obstructions

NG → **Remove the obstructions.**

OK

2	**Check battery (Switch assy).**

CHECK:

Check battery.

Check that the dry–cell battery used for the switch assy is not dead.

OK:

It is not dead.

NG → **Replace dry–cell battery.**

OK

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3	**Clean the infrared ray emitted portion.**

CHECK:

(a) Clean the infrared ray emitting portion on the rear seat audio controller.

(b) Check whether the same malfunction occurs.

OK:

The function returns to normal.

OK → **End.**

NG

4	**Replace switch assy.**

CHECK:

Replace the switch assy and check if it operates normally.

OK:

Normal operation.

OK → **End.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2050).

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REAR SEAT ENTERTAINMANT SYSTEM

DIDAS–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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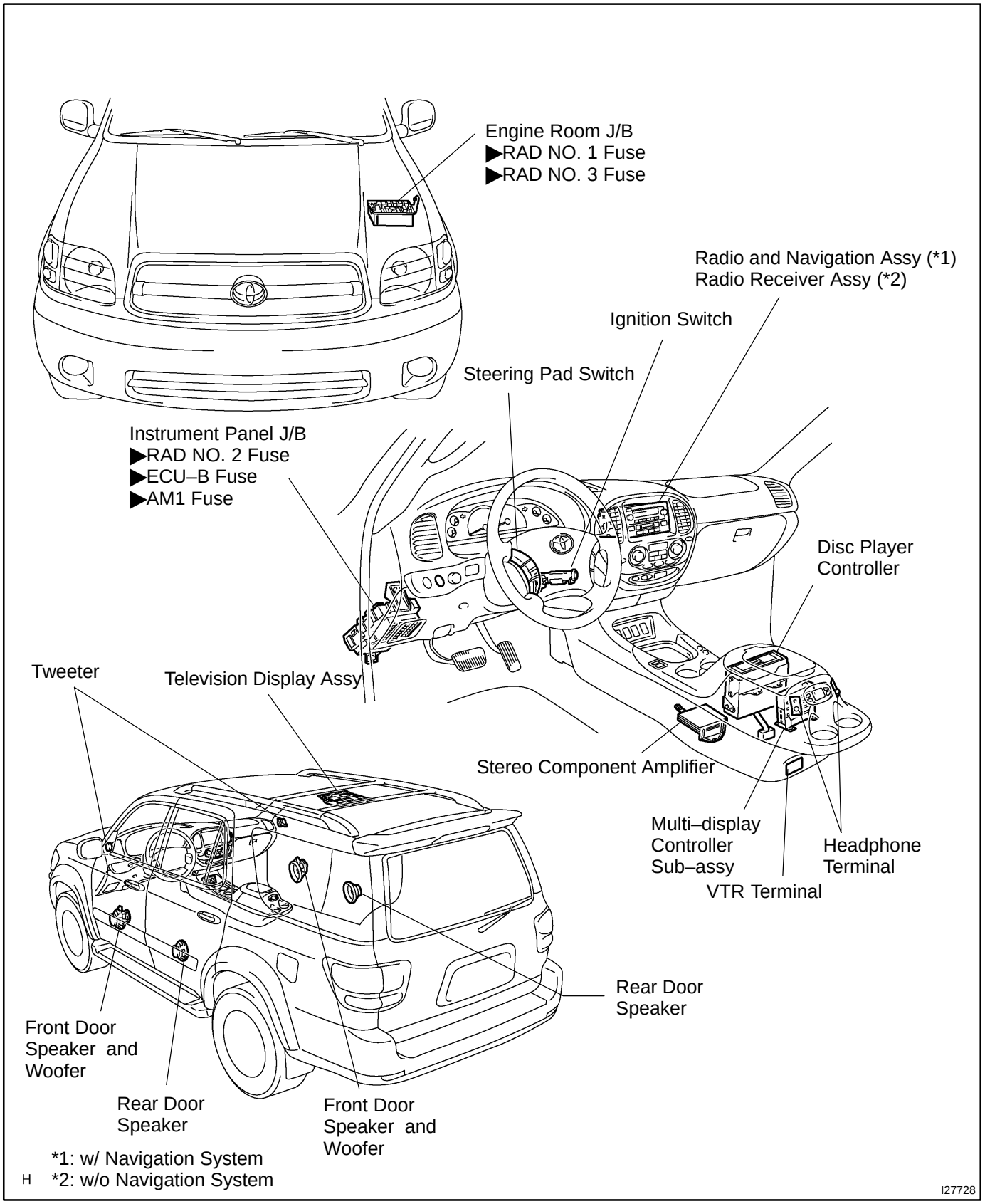
DIDAT–01

LOCATION



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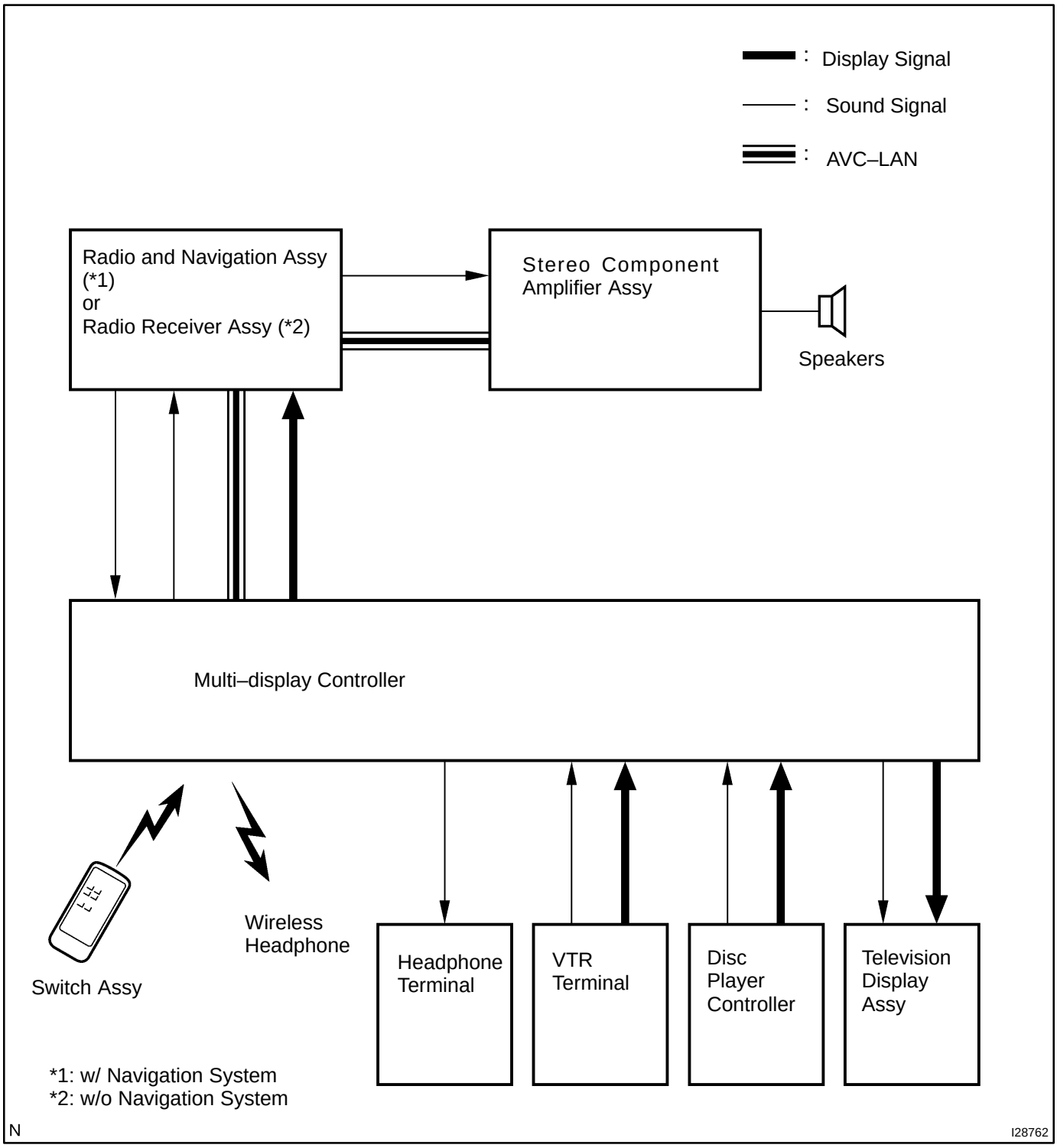
DIDAU–01

SYSTEM DIAGRAM



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DIDAV–01

SYSTEM DESCRIPTION

1. Outline

- As a unique feature of Rear Seat Entertainment (RSE) system, the front and rear seat occupants can enjoy different audio–visual modes at the same time. Thus, this system offers enhanced entertainment to the rear seat occupants.
- The rear seat occupants can control the audio–visual modes with the remote controller (switch assy), and listen to audio by using wired or wireless headphones.
- The RSE system is controlled by the multi–display controller, and the communication among the audio head unit, rear display assembly, and DVD player is established via an AVC–LAN (Audio Visual Communication–Local Area Network).

2. Function of Main Component

Television Display Assy	▶Displays DVD and video images in accordance with video signals from the RSE ECU. ▶Receives signals from the remote controller and outputs them to the RSE ECU. ▶Outputs audio signals to the wireless headphones in the form of infrared signals. ▶Displays the audio–visual control screen. ▶Displays the adjustment screen. ▶Displays the diagnosis screen. ▶The diagnosis screen appears when the diagnosis mode is started on the audio head unit.
Audio Head Unit w/ Navigation system: Radio and navigation assy w/o Navigation system: Radio receiver assy	▶Outputs audio signals to the RSE ECU and the stereo component amplifier. ▶Outputs a request to the RSE ECU to start the diagnosis mode.
RSE ECU (Multi–display Controller)	▶Processes video and audio signals from the DVD player and video player and audio signals from the audio head unit, and outputs them to the television display assembly and headphone terminals. ▶Controls the distribution of the audio–visual mode to the front (audio head unit) and the rear (RSE).
Remote Controller (Switch Assy)	Outputs various control signals of the RSE system to the television display assembly in the form of infrared signals.
Wireless Headphone	▶Receives the audio signals from the television display assembly in the form of infrared signals. ▶Volume adjustment of the wireless headphone can be done by using the volume equipped on the wireless headphone.
Headphone Terminal	▶Outputs audio signals to the wired headphones that are connected. ▶Adjusts the volume of the wired headphones in accordance with volume control.
VTR Terminal	This terminal is for connecting the video player's video and audio output terminals.

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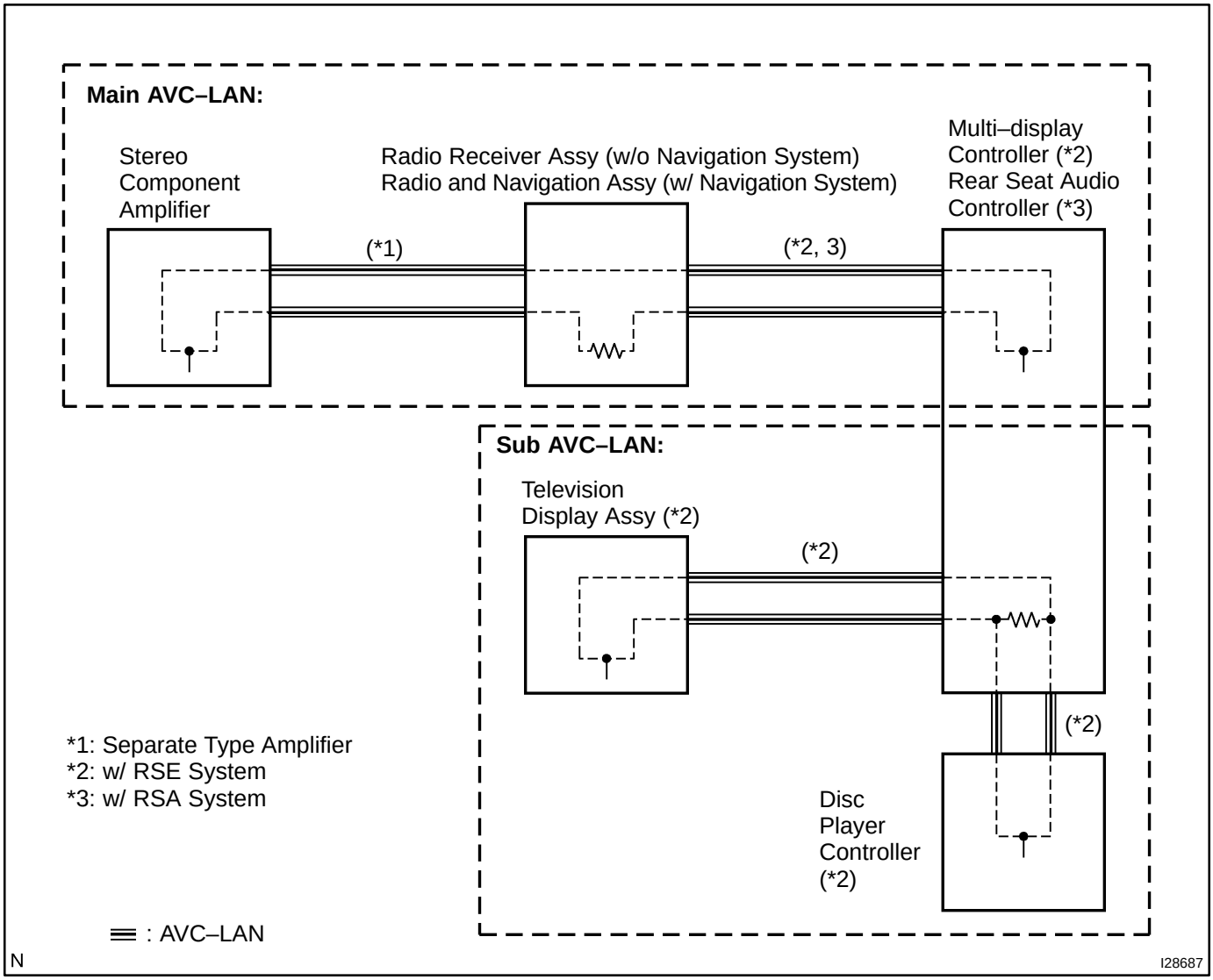
3. COMMUNICATION SYSTEM

(a) This system has 2 kinds of AVC–LAN, Main AVC–LAN and Sub AVC–LAN.

(b) Multi–display controller sub–assy works as a master unit in the Sub AVC–LAN, but not in the Main AVC–LAN.



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DIDAW–01

HOW TO PROCEED WITH TROUBLESHOOTING

Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Vehicle brought into a workshop

⇩

1. Customer problem analysis
P. DI–2084

⇩

2. Problem Symptom Confirmation → Symptom occurs → Go to step 4

Symptom does not occur ⇩

3. Symptom Simulation
P. IN–24

⇩

4. Check the diagnostic trouble codes
P. DI–2097 → DTC is not output (Go to step 6)

Malfunction code ⇩ / Normal system code

5. Diagnostic trouble code chart.
P. DI–2103 → Go to step 7

6. Problem symptoms table
P. DI–2087

⇩

7. Circuit inspection and part inspection
P. DI–2107 – DI–2157

⇩

8. Identification of problem

⇩

9. Repair or replace

⇩

10. Perform confirmation test

⇩

END

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DIDAX–01

CUSTOMER PROBLEM ANALYSIS CHECK

RSE SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Brought–in Date	/ /	**Odometer Reading**	**km mile**

Date of First Occurrence	/ /
Frequency of Problem Occurrence	▶ Constant ▶ Intermittent (Times a day)

Problem Symptom	**▶ Switch Assy**
	▶ Headphone
	▶ Multi–display Controller Sub–assy
	▶ Disc Player Controller
	▶ Television Display Assy
	▶

	Parts name	**DTC (1st time).**	**DTC (2nd time).**
DTC Check	Disc Player Controller		
	Television Display Assy		

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I28289

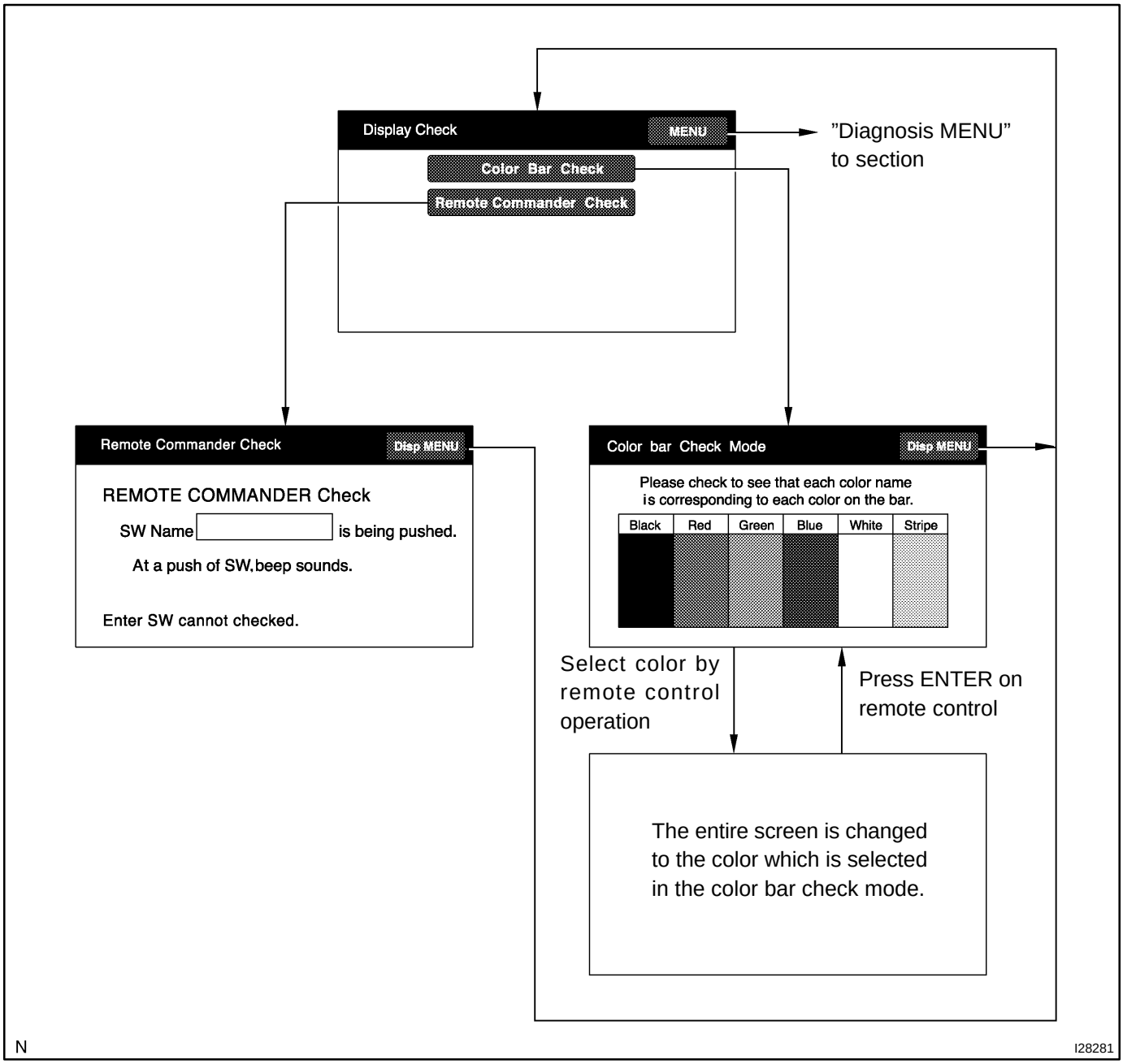
DIDAY–01

DISPLAY CHECK MODE

DISPLAY CHECK MODE

HINT:

- ▶ Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- ▶ Display check mode is operated as follows.



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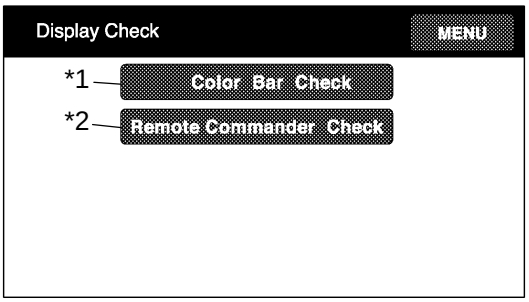
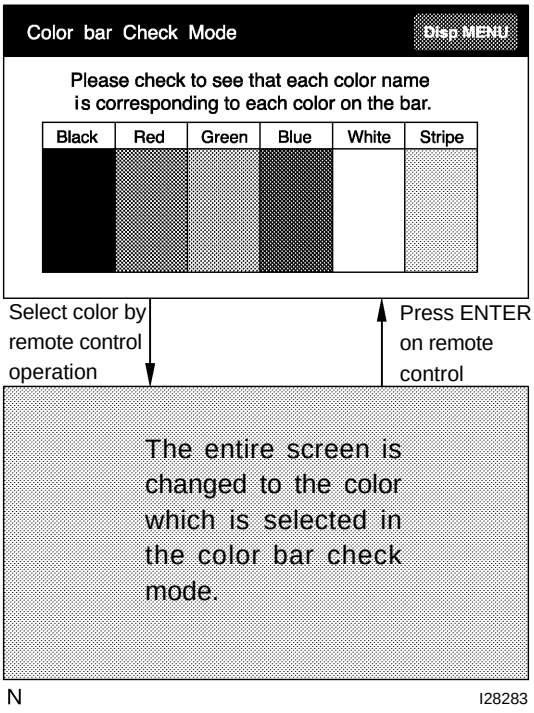


N I28282

(a) Display Check Mode

Display	Contents
Color Bar Check/*1	Color display is checked.
Remote Commander/*2	Operating condition of remote commander display is checked.

HINT:
In Display Check Mode, above checks can be performed.

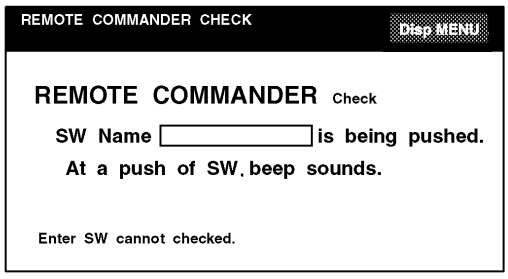


N I28283

(b) Display Color Bar Check
(1) Start the Diagnosis System (See page DI–2097).
(2) Select ”MENU”.
(3) Select ”Display Check”.
(4) Select ”Color Bar Check”.
(5) Make sure that each color name is corresponding to each color on the bar.

HINT:
Select Black, Red, Green, Blue, White and Stripe to display selected colors and stripe on the entire screen.

(6) Compare the color with the Color Bar Check, and make sure that the color is the same.



C I28284

(c) Display Remote Commander Check
(1) Start the Diagnosis system (See page DI–2097).
(2) Select ”MENU”.
(3) Select ”Display Check”.
(4) Select ”Remote Commander”.
(5) Press each switch and make sure that it corresponds to the display on the screen.

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DIDAZ–01

PROBLEM SYMPTOMS TABLE

TELEVISION DISPLAY ASSY

Symptom	Suspect Area	See page
Black screen.	1. Power source circuit (multi–display controller sub–assy) 2. Power source circuit (television display assy) 3. AVC–LAN circuit	DI–2110 DI–2107 DI–2139
Display screen not stabilized (Synchronous error).	1. Power source circuit (television display assy) 2. Power source circuit (multi–display controller sub–assy) 3. Display signal circuit (multi–display controller sub–assy – television display assy) 4. Television display assy 5. Multi–display controller sub–assy	DI–2107 DI–2110 DI–2115 – –
Color on display screen is unusual (RGB signal error).	1. Rear display color bar check of display check mode 2. Display signal circuit (multi–display controller sub–assy – television display assy) 3. Television display assy 4. Multi–display controller sub–assy	DI–2085 DI–2115 – –

DISC PLAYER CONTROLLER

Symptom	Suspect Area	See page
Only DVD screen is not displayed or not stabilized.	1. Power source circuit (multi–display controller sub–assy) 2. Power source circuit (disc player controller) 3. Display signal circuit (multi–display controller sub–assy – disc player controller) 4. Display signal circuit (multi–display controller sub–assy – radio and navigation assy) 5. Disc player controller 6. Multi–display controller sub–assy	DI–2110 DI–2112 DI–2117 DI–2119 – –
Only DVD is not heard or the sound quality is poor.	1. Power source circuit (multi–display controller sub–assy) 2. Power source circuit (disc player controller) 3. Sound signal circuit (multi–display controller sub–assy – disc player controller) 4. w/o Navigation system: Sound signal circuit (multi–display controller sub–assy – radio receiver assy) w/ Navigation: Sound signal circuit (multi–display controller sub–assy – radio and navigation assy) 5. Mute signal circuit 6. Multi–display controller sub–assy 7. Disc player controller	DI–2110 DI–2112 DI–2137 DI–2123 DI–2125 DI–2153 – –

VTR TERMINAL

Symptom	Suspect Area	See page
Only display screen input from the external device is not stabilized.	1. Power source circuit (multi–display controller sub–assy) 2. Power source circuit (television display assy) 3. Display signal circuit (multi–display controller sub–assy – television display assy) 4. VTR terminal 5. Multi–display controller sub–assy	DI–2110 DI–2107 DI–2115 – –

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Only sound quality input from the external device is poor or no sound can be heard.	1. Power source circuit (multi–display controller sub–assy) 2. Power source circuit (television display assy) 3. Sound signal circuit (multi–display controller sub–assy – VTR terminal) 4. VTR terminal 5. Multi–display controller sub–assy	DI–2110 DI–2107 DI–2131 – –
The operation the external device cannot be performed	1. Power source circuit (multi–display controller sub–assy) 2. Power source circuit (television display assy) 3. VTR terminal set signal circuit 4. VTR terminal 5. Multi–display controller sub–assy	DI–2110 DI–2107 DI–2155 – –

RSE SYSTEM

Symptom	Suspect Area	See page
Quality of sound from wireless headphone is poor or no sound can be heard (all sound).	1. Power source circuit (multi–display controller sub–assy) 2. Power source circuit (television display assy) 3. Sound signal circuit (multi–display controller sub–assy – television display assy) 4. Mute signal circuit (radio receiver assy – multi–display controller sub–assy) 5. Mute signal circuit (disc player controller – multi–display controller sub–assy) 6. Multi–display controller sub–assy 7. Television display assy	DI–2110 DI–2107 DI–2135 DI–2147 DI–2153 – –
Quality of sound from headphone connected to headphone terminal is poor or no sound can be heard (all sound).	1. Power source circuit (multi–display controller sub–assy) 2. Power source circuit (television display assy) 3. Sound signal circuit (multi–display controller sub–assy – headphone terminal) 4. Mute signal circuit 5. Multi–display controller sub–assy 6. Television display assy	DI–2110 DI–2107 DI–2133 DI–2147 – –
Quality of sound from wireless headphone is poor or no sound can be heard (DVD sound only).	1. Power source circuit (disc player controller) 2. Sound signal circuit (multi–display controller sub–assy – disc player controller) 3. Disc player controller 4. Multi–display controller sub–assy	DI–2112 DI–2137 – –
Quality of sound from headphone connected is poor or no sound can be heard (DVD sound only).	1. Power source circuit (disc player controller) 2. Sound signal circuit (multi–display controller sub–assy – disc player controller) 3. Disc player controller 4. Multi–display controller sub–assy	DI–2112 DI–2137 – –

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Quality of sound from wireless headphone is poor or no sound can be heard (radio sound only).	1. w/o Navigation System: Sound signal circuit (multi–display controller sub–assy – radio receiver assy) w/ Navigation System: Sound signal circuit (multi–display controller sub–assy – radio and navigation assy) 2. Multi–display controller sub–assy 3. w/o Navigation System: Radio receiver assy 4. w/ Navigation System: Radio and navigation assy	DI–2123 DI–2125 – – –
Quality of sound from headphone connected is poor or no sound can be heard (radio sound only).	1. w/o Navigation System: Sound signal circuit (multi–display controller sub–assy – radio receiver assy) w/ Navigation System: Sound signal circuit (multi–display controller sub–assy – radio and navigation assy) 2. Multi–display controller sub–assy 3. w/o Navigation System: Radio receiver assy 4. w/ Navigation System: Radio and navigation assy	DI–2123 DI–2125 – – –

REMOTE CONTROL

Symptom	Suspect Area	See page
A remote control system does not operate.	1. A remote control system does not operate 2. Remote commander check of display check mode 3. Power source circuit (multi–display controller sub–assy) 4. Power source circuit (television display assy) 5. AVC–LAN circuit	DI–2157 DI–2085 DI–2110 DI–2107 DI–2139

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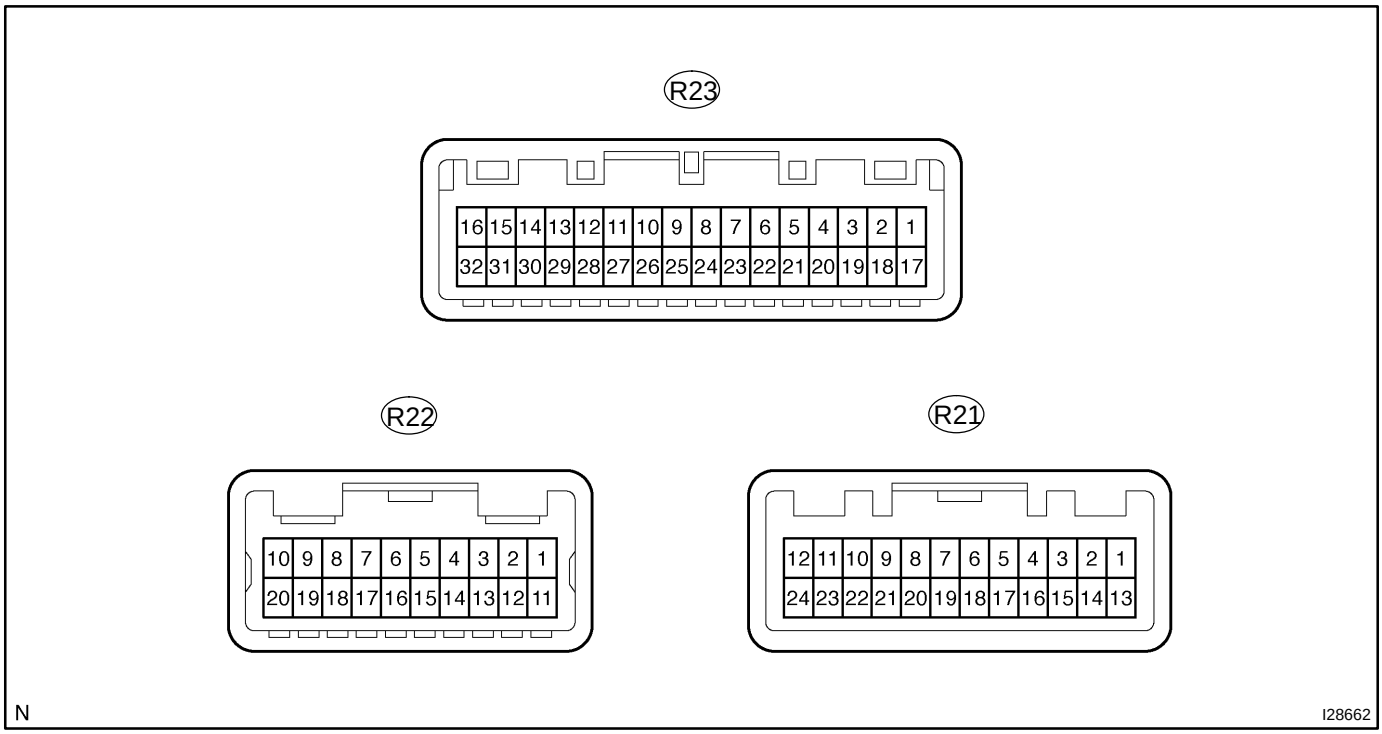
TERMINALS OF ECU

1. MULTI–DISPLAY CONTROLLER SUB–ASSY



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
L– – GND (R23–7 – R23–29)	W – Y	Sound signal (Output)	DVD system is playing	A waveform synchronized with sound is output
L+ – GND (R23–8 – R23–29)	W – Y	Sound signal (Output)	DVD system is playing	A waveform synchronized with sound is output
R– – GND (R23–9 – R23–29)	W – Y	Sound signal (Output)	DVD system is playing	A waveform synchronized with sound is output
R+ – GND (R23–10 – R23–29)	W – Y	Sound signal (Output)	DVD system is playing	A waveform synchronized with sound is output
SG1 – Body ground (R23–11 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
LMUT – GND (R23–12 – R23–29)	LG – Y	Mute signal	Disc player controller is sounding → changing mode	Above 3.5 V → Below 1 V
+B1 – GND (R23–16 – R23–29)	Y – Y	Battery	Always	10 to 14 V
(*1) SG3 – Body ground (R23–19 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
(*1) SGN1 – Body ground (R23–20 – Body ground)	BR – Body ground	Ground	Always	Below 1 V
(*1) NTS1 – GND (R23–21 – R23–29)	BR – Y	Display signal	DVD system is displayed	Pulse generation

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R–L– – GND (R23–23 – R23–29)	W – Y	Sound signal (Input)	RSE system is playing	A waveform synchronized with sound is output
R–L+ – GND (R23–24 – R23–29)	W – Y	Sound signal (Input)	RSE system is playing	A waveform synchronized with sound is output
R–R– – GND (R23–25 – R23–29)	W – Y	Sound signal (Input)	RSE system is playing	A waveform synchronized with sound is output
R–R+ – GND (R23–26 – R23–29)	W – Y	Sound signal (Input)	RSE system is playing	A waveform synchronized with sound is output
SG2 – Body ground (R23–27 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
RMUT – GND (R23–28 – R23–29)	LG – Y	Mute signal	Audio source is changing	Below 1 V
GND – Body ground (R23–29 – Body ground)	Y – Body ground	Ground	Always	Below 1 V
TX– – GND (R23–30 – R23–29)	LG – Y	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
TX+ – GND (R23–31 – R23–29)	LG – Y	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
ACC – GND (R23–32 – R23–29)	LG – Y	Ignition (ACC)	Ignition switch in the ACC position	10 to 14 V
MUTE – GND (R22–1 – R23–29)	LG – Y	Mute signal	Disc player controller is changing	Below 1 V
AL– – GND (R22–2 – R23–29)	W – Y	Sound signal (Input)	DVD system is playing	A waveform synchronized with sound is output
AL+ – GND (R22–3 – R23–29)	W – Y	Sound signal (Input)	DVD system is playing	A waveform synchronized with sound is output
AR– – GND (R22–4 – R23–29)	W – Y	Sound signal (Input)	DVD system is playing	A waveform synchronized with sound is output
AR+ – GND (R22–5 – R23–29)	W – Y	Sound signal (Input)	DVD system is playing	A waveform synchronized with sound is output
SG4 – Body ground (R22–6 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
NTS2 – GND (R22–8 – R23–29)	BR – Y	Display signal	DVD system is displayed	Pulse generation
SGN2 – Body ground (R22–9 – Body ground)	BR – Body ground	Ground	Always	Below 1 V
SG9 – Body ground (R22–10 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
+B – GND (R22–11 – R23–29)	LG – Y	Battery	Always	10 to 14 V

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ACC3 – GND (R22–12 – R23–29)	LG – Y	Ignition (ACC)	Ignition switch in the ACC position	10 to 14 V
TX3– – GND (R22–13 – R23–29)	LG – Y	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
TX3+ – GND (R22–14 – R23–29)	LG – Y	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
GND4 – Body ground (R22–15 – Body ground)	LG – Body ground	Ground	Always	Below 1 V
HPL– – GND (R22–16 – R23–29)	W – Y	Sound signal (Output)	RSE system is playing	A waveform synchronized with sound is output
HPL+ – GND (R22–17 – R23–29)	W – Y	Sound signal (Output)	RSE system is playing	A waveform synchronized with sound is output
HPR– – GND (R22–18 – R23–29)	W – Y	Sound signal (Output)	RSE system is playing	A waveform synchronized with sound is output
HPR+ – GND (R22–19 – R23–29)	W – Y	Sound signal (Output)	RSE system is playing	A waveform synchronized with sound is output
SLD1 – Body ground (R22–20 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
+B2 – GND (R21–1 – R23–29)	Y – Y	Battery	Always	10 to 14 V
ACC2 – GND (R21–2 – R23–29)	LG – Y	Ignition (ACC)	Ignition switch in the ACC position	10 to 14 V
GAUX – GND (R21–3 – R23–29)	LG – Y	Ground	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
TX2– – GND (R21–4 – R23–29)	LG – Y	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
TX2+ – GND (R21–5 – R23–29)	LG – Y	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
GND1 – Body ground (R21–6 – Body ground)	Y – Body ground	Ground	Always	Below 1 V
SG5 – Body ground (R21–7 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
HP1L – GND (R21–8 – R23–29)	BR – Y	Sound signal (Input)	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
HP1R – GND (R21–9 – R23–29)	BR – Y	Sound signal (Input)	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
SG7 – Body ground (R21–10 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
AUXL – GND (R21–11 – R23–29)	BR – Y	Sound signal	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output

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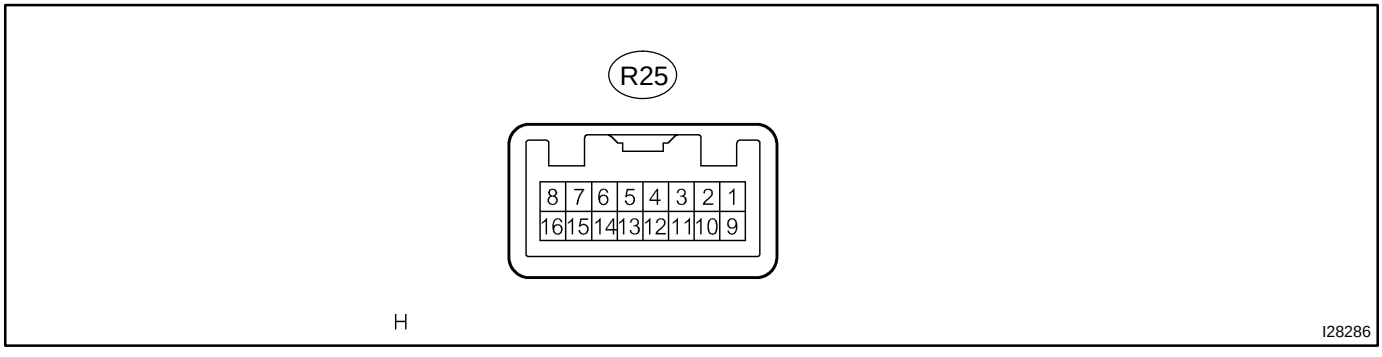
AUXR – GND (R21–12 – R23–29)	BR – Y	Sound signal	External device system is playing (At that time of VTR jack use)	A waveform synchronized with sound is output
R2 – GND (R21–13 – R23–29)	B – Y	Display signal (Red)	Display is on (Television display assy)	Pulse generation
G2 – GND (R21–14 – R23–29)	B – Y	Display signal (Green)	Display is on (Television display assy)	Pulse generation
B2 – GND (R21–15 – R23–29)	B – Y	Display signal (Blue)	Display is on (Television display assy)	Pulse generation
SYN2 – GND (R21–16 – R23–29)	B – Y	Display signal (Synchronize)	Display is on (Television display assy)	Pulse generation
VR2 – Body ground (R21–17 – Body ground)	B – Body ground	Ground	Always	Below 1 V
VG2 – Body ground (R21–18 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
SG6 – Body ground (R21–19 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
HP2L – GND (R21–20 – R23–29)	BR – Y	Sound signal (Output)	Audio system is playing (Headphone)	A waveform synchronized with sound is output
HP2R – GND (R21–21 – R23–29)	BR – Y	Sound signal (Output)	Audio system is playing (Headphone)	A waveform synchronized with sound is output
SG6 – Body ground (R21–22 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
SGN5 – Body ground (R21–23 – Body ground)	BR – Body ground	Ground	Always	Below 1 V
NTS4 – GND (R21–24 – R23–29)	BR – Y	Display signal	External device system displayed (At that time of VTR jack use)	Pulse generation

*1: w/ Navigation System

2. TELEVISION DISPLAY ASSY



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
GND – Body ground (R25–1 – Body ground)	Y – Body ground	Ground	Always	Below 1 V
SGND – Body ground (R25–2 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V

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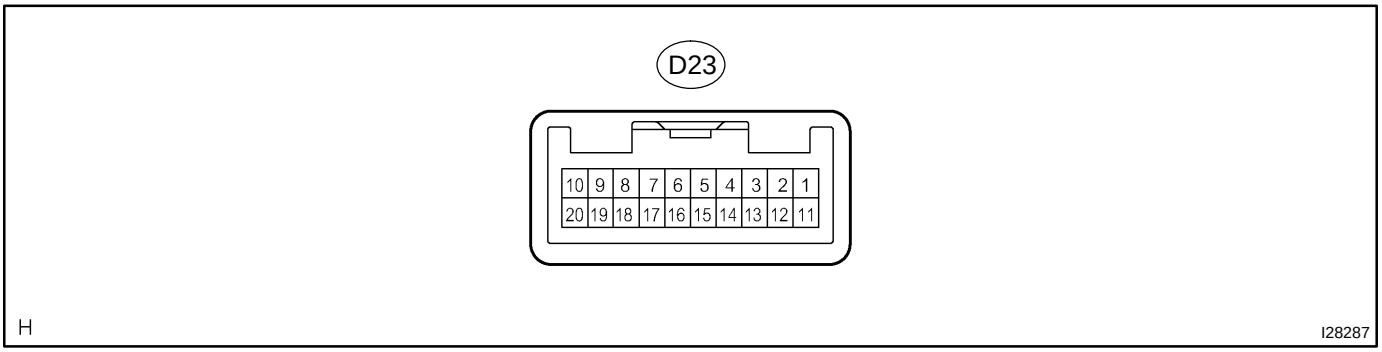
R+ – GND (R25–3 – R25–1)	W – Y	Sound signal (Input)	RSE system is sounding (Headphone)	A waveform synchronized with sound is output
R– – GND (R25–4 – R25–1)	W – Y	Sound signal (Input)	RSE system is sounding (Headphone)	A waveform synchronized with sound is output
L+ – GND (R25–5 – R25–1)	W – Y	Sound signal (Input)	RSE system is sounding (Headphone)	A waveform synchronized with sound is output
L– – GND (R25–6 – R25–1)	W – Y	Sound signal (Input)	RSE system is sounding (Headphone)	A waveform synchronized with sound is output
ACC – GND (R25–7 – R25–1)	LG – Y	Ignition (ACC)	Ignition switch ACC	10 to 14 V
BU+B – GND (R25–8 – R25–1)	Y – Y	Battery	Always	10 to 14 V
TX+ – GND (R25–9 – R25–1)	LG – Y	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
TX– – GND (R25–10 – R25–1)	LG – Y	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
VG – Body ground (R25–11 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
VR – Body ground (R25–12 – Body ground)	B – Body ground	Ground	Always	Below 1 V
SYNC – VR (R25–13 – R25–12)	B – B	Display signal (Synchronize)	Rear display is displayed	Pulse generation
B – VR (R25–14 – R25–12)	B – B	Display signal (Blue)	Rear display is displayed	Pulse generation
G – VR (R25–15 – R25–12)	B – B	Display signal (Green)	Rear display is displayed	Pulse generation
R – VR (R25–16 – R25–12)	B – B	Display signal (Red)	Rear display is displayed	Pulse generation

3. DISC PLAYER CONTROLLER



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
SLD – Body ground (D23–1 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
S.GND – Body ground (D23–2 – Body ground)	BR – Body ground	Ground	Always	Below 1 V

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NTSC – GND (D23–3 – D23–16)	BR – LG	Display signal (Output)	Rear display is displayed (DVD)	Pulse generation
SLD – Body ground (D23–5 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 Ω
R+ – GND (D23–6 – D23–16)	W – LG	Sound signal (Output)	DVD system is sounding	A waveform synchronized with sound is output
R– – GND (D23–7 – D23–16)	W – LG	Sound signal (Output)	DVD system is sounding	A waveform synchronized with sound is output
L+ – GND (D23–8 – D23–16)	W – LG	Sound signal (Output)	DVD system is sounding	A waveform synchronized with sound is output
L– – GND (D23–9 – D23–16)	W – LG	Sound signal (Output)	DVD system is sounding	A waveform synchronized with sound is output
MUTE – GND (D23–10 – D23–16)	LG – LG	Mute signal	DVD system is sounding	Below 1 V
GND – Body ground (D23–16 – Body ground)	LG – Body ground	Ground	Always	Below 1 V
TX+ – GND (D23–17 – D23–16)	LG – LG	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
TX– – GND (D23–18 – D23–16)	LG – LG	AVC–LAN communication signal	Ignition switch ACC	2 to 3 V
ACC – GND (D23–19 – D23–16)	LG – LG	Ignition (ACC)	Ignition switch ACC	10 to 14 V
+B – GND (D23–20 – D23–16)	LG – LG	Battery	Always	10 to 14 V

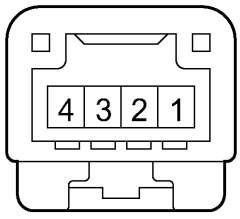
4. HEADPHONE TERMINAL

H10

Headphone Terminal LH

H11

Headphone Terminal RH



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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
HPR – SGND (H10–1 – H10–3)	BR – Shielded	Sound signal (Input)	External device system sounding (At that time of VTR jack use)	A waveform synchronized with sound is output
HPL – SGND (H10–2 – H10–3)	BR – Shielded	Sound signal (Input)	External device system sounding (At that time of VTR jack use)	A waveform synchronized with sound is output
SGND – Body ground (H10–3 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V

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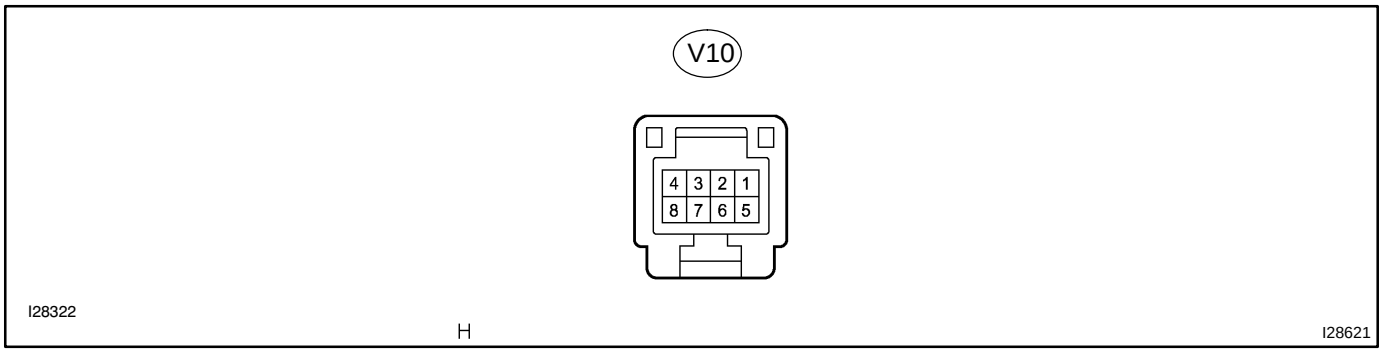
HPR – SGND (H11–1 – H11–3)	BR – Shielded	Sound signal (Input)	External device system sounding (At that time of VTR jack use)	A waveform synchronized with sound is output
HPL – SGND (H11–2 – H11–3)	BR – Shielded	Sound signal (Input)	External device system sounding (At that time of VTR jack use)	A waveform synchronized with sound is output
SGND – Body ground (H11–3 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V

5. VTR TERMINAL



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specification
AUXR – GND (V10–1 – R23–29)	BR – Y	External audio R input signal	External device system sounding (At that time of VTR jack use)	A waveform synchronized with sound is output
AUXL – GND (V10–2 – R23–29)	BR – Y	External audio L input signal	External device system sounding (At that time of VTR jack use)	A waveform synchronized with sound is output
SG6 – Body ground (V10–3 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V
CE – GND (V10–4 – R23–29)	LG – Y	External VIDEO input signal	External device system sounding (At that time of VTR jack use)	A waveform synchronized with sound is output
NTS4 – GND (V10–5 – R23–29)	BR – Y	Display signal	VTR is displayed	Pulse generation
DGND – Body ground (V10–6 – Body ground)	BR – Body ground	Ground	Always	Below 1 V
SGN5 – Body ground (V10–7 – Body ground)	Shielded – Body ground	Ground	Always	Below 1 V

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DIDB1–01

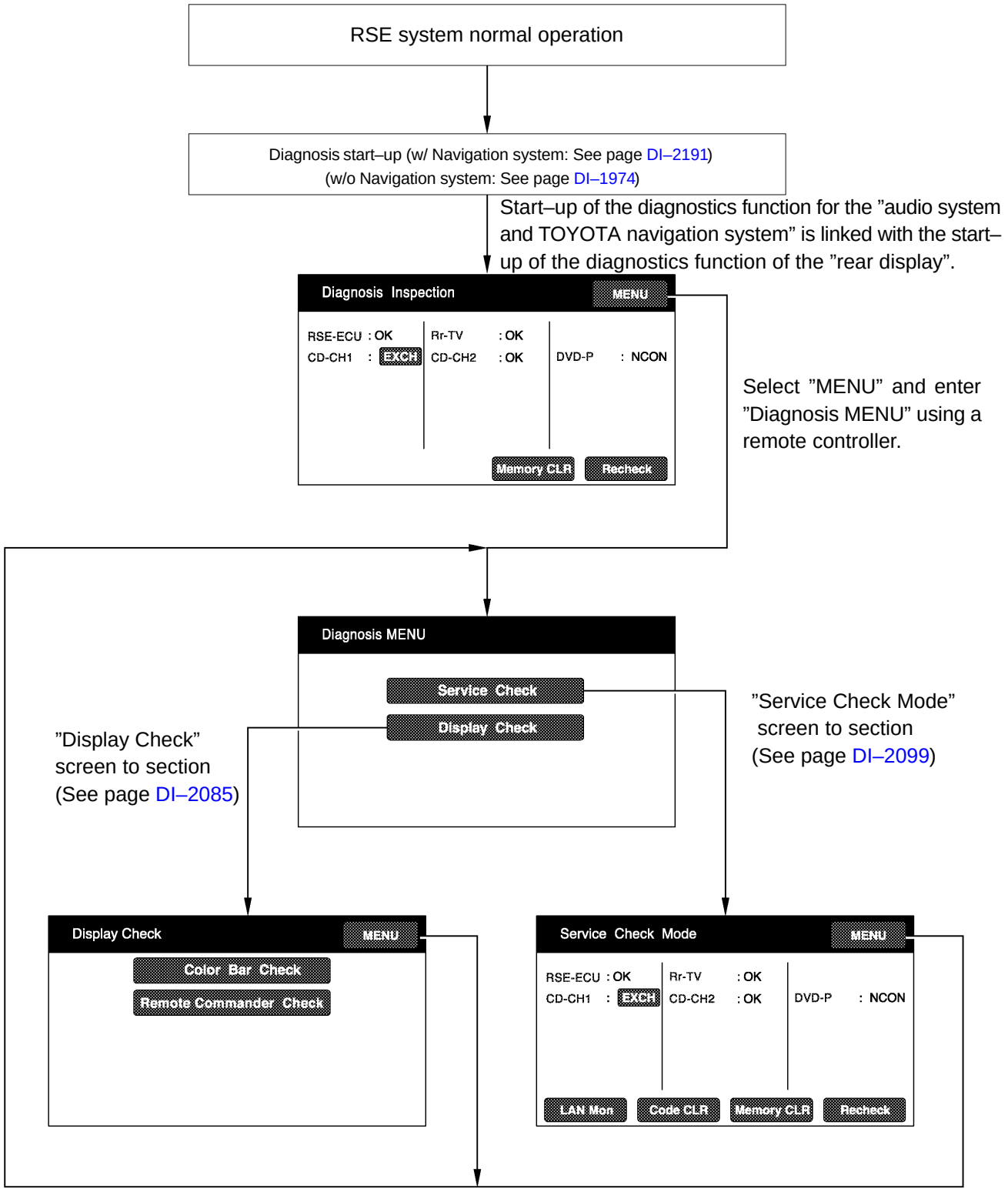
DIAGNOSIS SYSTEM

DIAGNOSIS CHECK

HINT:

Diagnosis system mode is operated as follows.

Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.



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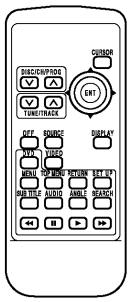
HINT:
RSE system inspects the devices consisting of Sub AVC–LAN by multi–display controller.
Starting Main AVC–LAN (See page DI–1974, DI–2097).
HINT:

- Starting Main AVC–LAN operates the diagnosis mode and Sub AVC–LAN is also automatically enter the diagnosis mode and performing the diagnosis mode operation on the multi–display controller.

Switch Assy:



N I28274

- Use a switch assy to operate diagnosis mode.

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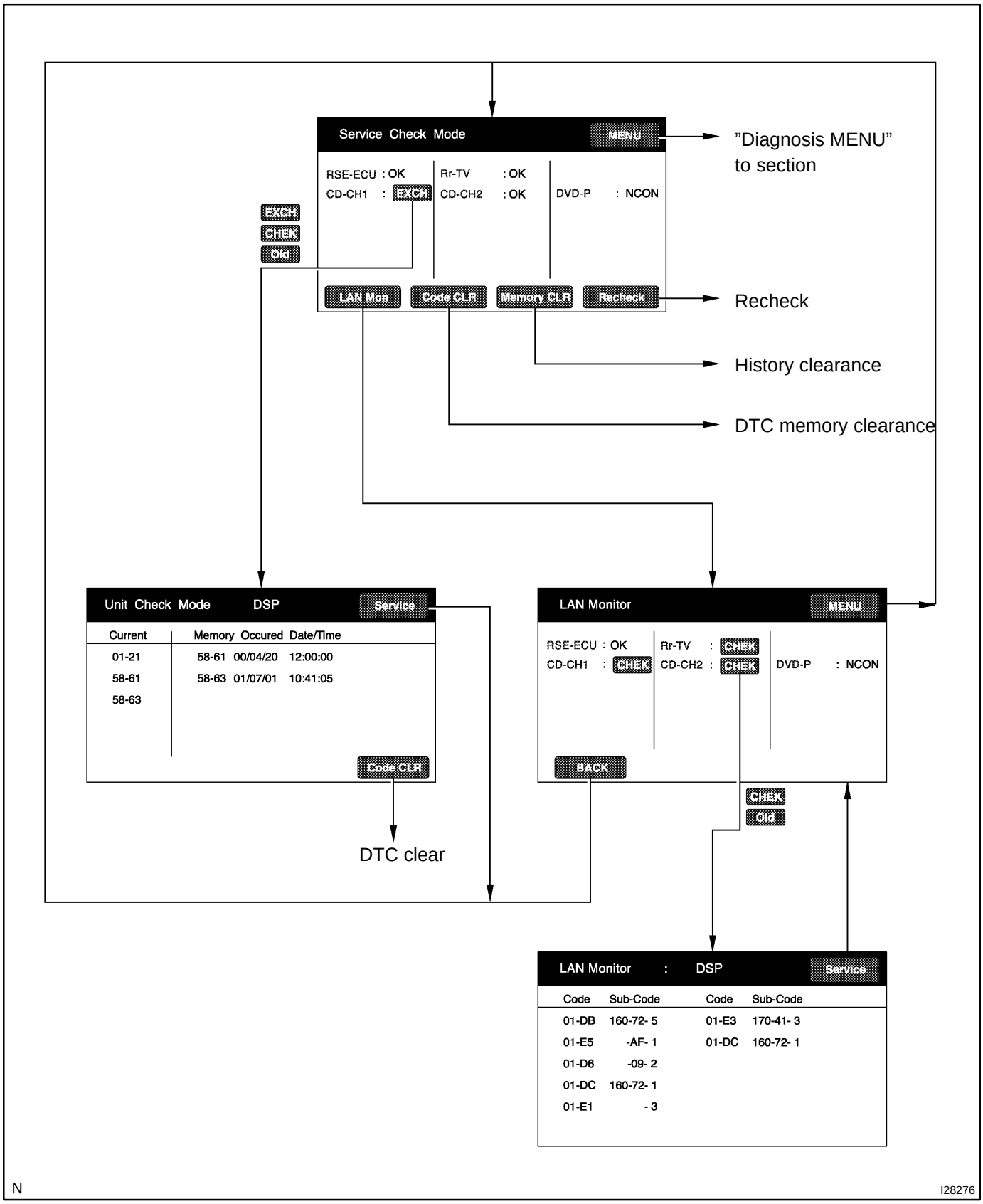
DIDB2–01

CHECK MODE PROCEDURE

SERVICE CHECK MODE

HINT:

Service Check Mode is operated as follows.



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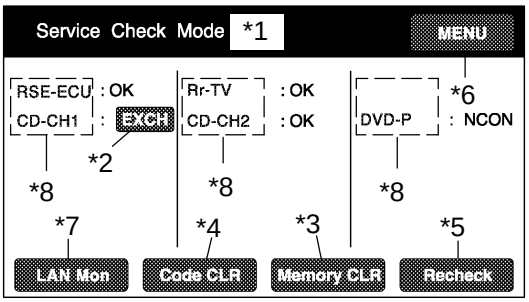

N I28277

Service Check Mode

(1) Start the Diagnosis System (see page DI–2097).

Display Item	Function
Components Name/*1	List of component names including optional components (15 components max.) are displayed. When the names are not identified, their physical addresses are displayed.
Check Result/*2	Check results are displayed.
Memory Clear switch/*3	Pressing this switch for 3 sec. deletes all the information about master component registration.
DTC Clear switch/*4	Pressing this switch for 3 sec. deletes diagnosis memory of all the components. It deletes Service Check results and the screen displaying the check results.
Recheck/*5	Pressing this switch performs Service Check again.
MENU/*6	Pressing this switch activates the Diagnosis Menu screen.
LAN Monitor screen switch/*7	Pressing this switch activates the LAN Monitor screen, which displays the logical address 01 with DTC D0 – FE.

Components:/*8

Display	Name
Rr–TV	Television Display Assy
DVD–P	Disc Player Controller

HINT:

Service Check displays the check results based on the information obtained from each component's response to "System Check Execution" and "Diagnosis Memory Request", and the information of "Current DTC Notification" (the Unit Check that will be displayed on the next screens.).

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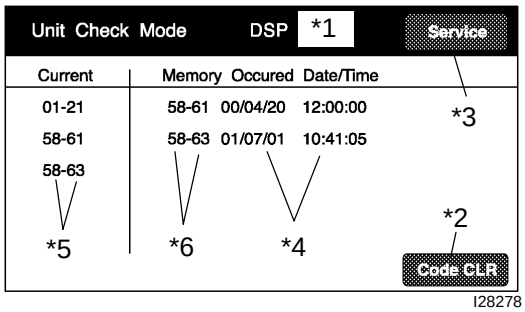
(2) Read Check Result

Check Result	Meaning
OK	No DTC is identified.
EXCH	One or more DTC requesting for exchange are detected.
CHEK	One or more DTC requesting for check are detected.
NCON	No connection response to Diagnosis System start–up, whereas it has the connection response to the AVC–LAN system when the power switch is turned on (when IG is turned to ACC).
Old	One or more DTC are detected because of old version.
NRES	No response to the information about the Diagnosis System, whereas it responds to the Diagnosis System start–up.

HINT:

- ▶ After repair and check, press ”Code CLR” for more than 3 sec. to delete diagnosis memory.
- ▶ After deleting diagnosis memory, press ”Recheck” and make sure ”OK” is displayed on the screen.



(3) ”EXCH”, ”CHEK” and ”Old” can be used as switches to activate Unit Check Mode” for detail information. Check troubled parts of the components in these modes by referring to the DTC code list.

Display Item	Description
Components name/*1	Names of components to be checked are displayed.
DTC clear switch/*2	Pressing this switch for 3 sec. deletes DTC memory of the selected diagnosis component.
Service check mode screen switch/*3	Pressing this returns to the Service Check Mode screen.
Date/Time/*4	The date and time stamped at the time of DTC occurrence are displayed in the order of year–month–day–hour–minute–second. (If the date and time data is invalid, it is displayed as a blank.)
Current/*5	Up to 6 DTC codes detected during the System Check are displayed.
Memory/*6	DTC memories stored and current DTC Notification are displayed.

HINT:

- ▶ Detecting Unit DTC activates the Unit Check Mode on the screen.
- ▶ In the Unit Check Mode, DTC which is identified as ”EHCK” in the Service Check is displayed as classified into Current DTC and Past DTC.

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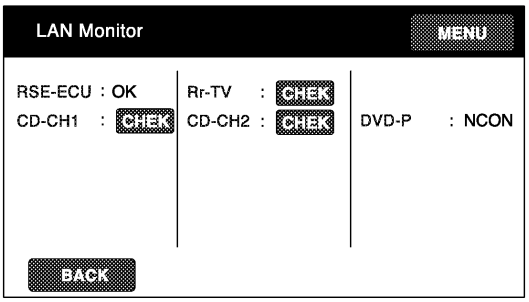
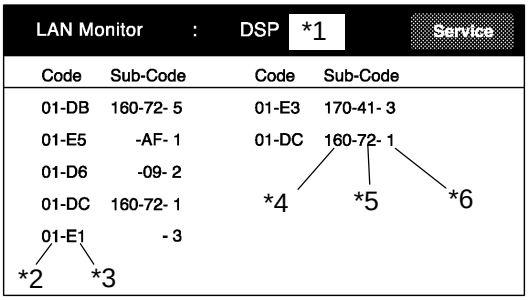


N I28279



N I28280

(4) ”LAN Monitor” can be used as a switch to activate ”LAN Monitor” for detail information. Check faulty parts of the components in these modes by referring to the DTC code list.

Display Item	Description
Components name/*1	Names of components to be checked are displayed.
Segment/*2	Logical address codes corresponding to DTC are displayed.
DTC/*3	DTC is displayed.
Sub–Code (address numbers of related components)/*4	Physical address codes memorized together with DTC are displayed.
Sub–code (Connection confirmation number) /*5	Connection confirmation numbers memorized together with DTC are displayed.
Sub–code (Number of occurrence) /*6	The number of occurrence of the same DTC is displayed.

HINT:

- ▶ Detecting no LAN DTC activates the LAN Monitor on the screen.
- ▶ The LAN Monitor chooses and displays the LAN DTC out of DTC of components identified as ”CHEK” in the LAN Monitor.

(5) Read Check Result

Check Result	Meaning
OK	No DTC is identified.
CHEK	One or more DTC requesting for check are detected.
NCON	No connection response to Diagnosis System start–up, whereas it has the connection response to the AVC–LAN system when the power switch is turned on (when IG is turned to ACC).
NRES	No response to the information about the Diagnosis System, whereas it responds to the Diagnosis System start–up.
Old	One or more DTC are detected because of old version.

HINT:

- ▶ After repairing and checking, press ”Code CLR” for more than 3 sec. to delete diagnosis memory.
- ▶ After deleting diagnosis memory, press ”Recheck” and make sure ”OK” is displayed on the screen.

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DIDB3–01

DIAGNOSTIC TROUBLE CODE CHART

Terms	Meaning
Physical address	Three–digit code (shown in hexadecimal) which is given to each component comprising the AVC–LAN. Corresponding to the function, individual symbols are specified.
Logical address	Two–digit code (shown in hexadecimal) which is given to each function comprising the inner system of the AVC–LAN.

HINT:

DTC of the device which is directly connected via AVC–LAN, is displayed on the ”audio system or navigation system” and the ”television display assy” respectively.

Titles for each unit are stated in the following order: parts name (physical address) [Name indicated by DTC]

1. MULTI–DISPLAY CONTROLLER SUB–ASSY (Physical address: 16C, 16D) [RSE–ECU]

HINT:

- ▶ *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting the engine.
- ▶ *2: This code is stored 180 seconds after the power supply connector is disconnected after engine start.
- ▶ *3: This code may be stored when the engine key is turned back to the ON position and then turned again to the START position after engine start.
- ▶ *4: This code may be stored when the engine key is turned back to the ON position and then turned again to the START position in 1 minute after engine start.

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D8 *2	No Response To Connection Check	Component shown by sub–code is or had been disconnected from system after engine start.	1. Power source circuit (Television display assy). 2. Power source circuit (Disc player controller). 3. AVC–LAN circuit. 4. Replace television display assy. 5. Replace disc player controller.	DI–2107 DI–2112 DI–2139 – –
D9 *1	Last Mode Error	Component operated (sound and/or image was provided) before engine stop is or was disconnected with ignition switch in the ACC or ON position.	1. Power source circuit (Television display assy). 2. Power source circuit (Disc player controller). 3. AVC–LAN circuit 4. Replace television display assy. 5. Replace disc player controller.	DI–2107 DI–2112 DI–2139 – –
DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Detected when sound and picture do not change by button operation.	1. Power source circuit (Television display assy). 2. Power source circuit (Disc player controller). 3. AVC–LAN circuit 4. Replace television display assy. 5. Replace disc player controller.	DI–2107 DI–2112 DI–2139 – –
DB *1	Mode Status Error	Dual alarm is detected.	1. Power source circuit (Television display assy). 2. Power source circuit (Disc player controller). 3. AVC–LAN circuit 4. Replace television display assy. 5. Replace disc player controller.	DI–2107 DI–2112 DI–2139 – –

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DC *4	Transmission Error	Transmission to component shown by sub–code failed. (This code does not necessarily mean actual failure.)	If same sub–code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.	–
DE *3	Slave Reset (Momentary Interruption)	After engine start, slave component has been disconnected.	1. Power source circuit (Television display assy). 2. Power source circuit (Disc player controller). 3. AVC–LAN circuit 4. Replace television display assy. 5. Replace disc player controller.	DI–2107 DI–2112 DI–2139 – –
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.	–

2. Television display assy (Physical address: 1B0) [Rr–TV]

HINT:

- ▶ *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting the engine.
- ▶ *2: This code may be stored when the engine key is turned again in 1 minute after the engine start.
- ▶ *3: This code may be stored when the engine key is turned again after the engine start.
- ▶ *4: The code is stored 210 seconds after the power supply connector of the master component is disconnected with the ignition switch in the ACC or ON position.

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
22	RAM Error	Abnormal condition of RAM is detected.	Replace television display assy	–
D6 *1	Absence of Master	Component in which this code is recorded was disconnected from system with the ignition switch in the ACC or ON position. Or, when this code was recorded, multi–display controller sub–assy was disconnected.	1. Power source circuit (Television display assy). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN circuit. 4. Replace television display assy. 5. Replace Multi–display controller sub–assy.	DI–2107 DI–2110 DI–2139 – –
D7 *4	Communication Check Error	Component in which this code is recorded is or was disconnected from system after engine start. Or, when recording this code, multi–display controller sub–assy was disconnected.	1. Power source circuit (Television display assy). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN circuit. 4. Replace television display assy. 5. Replace Multi–display controller sub–assy.	DI–2107 DI–2110 DI–2139 – –
DC *2	Transmission Error	Transmission to component shown by sub–code failed. (Detecting this DTC does not necessarily mean actual failure.)	If the same sub–code is recorded in other components, check harness for power supply and communication system of all components shown by code.	–

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DD *3	Master Reset (Momentary Interruption)	After engine start, multi–display controller sub–assy was disconnected from system.	1. Power source circuit (Television display assy). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN circuit. 4. Replace television display assy. 5. Replace Multi–display controller sub–assy.	DI–2107 DI–2110 DI–2139 – –
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (Television display assy). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN circuit. 4. Replace television display assy. 5. Replace Multi–display controller sub–assy.	DI–2107 DI–2110 DI–2139 – –
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.	–
E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from multi–display controller sub–assy.	Replace multi–display controller sub–assy.	–
E3 *1	Registration Request Transmission	▶Registration Request command is output from slave component. ▶Registration Connection Check Instruction, Registration Request command is output from sub–master component.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.	–
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purposes, it may be detected when no actual failure exists.	–

3. Disc player controller (Physical address: 1A0) [DVD–P]

HINT:

- ▶ *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting an engine.
- ▶ *2: This code may be stored when the engine key is turned again 1 min. after the engine starts.
- ▶ *3: This code may be stored when the engine key is turned again after the engine starts.
- ▶ *4: When 210 sec. have passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
22	RAM Error	Abnormal condition of RAM is detected.	Replace disc player controller	–
D6 *1	Absence of Master	Component in which this code is recorded was disconnected from system with the ignition switch in the ACC or ON position. Or, when this code was recorded, multi–display controller sub–assy was disconnected.	1. Power source circuit (Disc player controller). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN circuit. 4. Replace disc player controller. 5. Replace Multi–display controller sub–assy.	DI–2112 DI–2110 DI–2139 – –

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D7	Communication Check Error	Component in which this code is recorded is or was disconnected from system after engine start. Or, when recording this code, multi–display controller sub–assy was disconnected.	1. Power source circuit (Disc player controller). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN circuit. 4. Replace disc player controller. 5. Replace Multi–display controller sub–assy.	DI–2112 DI–2110 DI–2139 – –
DC *2	Transmission Error	Transmission to component shown by sub–code has been failed. (Detecting this DTC does not necessarily mean actual failure.)	If same sub–code is recorded in other components, check harness for power supply and communication system of all components shown by code	–
DD *3	Master Reset (Momentary Interruption)	After engine start, radio and player assembly was disconnected from system.	1. Power source circuit (Disc player controller). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN circuit. 4. Replace disc player controller. 5. Replace Multi–display controller sub–assy.	DI–2112 DI–2110 DI–2139 – –
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (Disc player controller). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN circuit. 4. Replace disc player controller. 5. Replace Multi–display controller sub–assy.	DI–2112 DI–2110 DI–2139 – –
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists	–
E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from disc player controller.	Replace disc player controller	–
E3 *1	Registration Request Transmission	▶Registration Request command is output from slave component. ▶Registration Connection Check Instruction, Registration Request command is output from sub–master component.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists	–
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists	–

(b) Logical address: 44 (DVD)

DTC	Name	Diagnosis	Verification	See page
42	No Disc Readout	Disc cannot be read.	Inspect disc	–
44	DVD Error	Error is detected in disc player controller.	Replace disc player controller	–
45	EJECT Error	Disc cannot be ejected.	Replace disc player controller	–
46	Disc Crack	A crack and dirt are in a disc.	Replace disc player controller	–
52	Player Error	Clamp unusually generating.	Replace disc player controller	–

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DIDB4–01

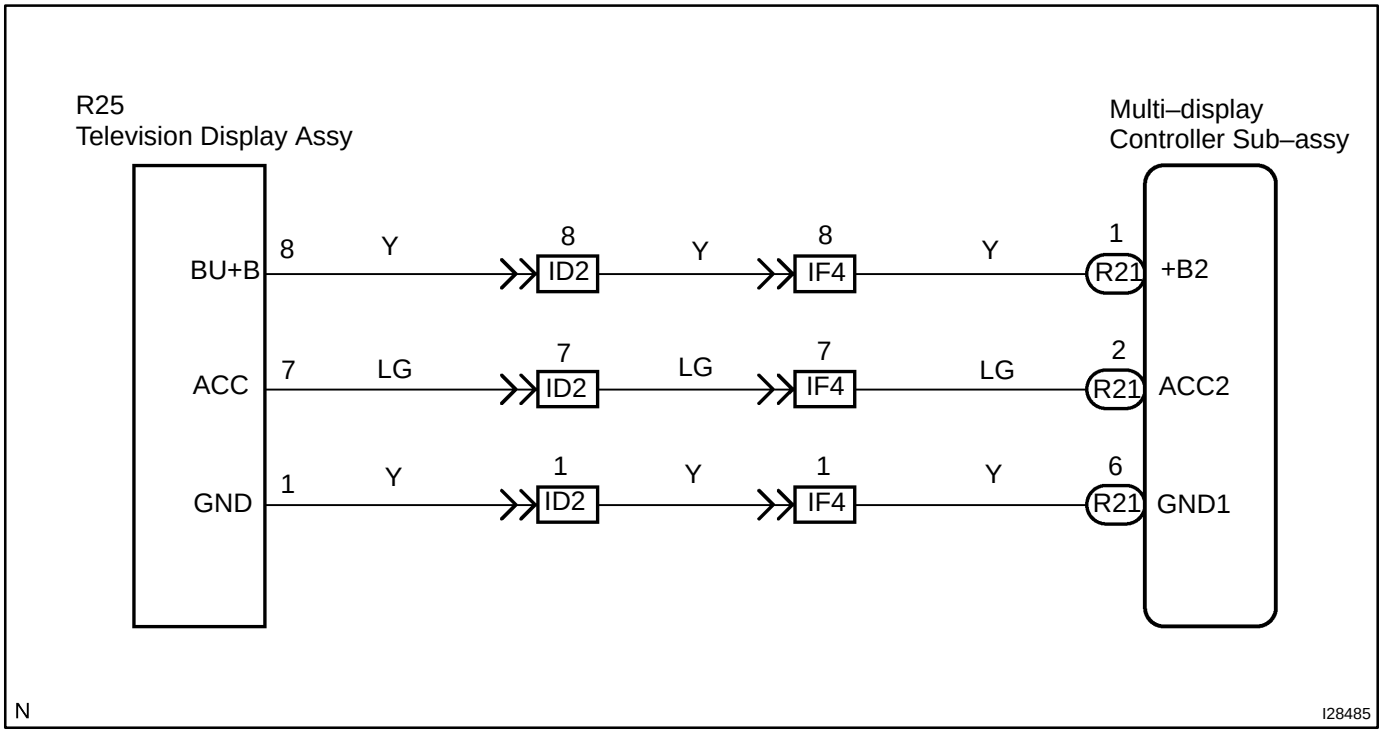
CIRCUIT INSPECTION

Power source circuit (Television display assy)

CIRCUIT DESCRIPTION

This circuit provides power to the television display assy. The power is sent from the battery to the television display assy through the multi–display controller sub–assy.

WIRING DIAGRAM



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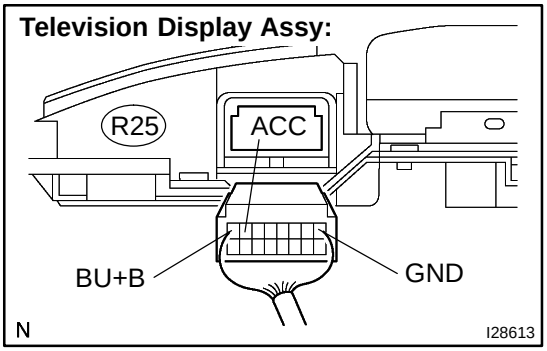
INSPECTION PROCEDURE

1	Inspect television display assy (BU+B, ACC, GND).

Television Display Assy:



PREPARATION:

Disconnect the R25 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
GND (R25–1) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
BU+B (R25–8) – GND (R25–1)	Always	10 to 14 V
ACC (R25–7) – GND (R25–1)	Ignition SW ACC	10 to 14 V

OK → **Go to step 3.**

NG

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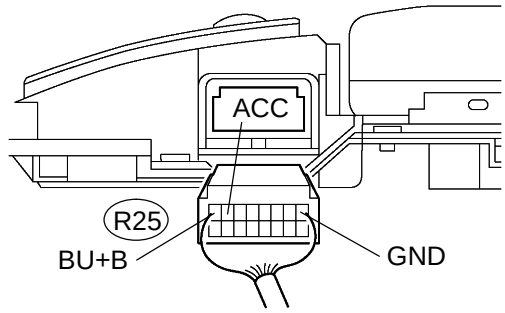
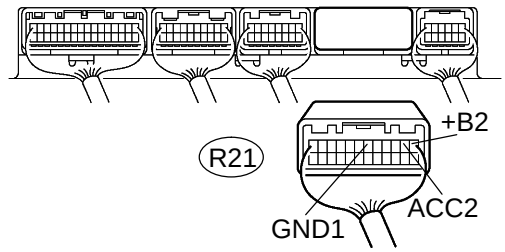
2	Check harness and connector (Television display assy – multi–display controller sub–assy).

Television Display Assy:



Multi–display Controller Sub–assy:



N I28616

PREPARATION:

Disconnect the R25 and R21 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
BU+B (R25–8) – +B2 (R21–1)	Always	Below 1 Ω
ACC (R25–7) – ACC2 (R21–2)	Always	Below 1 Ω
GND (R25–1) – GND1 (R21–6)	Always	Below 1 Ω
BU+B (R25–8) – Body ground	Always	10 kΩ or higher
ACC (R25–7) – Body ground	Always	10 kΩ or higher
GND (R25–1) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Replace multi–display controller sub–assy.

3	Check problem symptoms table.

CHECK:

Check the problem symptoms table.

RESULT:

All possible suspected areas have been inspected	Go to step A
Possible suspected areas still exist	Go to step B

B → **Proceed to next circuit inspection shown in problem symptoms table or diagnostic trouble code chart (See page DI–2087 or DI–2103).**

A →

Replace television display assy.

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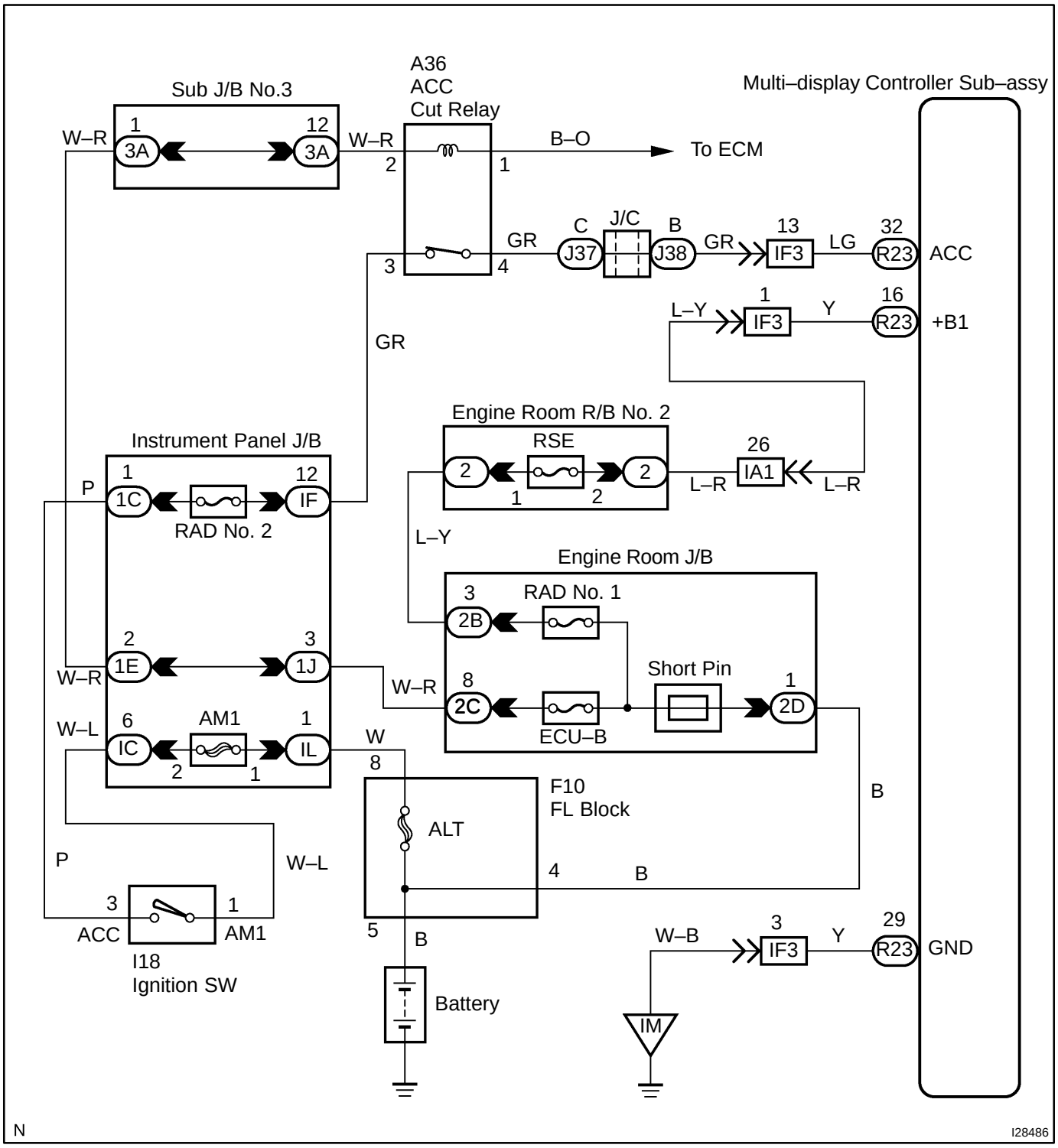
DIDB5–01

Power source circuit (Multi–display controller sub–assy)

CIRCUIT DESCRIPTION

This circuit provides power to the multi–display controller sub–assy.

WIRING DIAGRAM



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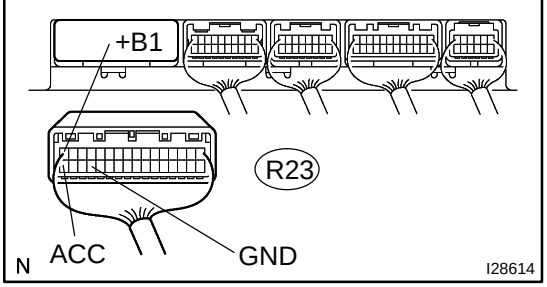
INSPECTION PROCEDURE

1	**Inspect multi–display controller sub–assy (+B1, ACC, GND).**

Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R23 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
GND (R23–29) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
+B1 (R23–16) – GND (R23–29)	Always	10 to 14 V
ACC (R23–32) – GND (R23–29)	Ignition SW ACC	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

2	**Check problem symptoms table.**

CHECK:

Check the problem symptoms table.

RESULT:

All possible suspected areas have been inspected	Go to step A
Possible suspected areas still exist	Go to step B

B → **Proceed to next circuit inspection shown in problem symptoms table or diagnostic trouble code chart (See page DI–2087 or DI–2103).**

A

Replace multi–display controller sub–assy.

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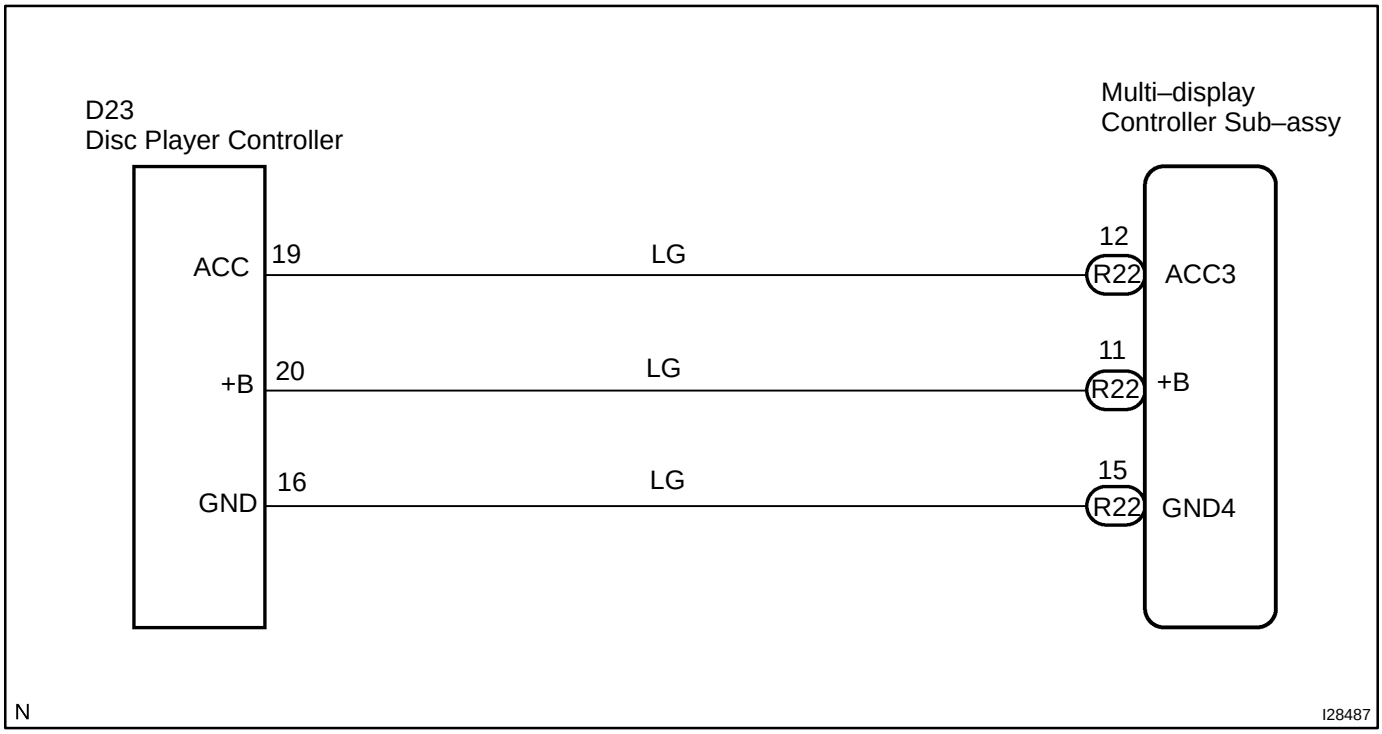
DIDB6–01

Power source circuit (Disc player controller)

CIRCUIT DESCRIPTION

This circuit provides power to the disc player controller. The power is sent from the battery to the disc player controller through the multi–display controller sub–assy.

WIRING DIAGRAM



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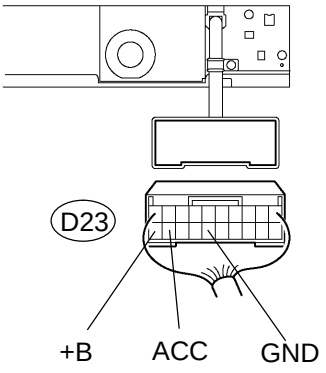
INSPECTION PROCEDURE

1	**Inspect disc player controller (+B, ACC, GND).**

Disc Player Controller:



PREPARATION:

Disconnect the D23 connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
GND (D23–16) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
+B (D23–20) – GND (D23–16)	Always	10 to 14 V
ACC (D23–19) – GND (D23–16)	Ignition SW ACC	10 to 14 V

NG → **Go to step 3.**

OK

2	**Check problem symptoms table.**

CHECK:

Check the problem symptoms table.

RESULT:

All possible suspected areas have been inspected	Go to step A
Possible suspected areas still exist	Go to step B

B → **Proceed to next circuit inspection shown in problem symptoms table or diagnostic trouble code chart (See page DI–2087 or DI–2103).**

A

Replace disc player controller.

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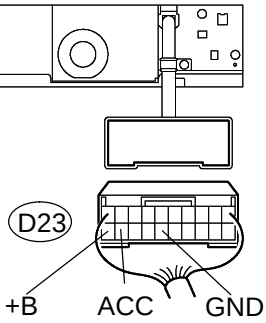
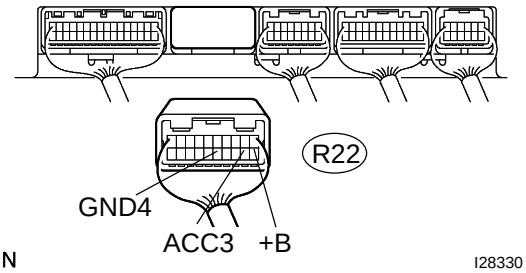
3	Check harness and connector (Multi–display controller sub–assy – Disc player controller).

Disc Player Controller:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R22 and D23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
ACC (D23–19) – ACC3 (R22–12)	Always	Below 1 Ω
+B (D23–20) – +B (R22–11)	Always	Below 1 Ω
GND (D23–16) – GND4 (R22–15)	Always	Below 1 Ω
ACC (D23–19) – Body ground	Always	10 kΩ or higher
+B (D23–20) – Body ground	Always	10 kΩ or higher
GND (D23–16) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace multi–display controller sub–assy.

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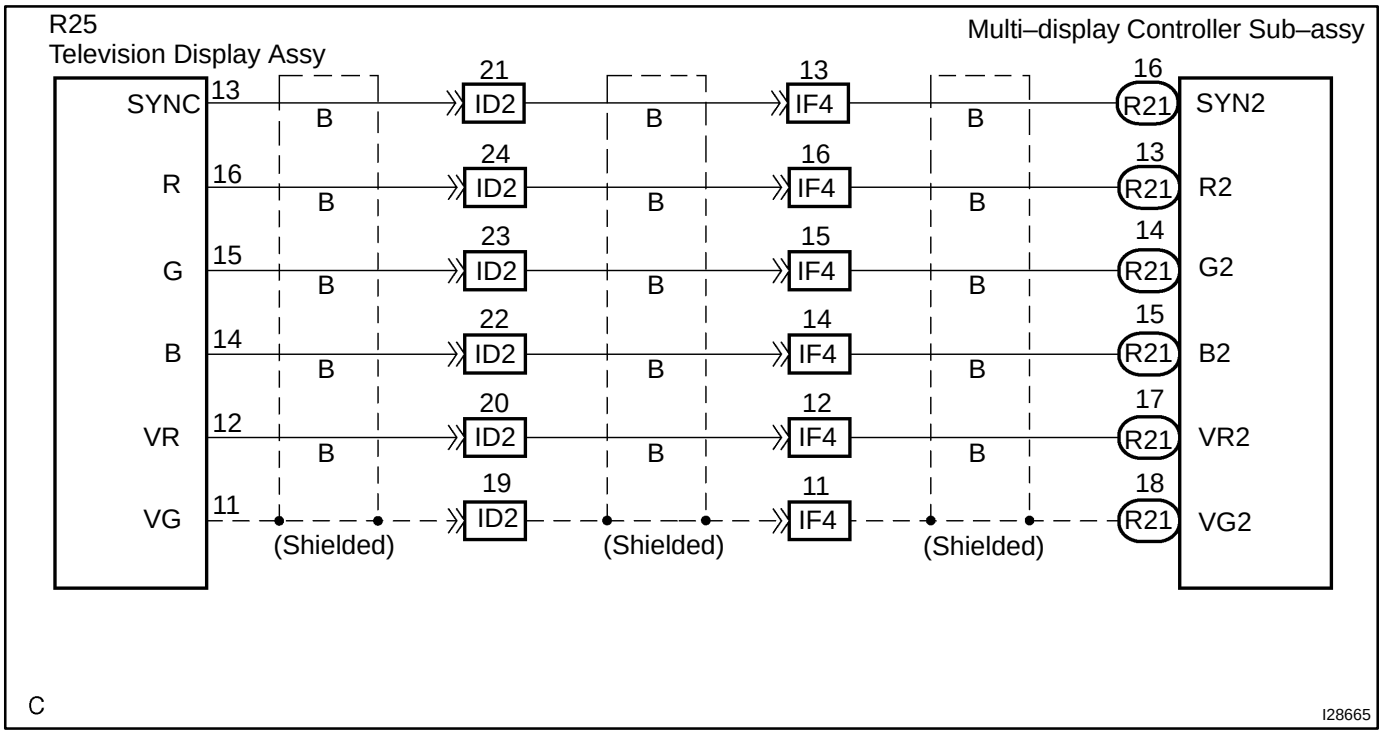
DIDB7–01

Display signal circuit (Multi–display controller sub–assy – Television display assy)

CIRCUIT DESCRIPTION

This is the display signal circuit from the multi–display controller sub–assy to the television display assy.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Display check mode (Color bar check).**

CHECK:

Enter display check mode (See page DI–2085).

Start the diagnosis system and perform the display color bar check in display check mode.

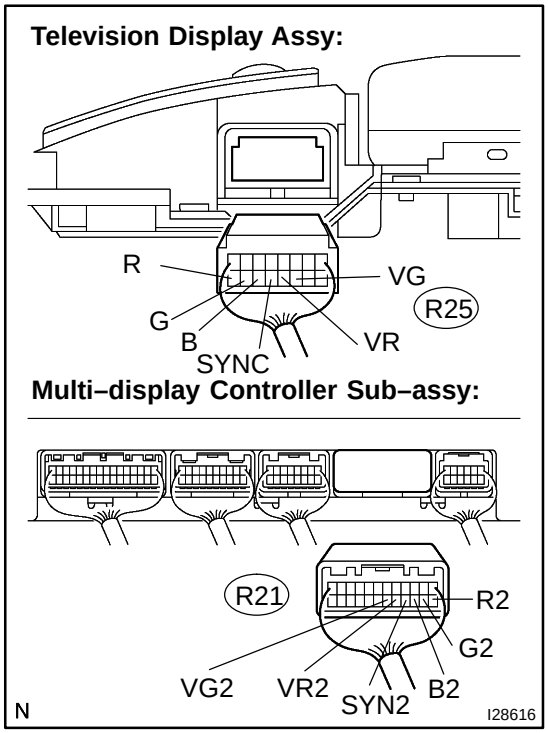
OK:

The check result is normal.

OK → **Adjust display color.**

NG

2	**Check harness and connector (Multi–display controller sub–assy – Television display assy).**



PREPARATION:

Disconnect the R21 and R25 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
VG (R25–11) – VG2 (R21–18)	Always	Below 1 Ω
VR (R25–12) – VR2 (R21–17)	Always	Below 1 Ω
SYNC (R25–13) – SYN2 (R21–16)	Always	Below 1 Ω
B (R25–14) – B2 (R21–15)	Always	Below 1 Ω
G (R25–15) – G2 (R21–14)	Always	Below 1 Ω
R (R25–16) – R2 (R21–13)	Always	Below 1 Ω
VG (R25–11)– Body ground	Always	10 kΩ or higher
VR (R25–12) – Body ground	Always	10 kΩ or higher
SYNC (R25–13) – Body ground	Always	10 kΩ or higher
B (R25–14) – Body ground	Always	10 kΩ or higher
G (R25–15) – Body ground	Always	10 kΩ or higher
R (R25–16) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

Dardoor.com

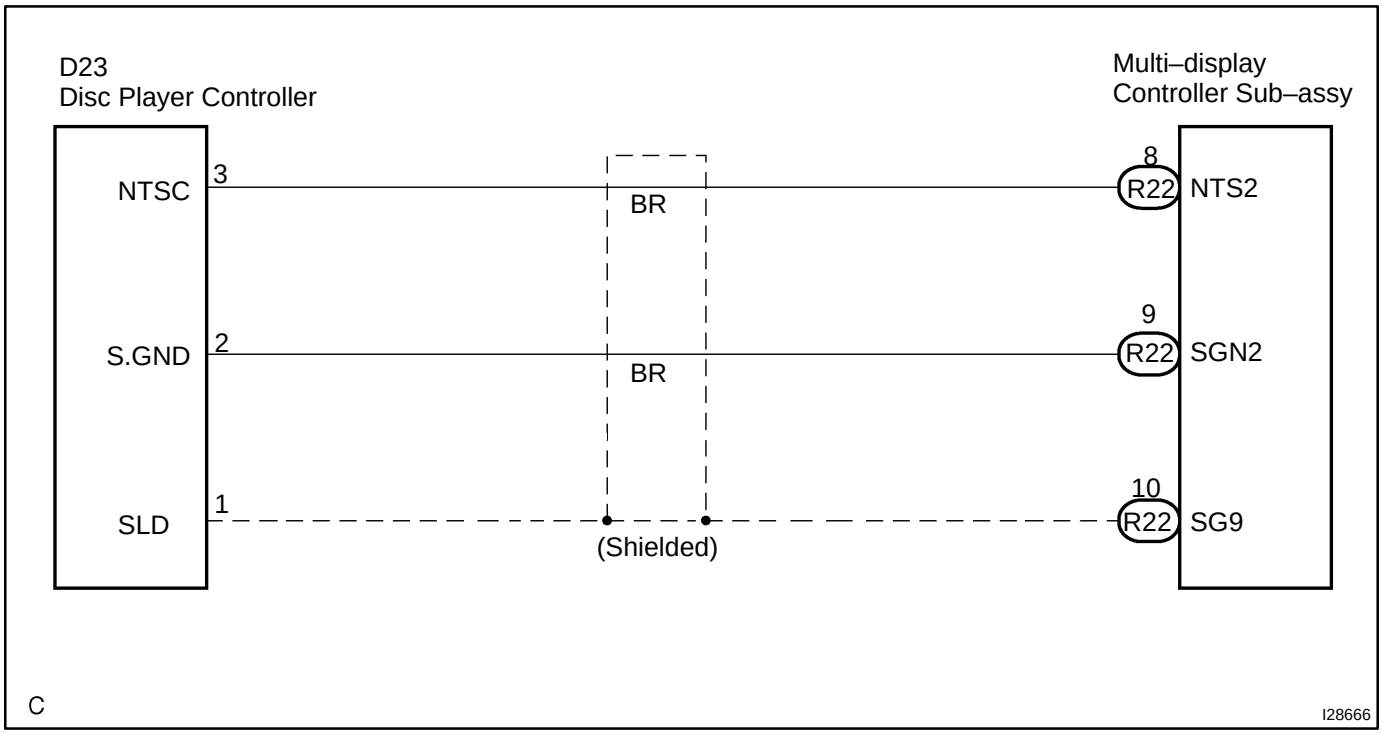
DIDB8–01

Display signal circuit (Multi–display controller sub–assy – Disc player controller)

CIRCUIT DESCRIPTION

This is the display signal circuit from the disc player controller to the multi–display controller sub–assy.

WIRING DIAGRAM

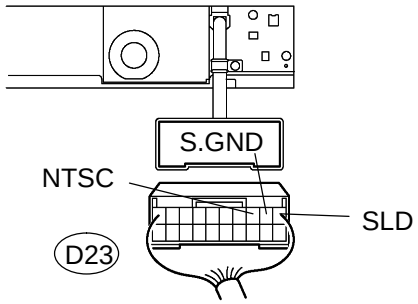


Dardoor.com

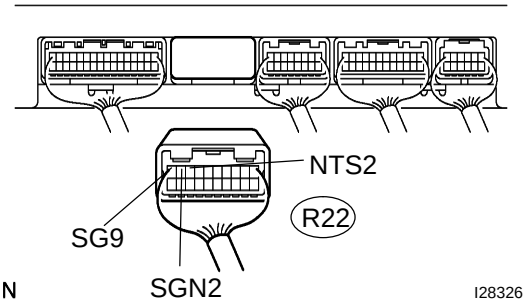
INSPECTION PROCEDURE

1	**Check harness and connector (Multi–display controller sub–assy – Disc player controller).**

Disc Player Controller:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R22 and D23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
NTSC (D23–3) – NTS2 (R22–8)	Always	Below 1 Ω
S.GND (D23–2)– SGN2 (R22–9)	Always	Below 1 Ω
SLD (D23–1)– SG9 (R22–10)	Always	Below 1 Ω
NTSC (D23–3) – Body ground	Always	10 kΩ or higher
S.GND (D23–2) – Body ground	Always	10 kΩ or higher
SLD (D23–1) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

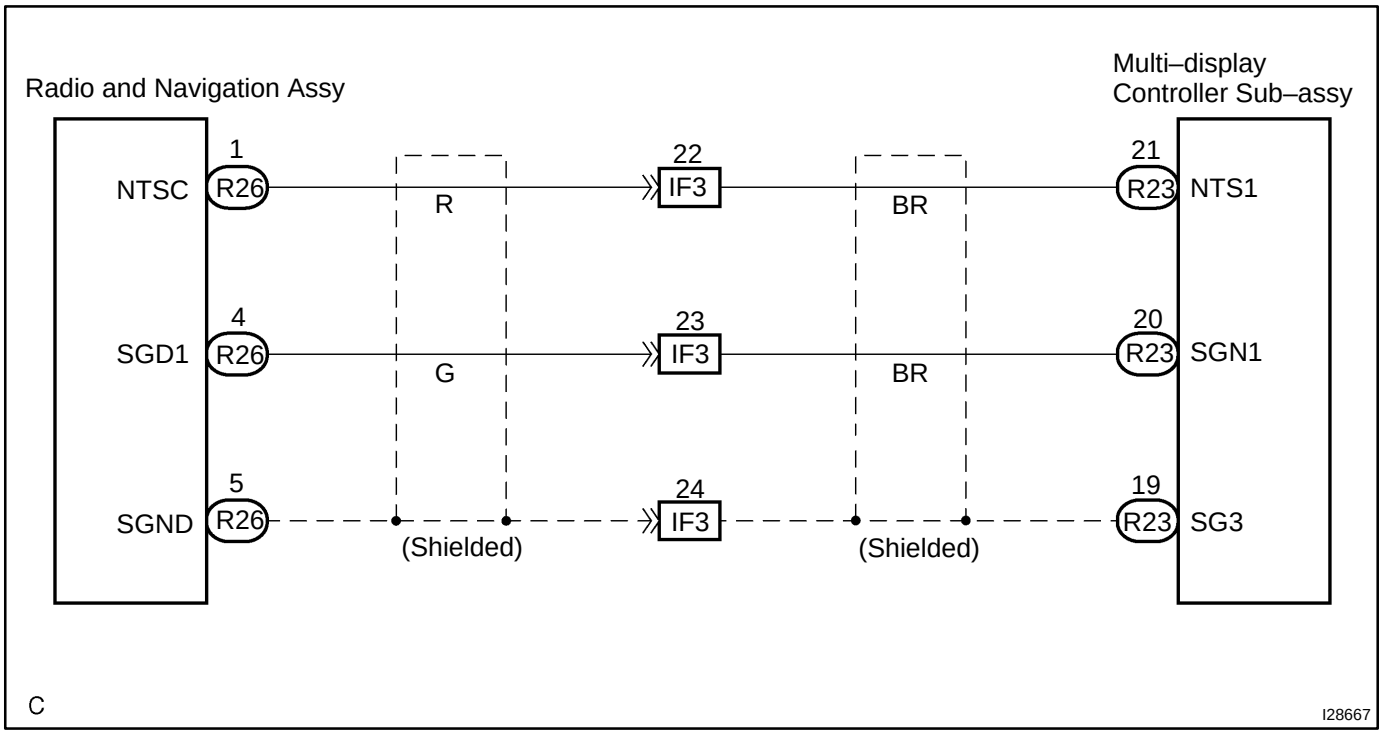
Dardoor.com

Display signal circuit (Multi–display sub–assy – Radio and navigation assy)

CIRCUIT DESCRIPTION

This is the display signal circuit from the multi–display controller sub–assy to the radio and navigation assy.

WIRING DIAGRAM

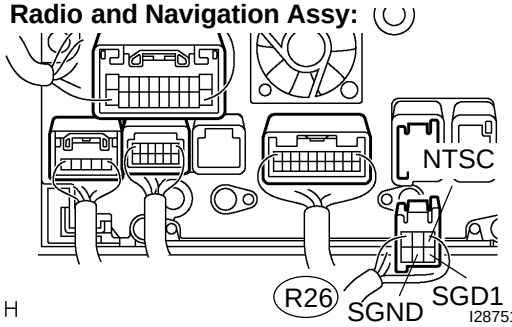


Dardoor.com

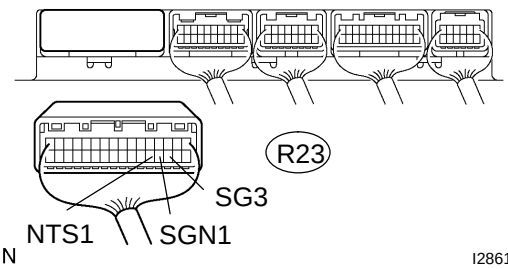
INSPECTION PROCEDURE

1	**Check harness and connector (Multi–display controller sub–assy – Radio and navigation assy).**

Radio and Navigation Assy:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R26 and R23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
NTS1 (R23–21) – NTSC (R26–1)	Always	Below 1 Ω
SGN1 (R23–20) – SGD1 (R26–4)	Always	Below 1 Ω
SG3 (R23–19) – SGND (R26–5)	Always	Below 1 Ω
NTS1 (R23–21) – Body ground	Always	10 kΩ or higher
SGN1 (R23–20) – Body ground	Always	10 kΩ or higher
SG3 (R23–19) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

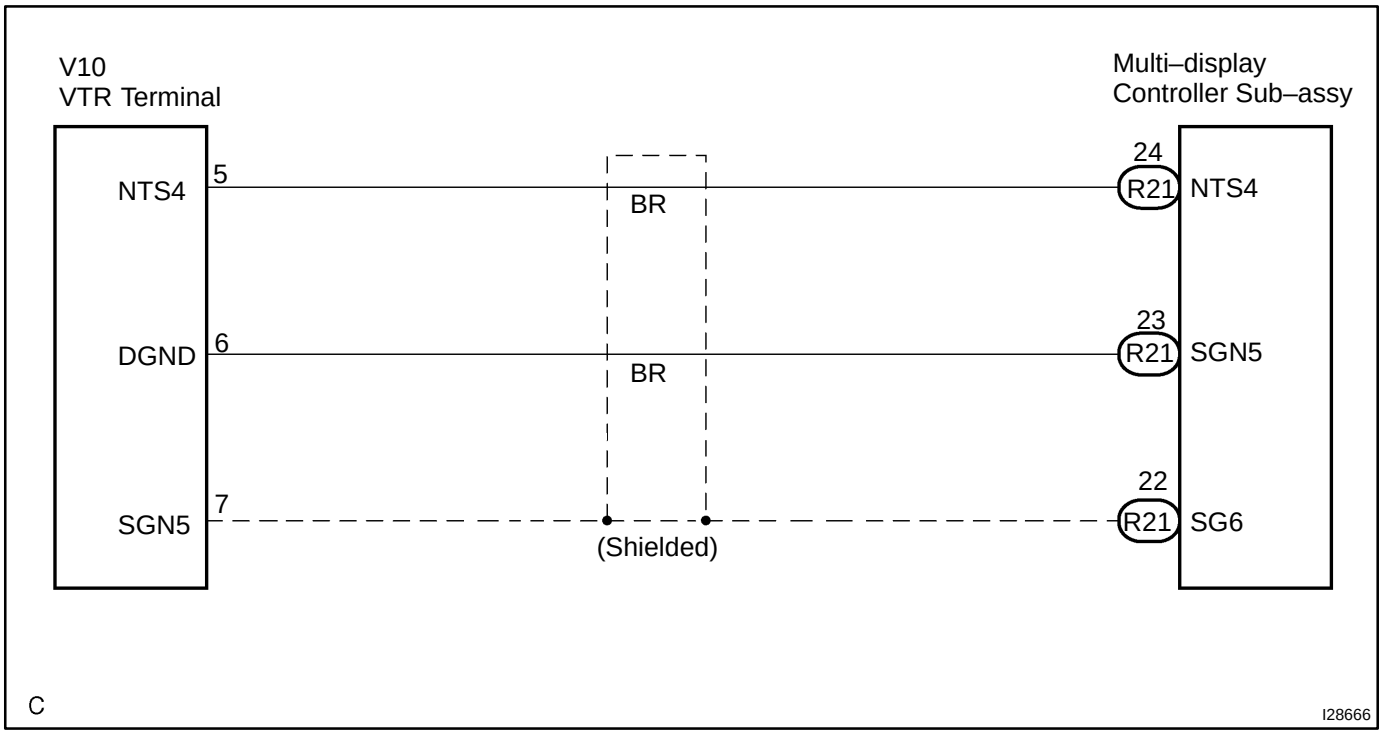
Dardoor.com

Display signal circuit (Multi–display controller sub–assy – VTR terminal)

CIRCUIT DESCRIPTION

This is the display signal circuit from the multi–display controller sub–assy to the VTR terminal.

WIRING DIAGRAM

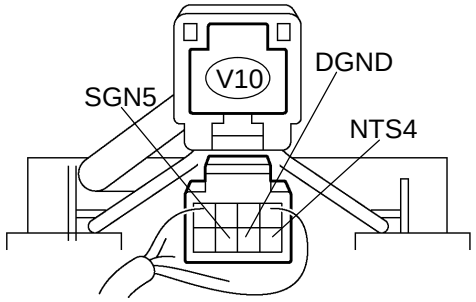


Dardoor.com

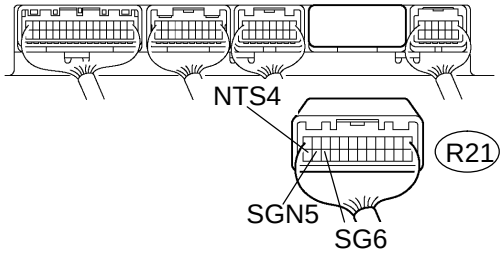
INSPECTION PROCEDURE

1	**Check harness and connector (Multi–display controller sub–assy – VTR terminal).**

VTR Terminal:



Multi–display Controller Sub–assy:



N I28321 I28327

PREPARATION:

Disconnect the V10 and R21 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
NTS4 (V10–5) – NTS4 (R21–24)	Always	Below 1 Ω
DGND (V10–6) – SGN5 (R21–23)	Always	Below 1 Ω
SGN5 (V10–7) – SG6 (R21–22)	Always	Below 1 Ω
NTS4 (V10–5) – Body ground	Always	10 kΩ or higher
DGND (V10–6) – Body ground	Always	10 kΩ or higher
SGN5 (V10–7) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

Dardoor.com

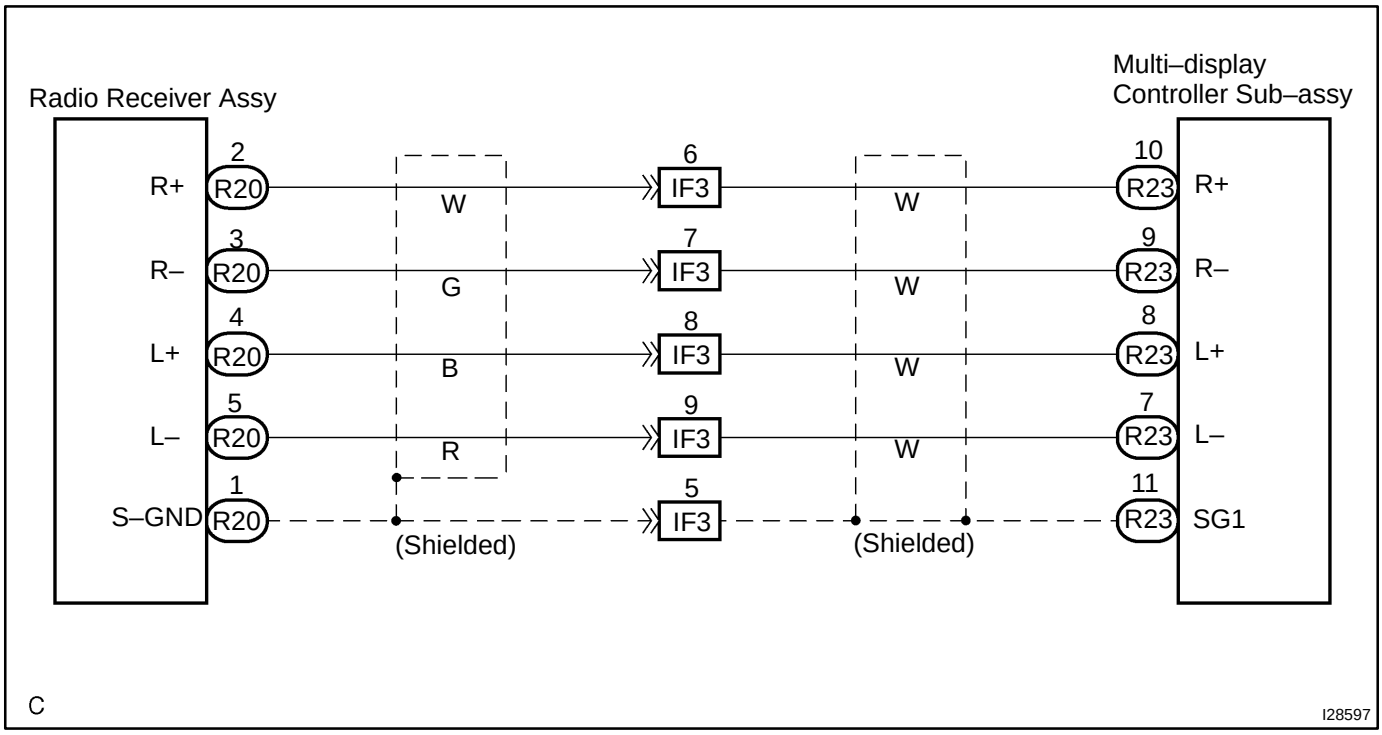
DIDBB–01

Sound signal circuit (From multi–display controller sub–assy to radio receiver assy)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the multi–display controller sub–assy to the radio receiver assy.

WIRING DIAGRAM

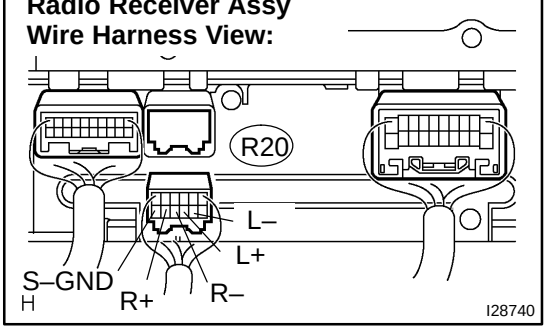


Dardoor.com

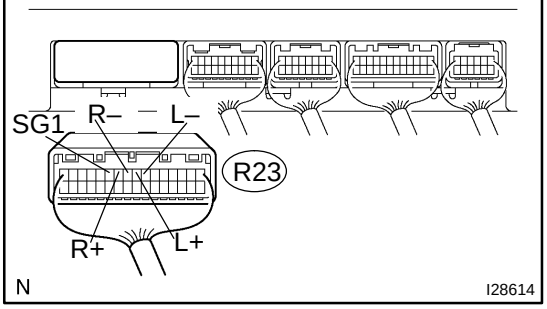
INSPECTION PROCEDURE

1	**Check harness and connector (Radio receiver assy – Multi–display controller sub–assy).**

Radio Receiver Assy Wire Harness View:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R20 and R23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
L+ (R20–4) – L+ (R23–8)	Always	Below 1 Ω
L– (R20–5) – L– (R23–7)	Always	Below 1 Ω
R+ (R20–2) – R+ (R23–10)	Always	Below 1 Ω
R– (R20–3) – R– (R23–9)	Always	Below 1 Ω
S–GND (R20–1) – SG1 (R23–11)	Always	Below 1 Ω
L+ (R20–4) – Body ground	Always	10 kΩ or higher
L– (R20–5) – Body ground	Always	10 kΩ or higher
R+ (R20–2) – Body ground	Always	10 kΩ or higher
R– (R20–3) – Body ground	Always	10 kΩ or higher
S–GND (R20–1) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

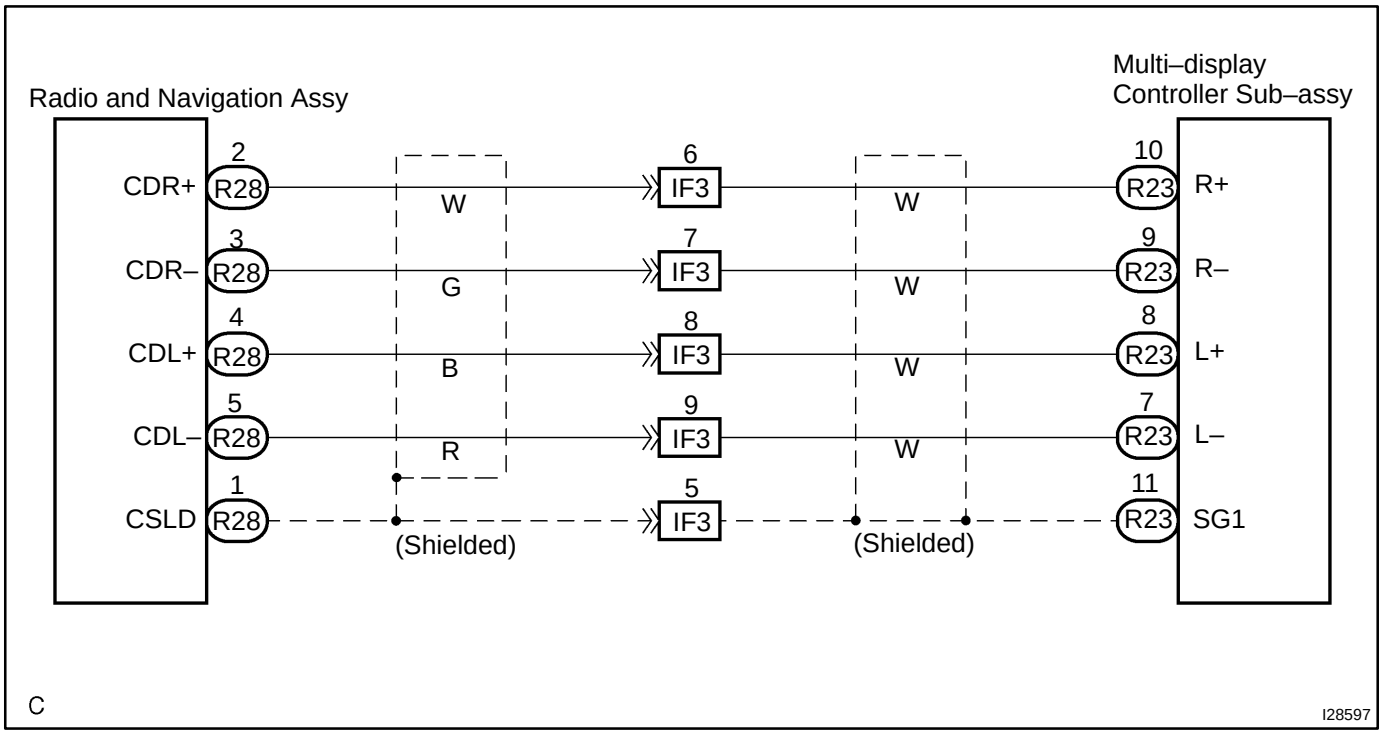
Dardoor.com

Sound signal circuit (From multi–display controller sub–assy to radio and navigation assy)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the multi–display controller sub–assy to the radio and navigation assy.

WIRING DIAGRAM

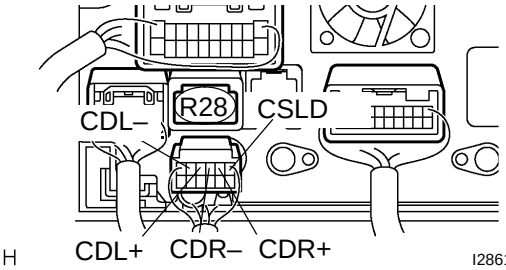


Dardoor.com

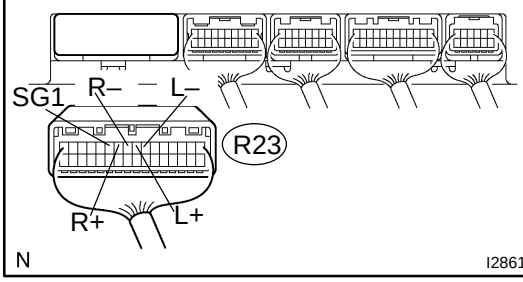
INSPECTION PROCEDURE

1	**Check harness and connector (Radio and navigation assy – Multi–display controller sub–assy).**

Radio and Navigation Assy Wire Harness View:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R23 and R28 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
CDL+ (R28–4) – L+ (R23–8)	Always	Below 1 Ω
CDL– (R28–5) – L– (R23–7)	Always	Below 1 Ω
CDR+ (R28–2) – R+ (R23–10)	Always	Below 1 Ω
CDR– (R28–3) – R– (R23–9)	Always	Below 1 Ω
CSLD (R28–1) – SG1 (R23–11)	Always	Below 1 Ω
CDL+ (R28–4) – Body ground	Always	10 kΩ or higher
CDL– (R28–5) – Body ground	Always	10 kΩ or higher
CDR+ (R28–2) – Body ground	Always	10 kΩ or higher
CDR– (R28–3) – Body ground	Always	10 kΩ or higher
CSLD (R28–1) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

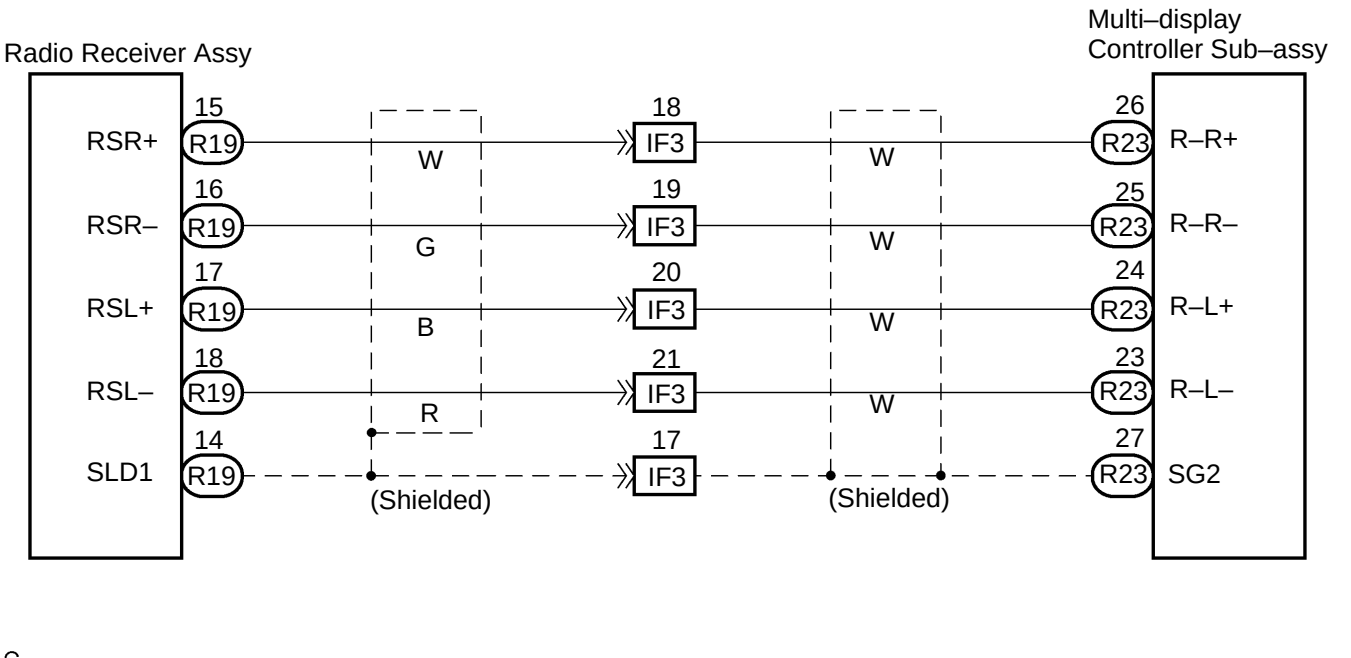
Dardoor.com

Sound signal circuit (From radio receiver assy to multi–display sub–assy)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the radio receiver assy to the multi–display controller sub–assy.

WIRING DIAGRAM

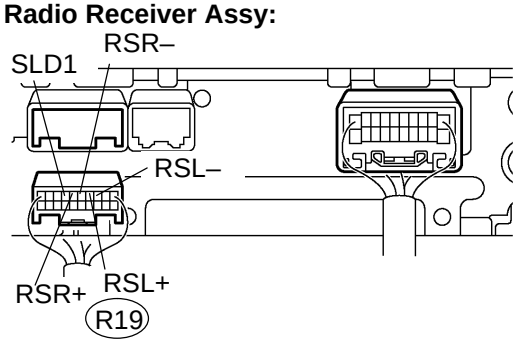


Dardoor.com

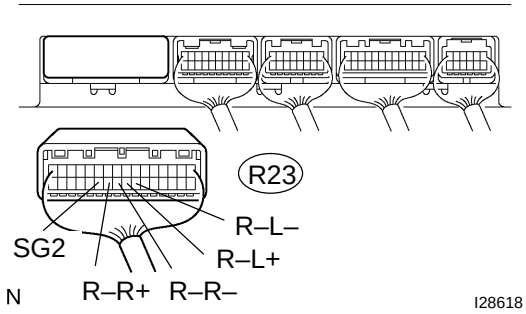
INSPECTION PROCEDURE

1	**Check harness and connector (Radio receiver assy – Multi–display controller sub–assy).**

Radio Receiver Assy:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R23 and R19 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
RSR+ (R19–15) – R–R+ (R23–26)	Always	Below 1 Ω
RSR– (R19–16) – R–R– (R23–25)	Always	Below 1 Ω
RSL+ (R19–17) – R–L+ (R23–24)	Always	Below 1 Ω
RSL– (R19–18) – R–L– (R23–23)	Always	Below 1 Ω
SLD1 (R19–14) – SG2 (R23–27)	Always	Below 1 Ω
RSR+ (R19–15) – Body ground	Always	10 kΩ or higher
RSR– (R19–16) – Body ground	Always	10 kΩ or higher
RSL+ (R19–17) – Body ground	Always	10 kΩ or higher
RSL– (R19–18) – Body ground	Always	10 kΩ or higher
SLD1 (R19–14) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

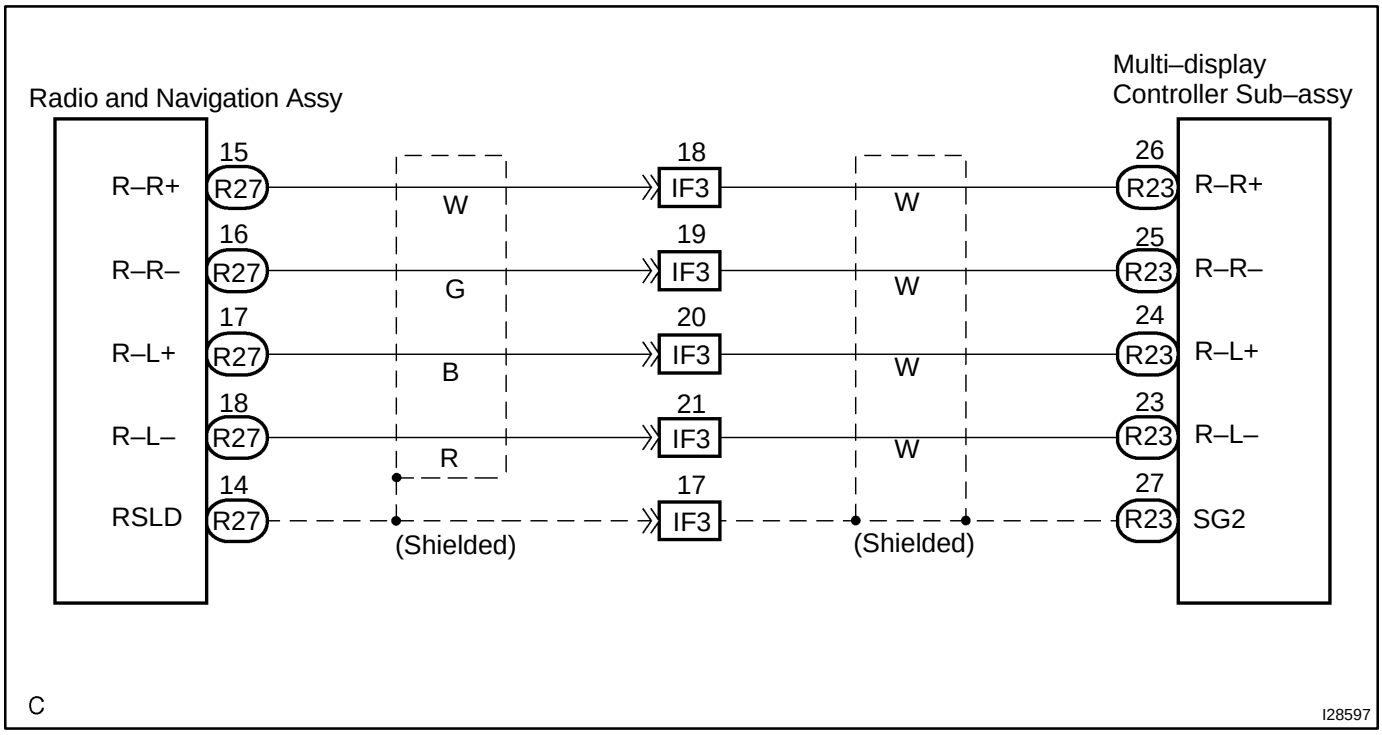
Dardoor.com

Sound signal circuit (From radio and navigation assy to multi–display sub–assy)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the radio and navigation assy to the multi–display controller sub–assy.

WIRING DIAGRAM

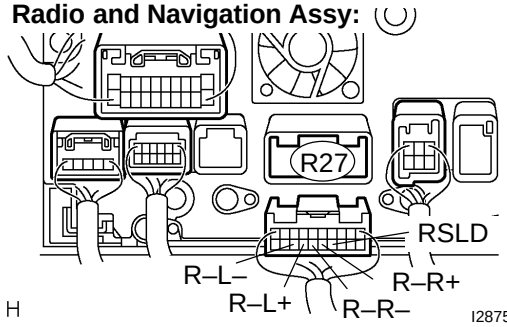


Dardoor.com

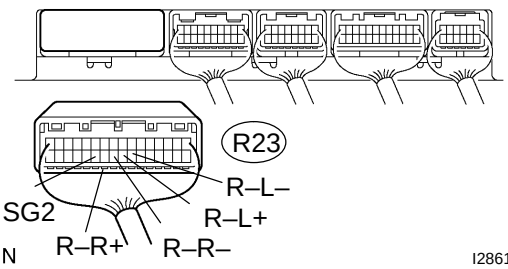
INSPECTION PROCEDURE

1	**Check harness and connector (Radio and navigation assy – Multi–display controller sub–assy).**

Radio and Navigation Assy:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R23 and R27 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
R–R+ (R27–15) – R–R+ (R23–26)	Always	Below 1 Ω
R–R– (R27–16) – R–R– (R23–25)	Always	Below 1 Ω
R–L+ (R27–17) – R–L+ (R23–24)	Always	Below 1 Ω
R–L– (R27–18) – R–L– (R23–23)	Always	Below 1 Ω
RSLD (R27–14) – SG2 (R23–27)	Always	Below 1 Ω
R–R+ (R27–15) – Body ground	Always	10 kΩ or higher
R–R– (R27–16) – Body ground	Always	10 kΩ or higher
R–L+ (R27–17) – Body ground	Always	10 kΩ or higher
R–L– (R27–18) – Body ground	Always	10 kΩ or higher
RSLD (R27–14) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

Dardoor.com

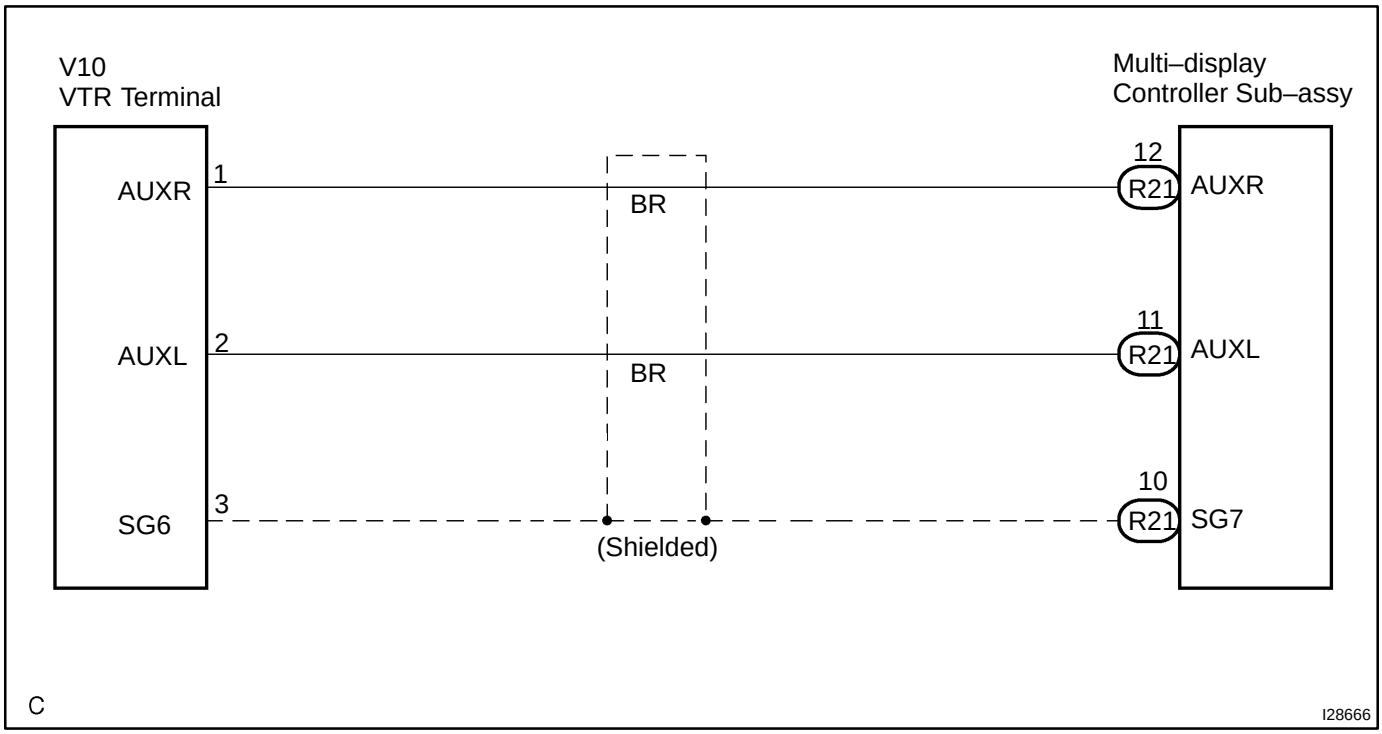
DIDBF–01

Sound signal circuit (Multi–display controller sub–assy – VTR terminal)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the VTR terminal to the multi–display controller sub–assy.

WIRING DIAGRAM

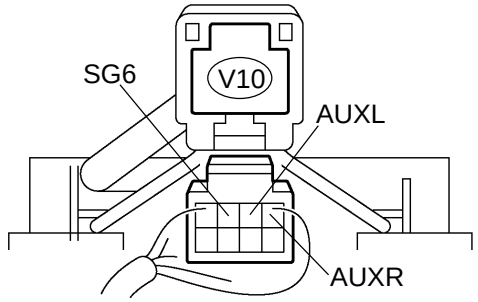


Dardoor.com

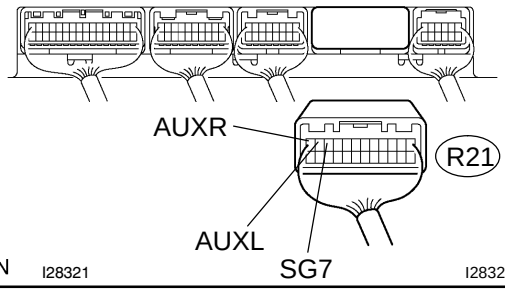
INSPECTION PROCEDURE

1	**Check harness and connector (VTR terminal – Multi–display controller sub–assy).**

VTR Terminal:



Multi–display Controller Sub–assy:



N I28321 I28327

PREPARATION:

Disconnect the R21 and V10 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
SG6 (V10–3) – SG7 (R21–10)	Always	Below 1 Ω
AUXR (V10–1) – AUXR (R21–12)	Always	Below 1 Ω
AUXL (V10–2) – AUXL (R21–11)	Always	Below 1 Ω
AUXR (V10–1) – Body ground	Always	10 kΩ or higher
AUXL (V10–2) – Body ground	Always	10 kΩ or higher
SG6 (V10–3) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

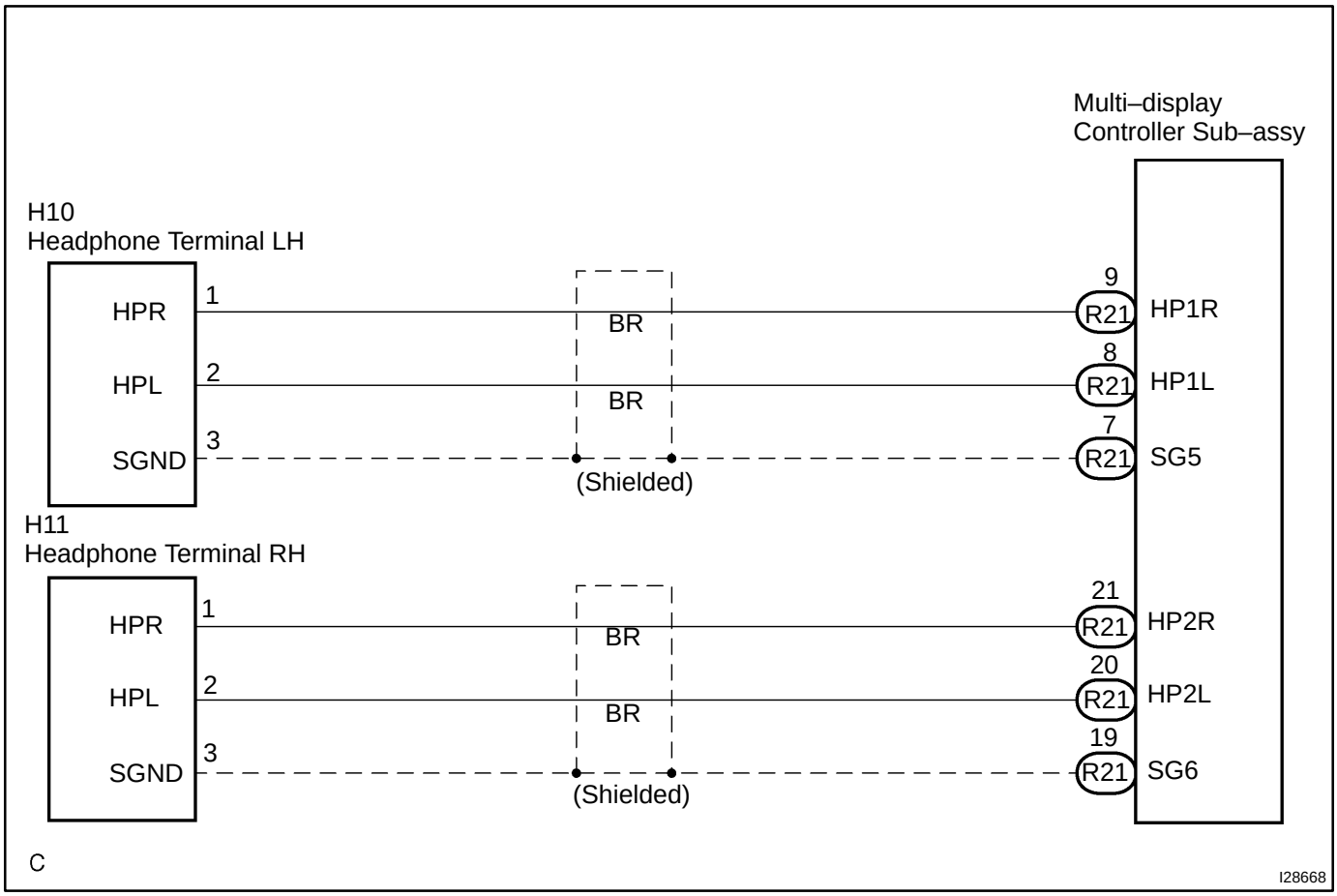
Dardoor.com

Sound signal circuit (Multi–display controller sub–assy – Headphone terminal)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the headphone terminal to the multi–display controller sub–assy.

WIRING DIAGRAM

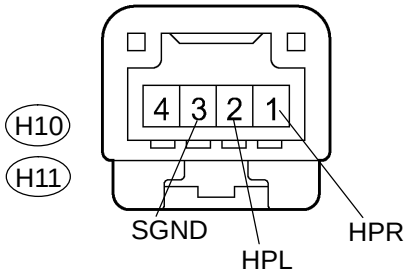


Dardoor.com

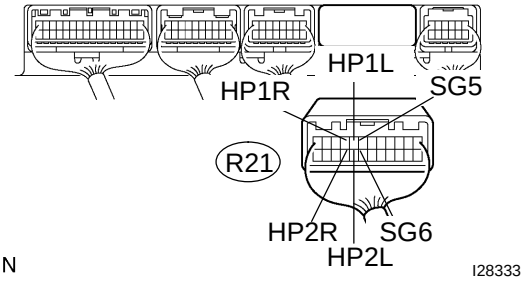
INSPECTION PROCEDURE

1	**Check harness and connector (Headphone terminal – Multi–display controller sub–assy).**

Headphone Terminal:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the H10 (H11) and R21 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
HPR (H10–1) – HP1R (R21–9)	Always	Below 1 Ω
HPL (H10–2) – HP1L (R21–8)	Always	Below 1 Ω
HPR (H11–1) – HP2R (R21–21)	Always	Below 1 Ω
HPL (H11–2) – HP2L (R21–20)	Always	Below 1 Ω
SGND (H10–3) – SG5 (R21–7)	Always	Below 1 Ω
SGND (H11–3) – SG6 (R21–19)	Always	Below 1 Ω
HPR (H10–1, H11–1) – Body ground	Always	10 kΩ or higher
HPL (H10–2, H11–2) – Body ground	Always	10 kΩ or higher
SGND (H10–3, H11–3) – Body ground	Always	10 kΩ or higher
SGND (H10–3) – Body ground	Always	10 kΩ or higher
SGND (H11–3) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

Dardoor.com

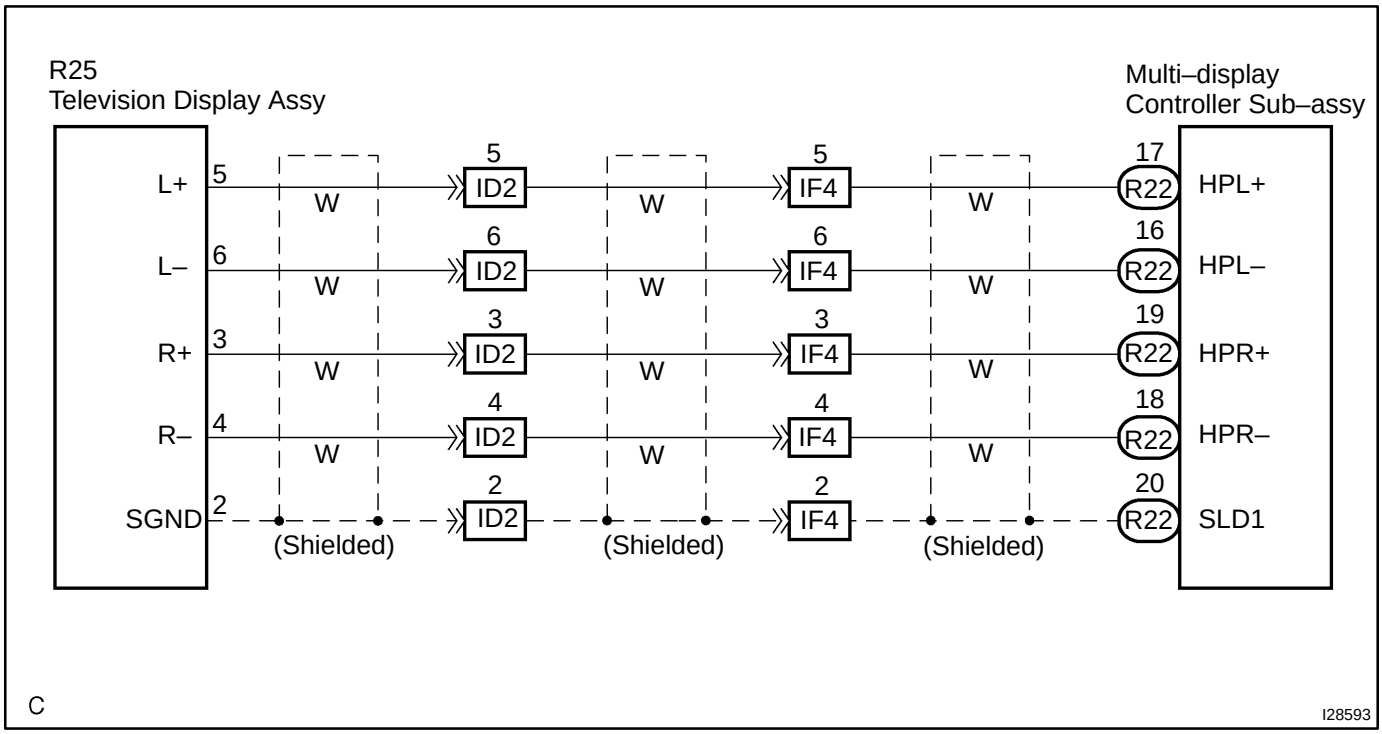
DIDBH–01

Sound signal circuit (Multi–display controller sub–assy – Television display assy)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the television display assy to the multi–display controller sub–assy.

WIRING DIAGRAM

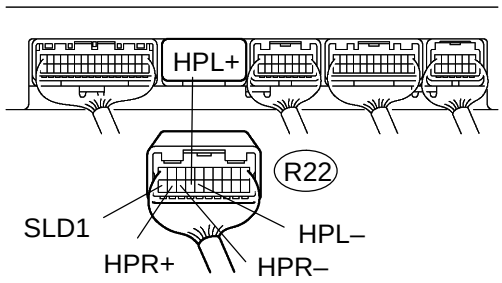


Dardoor.com

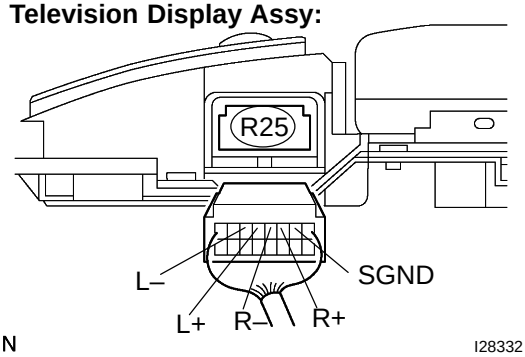
INSPECTION PROCEDURE

1	**Check harness and connector (Multi–display controller sub–assy – Television display assy).**

Multi–display Controller Sub–assy:



Television Display Assy:



N I28332

PREPARATION:

Disconnect the R22 and R25 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
HPR+ (R22–19) – R+ (R25–3)	Always	Below 1 Ω
HPR– (R22–18) – R– (R25–4)	Always	Below 1 Ω
HPL+ (R22–17) – L+ (R25–5)	Always	Below 1 Ω
HPL– (R22–16) – L– (R25–6)	Always	Below 1 Ω
SLD1 (R22–20) – SGND (R25–2)	Always	Below 1 Ω
HPR+ (R22–19) – Body ground	Always	10 kΩ or higher
HPR– (R22–18) – Body ground	Always	10 kΩ or higher
HPL+ (R22–17) – Body ground	Always	10 kΩ or higher
HPL– (R22–16) – Body ground	Always	10 kΩ or higher
SLD1 (R22–20) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

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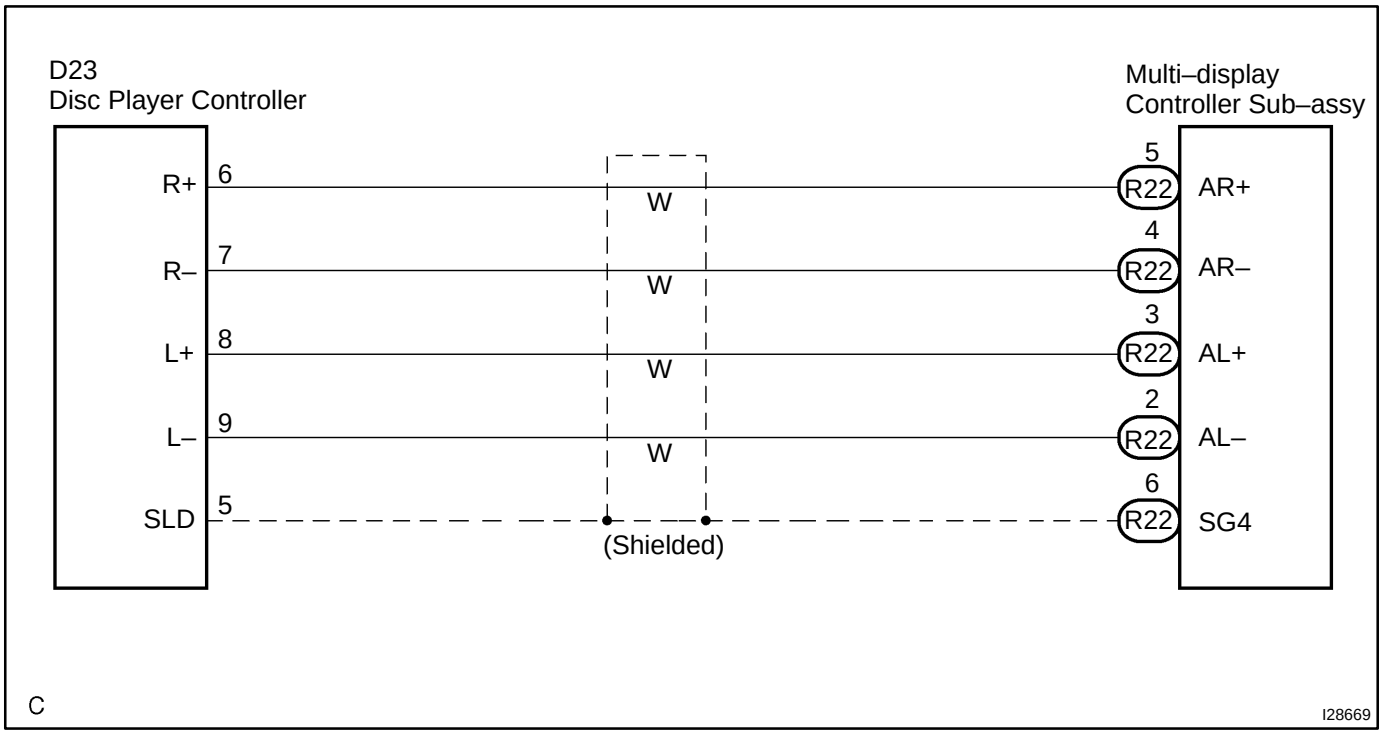
Sound signal circuit (Multi–display controller sub–assy – Disc player controller)

CIRCUIT DESCRIPTION

This is the sound signal circuit from the disc player controller to the multi–display controller sub–assy.

WIRING DIAGRAM

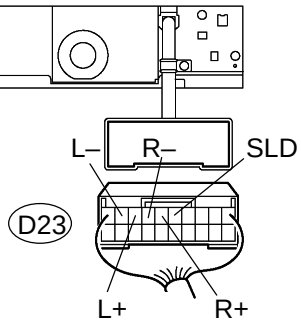


Dardoor.com

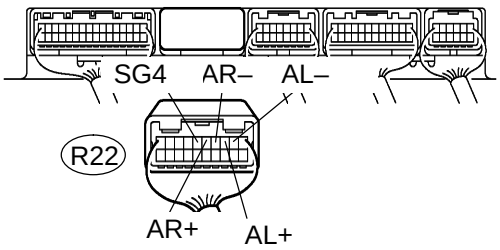
INSPECTION PROCEDURE

1	**Check harness and connector (Multi–display controller sub–assy – Disc player controller).**

Disc Player Controller:



Multi–display Controller Sub–assy:



N I28330

PREPARATION:

Disconnect the R22 and D23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
L– (D23–9) – AL– (R22–2)	Always	Below 1 Ω
L+ (D23–8) – AL+ (R22–3)	Always	Below 1 Ω
R– (D23–7) – AR– (R22–4)	Always	Below 1 Ω
R+ (D23–6) – AR+ (R22–5)	Always	Below 1 Ω
SLD (D23–5) – SG4 (R22–6)	Always	Below 1 Ω
L– (D23–9) – Body ground	Always	10 kΩ or higher
L+ (D23–8) – Body ground	Always	10 kΩ or higher
R– (D23–7) – Body ground	Always	10 kΩ or higher
R+ (D23–6) – Body ground	Always	10 kΩ or higher
SLD (D23–5) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

Dardoor.com

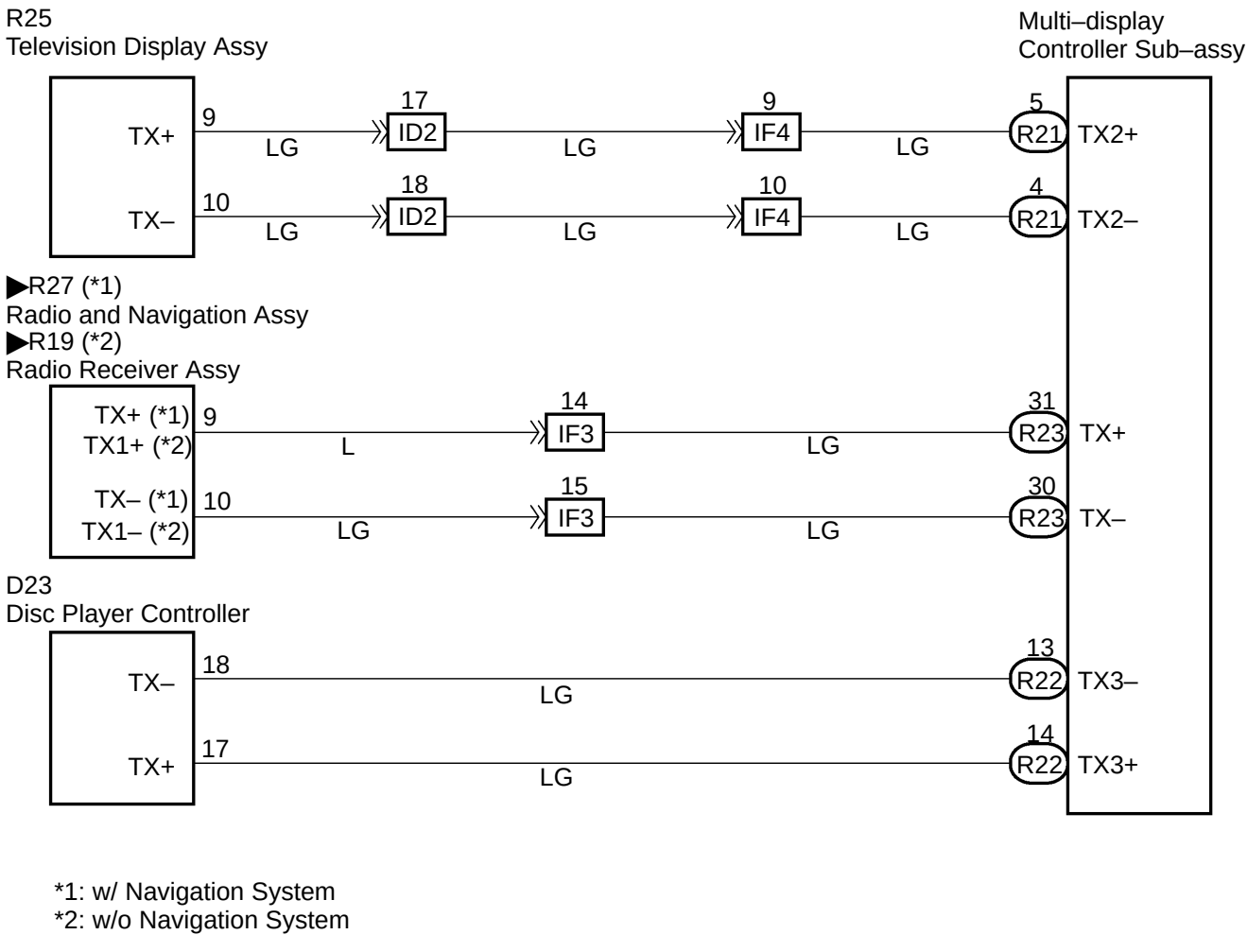
DIDBJ–01

AVC–LAN circuit

CIRCUIT DESCRIPTION

Each unit of this system connected to the AVC–LAN (communication bus) transfers the signal of each switch by communication.
When a short to +B or short to ground occurs in this AVC– LAN, this system will not function normally as communication is discontinued.
This system has 2 kinds of AVC–LAN: main AVC–LAN and sub AVC–LAN.
w/ navigation system:
In the main AVC–LAN, the radio and navigation assy becomes the communication master and has enough resistance necessary for communication.
w/o navigation system:
In the main AVC–LAN, the radio receiver assy becomes the communication master and has enough resistance necessary for communication.
In the sub AVC–LAN, the multi–display controller sub–assy becomes the communication master and has enough resistance necessary for communication.

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	**Inspect apparatus.**

CHECK:

Choose the apparatus to be inspected.

RESULT:

Television display assy	Go to step A
Radio and navigation assy (w/ Navigation System)	Go to step B
Radio receiver assy (w/o Navigation System)	Go to step C
Disc player controller	Go to step D

B	**Go to step 4.**
C	**Go to step 6.**
D	**Go to step 7.**

A

2	**Service check mode (Television display assy).**

CHECK:

Perform the service check (See page DI–2099).

Start the diagnosis system and read the check result for the television display assy.

RESULT:

”NCON” is displayed or result is not displayed (Rr–TV)	Go to step A
”GOOD” is displayed	Go to step B

HINT:

- ◀ This system has 2 kinds of AVC–LAN: main AVC–LAN and sub AVC–LAN. The television display is connected for the sub AVC–LAN.
- ◀ Perform the communication check for the diagnosis system (See page DI–2097).

B	**Replace multi–display controller sub–assy.**

A

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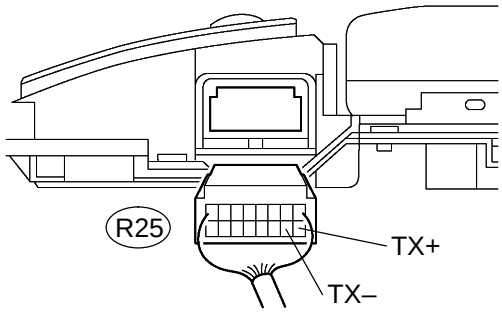
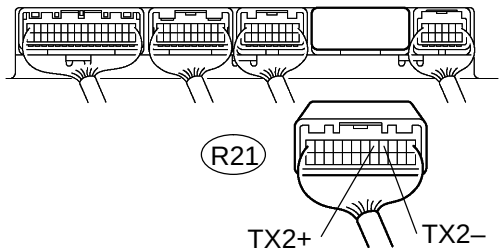
3	Check harness and connector (Television display assy – Multi–display controller sub–assy).

Television Display Assy:



Multi display Controller Sub–assy:



N I28616

PREPARATION:

Disconnect the R21 and R25 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TX+ (R25–9) – TX2+ (R21–5)	Always	Below 1 Ω
TX– (R25–10) – TX2– (R21–4)	Always	Below 1 Ω
TX+(R25–9) – Body ground	Always	10 kΩ or higher
TX– (R25–10) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace television display assy.

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4	**Service check mode (Multi–display controller sub–assy).**

CHECK:

Perform the service check (See page DI–2099).

Start the diagnosis system and read the check result for the radio and navigation assy.

RESULT:

”NCON” is displayed or result is not displayed (RSE ECU)	Go to step A
”GOOD” is displayed	Go to step B

HINT:

- This system has 2 kinds of AVC–LAN: main AVC–LAN and sub AVC–LAN. The television display is connected for the sub AVC–LAN.
- Perform the communication check for the diagnosis system (See page DI–2097).

B → **Replace radio and navigation assy.**

A

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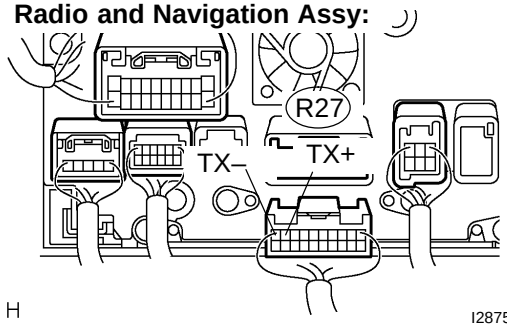
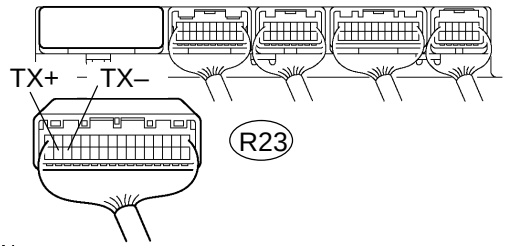
5	Check harness and connector (Radio and navigation assy – multi–display controller sub–assy).

Radio and Navigation Assy:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R23 and R27 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TX+ (R27–9) – TX+ (R23–31)	Always	Below 1 Ω
TX– (R27–10) – TX– (R23–30)	Always	Below 1 Ω
TX+ (R27–9) – Body ground	Always	10 kΩ or higher
TX– (R27–10) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace multi–display controller sub–assy.

6	Service check mode (Multi–display controller sub–assy).

CHECK:

Perform the service check (See page DI–2099).

Start the diagnosis system and read the check result for the radio and navigation assy.

RESULT:

”NCON” is displayed or result is not displayed (RSE ECU)	Go to step A
”GOOD” is displayed	Go to step B

HINT:

- This system has 2 kinds of AVC–LAN: main AVC–LAN and sub AVC–LAN. The television display is connected for the sub AVC–LAN.
- Perform the communication check for the diagnosis system (See page DI–2097).

B → **Replace radio receiver assy.**

A

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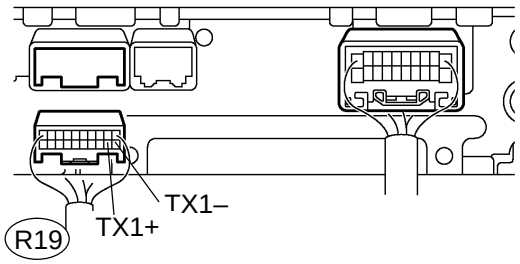
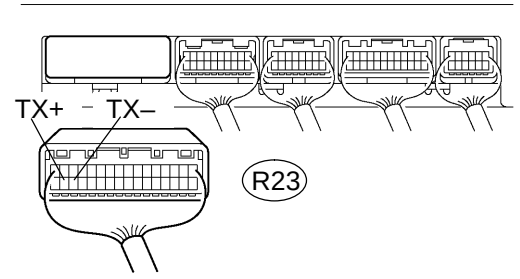
7	**Check harness and connector (Radio receiver assy – Multi–display controller sub–assy).**

Radio Receiver Assy:



Multi–display Controller Sub–assy:



N

I28618

PREPARATION:

Disconnect the R19 and R23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TX1+ (R19–9) – TX+ (R23–31)	Always	Below 1 Ω
TX1– (R19–10) – TX– (R23–30)	Always	Below 1 Ω
TX1+ (R19–9) – Body ground	Always	10 kΩ or higher
TX1– (R19–10) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace radio receiver assy.

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8	Service check mode (Disc player controller).

CHECK:

Perform the service check (See page DI–2099).

Start the diagnosis system and read the check result for the disc player controller.

RESULT:

”NCON” is displayed or result is not displayed (DVD–P)	Go to step A
”GOOD” is displayed	Go to step B

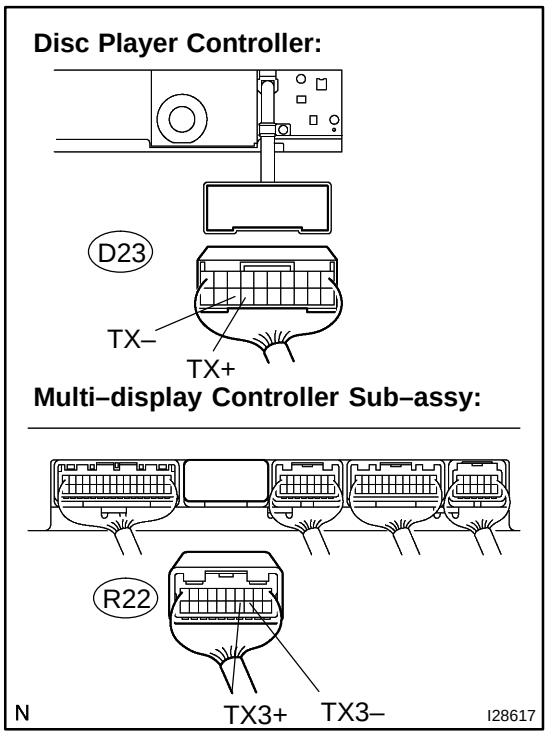
HINT:

- This system has 2 kinds of AVC–LAN: main AVC–LAN and sub AVC–LAN. The television display is connected for the sub AVC–LAN.
- Perform the communication check for the diagnosis system (See page DI–2097).

B → **Replace multi–display controller sub–assy.**

A

9	Check harness and connector (Disc player controller – Multi–display controller sub–assy).



PREPARATION:

Disconnect the R22 and D23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
TX+ (D23–17) – TX3+ (R22–14)	Always	Below 1 Ω
TX– (D23–18) – TX3– (R22–13)	Always	Below 1 Ω
TX+ (D23–17)– Body ground	Always	10 kΩ or higher
TX– (D23–18) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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Replace disc player controller.

Dardoor.com

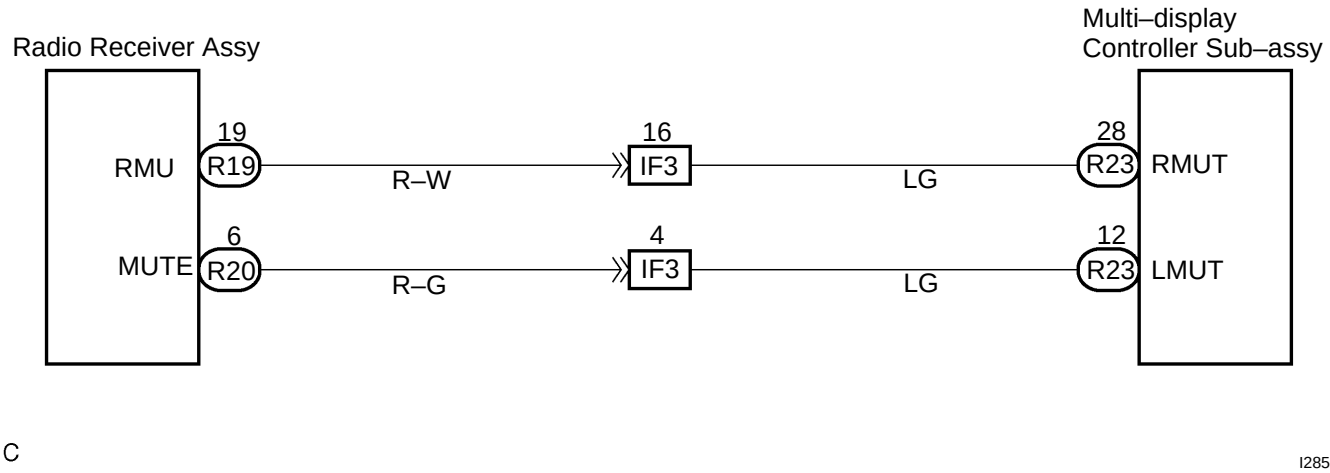
Mute signal circuit (Radio receiver assy / Radio and navigation assy – Multi–display controller sub–assy)

CIRCUIT DESCRIPTION

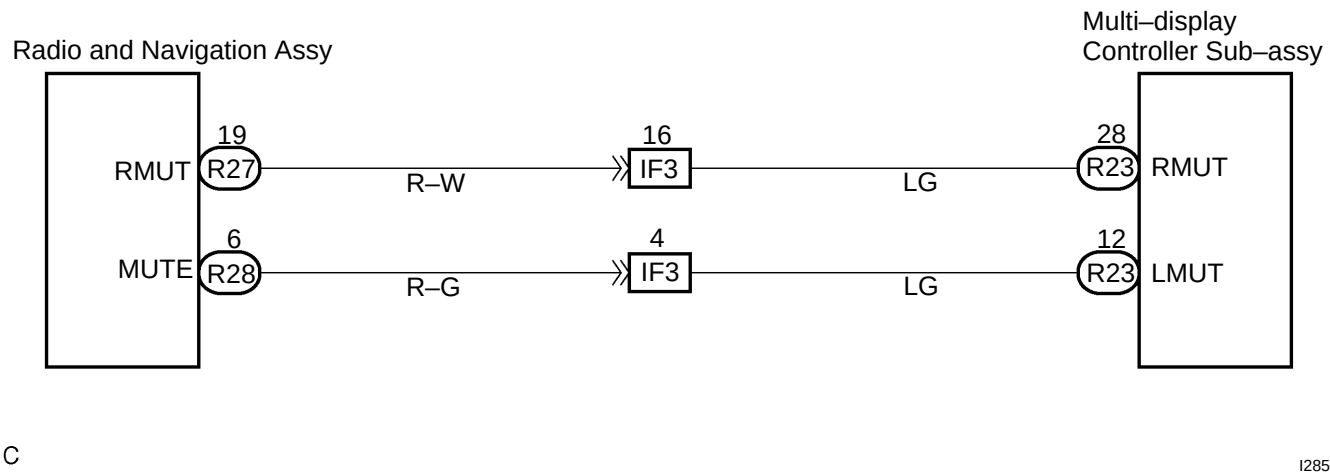
The multi–display controller sub–assy controls the volume according to the MUTE signal from the radio receiver assy or radio and navigation assy.
The MUTE signal is sent to reduce noise and a popping sound generated when the mode, etc. is switched.

WIRING DIAGRAM

w/o Navigation System:



w/ Navigation System:



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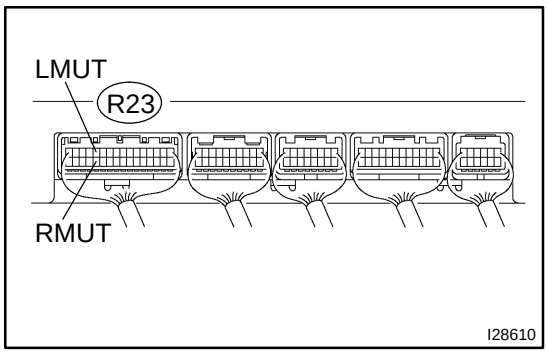
INSPECTION PROCEDURE

1	Inspect multi–display controller sub–assy.



PREPARATION:

Make sure that the R23 connector is connected.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specification
RMUT (R23–28) – Body ground	Turn ignition switch to ACC, Audio system is sounding → Changing	Above 3.5 V → Below 1 V
LMUT (R23–12) – Body ground	Turn ignition switch to ACC, RSE system is sounding → Changing	Above 3.5 V → Below 1 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).**

NG

2	Check system.

CHECK:

Check whether the vehicle is equipped with a navigation system or not.

RESULT:

w/o Navigation system	Go to step A
w/ Navigation system	Go to step B

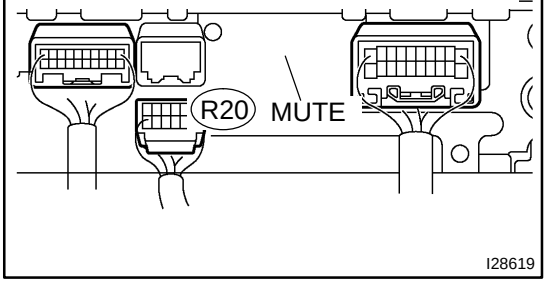
B → **Go to step 5.**

A

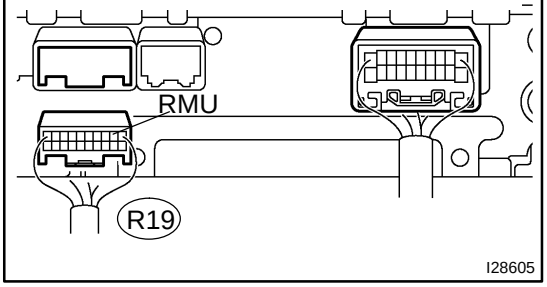
Dardoor.com

3	**Check harness and connector (Radio receiver assy – Multi–display controller sub–assy).**

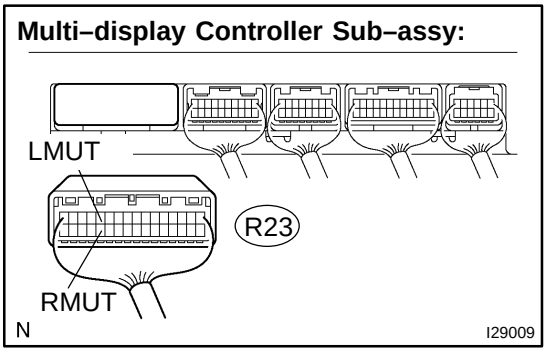
Radio Receiver Assy Wire Harness View:



Radio Receiver Assy Wire Harness View:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R19, R20 and R23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
RMUT (R23–28) – RMU (R19–19)	Always	Below 1 Ω
LMUT (R23–12) – MUTE (R20–6)	Always	Below 1 Ω
RMUT (R23–28) – Body ground	Always	10 kΩ or higher
LMUT (R23–12) – Body ground1	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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4	**Replace multi–display controller sub–assy.**

CHECK:

Replace the multi–display controller sub–assy and check if it operates normally.

OK:

Normal operation.

OK	**Normal operation.**

NG

Replace radio receiver assy.

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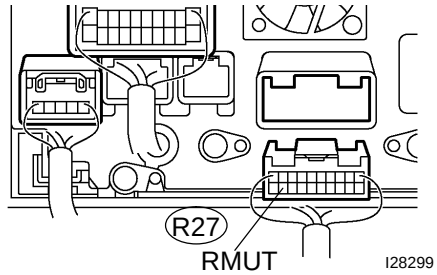
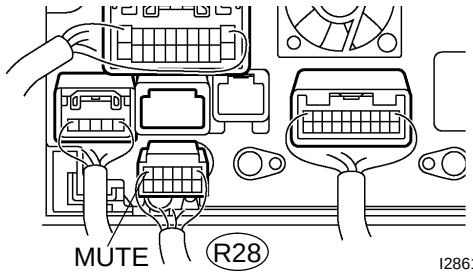
5	Check harness and connector (Radio and navigation assy – Multi–display controller sub–assy).

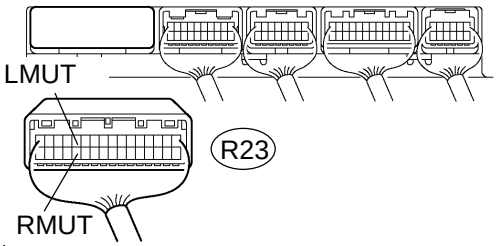
Radio and Navigation Assy Wire Harness View:



Radio and Navigation Assy Wire Harness View:



Multi–display Controller Sub–assy:



PREPARATION:

Disconnect the R23, R27 and R28 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
RMUT (R23–28) – RMUT (R27–19)	Always	Below 1 Ω
LMUT (R23–12) – MUTE (R28–6)	Always	Below 1 Ω
RMUT (R23–28) – Body ground	Always	10 kΩ or higher
LMUT (R23–12) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Dardoor.com

6	**Replace multi–display controller sub–assy.**

CHECK:

Replace the multi–display controller sub–assy and check if it operates normally.

OK:

Normal operation.

OK → **Normal operation.**

NG

Replace radio and navigation assy.

Dardoor.com

Mute signal circuit (Disc player controller – Multi–display controller sub–assy)

CIRCUIT DESCRIPTION

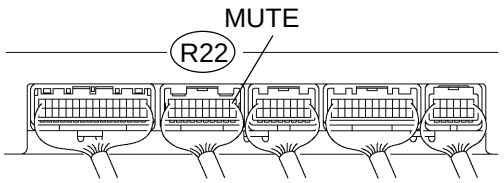
The multi–display controller sub–assy controls the volume according to the MUTE signal from the disc player controller.
The MUTE signal is sent to reduce noise and a popping sound generated when the mode, etc. is switched.

WIRING DIAGRAM

INSPECTION PROCEDURE

1	**Inspect multi–display controller sub–assy.**

Multi–display Controller Sub–assy:



PREPARATION:
Make sure that the R22 connector is connected.
CHECK:
Measure the voltage according to the value(s) in the table below.
OK:

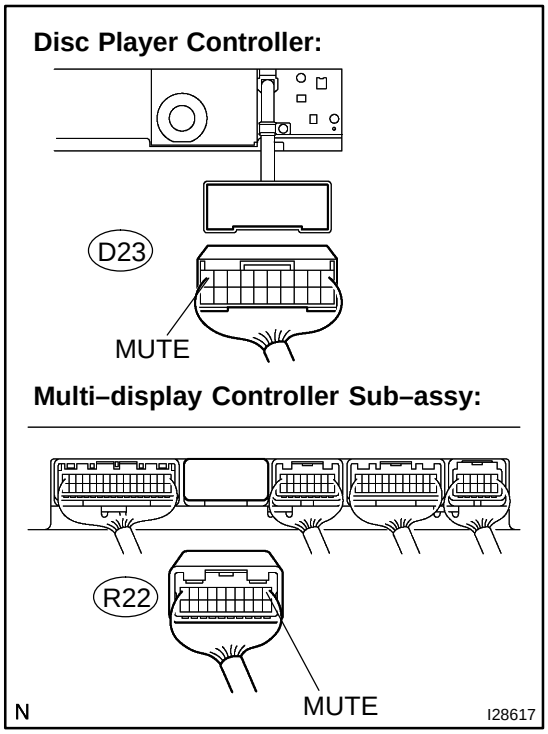
Symbol (Tester connection)	Condition	Specification
MUTE (R22–1) – Body ground	Turn ignition switch to ACC, RSE system is sounding → Changing mode	Above 3.5 V → Below 1 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).**

NG

Dardoor.com

2	**Check harness and connector (Disc player controller – Multi–display controller sub–assy).**



PREPARATION:

Disconnect the R22 and D23 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
MUTE (D23–10) – MUTE (R22–1)	Always	Below 1 Ω
MUTE (D23–10) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

Dardoor.com

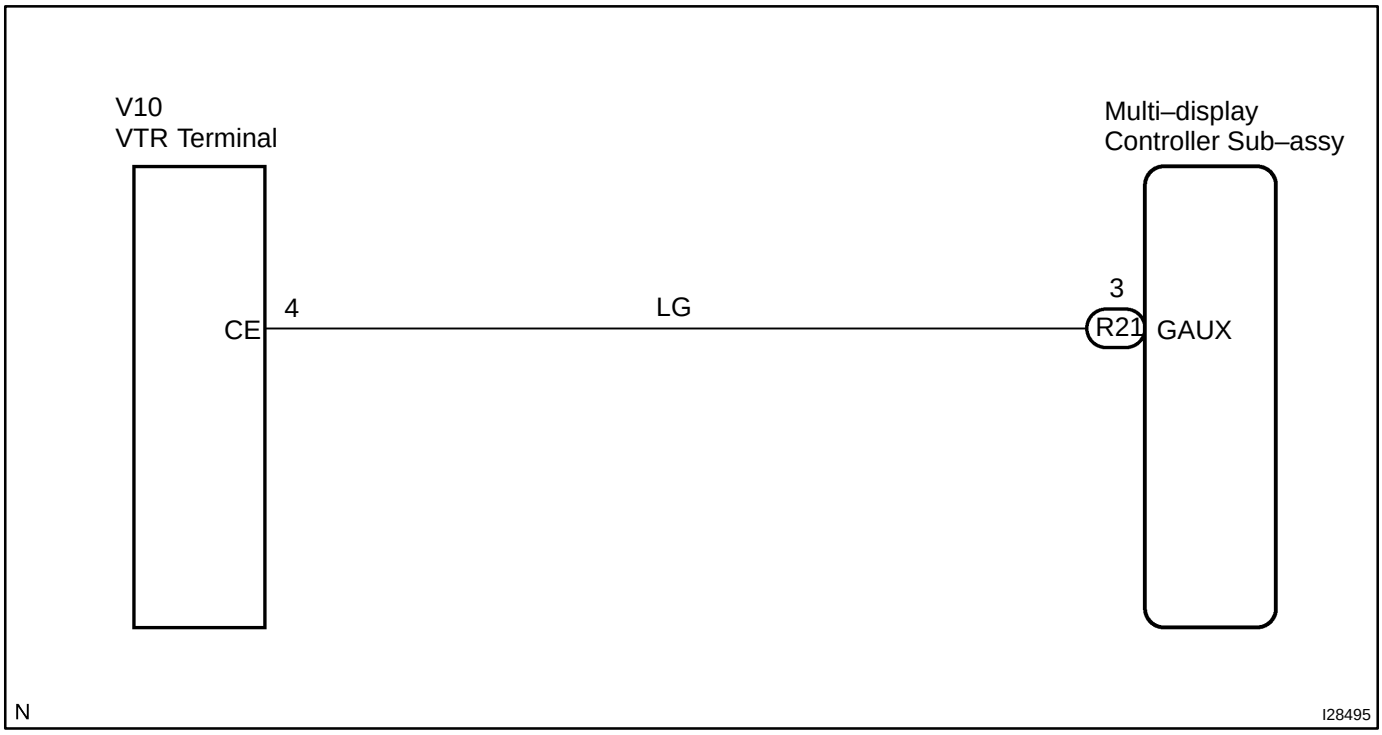
DIDBM–01

VTR terminal set signal circuit

CIRCUIT DESCRIPTION

When terminal GAUX is grounded, the multi–display controller recognizes that an external device is connected.

WIRING DIAGRAM

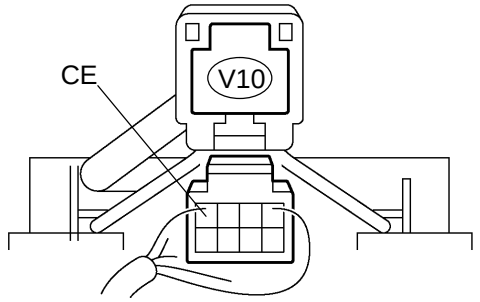


Dardoor.com

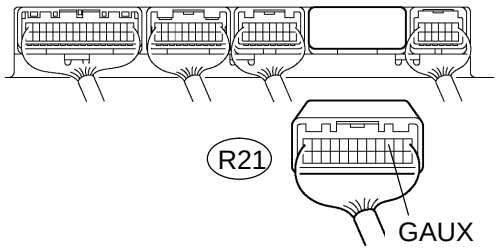
INSPECTION PROCEDURE

1	**Check harness and connector (VTR terminal – Multi–display controller sub–assy).**

VTR Terminal:



Multi–display Controller Sub–assy:



N I28321 I28327

PREPARATION:

Disconnect the R21 and V10 connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
CE (V10–4) – GAUX (R21–3)	Always	Below 1 Ω
CE (V10–4) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

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DIDBN–01

Remote control system does not operate

INSPECTION PROCEDURE

1	**Check malfunction symptoms.**

CHECK:

Check for obstructions.

Check that there are no obstructions between the switch assy and the infrared ray emitting portion of the television display assy.

OK:

No obstructions.

NG → **Remove obstructions.**

OK

2	**Check battery (Switch assy).**

CHECK:

Check the battery.

Check that the dry–cell battery used for the switch assy is not dead.

OK:

It is not dead.

NG → **Replace dry–cell battery.**

OK

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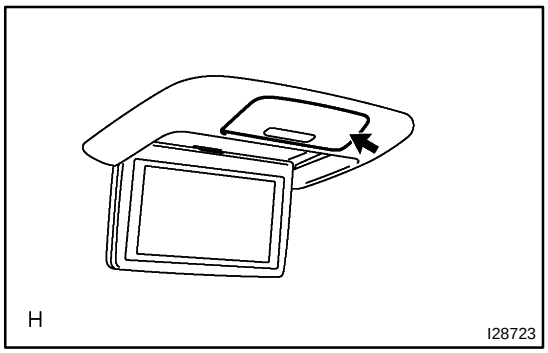
3	Clean the infrared ray emitting portion.



PREPARATION:
Clean the infrared ray emitting portion.
CHECK:
(a) Clean the infrared ray emitting portion on the television display assy.
(b) Check whether the same malfunction occurs.
OK:
The function returns to normal.

OK → **End.**

NG

4	Replace switch assy.

CHECK:
Replace the switch assy and check if it operates normally.
OK:
Normal operation.

OK → **End.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2087).

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NAVIGATION SYSTEM

DIDBO–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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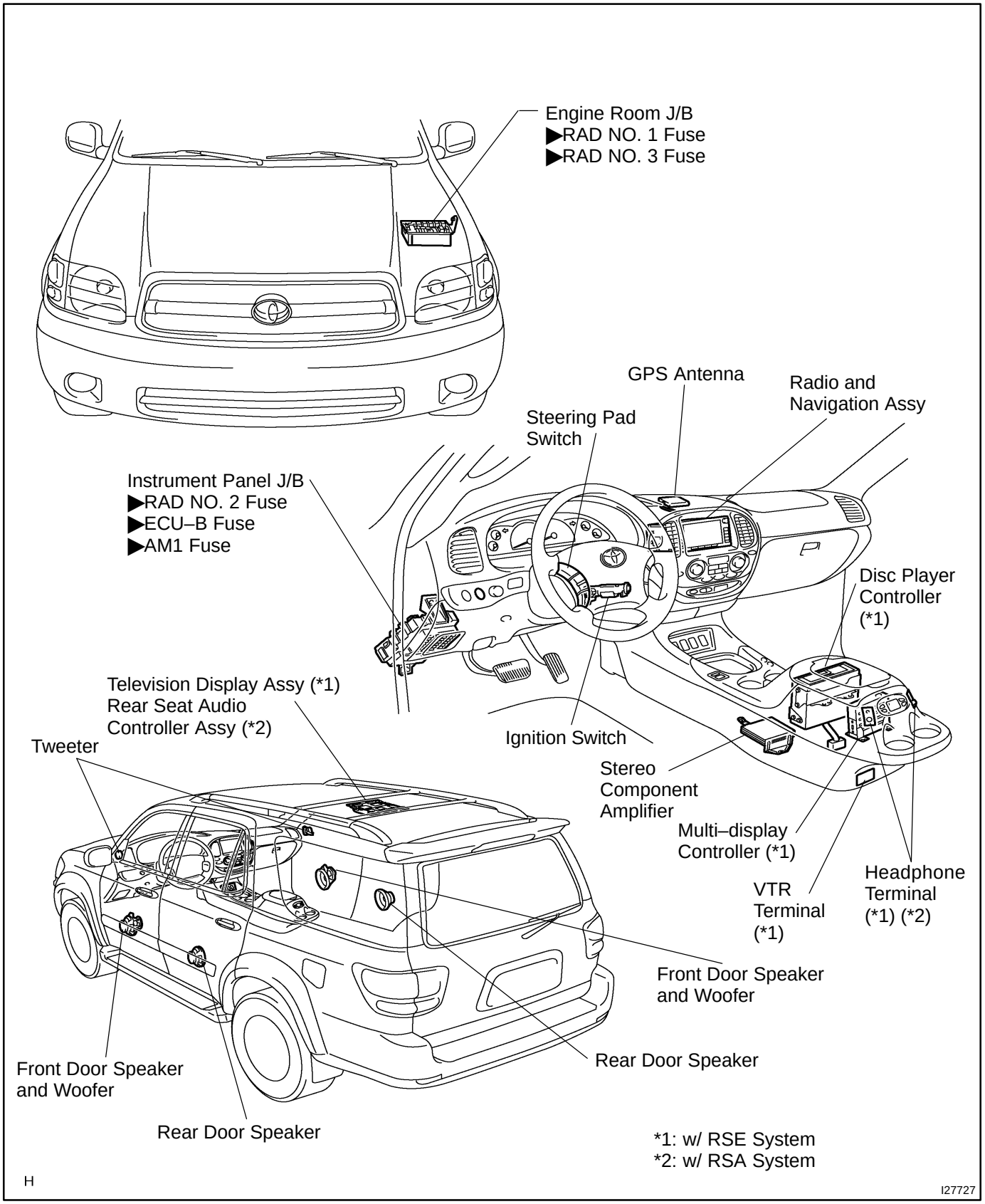
DIDBP–01

LOCATION



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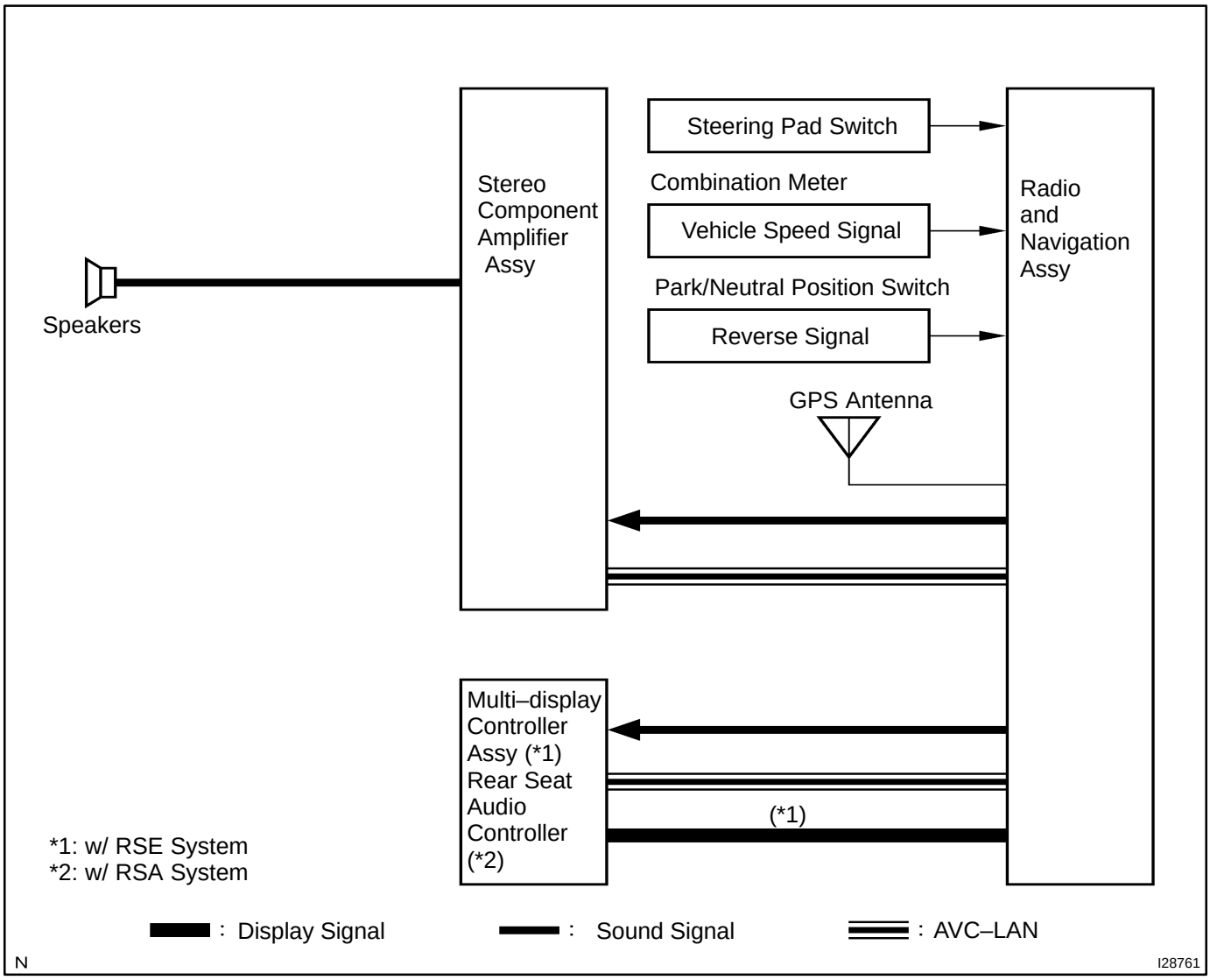
DIDBQ–01

SYSTEM DIAGRAM



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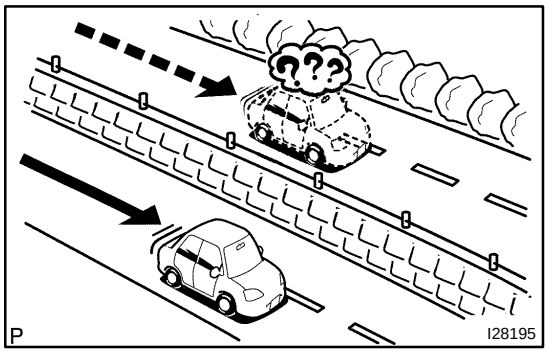
DIDBR–01

SYSTEM DESCRIPTION

1. SYSTEM NORMAL CONDITION CHECK

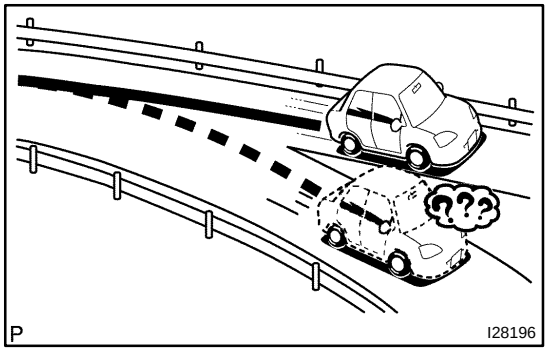
(a) If the symptom is applicable to any of the following, it is intended behavior, and not a malfunction.

Symptom	Answer
A longer route than expected is chosen.	Depending on the road conditions, the navigation ECU may determine that a longer route is quicker.
Even when distance priority is high, the shortest route is not shown.	Some paths may not be advised due to safety concerns.
When the vehicle is put into motion immediately after the engine starts, the navigation system deviates from the actual position.	If the vehicle starts before the navigation system activates, the system may not react.
When running on certain types of roads, especially new roads, the vehicle position deviates from the actual position.	When the vehicle is driving on new roads not available on the map disc, the system attempts to match it to another nearby road, causing the position mark to deviate.

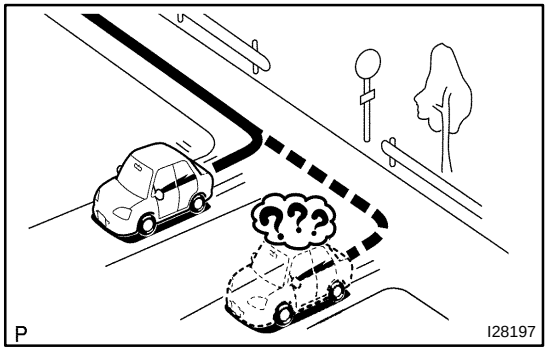


(b) The following symptoms are not a malfunction, but are caused by errors inherent in the GPS, gyro sensor, speed sensor, and navigation ECU.

(1) The current position mark may be displayed on a nearby parallel road.



(2) Immediately after a fork in the road, the current vehicle position mark may be displayed on the wrong road.



(3) When the vehicle turns right or left at an intersection, the current vehicle position mark may be displayed on a nearby parallel road.

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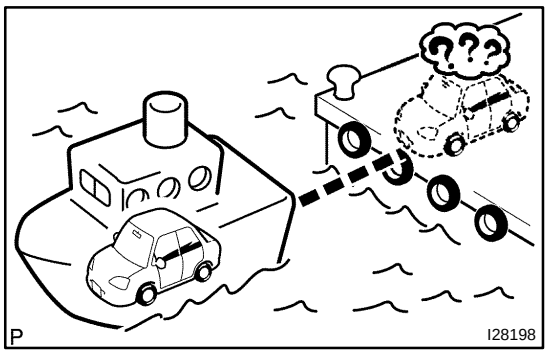
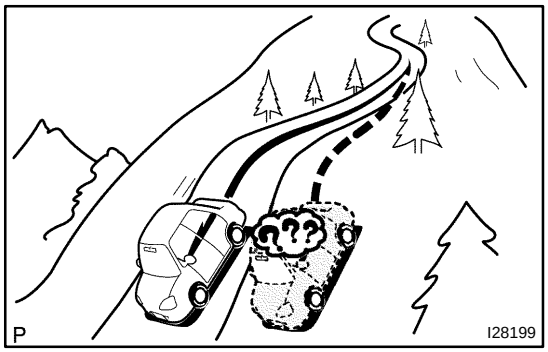
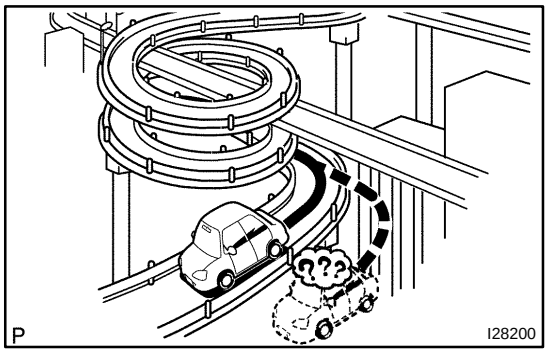


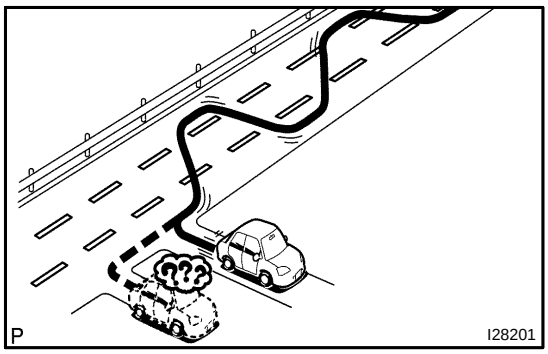
(4) When the vehicle is carried, such as on a ferry, and the vehicle itself is not running, the current vehicle position mark may be displayed in the position where the vehicle was until a measurement can be performed by GPS.



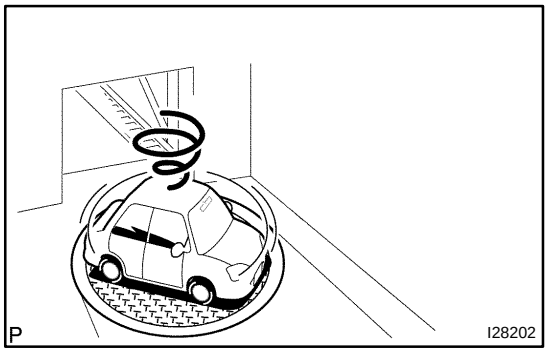
(5) When the vehicle runs on a steep hill, the current vehicle position mark may deviate from the correct position.



(6) When the vehicle makes a continuous turn of 360, 720, 1,080, etc. degrees, the current vehicle position mark may deviate from the correct position.



(7) When the vehicle moves erratically, such as constant lane changes, the current vehicle position mark may deviate from the correct position.



(8) When the ignition switch is turned to the ACC or ON position on a turntable before parking, the current vehicle position mark may not point in the correct direction. The same will occur when the vehicle comes out of parking.

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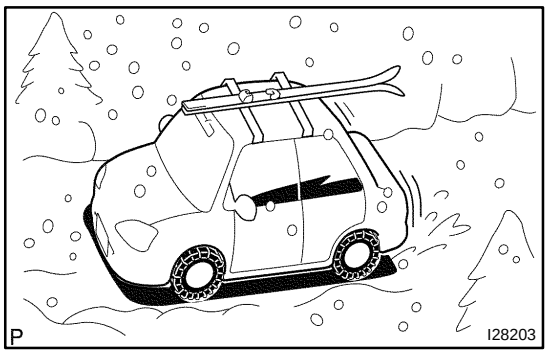
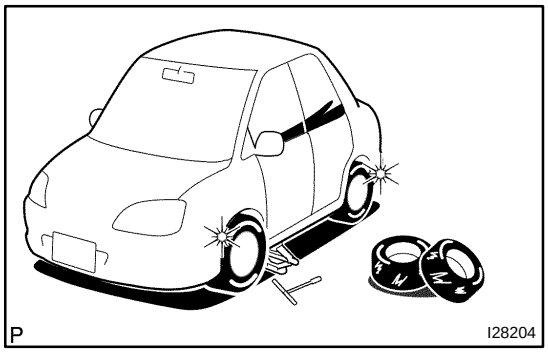


(9) When the vehicle runs on the snowy road or a mountain path with the chains installed or using a spare tire, the current vehicle position mark may deviate from the correct position.



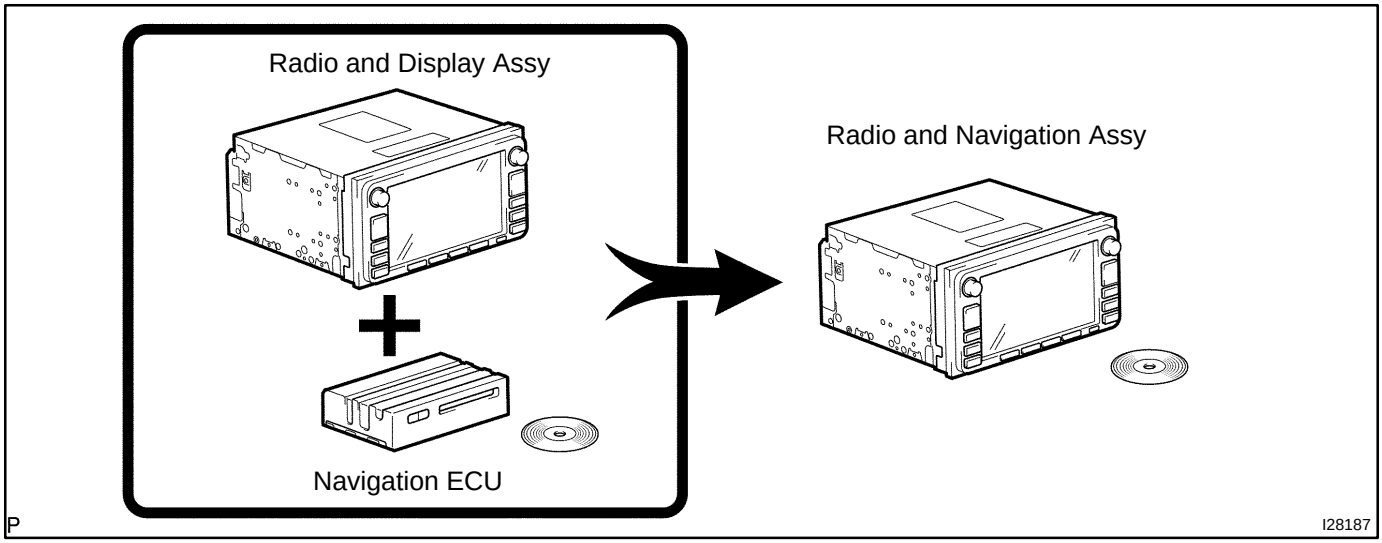
(10) When a tire is changed, the current vehicle position mark may deviate from the correct position.

HINT:

- Diameter of the tire may change, causing a speed sensor error.
- Performing the ”tire change” in calibration mode will allow the system to correct the current vehicle position faster.

2. Radio and navigation assy outline

Conventionally, 2 separate devices, a ”radio and display assy” and a ”navigation ECU” are used. This model has adopted a new type, combining these devices into a single unit.



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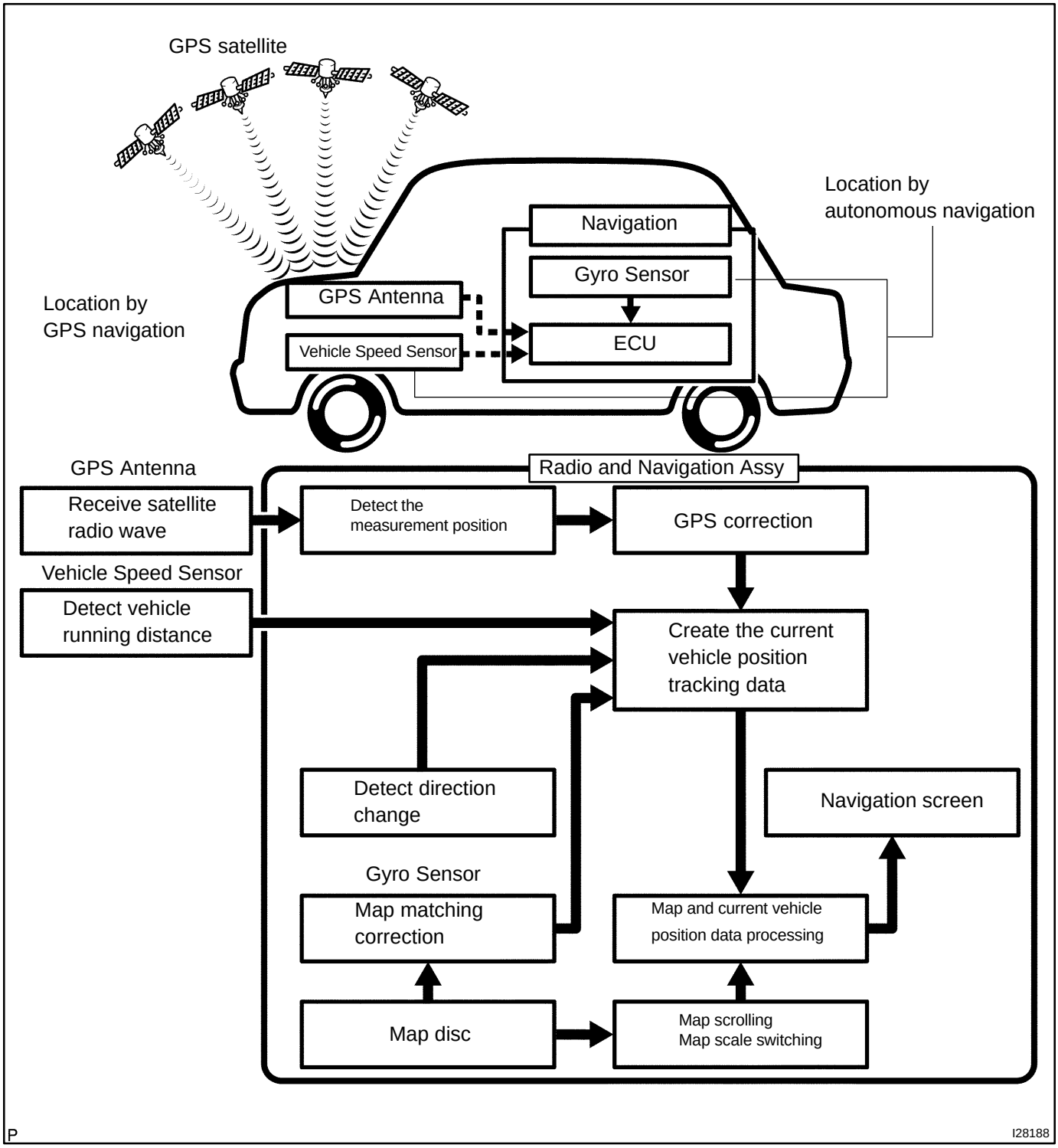
3. Navigation system outline

(a) Vehicle position tracking methods

It is essential that the navigation system correctly tracks the current vehicle position and displays it on the map. There are 2 methods to track the current vehicle position: autonomous (dead reckoning) and GPS* (satellite) navigation. Both navigation methods are used in conjunction with each other.

*GPS (Global Positioning System)



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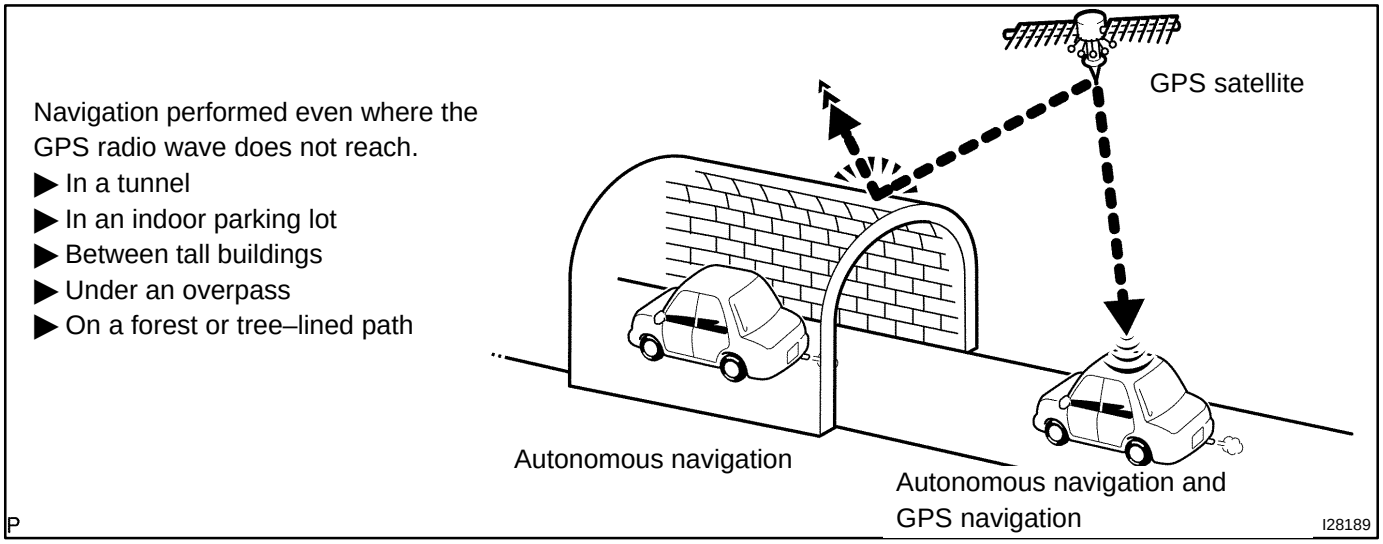
Operation	Description
Vehicle Position Calculation	The navigation ECU calculates the current vehicle position (direction and current position) using the direction deviation signal from the gyro sensor and the running distance signal from the vehicle speed sensor and creates the driving route.
Map Display processing	The navigation ECU displays the vehicle track on the map by processing the vehicle position data, vehicle running track, and map data from the map disc.
Map Matching	The map data from the map disc is compared to the vehicle position and running track data. Then, the vehicle position is matched with the nearest road.
GPS Correction	The vehicle position is matched to the position measured by GPS. Then, the measurement position data from the GPS unit is compared with the vehicle position and running track data. If the position is widely different, the GPS measurement position is used.
Distance Correction	The running distance signal from the vehicle speed sensor includes the error caused by tire wear and slippage between the tires and road surface. Distance correction is performed to account for this. The navigation ECU automatically offsets the running distance signal to make up for the difference between it and the distance data of the map. The offset is automatically updated.

HINT:

The combination of autonomous and GPS navigation makes it possible to display the vehicle position even when the vehicle is in places where the GPS radio wave cannot receive a signal. When only autonomous navigation is used, however, the mapping accuracy may slightly decline.



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(b) Autonomous navigation

This method determines the relative vehicle position based on the running track determined by the gyro and vehicle speed sensors located in the navigation ECU.

(1) Gyro sensor

Calculates the direction by detecting angular velocity. It is located in the radio and navigation assy.

(2) Vehicle speed sensor

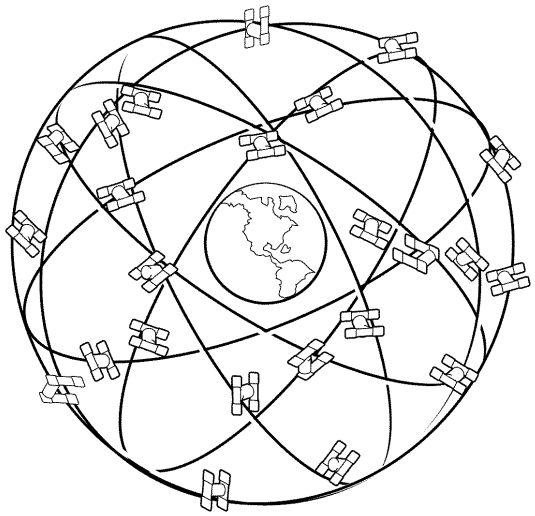
Used to calculate the vehicle running distance.

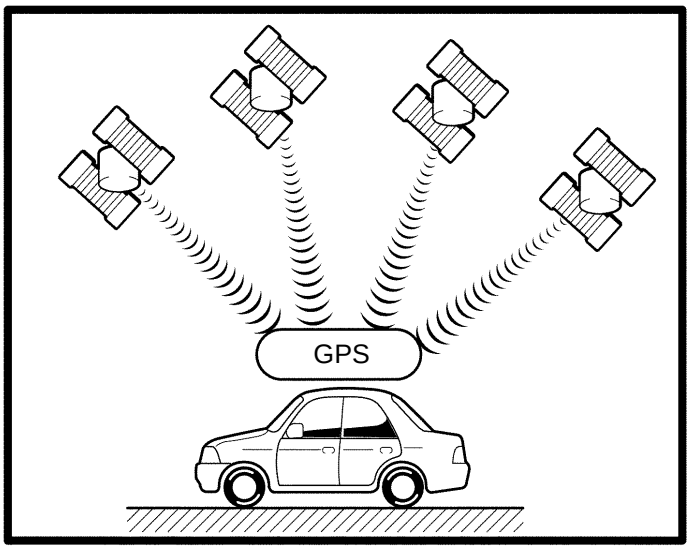
(c) GPS navigation (Satellite navigation)

This method detects the absolute vehicle position using radio wave from a GPS satellite.

* GPS satellites were launched by the U.S. Department of Defence for military purposes.

Current longitude/latitude/altitude is determined using the radio wave arrival time from four satellites.





P I28190

Number of satellites	Measurement	Description
2 or less	Measurement impossible	Vehicle position cannot be obtained because the number of satellites is not enough.
3	2–dimensional measurement is possible	Vehicle position is obtained based on the current longitude and latitude (This is less precise than 3–dimensional measurement).
4	3–dimensional measurement is possible	Vehicle position is obtained based on the current longitude, latitude and altitude.

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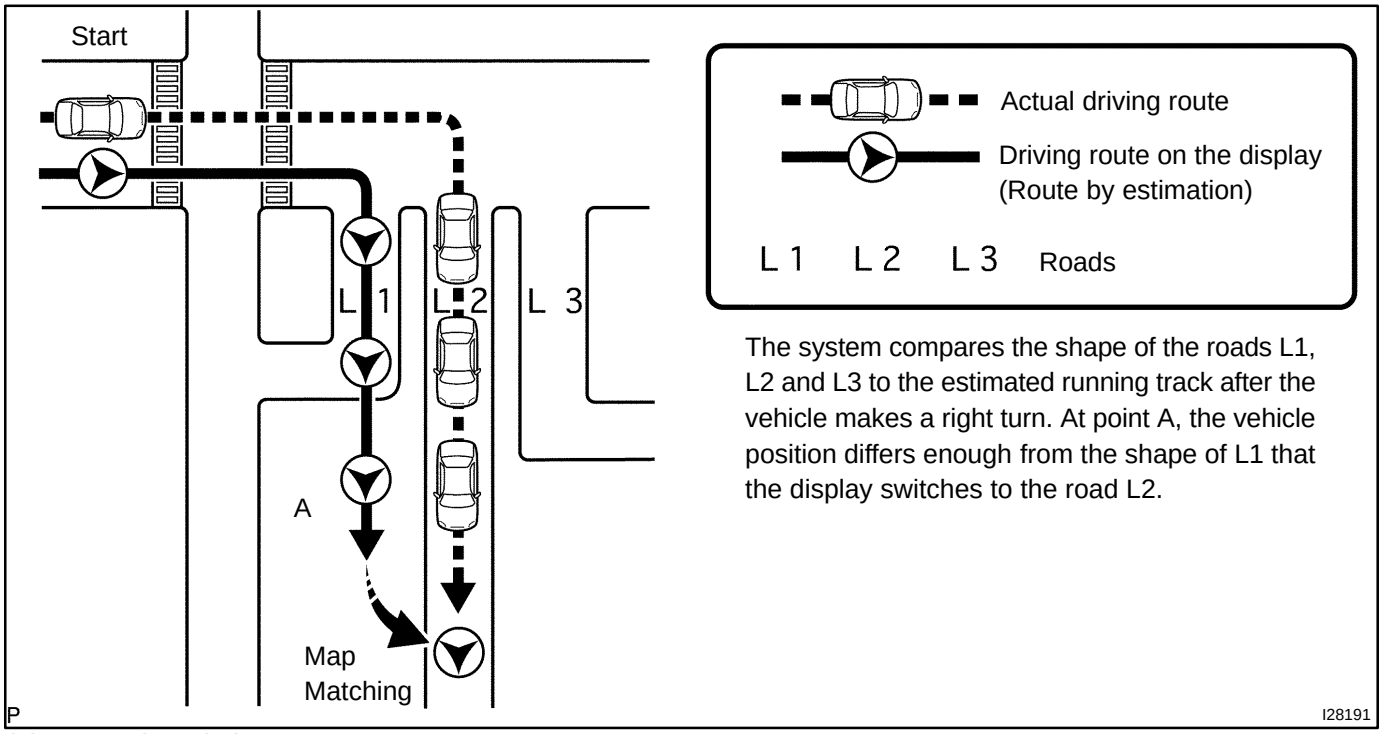
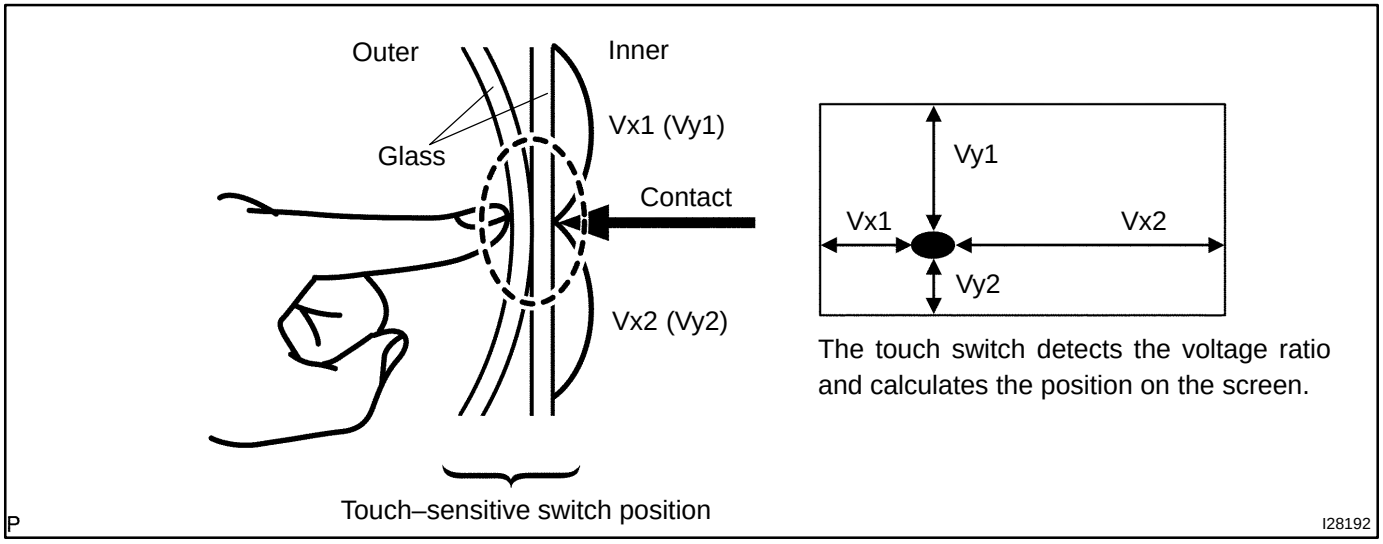
(d) Map matching

The current driving route is calculated by autonomous navigation (according to the gyro sensor and vehicle speed sensor) and GPS navigation. This information is then compared with possible road shapes from the map data in the map disc and the vehicle position is set onto the most appropriate road.



(e) Touch switch

Touch switches are touch–sensitive (interactive) switches operated by touching the screen. When a switch is pressed, the outer glass bends in to contact the inner glass at the pressed position. By doing this, the voltage ratio is measured and the pressed position is detected.



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4. DVD (Digital Versatile Disc) player outline (for navigation map)

The navigation ECU uses a laser pickup to read the digital signals recorded on a DVD.

HINT:

- Do not disassemble any part of the navigation system.
- Do not apply oil to the navigation system.
- Do not insert anything but a DVD into the navigation system.

CAUTION:

Because the navigation system uses an invisible laser beam, do not look directly at the laser pickup. Be sure to only operate the navigation as instructed.

5. CD (Compact Disc) player outline

A CD player uses a laser pickup to read digital signals recorded on a CD. By converting the digital signals to analog, it can play music and other things. In general, CD players can play a 4.7–inch (12 cm) or 3.2–inch (8 cm) disc.

HINT:

- Do not disassemble any part of the CD player.
- Do not apply oil to the CD player.
- Do not insert anything but a CD into the CD player.

CAUTION:

Because the CD player uses an invisible laser beam, do not look directly at the laser pickup. Be sure to only operate the player as instructed.

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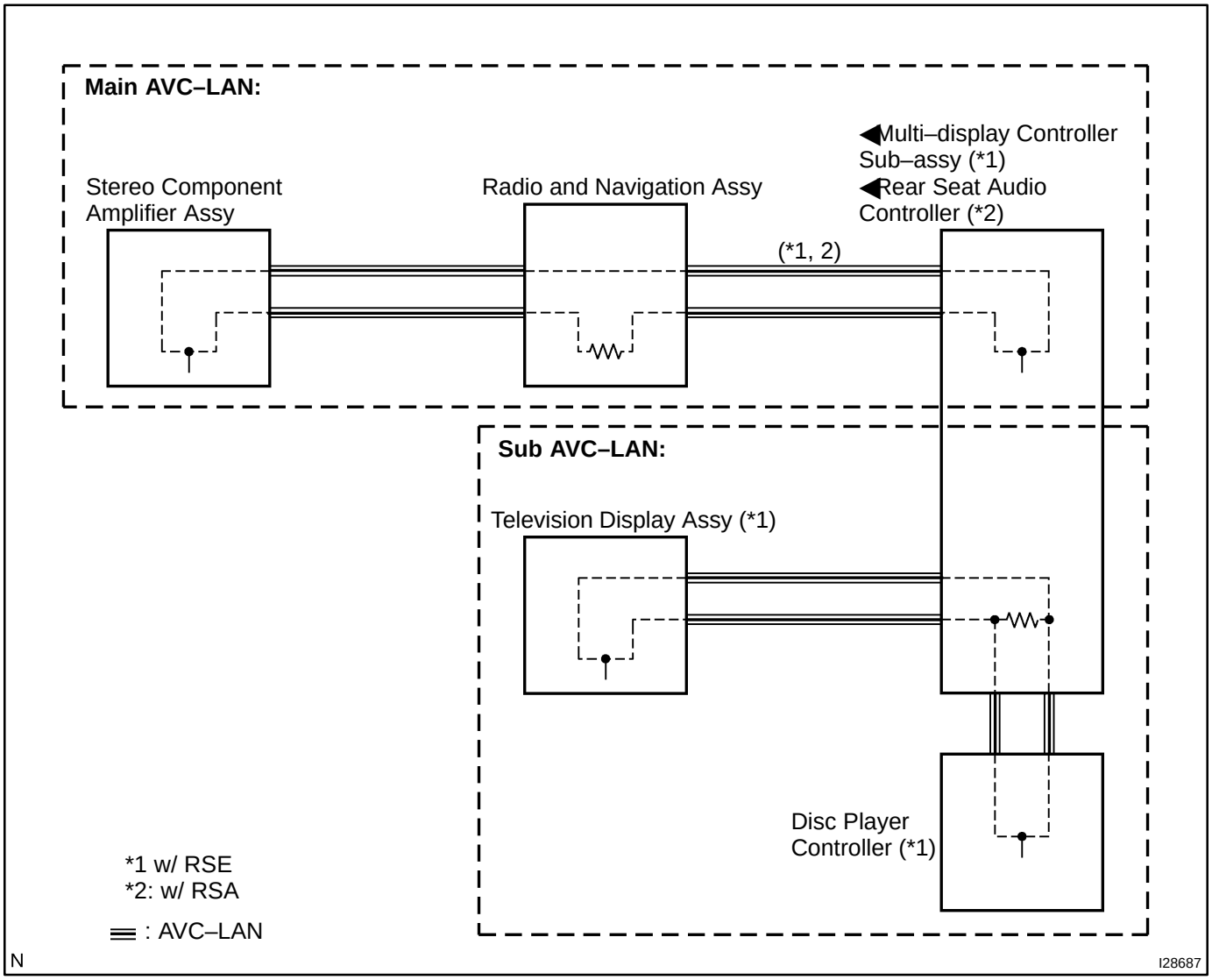
6. AVC–LAN Description

(a) What is AVC–LAN?

AVC–LAN, an abbreviation for ”Audio Visual Communication Local Area Network”, is a united standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.



(b) Purpose:

Recently, car audio systems have rapidly developed and the functions vastly changed. The conventional car audio system is being integrated with multi–media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows.

(1) To solve sound problems, etc. caused by using components of different manufacturers through signal standardization.

(2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.

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HINT:

- If a short to +B or short to ground is detected in the AVC–LAN circuit, communication is interrupted and the audio system will stop functioning.
- If an audio system is equipped with a navigation system, the multi–display unit acts as the master unit. If the navigation system is not equipped, the audio head unit acts as the master unit instead. If the radio and navigation assy is equipped, it is the master unit.
- The radio and navigation assy provides resistance to make communication possible.
- The car audio system with an AVC–LAN circuit has a diagnostic function.
- Each component has a specified number (3–digit) called a physical address. Each function has a number (2–digit) called a logical address.

7. Communication system outline

(a) Components of the audio system communicate with each other via the AVC–LAN.

(b) The master component of the AVC–LAN is a radio and navigation assy with a 60 to 80 Ω resistor. This is essential for communication.

(c) If a short circuit or open circuit occurs in the AVC–LAN circuit, communication is interrupted and the audio system will stop functioning.

8. Diagnostic function outline

(a) The audio system has a diagnostic function (the result is indicated on the master unit).

(b) A 3–digit hexadecimal component code (physical address) is allocated to each component on the AVC–LAN. Using this code, the component in the diagnostic function can be displayed.

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DIDBS–01

HOW TO PROCEED WITH TROUBLESHOOTING

Vehicle brought into a workshop

Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

1. Diagnostic questioning and symptom confirmation

HINT:
Ask the customer about symptoms and confirm malfunctions.
Fill out the Customer Problem Analysis check sheet.

Other symptoms

The screen displays nothing (Go to step 5, proceed to "BLACK SCREEN (NO IMAGE APPEARS ON NAVIGATION/AUDIO SCREEN)") P. DI–2214

2. Confirm the system normal condition P. DI–2162 → Applicable (This is not a malfunction.)

Not applicable

3. Check the diagnostic trouble codes P. DI–2191 → A code is not output (Go to step 5)

A code is output

HINT:
▶Even if the malfunction symptom is not confirmed, check the diagnostic trouble codes. This is because the system stores past diagnostic trouble codes.
▶Refer to the detailed description on the diagnostic screen, as necessary.

4. Diagnostic trouble code chart. P. DI–2203 → Output the diagnostic trouble code (Go to step 7)

HINT:
Find the output code on the diagnostic trouble code chart.

5. Problem symptoms table P. DI–2184 → There is an applicable symptom code in the table (Go to step 7)

There is no applicable symptom code in the table

HINT:
If the symptom does not recur and no code is output, perform the symptom reproduction method.

6. Check the ECU terminal arrangement based on the malfunction symptom

7. Circuit inspection and part inspection P. DI–2214 – DI–2294

8. Recheck the diagnostic trouble code P. DI–2199

HINT:
After deleting the DTC, recheck the diagnostic trouble code.

9. Perform confirmation test

END

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DIDBT–01

CUSTOMER PROBLEM ANALYSIS CHECK

RADIO AND NAVIGATION SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km mile**

Date Problem First Occurred	/ /
Frequency Problem Occurs	▶ Always ▶ Intermittently (times a day)

DTC Check

1st time trouble code.

Unit Check Mode				
Current	Memory	Occured	Data/Time	

LAN Monitor			
Code	Sub-Code	Code	Sub-Code

2nd time trouble code.

Unit Check Mode				
Current	Memory	Occured	Data/Time	

LAN Monitor			
Code	Sub-Code	Code	Sub-Code

Problem Symptom

I28194

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DIDBU–01

IDENTIFICATION OF NOISE SOURCE

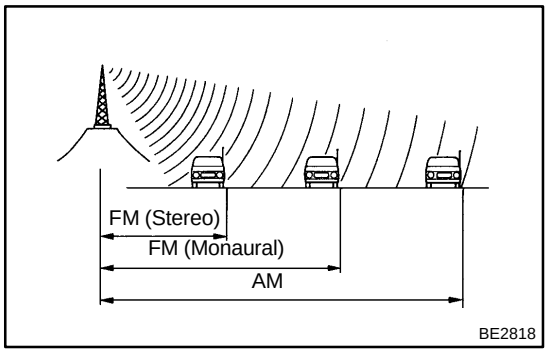
Radio Description

(a) Radio frequency band

Radio Broadcasts use the radio frequency bands shown in the table below.

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM ⟷		FM ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency
MF: Medium Frequency
HF: High Frequency
VHF: Very High Frequency



(b) Service area

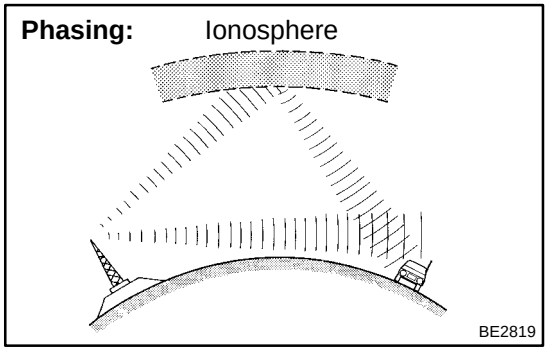
The service areas of the AM and FM broadcasts are vastly different. Even if an AM broadcast has clear reception, an FM broadcast originating in the same location may not be received at all.

The service area of FM stereo broadcasts is small, and static as well as interference (noise) easily enters the signal.

(c) Radio reception problems

HINT:

In addition to static, other problems such as ”phasing”, ”multi–path”, and ”fade out” exist. These problems are not caused by electrical noise, but by the radio signal propagation method itself.



(1) Phasing

The AM frequency band reflects off the earth’s ionosphere at night. When this occurs, the reflected signal may interfere with the direct signal sent by the same transmitter. This phenomenon is known as ”phasing”.

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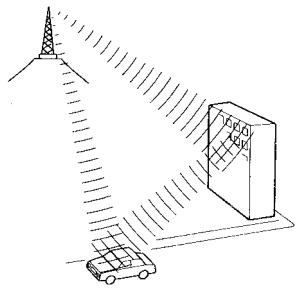
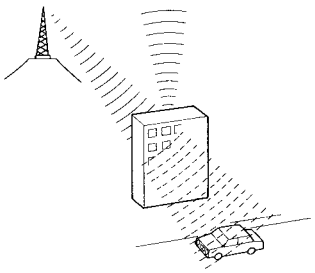
Multi–path:



BE2820

(2) Multi–path
A radio signal can sometimes be reflected by an obstruction in its path. When this occurs, the reflected signal may interfere with the direct signal sent from the transmitter. This phenomenon is known as ”Multi–path”.

Fade Out:



BE2821

(3) Fade out
FM radio frequency is higher than AM. Therefore, it is more likely to be reflected by large obstructions such as tall buildings or mountains. For this reason, the FM signal will gradually weaken or disappear when the vehicle is behind such obstructions. This phenomenon is known as ”fade out”.

(d) Noise problem
It is very important for a technician to understand the specifics of the noise problem. To diagnose the symptom, use the table below.

Radio Frequency	Noise occurrence condition	Presumable cause
AM	Noise occurs in a specified area	Foreign noise
AM	Noise occurs when listening to an intermittent broadcast	An identical program transmitted from multiple towers can cause noise where the signals overlap
AM	Noise occurs only at night	Music beat from a far–off broadcast
FM	Noise occurs while driving in a specified area	Multi–path or phasing noise resulting from a change in FM frequency

HINT:
If the noise does not fall into any category in the table above, determine the cause using ”Radio reception problems” above. Refer to the multi–path and phasing sections.

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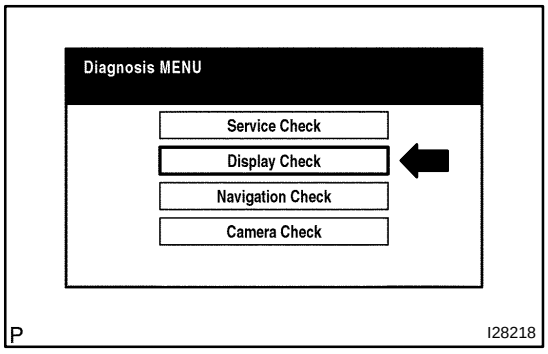
DIDBV–01

DISPLAY CHECK MODE (Color Bar Check)

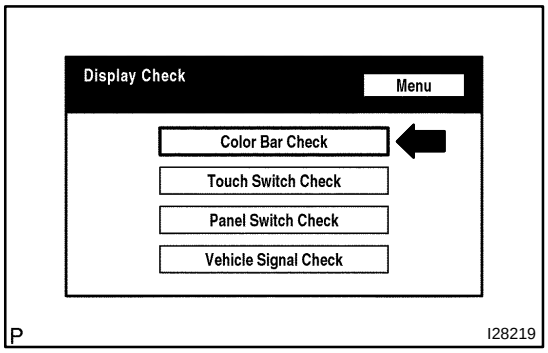
HINT:

- This mode checks the color display on the radio and navigation assy.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

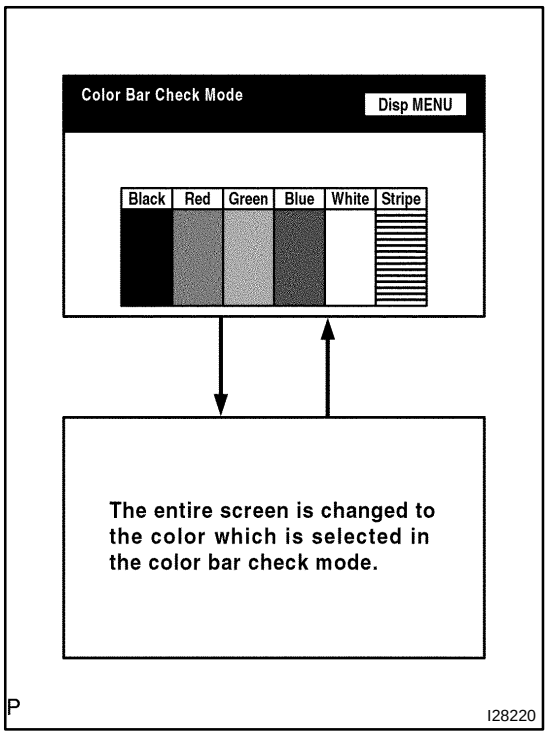
1. Enter diagnostic mode (See page DI–2191).



2. Select "Display Check" from the "Diagnosis MENU" screen.



3. Select "Color Bar Check" from the "Display Check" screen.



4. Select a color bar from the "Color Bar Check Mode" screen.

HINT:

- The entire screen turns to the color or stripe selected.
- Touching the display will return to the "Color Bar Check" screen.

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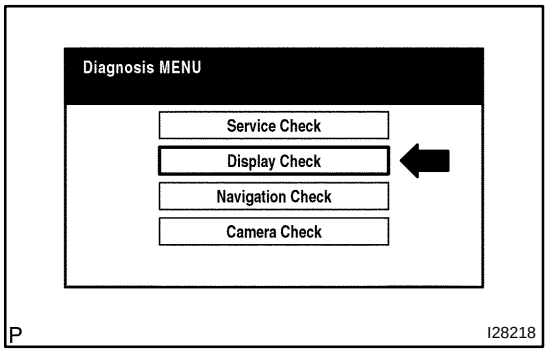
DIDBW–01

DISPLAY CHECK MODE (Touch Switch Check)

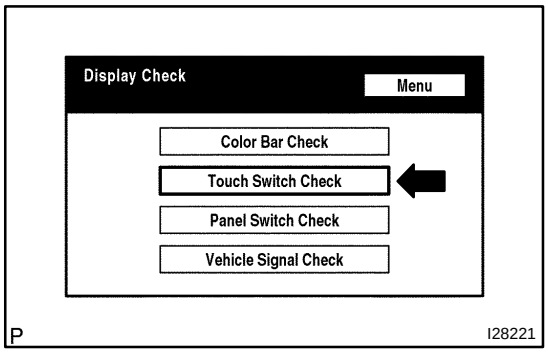
HINT:

- This mode checks the touch switch operation condition on the radio and navigation assy.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

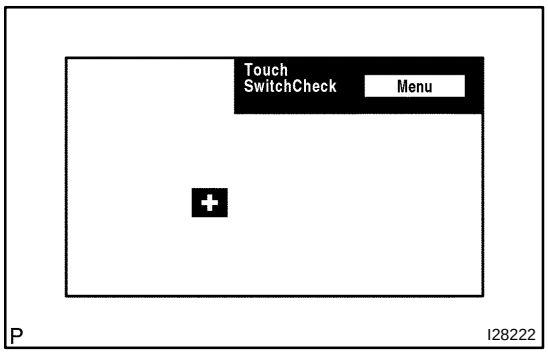
1. Enter diagnostic mode (See page DI–2191).



2. Select "Display Check" from the "Diagnosis MENU" screen.



3. Select "Touch Switch Check" from the "Display Check" screen.



4. Touch the display anywhere in the open area to perform the check when the "Touch Switch Check" screen is displayed.

HINT:

- A "+" mark is displayed where the display is touched.
- The "+" mark remains on the display even after the finger is removed.

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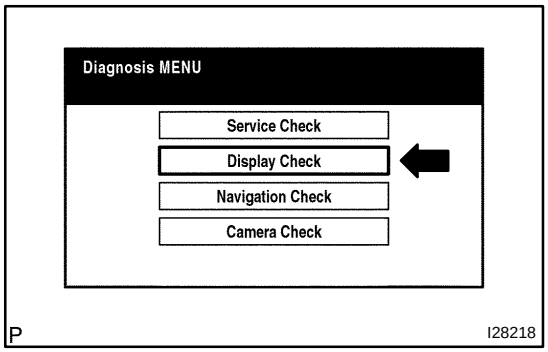
DIDBX–01

DISPLAY CHECK MODE (Panel Switch Check)

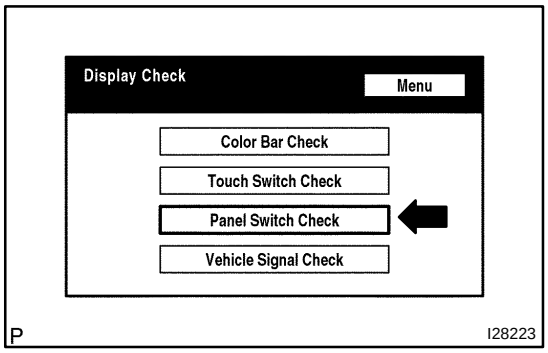
HINT:

- This mode checks the panel switch operation response on the radio and navigation assy.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

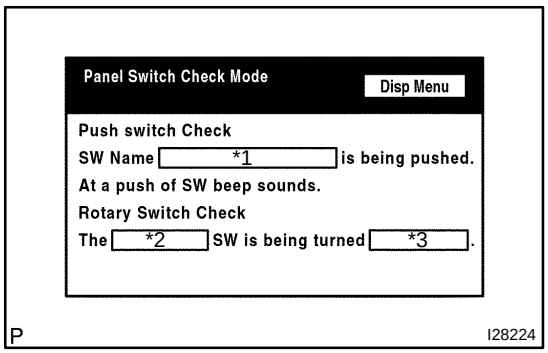
1. Enter diagnostic mode (See page DI–2191).



2. Select "Display Check" from the "Diagnosis MENU" screen.



3. Select "Panel Switch Check" from the "Display Check" screen.



4. Operate each switch and check that the switch name and condition are correctly displayed.

HINT:

- Pressing the "DISPLAY" switch for 3 seconds will exit the diagnostic mode.
- "OPEN" and "TILT" switches are not displayed. To test these switches, they must be operated.

Display	Contents
Push switch name/*1	▶Name of the pressed switch is displayed. ▶If more than one switch is pressed, "MULTIPLE" is displayed.
Rotary switch name/*2	Name of the rotary switch is displayed.
Rotary switch direction/*3	Direction of the rotary switch is rotated.

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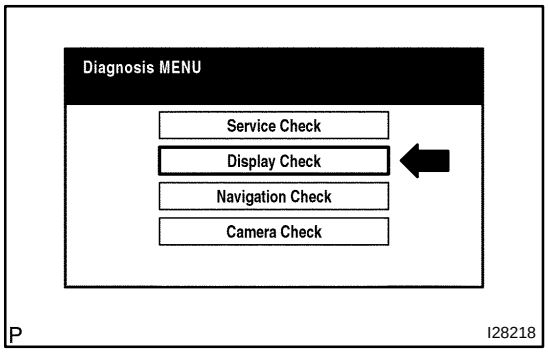
DIDBY–01

DISPLAY CHECK MODE (Vehicle Signal Check)

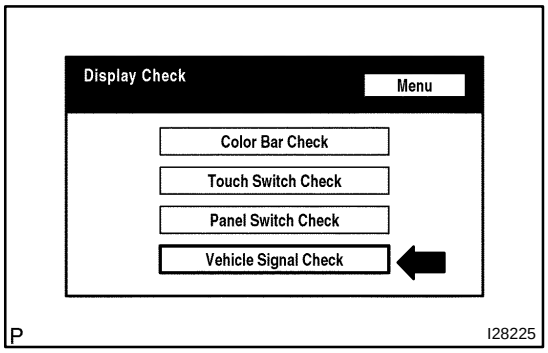
HINT:

- This mode checks the vehicle signal status input to the radio and navigation assy.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

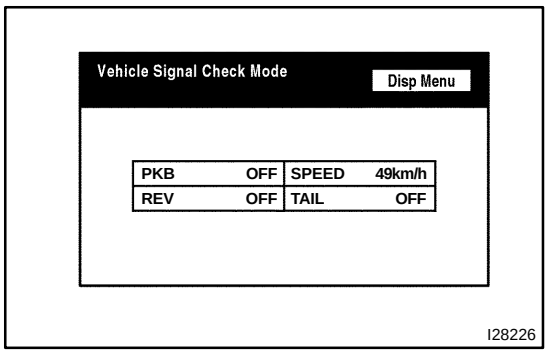
1. Enter diagnostic mode (See page DI–2191).



2. Select "Display Check" from the "Diagnosis MENU" screen.



3. Select "Vehicle Signal Check" from the "Display Check" screen.



4. When the "Vehicle Signal Check Mode" screen is displayed, check all the vehicle signal conditions.

HINT:

- Only conditions having inputs are displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

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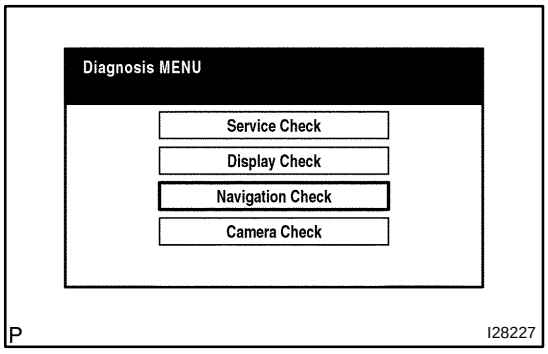
DIDBZ–01

NAVIGATION CHECK MODE (GPS Information)

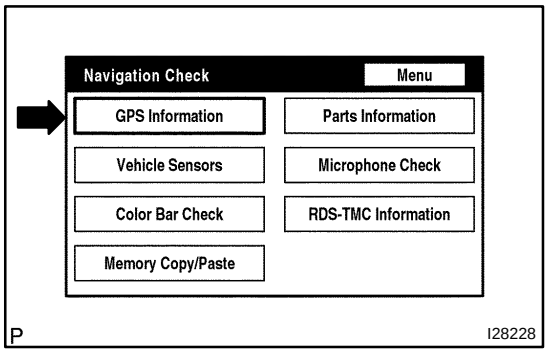
HINT:

- This mode displays GPS satellite information.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

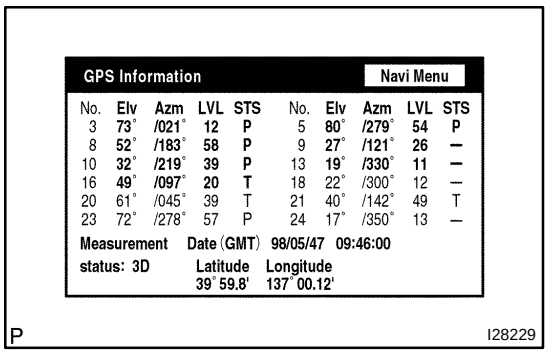
1. Enter diagnostic mode (See page DI–2191).



2. Select "Navigation Check" from the "Diagnosis MENU" screen.



3. Select "GPS Information" from the "Navigation Check" screen.



4. When GPS information is displayed, check the GPS conditions.

HINT:

This screen is updated once per second when input signals to the vehicle are changed.

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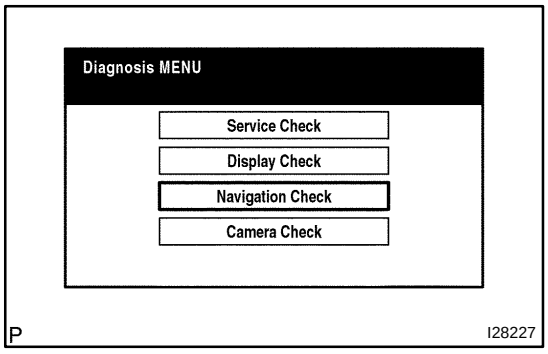
DIDC0–01

NAVIGATION CHECK MODE (Vehicle Sensors)

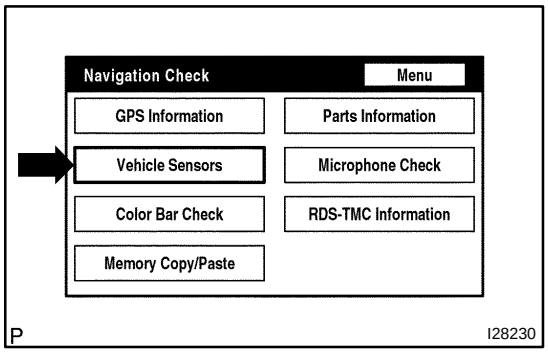
HINT:

- This mode checks the vehicle signal status input to the radio and navigation assy.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

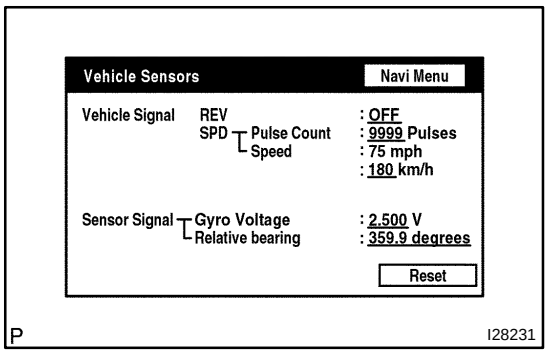
1. Enter diagnostic mode (See page DI–2191).



2. Select "Navigation Check" from the "Diagnosis MENU" screen.



3. Select "Vehicle Sensors" from the "Navigation Check" screen.



4. Check all the signals and sensors when vehicle signal information is displayed.

HINT:

This screen is updated once per second when input signals to the vehicle are changed.

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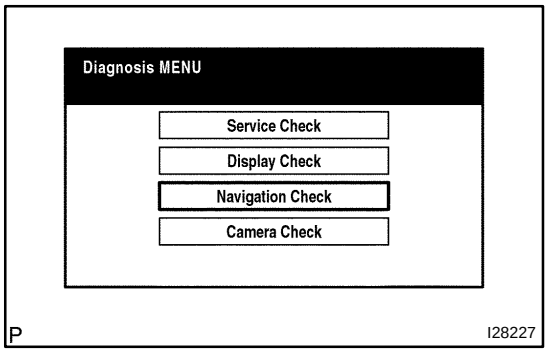
DIDC1–01

NAVIGATION CHECK MODE (Navi Color Bar Check)

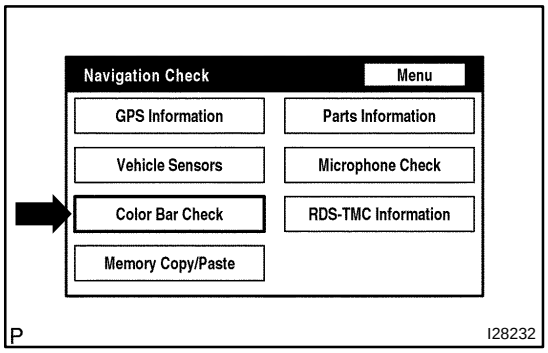
HINT:

- This mode checks the color display on the radio and navigation assy.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

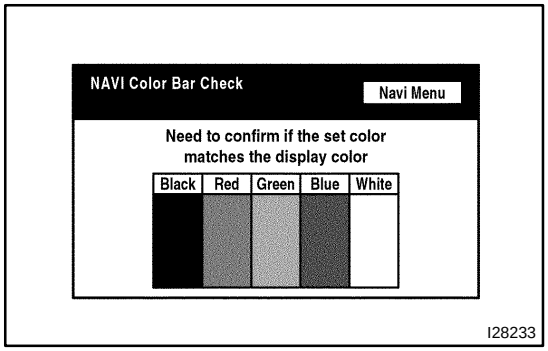
1. Enter diagnostic mode (See page DI–2191).



2. Select "Navigation Check" from the "Diagnosis MENU" screen.



3. Select "Color Bar Check" from the "Navigation Check" screen.



4. Check each color of the color bar when the "NAVI Color Bar Check" screen is displayed.

HINT:

Colors will not be displayed full–screen as in "Display Check Mode".

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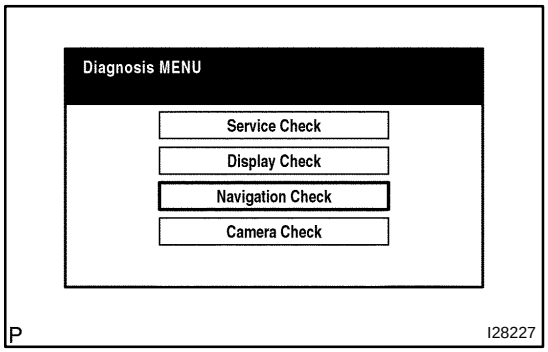
DIDC2–01

NAVIGATION CHECK MODE (Parts Information)

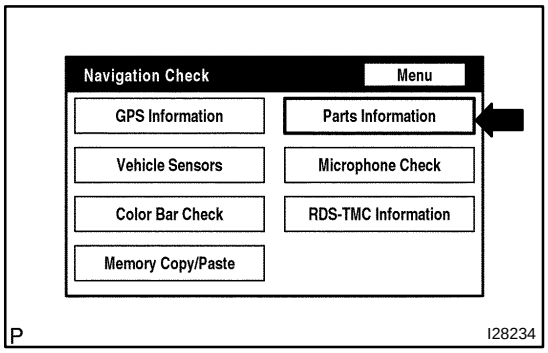
HINT:

- ▶ This mode displays product information on the radio and navigation assy and discs.
- ▶ Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

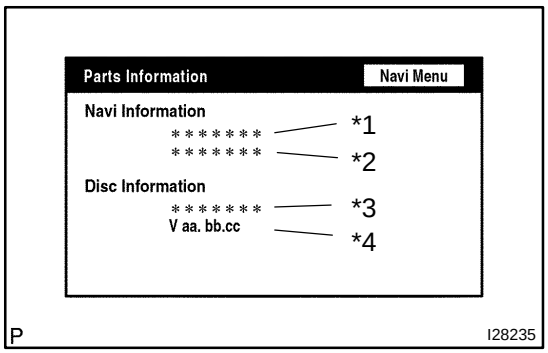
1. Enter diagnostic mode (See page DI–2191).



2. Select "Navigation Check" from the "Diagnosis MENU" screen.



3. Select "Parts Information" from the "Navigation Check" screen.



4. Check the navigation and disc information when the "Parts Information" screen is displayed.

Display	Contents
Navigation Manufacturer/*1	Radio and navigation assy manufacturer name is displayed.
Navigation Version/*2	Radio and navigation assy version is displayed.
Disc Manufacturer/*3	Map disc manufacturer is displayed.
Disc Version/*4	Map disc version is displayed.

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DIDC3–01

PROBLEM SYMPTOMS TABLE

HINT:

- ▶ Before performing verification listed in the table below, check the fuse and relay.
- ▶ Methods used to verify the cause of the problem are listed in order of probability in the verification column.

Display function

Symptom	Verification	See page
Pressing PWR switch does not turn on system.	1. "PRESSING POWER SWITCH DOES NOT TURN ON SYSTEM" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2213 DI–2256 –
Black screen (no image appears on navigation and audio screen).	1. "BLACK SCREEN (NO IMAGE APPEARS ON NAVIGATION AND AUDIO SCREEN)" 2. Illumination circuit 3. Power source circuit (radio and navigation assy) 4. Replace radio and navigation assy	DI–2214 DI–2260 DI–2256 –
Illumination for panel switch does not come on with TAIL switch on.	1. "ILLUMINATION FOR PANEL SWITCH DOES NOT COME ON WITH TAIL SWITCH ON" 2. Illumination circuit 3. Replace radio and navigation assy	DI–2216 DI–2260 –
Display does not dim (night screen) with TAIL switch on.	1. "DISPLAY DOES NOT DIM (NIGHT SCREEN) WITH TAIL SWITCH ON" 2. Illumination circuit 3. Replace radio and navigation assy	DI–2217 DI–2260 –
Power does not turn off (screen remains on).	1. Power source circuit (radio and navigation assy) 2. Replace radio and navigation assy	DI–2256 –
Panel switch does not function.	1. "PANEL SWITCH DOES NOT FUNCTION" 2. Steering pad switch circuit 3. Replace radio and navigation assy	DI–2218 DI–2287 –
Touch panel switch does not function.	1. "TOUCH PANEL SWITCH DOES NOT FUNCTION" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2219 DI–2256 –
Display panel does not open, tilt, or tilts improperly.	1. "DISPLAY PANEL DOES NOT OPEN, TILT, OR TILTS IMPROPERLY" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2220 DI–2256 –
Screen is distorted.	1. Power source circuit (radio and navigation assy) 2. Replace radio and navigation assy	DI–2256 –
Screen flicker or color distortion.	1. "SCREEN FLICKER OR COLOR DISTORTION" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2221 DI–2256 –

Audio function

Symptom	Verification	See page
No sound can be heard from speakers (audio is mute).	1. "NO SOUND CAN BE HEARD FROM SPEAKERS (AUDIO IS MUTE)" 2. Speaker circuit 3. AVC–LAN circuit (radio and navigation – stereo component amplifier) 4. Amplifier sound signal circuit 5. Amplifier mute signal circuit 6. Replace stereo component amplifier 7. Replace radio and navigation assy	DI–2224 DI–2282 DI–2268 DI–2274 DI–2271 – –

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Radio broadcast cannot be received (poor reception).	1. "RADIO BROADCAST CANNOT BE RECEIVED (POOR RECEPTION)" 2. Replace radio and navigation assy	DI–2225 –
CD cannot be inserted/played or CD is ejected right after insertion.	1. "CD CANNOT BE INSERTED/PLAYED OR CD IS EJECTED RIGHT AFTER INSERTION" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2228 DI–2256 –
CD cannot be ejected.	1. "CD CANNOT BE EJECTED" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2231 DI–2256 –
Abnormal noise occurs.	1. "ABNORMAL NOISE OCCURS" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2233 DI–2256 –
CD sound skips.	1. "CD SOUND SKIPS" 2. Replace radio and navigation assy	DI–2234 –
Poor sound quality in all modes (low volume).	1. "POOR SOUND QUALITY IN ALL MODES (LOW VOLUME)" 2. AMP mute signal circuit 3. Replace radio and navigation assy 4. Replace stereo component amplifier	DI–2236 DI–2271 – –

Navigation function

Symptom	Verification	See page
Map disc cannot be inserted.	1. "MAP DISC CANNOT BE INSERTED" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2237 DI–2256 –
Map disc cannot be ejected.	1. "MAP DISC CANNOT BE EJECTED" 2. Power source circuit (radio and navigation assy) 3. Replace radio and navigation assy	DI–2238 DI–2256 –
Vehicle position mark deviates greatly.	1. "VEHICLE POSITION MARK DEVIATES GREATLY" 2. Replace GPS antenna assy 3. Replace radio and navigation assy	DI–2239 – –
Cursor or map rotates when vehicle is stopped.	1. "CURSOR OR MAP ROTATES WHEN VEHICLE IS STOPPED" 2. Replace radio and navigation assy	DI–2241 –
Vehicle position mark is not updated.	1. "VEHICLE POSITION MARK IS NOT UPDATED" 2. Replace map disc 3. Replace radio and navigation assy	DI–2242 – –
Current position display does not appear.	1. "CURRENT POSITION DISPLAY DOES NOT APPEAR" 2. Replace map disc 3. Replace radio and navigation assy	DI–2244 – –
GPS mark does not displayed.	1. "GPS MARK IS NOT DISPLAYED" 2. Replace GPS antenna assy 3. Replace radio and navigation assy	DI–2245 – –
Voice guidance does not function.	1. "VOICE GUIDANCE DOES NOT FUNCTION" 2. Speaker circuit 3. Replace map disc 4. Replace radio and navigation assy	DI–2248 DI–2282 – –

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Map display incomplete.	1. "MAP DISPLAY INCOMPLETE" 2. Replace map disc 3. Replace radio and navigation assy	DI–2251 – –
Route cannot be calculated.	1. "ROUTE CANNOT BE CALCULATED" 2. Replace map disc 3. Replace radio and navigation assy	DI–2252 – –

Steering pad switch assy function

Symptom	Verification	See page
The system cannot be operated by the steering pad switch.	1. Steering pad switch circuit 2. Replace radio and navigation assy	DI–2287 –
Illumination for steering pad switch does not come on with TAIL switch on.	1. Steering pad switch circuit 2. Replace radio and navigation assy	DI–2287 –

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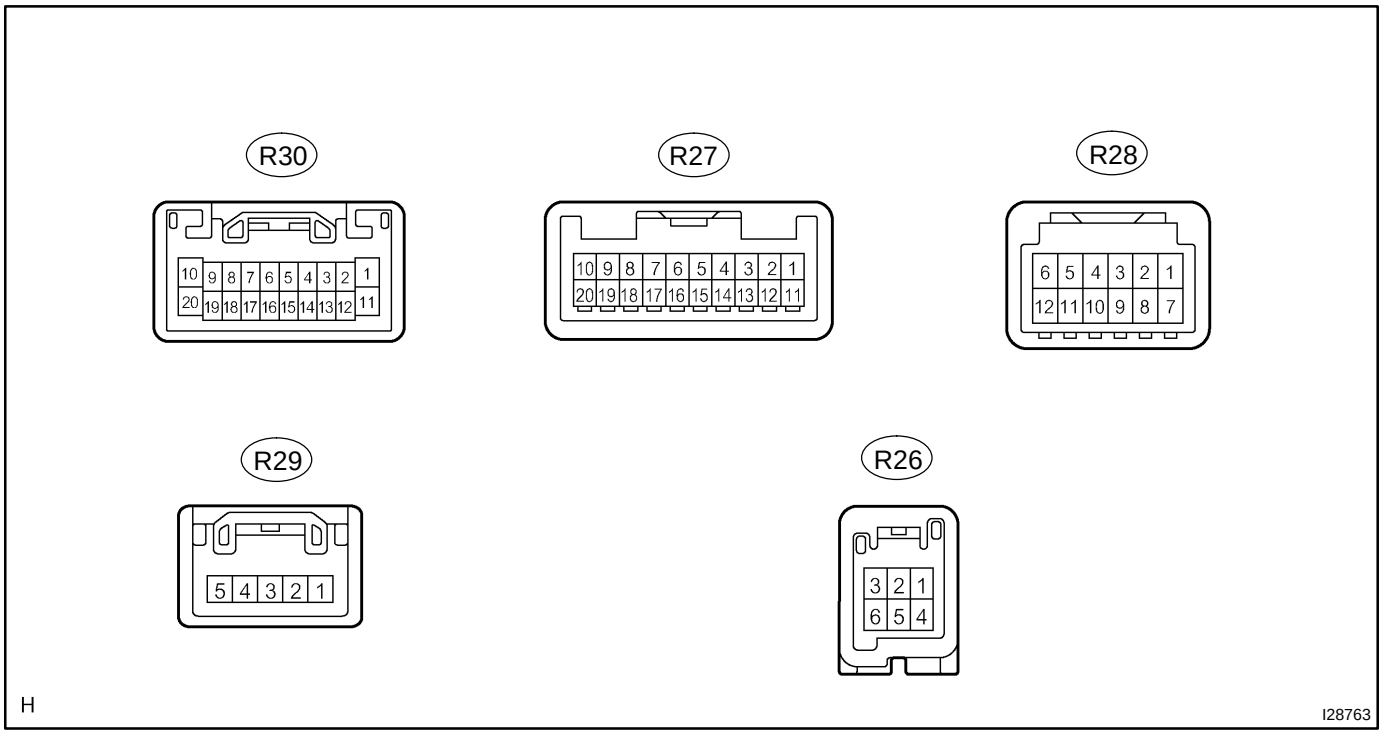
DIDC4–01

TERMINALS OF ECU

1. RADIO AND NAVIGATION ASSY



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
ACC (R30–11) – GND (R30–20)	GR – BR	Accessory (ON)	Ignition switch OFF → ACC or ON	Below 1 V →10 to 14 V
B (R30–1) – GND (R30–20)	L–Y – BR	Battery	Always	10 to 14 V
GND (R30–20) – Body ground	BR – Body ground	Ground	Always	Below 1 V
ANT (R30–13) – GND (R30–20)	B–R – BR	Power source of antenna	Radio switch ON and AM or FM	10 to 14 V
ILL+ (R30–2) – ILL– (R30–12)	G – W–G	Illumination signal	Ignition switch ON Light control switch OFF → TAIL or ON	Below 1 V → 10 to 14 V
R+ (R30–8) – GND (R30–20)	W – BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sound is output
L+ (R30–9) – GND (R30–20)	B – BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sound is output
R– (R30–18) – GND (R30–20)	G – BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sound is output
L– (R30–19) – GND (R30–20)	R – BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sound is output
SWG (R27–6) – Body ground	BR–W – Body ground	Steering pad switch ground	Always	Below 1 V
SW1 (R27–7) – SWG (R27–6)	LG–R – BR–W	Steering pad switch signal	Steering pad switch not operated → SEEK+ switch pushed → SEEK– switch pushed → VOL+ switch pushed → VOL– switch pushed	4 V or more → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V

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SW2 (R27–8) – SWG (R27–6)	GR–R – BR–W	Steering pad switch signal	Steering pad switch not operated → MODE switch pushed	4 V or more → Below 2.5 V
SPD (R29–3) – GND (R30–20)	G–O – BR	Speed signal from combination meter	See "Vehicle Signal Check Mode" (See page DI–2179)	–
REV (R29–5) – GND (R30–20)	B–Y – BR	Reverse signal from combination meter	See "Vehicle Signal Check Mode" (See page DI–2179)	–
MUTE (R28–7) – GND (R30–20)	R–W – BR	MUTE signal (From navigation)	Audio system is playing → changing mode	Above 3.5 V → Below 1 V
SLD (R30–10) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
SWG (R27–6) – Body ground	BR–W – Body ground	Steering pad switch ground	Always	Below 1 V
ATX+ (R30–5) – GND (R30–20)	V – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
ATX– (R30–15) – GND (R30–20)	P – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
IVO+ (R27–11) – GND (R30–20)	W – BR	Voice guidance output signal	Navigation system is voice guidance output	A waveform synchronized with sound is output
IVO– (R27–12) – GND (R30–20)	B – BR	Voice guidance output signal	Navigation system is voice guidance output	A waveform synchronized with sound is output
SLD1 (R27–13) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
PKB (R29–1) – GND (R30–20)	LG–R – BR	Parking brake switch signal	Parking brake pedal is depress →	Below 1 V → 10 to 14 V
(*1) NTSC (R26–1) – GND (R30–20)	R – BR	Display signal (From multi–display controller)	Navigation display is ON	Pulse generation
(*1) SGD1 (R26–4) – Body ground	G – Body ground	Ground	Always	Below 1 V
(*1) SGND (R26–5) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
(*1, 2) TX+ (R27–9) – GND (R30–20)	L – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
(*1, 2) TX– (R27–10) – GND (R30–20)	LG – BR	AVC–LAN communication signal	Ignition switch ON	2 to 3 V
(*1, 2) R–R+ (R27–15) – GND (R30–20)	W – BR	Sound signal (Right output)	Audio system is playing	A waveform synchronized with sound is output
(*1, 2) R–R– (R27–16) – GND (R30–20)	G – BR	Sound signal (Right output)	Audio system is playing	A waveform synchronized with sound is output
(*1, 2) R–L+ (R27–17) – GND (R30–20)	B – BR	Sound signal (Left output)	Audio system is playing	A waveform synchronized with sound is output
(*1, 2) R–L– (R27–18) – GND (R30–20)	R – BR	Sound signal (Left output)	Audio system is playing	A waveform synchronized with sound is output
(*1) RSLD (R27–14) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
(*1, 2) RMUT (R27–19) – GND (R30–20)	R–W – BR	MUTE signal (To multi–display controller)	Audio system is playing → changing mode	Above 3.5 V → Below 1 V
(*1) CDR+ (R28–2) – GND (R30–20)	W – BR	Sound signal (Right input)	Rear seat entertainment system is playing	A waveform synchronized with sound is output

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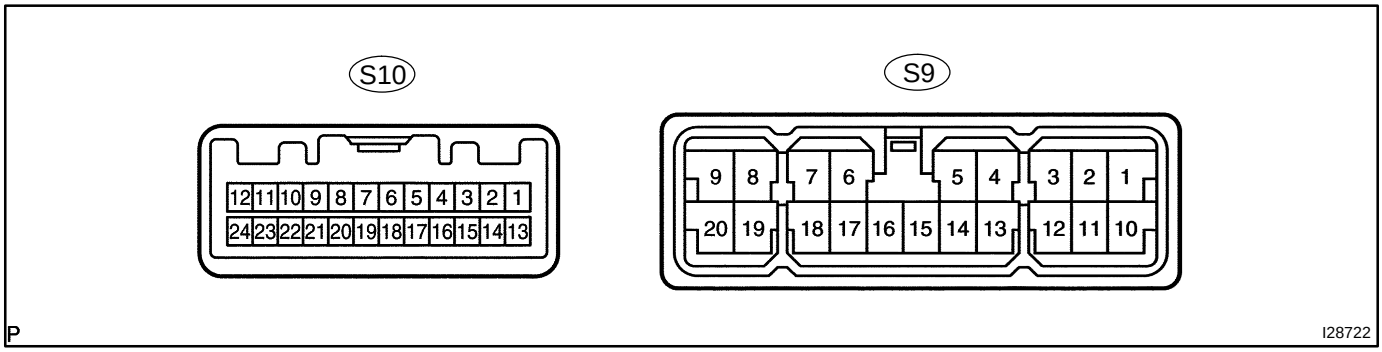
(*1) CDR– (R28–3) – GND (R30–20)	G – BR	Sound signal (Right input)	Rear seat entertainment system is playing	A waveform synchronized with sound is output
(*1) CDL+ (R28–4) – GND (R30–20)	B – BR	Sound signal (Left input)	Rear seat entertainment system is playing	A waveform synchronized with sound is output
(*1) CDL– (R28–5) – GND (R30–20)	R – BR	Sound signal (Left input)	Rear seat entertainment system is playing	A waveform synchronized with sound is output
(*1) CSLD (R28–1) – Body ground	Shielded – Body ground	Shield ground	Always	Below 1 V
(*1) MUTE (R28–6) – GND (R30–20)	R–G – BR	MUTE signal (From multi–display controller)	Rear seat entertainment system is playing → changing mode	Above 3.5 V → Below 1 V

*1: w/ Rear seat entertainment system

*2: w/ Rear seat audio system

2. STEREO COMPONENT AMPLIFIER ASSY



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
B+ (S9–1) – E (S9–16)	L–W – BR	Battery	Always	10 to 14 V
RL+ (S9–4) – E (S9–16)	B – BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sound is output
RR+ (S9–5) – E (S9–16)	R – BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sound is output
FL+ (S9–2) – E (S9–16)	P – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sound is output
FR+ (S9–3) – E (S9–16)	LG – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sound is output
WFL+ (S9–6) – E (S9–16)	L–W – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sound is output
WFR+ (S9–7) – E (S9–16)	R – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sound is output
B2+ (S9–10) – E (S9–16)	L–W – BR	Battery	Always	10 to 14 V
RL– (S9–13) – E (S9–16)	Y – BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sound is output
RR– (S9–14) – E (S9–16)	W – BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sound is output
GND (S9–15) – Body ground	BR – Body ground	Ground	Always	Below 1 V

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E (S9–16) – Body ground	BR – Body ground	Ground	Always	Below 1 V
FL– (S9–11) – E (S9–16)	V – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sound is output
FR– (S9–12) – E (S9–16)	L – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sound is output
WFL– (S9–17) – E (S9–16)	G – BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sound is output
WFR– (S9–18) – E (S9–16)	Y – BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sound is output
MUTE (S10–1) – E (S9–16)	R–W – BR	Mute signal from radio receiver	Audio system is sounding → changing mode	Above 3.5 V → Below 3.5 V
L– (S10–2) – E (S9–16)	R – BR	Sound signal from radio receiver (Left)	Audio system is playing	A waveform synchronized with sound is output
L+ (S10–3) – E (S9–16)	B – BR	Sound signal from radio receiver (Left)	Audio system is playing	A waveform synchronized with sound is output
R– (S10–4) – E (S9–16)	G – BR	Sound signal from radio receiver (Right)	Audio system is playing	A waveform synchronized with sound is output
R+ (S10–5) – E (S9–16)	W – BR	Sound signal from radio receiver (Right)	Audio system is playing	A waveform synchronized with sound is output
SGND (S10–6) – Body ground	Shielded – Body ground	Ground	Always	Below 1 V
TX– (S10–19) – E (S9–16)	P – BR	AVC–LAN communication signal	Turn ignition switch to ACC	2 to 3 V
TX+ (S10–20) – E (S9–16)	V – BR	AVC–LAN communication signal	Turn ignition switch to ACC	2 to 3 V
ACC (S10–12) – E (S9–16)	GR – BR	Accessory (ON)	Turn ignition switch OFF → ACC	Below 1 V → 10 to 14 V
INT– (S10–22) – E (S9–16)	B – BR	Voice guidance signal	Voice guidance	A waveform synchronized with sound is output
INT+ (S10–23) – E (S9–16)	W – BR	Voice guidance signal	Voice guidance	A waveform synchronized with sound is output

3. MULTI–DISPLAY CONTROLLER ASSY

See page DI–2090

4. REAR SEAT AUDIO CONTROLLER

See page DI–2051

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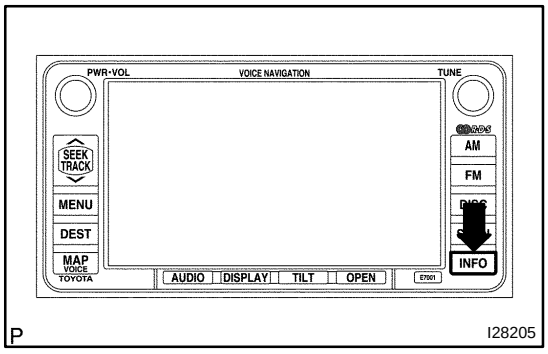
DIDC5–01

DIAGNOSIS SYSTEM

HINT:

- ▶ Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- ▶ After the ignition switch is turned on, check that the map is displayed before starting the diagnostic mode. Otherwise, some items cannot be checked.

1. There are 2 methods to start diagnostic mode. Start the mode by using one of them.

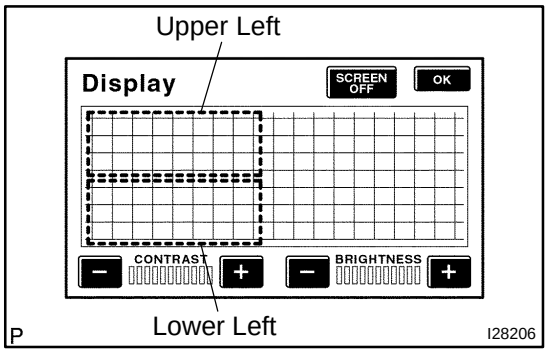


2. Method 1

(a) Start the engine.

(b) While pressing and holding ”INFO” switch, operate the light control switch, OFF → TAIL → OFF → TAIL → OFF → TAIL → OFF.

(c) The diagnostic mode starts and the service check screen (”System Check Mode”) will be displayed. Service inspection starts automatically and the result will be displayed.



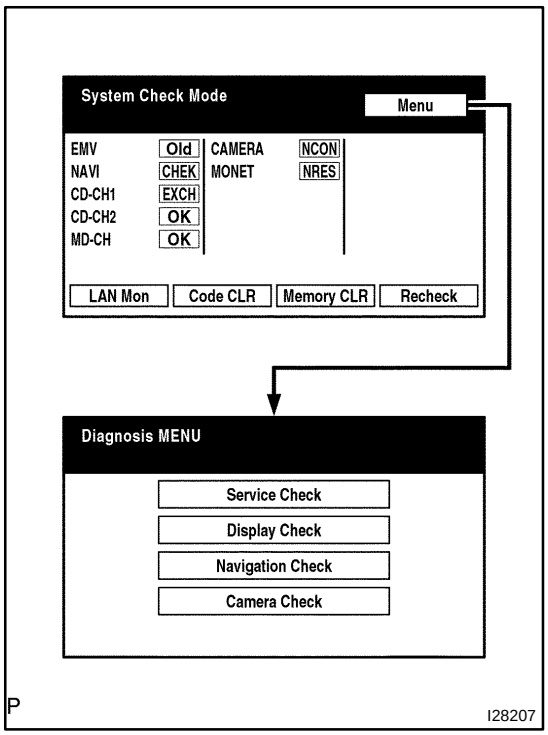
3. Method 2

(a) Start the engine.

(b) Switch to the ”Display quality adjustment” screen.

(c) From the display quality adjustment screen, touch the corners of the screen in the following order: upper left → lower left → upper left → lower left → upper left → lower left.

(d) The diagnostic mode starts and ”Service Check” screen will be displayed. Service inspection starts automatically and the result will be displayed.



4. Diagnosis MENU

(a) Diagnostic screen will be displayed by pressing the menu switch on the service check screen.

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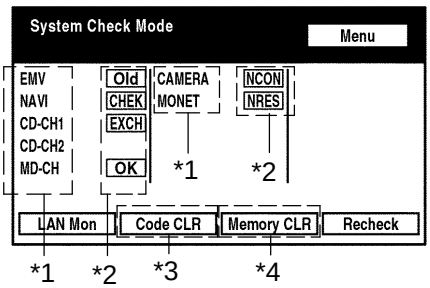
5. DIAGNOSIS DISPLAY DETAILED DESCRIPTION

HINT:

- ▶ This section contains a detailed description of displays within diagnostic mode.
- ▶ Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

(a) System Checks

(1) System Check Mode Screen



Device Names and Hardware Address/*1

HINT:

- ▶ Registered device names are displayed.
- ▶ If a device name is unknown to the system, its physical address is shown instead.

Address No.	Name	Address No.	Name
110	EMV	120	AVX
128	1DIN TV	140	AVN
144	G–BOOK	178	NAVI
17C	MONET	190	AUDIO H/U
1AC	CAMERA–C	1B0	Rr–TV
1C0	Rr–CONT	1C2	TV–TUNER2
1C4	PANEL	1C6	G/W
1C8	FM–M–LCD	1D8	CONT–SW
1EC	BODY	1F0	RADIO TUNER
1F1	XM	1F2	SIRIUS
230	TV–TUNER	240	CD–CH2
250	DVD–CH	280	CAMERA
360	CD–CH1	3A0	MD–CH
17D	TEL	440	DSP–AMP
530	ETC	5C8	MAYDAY
1A0	DVD–P	1D6	CLOCK
1F4	RSA	1F6	RSE
480	AMP	–	–

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Check Result/*2

HINT:

Result codes for all devices are displayed.

Result	Meaning	Action
OK	The device did not respond with a DTC (excluding communication DTCs from the AVC–LAN).	–
EXCH	The device responds with a ”replace”–type DTC.	Look up the DTC in ”Unit Check Mode” and replace the device.
CHEK	The device responds with a ”check”–type DTC.	Look up the DTC in Unit Check Mode”.
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.
Old	The device responds with an ”old”–type DTC.	Look up the DTC in ”Unit Check Mode”.
NRES	The device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.

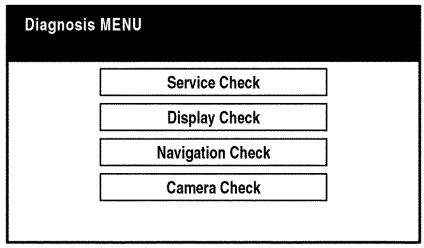
Code Clear/*3

Present DTCs are cleared.

Memory Clear/*4

Present and past DTCs and registered connected device names are cleared.

(1) Diagnosis MENU Screen



P I28237

HINT:

Each item is grayed out or not displayed based on the device settings.

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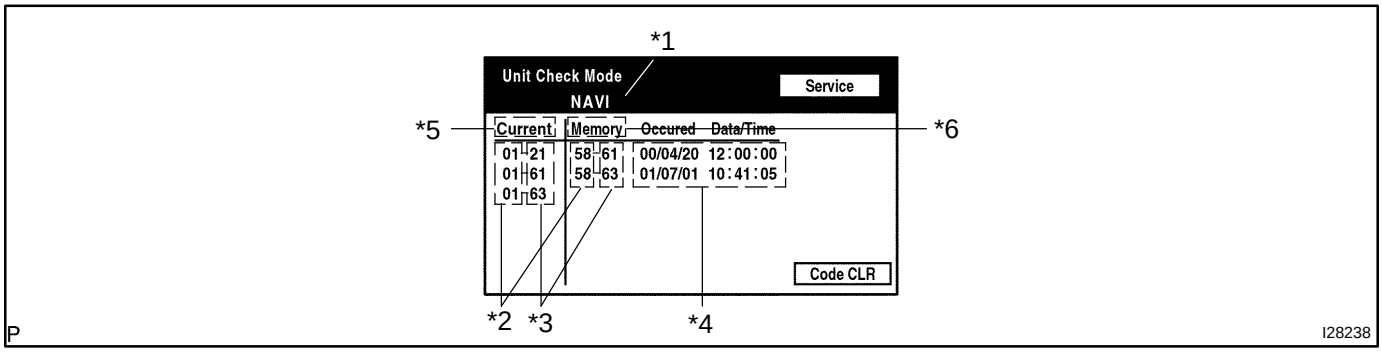
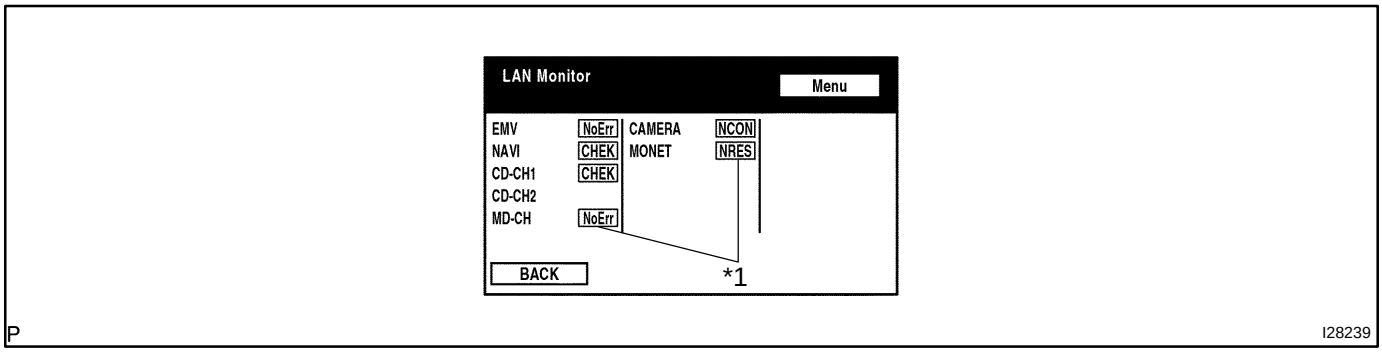
(2) Unit Check Mode Screen



Screen Description

Display	Contents
Device name/*1	Target device
Segment/*2	Target device logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Timestamp/*4	The time and date of past DTCs are displayed (The year is displayed in 2 digit format.).
Present Code/*5	The DTC output at the service check is displayed.
Past Code/*6	Diagnostic memory results and recorded DTCs are displayed.

(3) LAN Monitor (Original) Screen



Check Result/*1

HINT:

Check results of all the devices are displayed.

Result	Meaning	Action
No Err (OK)	There are no communication DTCs.	–
CHEK	The device responds with a ”check”–type DTC.	Look up the DTC in ”Unit Check Mode”.
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.
Old	The device responded with an old–type DTC.	Look up the DTC in ”Unit Check Mode”.
NRES	Device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC–LAN of the device.

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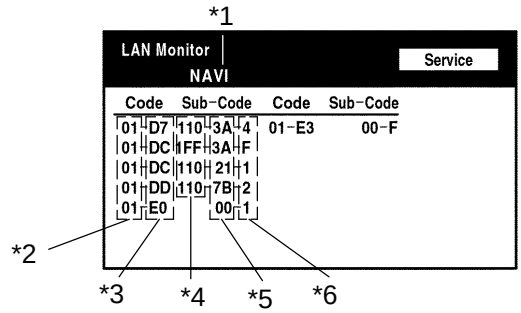
(4) LAN Monitor (Individual) Screen



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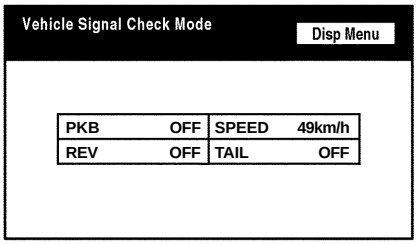
Screen Description

Display	Contents
Device name/*1	Target device
Segment/*2	Target logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Sub–Code (device address)/*4	Physical address stored with DTC (If there is no address, nothing is displayed.).
Connection check No./*5	Connection check number stored with DTC.
DTC occurrence/*6	Number of times the same DTC has been recorded.

(b) DISPLAY CHECK

(1) Vehicle Signal Check Mode Screen



I28226 I28974

Screen Description

Name	Contents
PKB	Parking brake ON/OFF state is displayed.
REV	Reverse signal ON/OFF state is displayed.
SPEED	Vehicle speed is displayed in km/h.
TAIL	TAIL signal (Head lamp dimmer switch) ON/OFF state is displayed.

HINT:

- ▶ Only items sending a vehicle signal will be displayed.
- ▶ This screen is updated once per second when input signals to the vehicle are changed.

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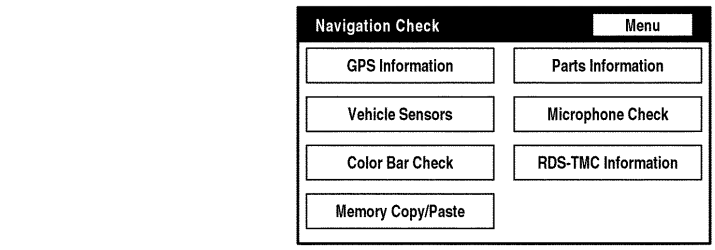
(c) NAVIGATION CHECK

(1) Navigation Check Screen

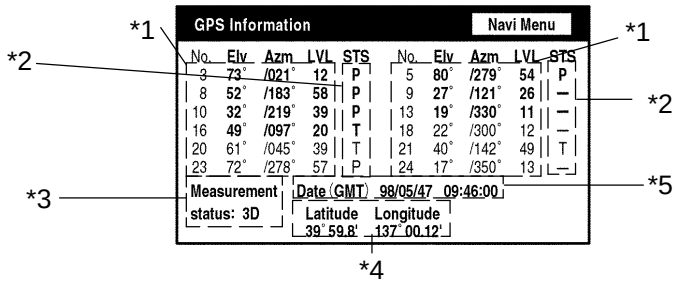


P I28242

HINT:

Each item is grayed out or not displayed based on the device settings.

(2) GPS information Screen



P I28243

Satellite information/*1

(3) Information from a maximum of 12 satellites is displayed on the screen. This information includes the target GPS satellite number, elevation angle, direction and signal level.

Receiving condition/*2

(DENSO model)

Display	Contents
T	The system is receiving a GPS signal, but is not using it for location.
P	The system is using the GPS signal for location.
–	The system cannot receive a GPS signal.

(AISIN AW model)

Display	Contents
01H	The system cannot receive a GPS signal.
02H	The system is tracing a satellite.
03H	The system is receiving a GPS signal, but is not using it for location.
04H	The system is using the GPS signal for location.

Measurement information/*3

Display	Contents
2D	2–dimensional location method is being used.
3D	3–dimensional location method is being used.
NG	Location data cannot be used.
Error	Reception error has occurred.
–	Any other state.

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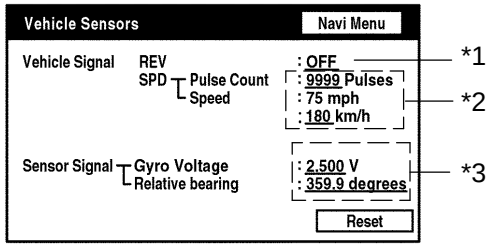
Position information/*4

Display	Contents
Position	Latitude and longitude information on the current position is displayed.

Date information/*5

Display	Contents
Date	The date/time information obtained from GPS signal is displayed in Greenwich mean time (GMT). The last 4 digits are displayed.

(4) Vehicle Sensors Screen



P I28244

Vehicle signal

Display	Contents
REV/*1	REV signal ON/OFF state is displayed.
SPD/*2	SPD signal condition is displayed.

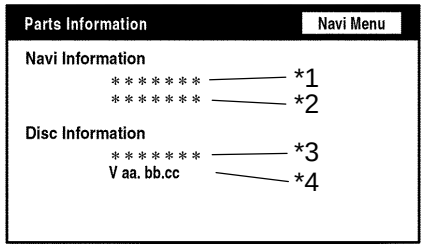
Sensor signal

Display	Contents
Gyro sensor/*3	Gyro sensor output condition is displayed (when the vehicle runs straight or is stationary, the voltage is approximately 2.5 V).

HINT:

Signals are updated once per second only when vehicle sensor signals are changed.

(5) Parts Information Screen



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Screen description

Display	Contents
Navigation Manufacturer/*1	Radio and navigation assy manufacturer is displayed.
Navigation Version No./*2	Radio and navigation assy version is displayed.
Disc Manufacturer/*3	Map disc manufacturer is displayed.
Disc Version No./*4	Map disc version is displayed.

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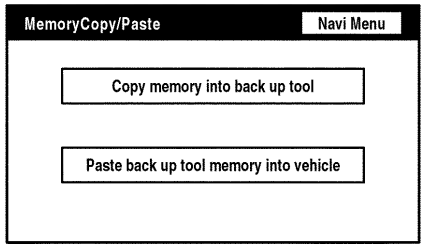
(6) Memory Copy/Paste Screen



P I28246

HINT:
This function cannot be used.

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DIDC6–01

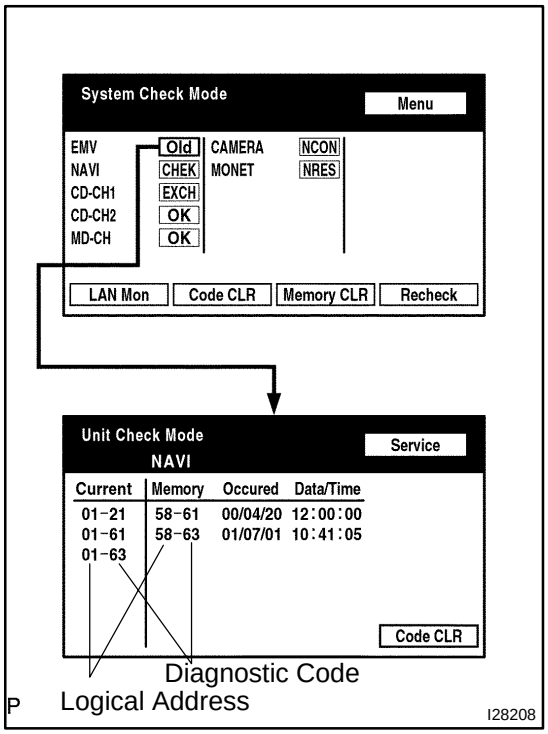
CHECK MODE PROCEDURE

1. SYSTEM CHECK MODE (DTC CHECK)

HINT:

Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

(a) Start the diagnostic mode (See page DI–2191).

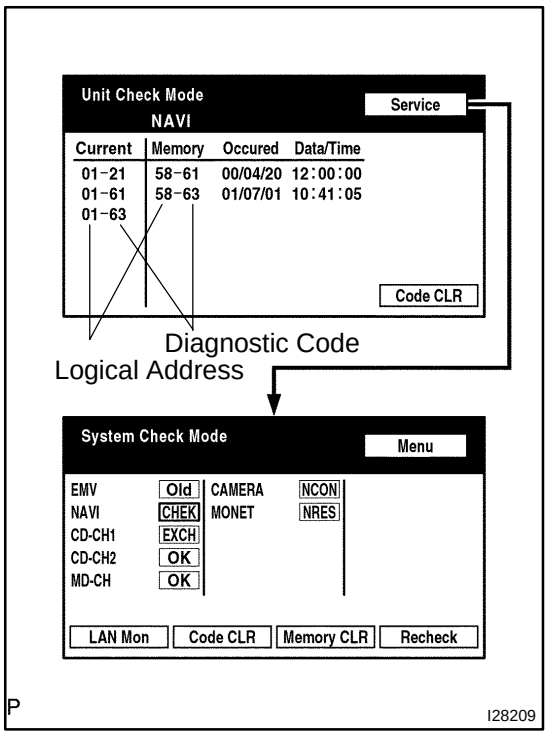


(b) Read the system check result.

If all check results are ”EXCH,” ”CHEK” or ”Old,” touch the display to check the contents on the ”Unit Check Mode” screen and record them on the customer problem analysis check sheet.

HINT:

- ▶ If all check results are ”OK,” go to communication DTC check (go to step c).
- ▶ If a device name is not known, its physical address is displayed.



HINT:

If ”EXCH”, ”CHEK” and ”Old” as well as ”OK” exist, press the service switch to return to the ”System Check Mode”. Then, check the ”Unit Check Mode” screen and record them on the customer problem analysis check sheet.

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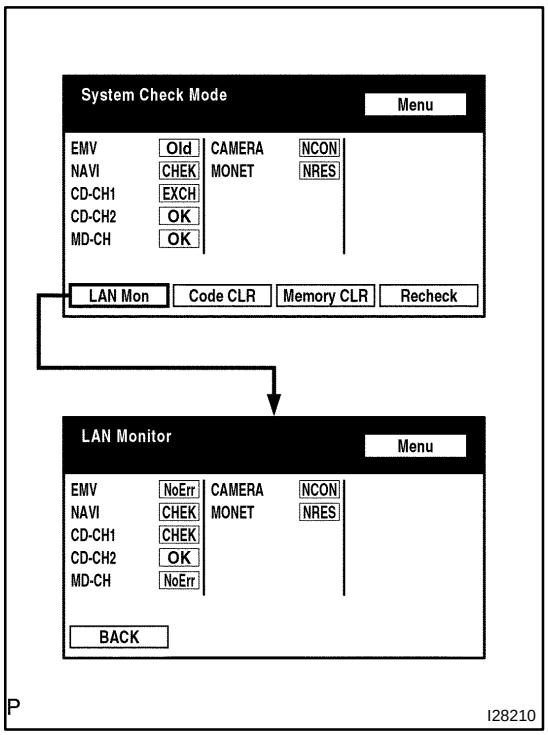
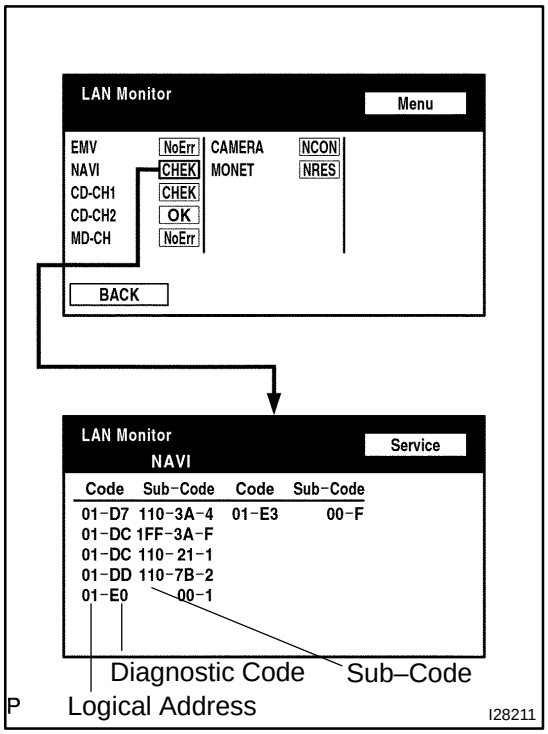


(c) Read the communication diagnostic check result.

(1) Return to the ”System Check Mode”, and press ”LAN Mon” switch to enter the LAN monitor screen.



(d) If the result is ”CHEK” or ”Old,” touch the result switch to check the contents on the individual communication diagnostic screen and record them on the customer problem analysis check sheet.

HINT:

- If all check results are ”No Err,” the system determines that no DTC exists.
- The sub–code (relevant device) will be indicated by its physical address.

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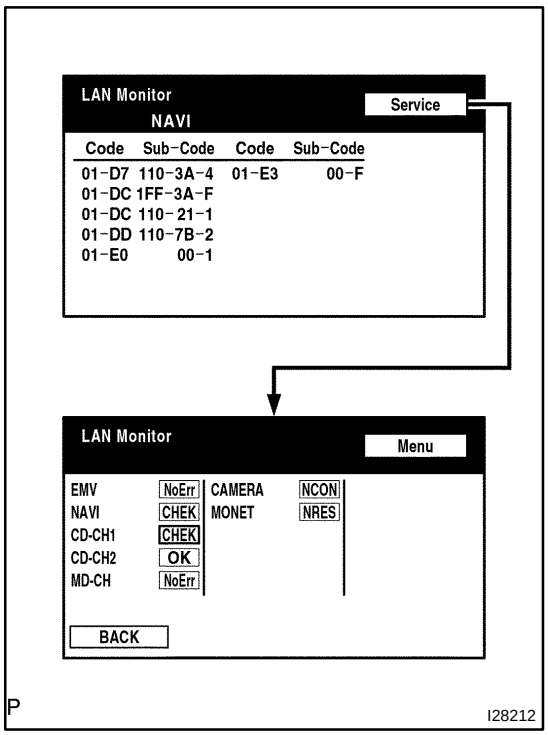
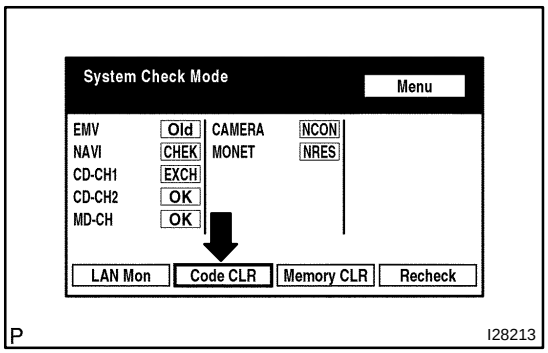


HINT:
If check results of other devices are ”CHEK,” press the ”Service” switch to return to the original ”LAN Monitor” screen. Then, check the individual communication diagnostic screen for the next device and record the result on the customer problem analysis check sheet.

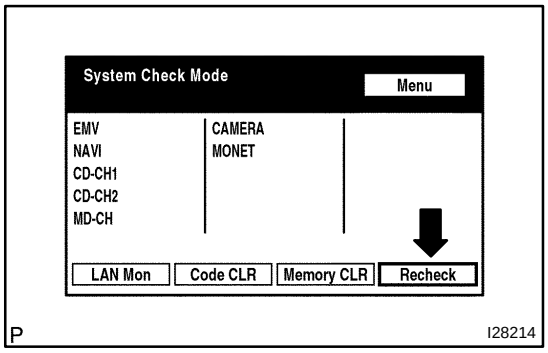
2. SYSTEM CHECK MODE (DTC CLEAR/RECHECK)

HINT:
Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

(a) Enter diagnostic mode (See page DI–2191).



(b) Clear DTC
(1) Press the ”Code CLR” switch for 3 seconds.



(2) Check result is cleared.

(c) Recheck
(1) Press the ”Recheck” switch.

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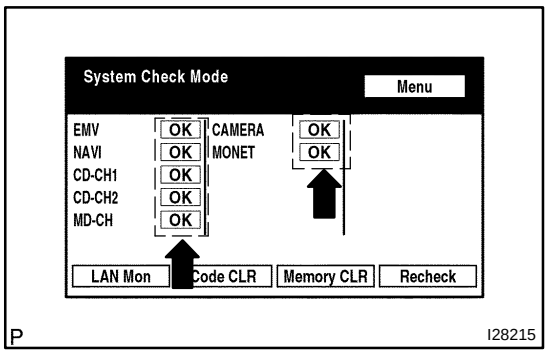
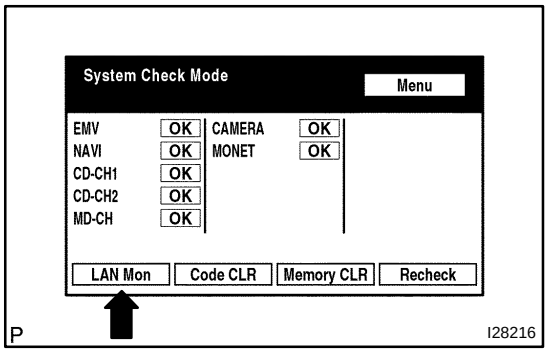
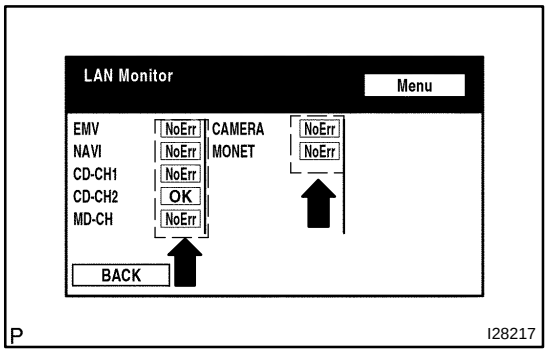


(2) Confirm that all diagnostic codes are ”OK” when the check results are displayed.

If a code other than ”OK” is displayed, troubleshoot again.



(3) Press the ”LAN Mon” switch to change to ”LAN Monitor” mode.



(4) Confirm that all diagnostic codes are ”No Err”.

If a code other than ”No Err” is displayed, troubleshoot again.

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DIDC7–01

DIAGNOSTIC TROUBLE CODE CHART

Terms	Description
Physical address	3–digit, hexadecimal code assigned to all components connected to the AVC–LAN. Individual symbols are specified based on function. Units whose names are unknown or relevant units are displayed with physical addresses.
Logical address	2–digit, hexadecimal code assigned to all the functions in the AVC–LAN system.

HINT:

Titles for each unit are stated in the following order: parts name (physical address) [Name indicated by DTC]

1. Radio and navigation assy (physical address: 140) [AVN]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D5 *1 *5	Absence of registration unit	A device that the sub code shows is (was) disconnected from the system when turning the ignition switch to the ACC or ON position. The communication condition with the device that the code shows cannot be obtained when the engine starts.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy). *7 4. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 5. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *6 6. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–2258 DI–2058 DI–2110 DI–2268 DI–2061 DI–2139 – – –
D8 *2 *5	No response to connection check	The device indicated by the sub code is (was) disconnected from the system after engine start.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy). *7 4. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 5. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *6 6. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–2258 DI–2058 DI–2110 DI–2268 DI–2061 DI–2139 – – –

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D9 *1 *5	Last mode error	The device (for audio visual system) that had functioned before the engine stopped is (was) disconnected from the system when the ignition switch is (was) in the ACC or ON position.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy). *7 4. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 5. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *6 6. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–2258 DI–2058 DI–2110 DI–2268 DI–2061 DI–2139 – – –

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DA *5	No response against ON/OFF command	No response is identified when changing mode (audio and visual mode change). Detected when sound and image do not change by switch operation.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy). *7 4. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 5. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *6 6. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–2258 DI–2058 DI–2110 DI–2268 DI–2061 DI–2139 – – –
DB *1 *5	Mode status error	This code detects a dual alarm.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy). *7 4. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 5. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *6 6. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–2258 DI–2058 DI–2110 DI–2268 DI–2061 DI–2139 – – –

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DC *3 *5	Failure in transmission	This code indicates a transmission failure to the device indicated by the sub code. NOTE: This DTC may have no direct relationship with the malfunction.	1. Power source circuit (Rear seat audio controller). *6 2. Power source circuit (Multi–display controller sub–assy). *7 3. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 4. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *6 5. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *7 6. Replace stereo component amplifier assy. 7. Replace rear seat audio controller. *6 8. Replace multi–display controller sub–assy. *7	DI–2058 DI–2110 DI–2268 DI–2061 DI–2139 – – –
DE *4 *5	Slave reset	This code is stored when a slave device has been disconnected after engine start.	1. Power source circuit (Stereo component amplifier assy). 2. Power source circuit (Rear seat audio controller). *6 3. Power source circuit (Multi–display controller sub–assy). *7 4. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 5. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *6 6. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *7 7. Replace stereo component amplifier assy. 8. Replace rear seat audio controller. *6 9. Replace multi–display controller sub–assy. *7	DI–2258 DI–2058 DI–2110 DI–2268 DI–2061 DI–2139 – – –
21	ROM error	This code is output when a malfunction exists in ROM.	Replace radio and navigation assy.	–
22	RAM error	This code is output when a malfunction exists in RAM.	Replace radio and navigation assy.	–

HINT:

- ▶ *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.
- ▶ *2: If the power connector is disconnected after the engine starts, this code is recorded after 180 seconds.
- ▶ *3: This code may be stored if the ignition key is turned to the START position again with the engine running.
- ▶ *4: This code may be stored if the ignition key is held in the START position for 1 minute or more before returning to the ON position.
- ▶ *5: If the device is reported as not existing during verification, check the power source circuit and AVC–LAN circuit for the device.
- ▶ *6: w/ Rear seat audio system only.

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▶ *7: w/ Rear seat entertainment system only.

(b) Logical address: 58 (Navigation): 80 (GPS)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
43	SPD signal error	The difference between the GPS speed and SPD pulse is detected.	1. Inspect speed signal error. 2. Speed signal circuit. 3. Replace radio and navigation assy.	– DI–2291 –
44	Player error	Map player error is detected.	1. Check if the disc can be inserted and ejected. If a malfunction is found, replace the radio and navigation assy. 2. If the same code is detected again, replace the radio and navigation assy.	– –
45	High temperature	High map player temperature is detected.	1. Park the vehicle in a cool place. Turn the engine off. After checking that the temperature of the radio and navigation assy becomes sufficiently low, turn the engine on to verify the malfunction symptom. 2. If the same code is detected again, replace the radio and navigation assy.	– –

(c) Logical address: 21 (SW): 23 (SW with name): 24 (SW converting): 25 (command SW)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
10	Panel switch error	The panel SW detection circuit has a failure.	Replace radio and navigation assy.	–

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2. Stereo component amplifier assy (Physical address: 440) [DSP AMP]

(a) Logical address: 01 (Communication control)

HINT:

Methods used to verify the cause of the problem are listed in order of probability in the verification column.

DTC	Name	Diagnosis	Verification	See page
D7 *2	Connection check error	When either of the following conditions is met. ▶The device that stored this code has (had) been disconnected after the engine starts (started). ▶The master device has (had) been disconnected when this code is (was) stored.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 3. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *5 4. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *6 5. Power source circuit (stereo component amplifier assy). 6. Replace radio and navigation assy. 7. Replace stereo component amplifier assy.	DI–2256 DI–2268 DI–2061 DI–2139 DI–2258 – –
DC *3 *4	Transmission error	The device stores the fact that transmission to the device indicated by the sub code has failed. NOTE: This DTC may not be directly related to the problem.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 3. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *5 4. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *6 5. Power source circuit (stereo component amplifier assy). 6. Replace radio and navigation assy. 7. Replace stereo component amplifier assy.	DI–2256 DI–2268 DI–2061 DI–2139 DI–2258 – –
E0 *1	Registration complete indication error	When ”Registration complete” command from the master device cannot be received. NOTE: This DTC may not be directly related to the problem.	–	–
E1 *1	Voice processing device ON error	When the AMP device records that the AMP output does not function even while the source device operates.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN circuit (Radio and navigation assy – Stereo component amplifier assy). 3. AVC–LAN (Radio and navigation assy – Rear seat audio controller). *5 4. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). *6 5. Replace radio and navigation assy.	DI–2256 DI–2268 DI–2061 DI–2139 –

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E2	ON/OFF indication parameter error	When the command for ON/OFF control from the master device has a problem.	Replace radio and navigation assy.	–
E3 *1	Registration demand transmission	When the registration demand command from the slave device is output, or when the registration demand command is output by receiving connection confirmation command from the sub master device. NOTE: This DTC may not be directly related to the problem.	–	–
E4 *1	Multiple frame incomplete	When the multiple frame transmission ends incomplete. NOTE: This DTC may not be directly related to the problem.	–	–

HINT:

- ▶ *1: This code may be recorded depending on the battery condition or engine start voltage even if no failure is detected.
- ▶ *2: This code may be stored if the ignition key is turned to the START position again with the engine running.
- ▶ *3: This code may be stored if the ignition key is held in the START position for 1 minute or more before returning to the ON position.
- ▶ *4: If the device is reported as not existing during verification, check the power source circuit and AVC–LAN circuit for the device.
- ▶ *5: w/ Rear seat audio system only.
- ▶ *6: w/ Rear seat entertainment system only.

3. Multi–display controller sub–assy (Physical address: 1F6) [RSE ECU, MAIN]

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
21	ROM Error	Abnormal condition of ROM is detected.	Replace multi–display controller sub–assy.	–
22	ROM Error	Abnormal condition of RAM is detected.	Replace multi–display controller sub–assy.	–
D1 *1 *4	Registered component disconnected AVC–LAN transmitting abnormalities	Component shown by sub–code is or was disconnected from system with ignition switch in ACC or ON. Communication with component shown by sub–code is not ensured when engine is started.	1. Power source circuit (Multi–display controller sub–assy). 2. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–2110 DI–2139 –
D7 *2	AVC–LAN Communication Check Error	Component in which this code is recorded is or was disconnected from system after engine start. Or, when recording this code, multi–display controller was disconnected.	1. Power source circuit (radio and navigation assy). 2. Power source circuit (Multi–display controller sub–assy). 3. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). 4. Replace Multi–display controller sub–assy.	DI–2256 DI–2110 DI–2139 –
D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, multi–display controller was disconnected.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–2256 DI–2139 –

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DC *1 *3	Transmission Error	Transmission to component shown by sub–code has been failed. (This code does not necessarily mean actual failure.)	If same sub–code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.	–
DD *4	Master Reset (Momentary Interruption)	Component that is to be master has been disconnected after engine start.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–2256 DI–2139 –
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.	–
E3 *1	Registration Request Transmission	▶Registration Request command is output from slave component. ▶Registration Request command is output from sub–master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.	–
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Multi–display controller sub–assy). 3. Replace Multi–display controller sub–assy.	DI–2256 DI–2139 –
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.	–

HINT:

- ▶ *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting an engine.
- ▶ *2: This code is stored when 210 sec. has passed after the power supply connector is pulled out after engine start.
- ▶ *3: This code may be stored when the engine key is turned back to the ON position and then turned again to the START position in 1 minute after engine start.
- ▶ *4: This code may be stored when the engine key is turned back to the ON position and then turned again to the START position after engine start.

4. Rear seat audio controller (Physical address: 1F4) [RSA]

(a) Logical address: 01 (Communication control)

DTC	Name	Diagnosis	Verification	See page
D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, RSA panel was disconnected.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –

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D7 *2	Connection Check Error	Component in which this code is recorded has been disconnected from system after engine start. Or, when this code was recorded, RSA panel was disconnected.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –
DC *1 *3	Transmission Error	Transmission to component shown by sub–code has been failed. (This code does not necessarily mean actual failure.)	If same sub–code is recorded in other component(s), check harness for power supply and communication system of all components shown by code.	–
DD *4	Master Reset (Momentary Interruption)	Component that is to be master has been disconnected after engine start.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –
E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.	–
E3 *1	Registration Request Transmission	▶Registration Request command is output from slave component. ▶Registration Request command is output from sub–master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.	–
DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment. Error occurs in communication between sub–master (audio) and master component.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –
E4 *1	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.	–
D8 *2	No Response To Connection Check	Component shown by sub–code is or had been disconnected from system after engine start.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –
D9 *1	Last Mode Error	Component operated (sound and/or image was provided) before engine stop is or was disconnected with ignition switch in ACC or ON.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –

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DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Detected when sound and picture does not change by button operation	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –
DB *1	Mode Status Error	Dual alarm is detected.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –
DE *4	Slave Reset (Momentary Interruption)	After engine start, slave component has been disconnected.	1. Power source circuit (radio and navigation assy). 2. AVC–LAN (Radio and navigation assy – Rear seat audio controller). 3. Replace Rear seat audio controller.	DI–2256 DI–2061 –

HINT:

- ▶ *1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting the engine.
- ▶ *2: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.
- ▶ *3: This code may be stored when the engine key is turned 1 min. again after engine start.
- ▶ *4: This code may be stored when the engine key is turned again after engine start.

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DIDC8–01

CIRCUIT INSPECTION

Pressing power switch does not turn on system

INSPECTION PROCEDURE

1	**Check cabin.**

CHECK:

Check that conditions in the cabin are not likely to cause condensation.

HINT:

This problem occurs when the cabin is humid and the temperature rapidly changes. This condition may produce condensation, resulting in a short circuit.

OK:

Condensation is not likely.

NG → **Dry cabin and recheck conditions.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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DIDC9–01

Black screen (No image appears on navigation and audio screen)

INSPECTION PROCEDURE

1	**Check display setting.**

CHECK:

Check that the display is not in ”Screen OFF” mode.

OK:

The display setting is not in ”Screen OFF” mode.

NG → **Change screen to ”screen on” mode.**

OK

2	**Check image quality setting.**

CHECK:

Check if screen color quality can be set.

OK:

Screen color quality can be set.

OK → **Press panel switch ”display” and set screen color quality to normal.**

NG

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3	**Check cabin.**

CHECK:

Check if condensation is likely to occur, or the temperature is high or low (extremely cold) in the cabin.

HINT:

This problem occurs when the cabin is humid and the temperature rapidly changes. This condition may produce condensation, resulting in a short circuit.

OK:

The above conditions are not observed.

NG → **Set cabin temperature to appropriate degrees (20 to 30°C) (68 to 86°F).**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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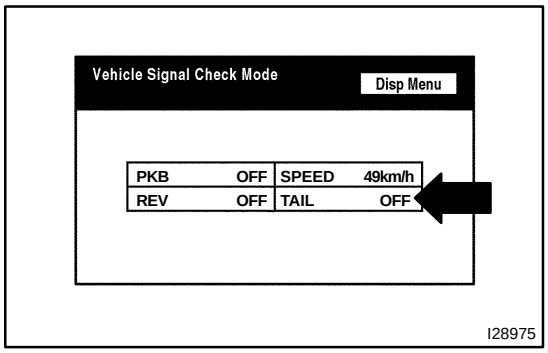
DIDCA–01

Illumination for panel switch does not come on with tail switch on

INSPECTION PROCEDURE

1	**Display check mode (Vehicle signal check mode).**



PREPARATION:

Enter the ”Display Check” mode (Vehicle Signal Check Mode) (See page DI–2176).

CHECK:

Turn the light control switch to the TAIL, HEAD or OFF position.

OK:

Light Control Switch	Display
TAIL or HEAD	ON
OFF	OFF

HINT:

The display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

OK → **Replace radio and navigation assy.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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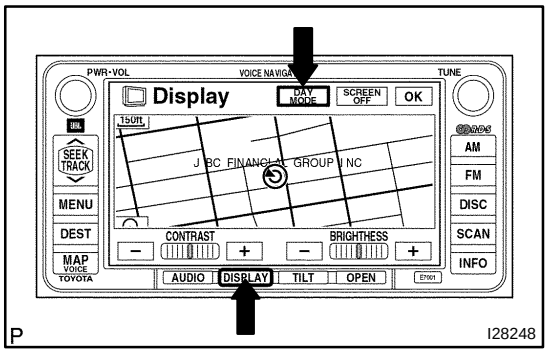
Display does not dim (Night screen) with tail switch on

INSPECTION PROCEDURE

1	**Check image quality setting.**



PREPARATION:

(a) Enter the display adjustment screen by pressing the "DISPLAY" switch.

(b) Turn the light control switch to the TAIL position.

CHECK:

Check if "DAY MODE" on the display adjustment is ON.

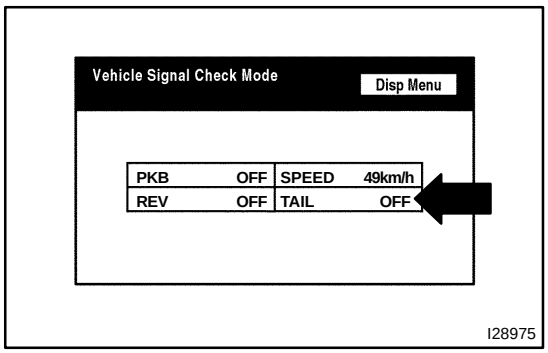
OK:

"DAY MODE" is ON.

OK	**Turn forced "DAY MODE" setting off.**

NG

2	**Display check mode (Vehicle signal check mode).**



PREPARATION:

Enter the "Display Check" mode (Vehicle Signal Check Mode) (See page DI–2176).

CHECK:

Turn the light control switch to the TAIL, HEAD or OFF position.

OK:

Light Control Switch	Display
TAIL or HEAD	ON
OFF	OFF

HINT:

The display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

OK	**Replace radio and navigation assy.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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Panel switch does not function

INSPECTION PROCEDURE

1	**Check panel switch.**

CHECK:

Check for foreign matter around the switch that might prevent operation.

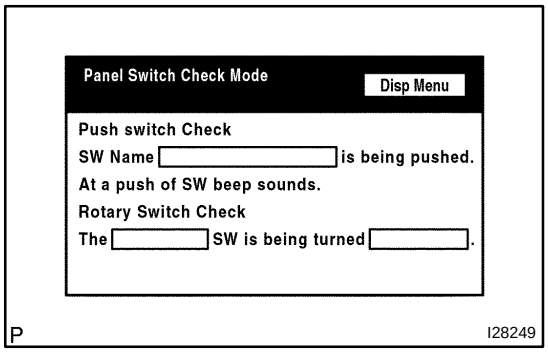
OK:

No foreign matter is found.

NG → **Remove any foreign matter found.**

OK

2	**Display check mode (Panel switch check mode).**



PREPARATION:

Enter the ”Display Check” mode (Panel Switch Check Mode) (See page DI–2176).

CHECK:

Operate the abnormal switch and check if the switch name and status are correctly displayed.

OK:

The switch name and status are correctly displayed as operated.

OK → **Replace radio and navigation assy.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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DIDCE–01

Touch panel switch does not function

INSPECTION PROCEDURE

1	**Check touch panel.**

CHECK:

Check for dirt on the display surface.

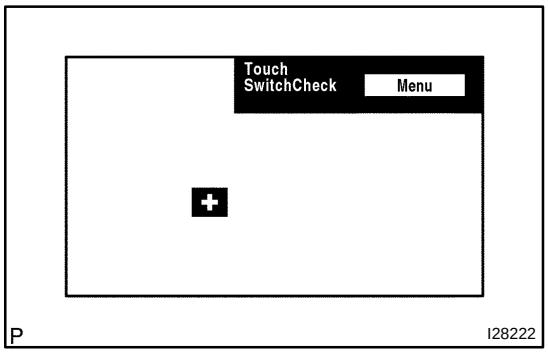
OK:

The display surface is clean.

NG → **Remove any dirt found and recheck touch panel.**

OK

2	**Display check mode (Touch switch check).**



PREPARATION:

Enter the ”Display Check” mode (Touch Switch Check) (See page DI–2176).

CHECK:

Touch the display in the area where the abnormal switch occurs.

OK:

A ”+” mark appears at the touched position.

OK → **Replace radio and navigation assy.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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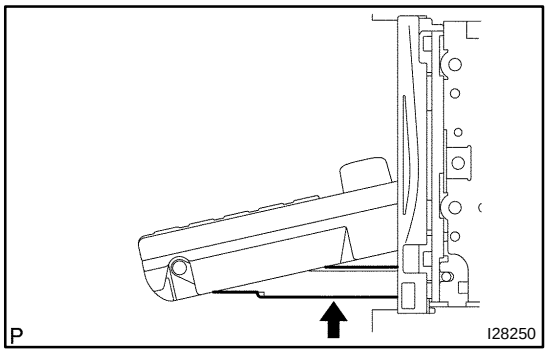
DIDCG–01

Display panel does not open, tilt, or tilts improperly

INSPECTION PROCEDURE

1	**Check radio and navigation assy.**



CHECK:
Check for foreign matter or obstructions caught in the moving parts of the panel.
OK:
No obstruction or foreign matter is found.

NG → **Remove any obstruction or foreign matter found.**

OK

2	**Operation check.**

CHECK:
Check if the navigation and audio systems function properly.
OK:
Navigation and audio systems function properly.

OK → **Replace radio and navigation assy.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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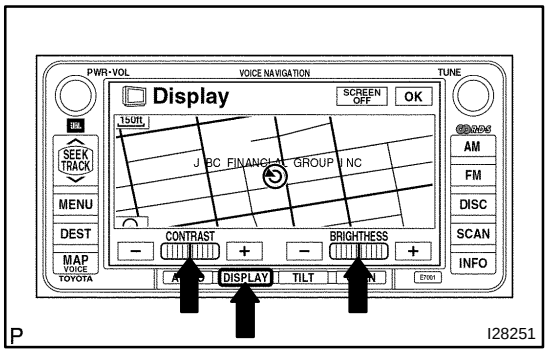
Screen flicker or color distortion

INSPECTION PROCEDURE

1	**Check display setting.**



PREPARATION:

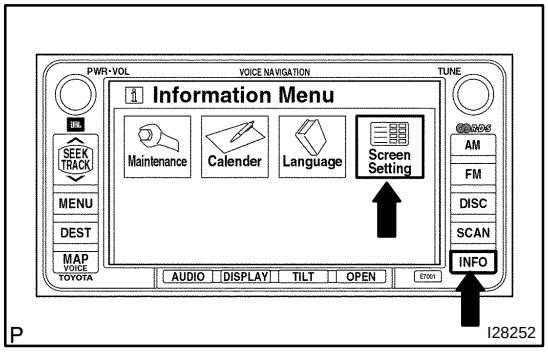
Enter the display adjustment screen by pressing the ”DISPLAY” switch.

CHECK:

Reset display settings (contrast, brightness) and check if the screen appears normal.

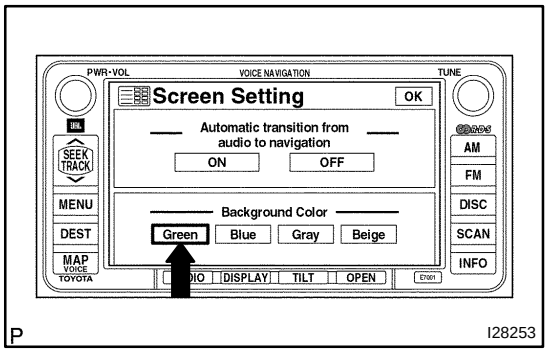
OK:

Returns to normal.



PREPARATION:

Press the ”INFO” switch and then the ”Screen Setting” switch.



CHECK:

Set the ”Background Color” to ”Green” (initial setting) and check if it is normal.

OK:

Returns to normal.

OK	**End.**

NG

Dardoor.com

2	**Check cabin.**

CHECK:

Check if the cabin temperature is –20°C (–4.0°F) or less.

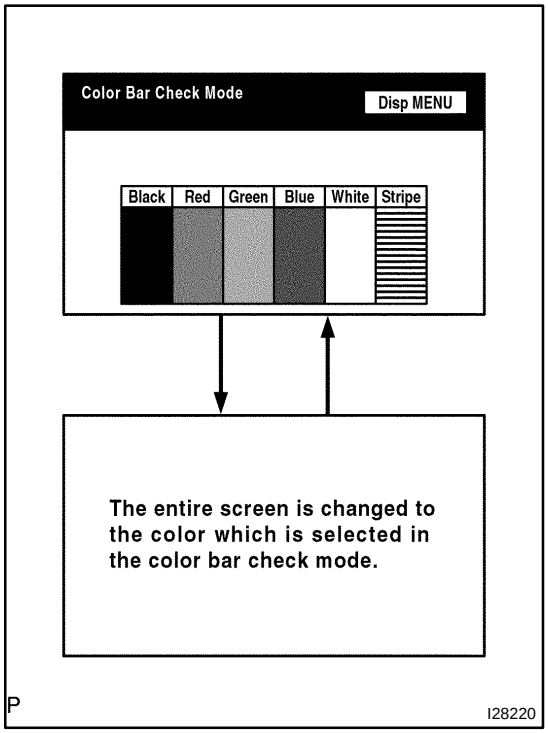
OK:

Cabin is warmer than –20°C (–4.0°F).

NG → **Heat cabin and recheck temperature.**

OK

3	**Display check mode (Color bar check mode).**



PREPARATION:

Enter the ”Display Check” mode (Color Bar Check Mode) (See page DI–2176).

CHECK:

Check that color bars match the displayed names.

OK:

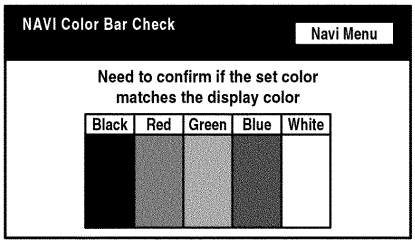
Color bars match the displayed names.

NG → **Replace radio and navigation assy.**

OK

Dardoor.com

4	Navigation check mode (Navi color bar check).



I28233

PREPARATION:

Enter the ”Navigation Check” mode (NAVI Color Bar Check) (See page DI–2180).

CHECK:

Check that color bars match the displayed names.

OK:

Color bars match the displayed names.

NG → **Replace radio and navigation assy.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

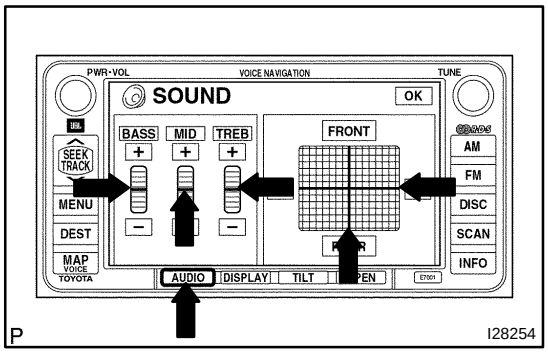
Dardoor.com

DIDCJ–01

No sound can be heard from speakers (Audio Is mute)

INSPECTION PROCEDURE

1	**Check audio settings.**



PREPARATION:

Enter the sound adjustment screen by pressing the ”SOUND” switch on the AUDIO display.

CHECK:

Set volume, fader, and balance to the initial values and check that sound is normal.

OK:

Audio returns to normal.

HINT:

Sound quality adjustment items vary depending on the type of the amplifier.

OK	**End.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

Dardoor.com

DIDCK–01

Radio broadcast cannot be received (Poor reception)

INSPECTION PROCEDURE

1	**Check if radio auto–search functions properly.**

CHECK:

Check if the radio auto–search functions properly.

Perform the auto–search of the radio and check that it functions normally.

OK:

The radio auto–search functions properly.

OK → **Replace radio and navigation assy.**

NG

2	**Check optional components.**

CHECK:

Check optional component (sun shade film, telephone antenna, etc.).

Check whether or not any optional component such as the sun shade film and the telephone antenna is installed.

OK:

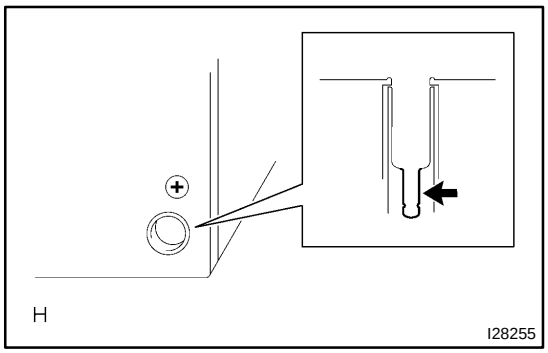
Optional component is not installed.

NG → **Effect from optional component.**

OK

Dardoor.com

3	Inspect radio and navigation assy.



PREPARATION:
Remove the antenna plug from the radio and navigation assy.
CHECK:
With the radio and navigation assy connector connected, turn the ignition switch to the ACC position.
Turn on the radio and choose the AM mode.
Place a screwdriver or a piece of metal such as thin wire on an antenna jack of the radio and navigation assy and check that the noise is heard from the speaker.
OK:

Noise occurs.

NG → **Replace radio and navigation assy.**

OK

4	Check antenna assy.

CHECK:
Check that the antenna is securely installed.
OK:

The antenna is installed properly.

NG → **Install antenna assy properly.**

OK

Dardoor.com

5	**Check antenna cord sub–assy.**

PREPARATION:
Remove the antenna plug of the radio and navigation assy and antenna assy.
CHECK:
Measure the resistance between the antenna assy and radio and navigation assy to check for an open circuit in the antenna cord sub–assy.
OK:
Below 1 Ω
CHECK:
Measure the resistance between the antenna cord sub–assy and body ground to check for a short circuit in the antenna cord sub–assy.
OK:
10 kΩ or higher

NG → **Replace antenna cord sub–assy.**

OK

6	**Replace amplifier antenna assy.**

CHECK:
Replace the amplifier antenna assy and check if it operates normally.
OK:
The amplifier antenna assy operates normally.

OK → **Normal operation.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

Dardoor.com

DIDCL–01

CD cannot be inserted/played or CD is ejected right after insertion

INSPECTION PROCEDURE

1	**Check CD.**

CHECK:

Check if the CD is a normal audio CD that has no cracks, scratches, deformations, dirt, or other defects.

OK:

The CD is a normal audio CD without any problems.

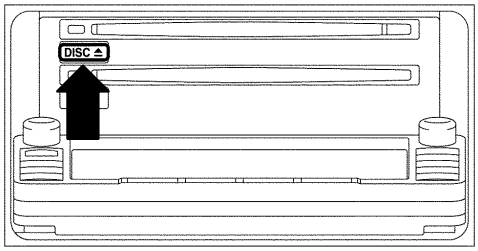
HINT:

- Translucent or deformed CDs cannot be played.
- CD–ROMs (even those with music) and CD–R discs cannot be played.
- A copy protected CD should not be used.
- An adaptor is not necessary to play 3.2 inch (8 cm) CDs.

NG → **Replace CD.**

OK

2	**Check radio and navigation assy.**



CHECK:

Check if the ”DISC” indicator near the disc slot is on.

OK:

It is not on.

NG → **Press disc switch to eject disc.**

OK

Dardoor.com

3	**Check if a cd is inserted properly.**

CHECK:

Check if a CD is inserted properly.

Check whether or not the CD is inserted upside down.

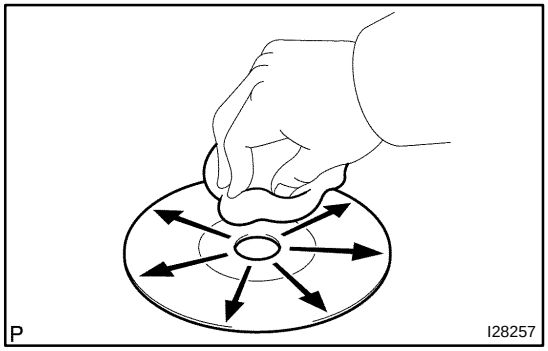
OK:

Not upside down.

NG → **Set disc correctly.**

OK

4	**Check CD.**



CHECK:

Check for dirt on the CD surface.

OK:

The CD is clean.

HINT:

If dirt is on the CD surface, wipe it with a soft cloth from inside to outside in a radial direction.

NOTICE:

Do not use conventional record cleaner or anti–static preservative.

NG → **Clean CD.**

OK

Dardoor.com

5	**Check using another CD.**

CHECK:

Check using another CD.

Check if the problem recurs using another CD.

OK:

The problem does not recur.

OK → **Replace CD.**

NG

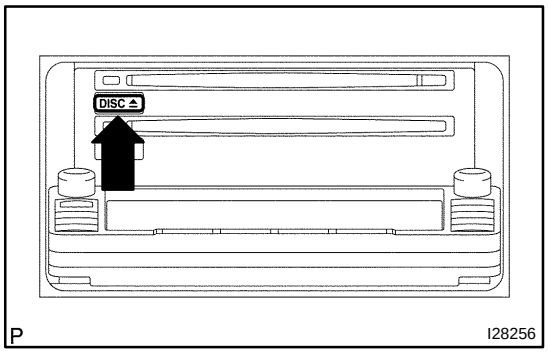
Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

Dardoor.com

CD cannot be ejected

INSPECTION PROCEDURE

1	**Check radio and navigation assy.**

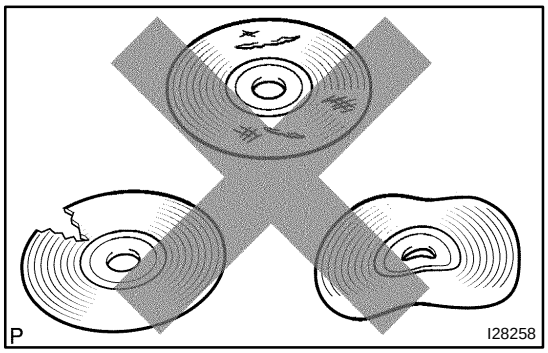


PREPARATION:
Turn the ignition switch to the ACC position.
CHECK:
Keep pressing the ”DISC” eject switch for 5 seconds and check if the disc is ejected by forced ejection.
OK:
The disc is ejected.
HINT:
The above operation can only be performed with the ignition switch in the ACC position.

NG	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).**

OK

2	**Check the CD.**



CHECK:
Check that the CD is not deformed or cracked.
OK:
No deformations or cracks appear on the CD.

NG	**Replace CD.**

OK

Dardoor.com

3	**Check radio and navigation assy.**

CHECK:

Insert another CD and check if it is ejected.

OK:

The disc is ejected.

NG → **Replace radio and navigation assy.**

OK

Normal operation.

Dardoor.com

Abnormal noise occurs

INSPECTION PROCEDURE

1	**Check speaker installation**

CHECK:

Check if each speaker is securely installed.

OK:

Each speaker is securely installed.

HINT:

The radio is equipped with a noise prevention system that blocks only excessively loud noise. If loud noise occurs, check that all wiring is proper and that the antenna installation part ground and noise–prevention equipment are installed.

Conditions under which noise occurs	Noise type
Noise increases when the accelerator pedal is depressed, but stops when the engine is stopped.	Generator noise
Noise occurs during A/C or heater operation.	Blower motor noise
Noise occurs when the vehicle accelerates rapidly on an unpaved road or after the ignition switch is turned on.	Fuel pump noise
Noise occurs when the horn switch is pressed and released or when pressed and held.	Horn noise
Quiet noise is occurs while the engine is running, but stops when the engine is stopped.	Ignition noise
Noise occurs synchronously with the blink of the turn signal.	Flasher noise
Noise occurs during window washer operation.	Washer noise
Noise occurs while the engine is running, and continues even after the engine is stopped.	Water temperature sensor noise
Noise occurs during wiper operation.	Wiper noise
Noise occurs when the brake pedal is depressed.	Stop light switch noise
Others.	Static electricity stored on the vehicle

HINT:

- ▶ Identify the condition under which the noise occurs, and check the noise filter on the relevant part.
- ▶ First ensure that the noise is not coming from outside. Failure to do so makes noise source detection difficult and may lead to a misdiagnosis.
- ▶ Noise should be removed in descending order of loudness.

NG → **Install it properly.**

OK →

Identification of noise source (See page DI–2174).

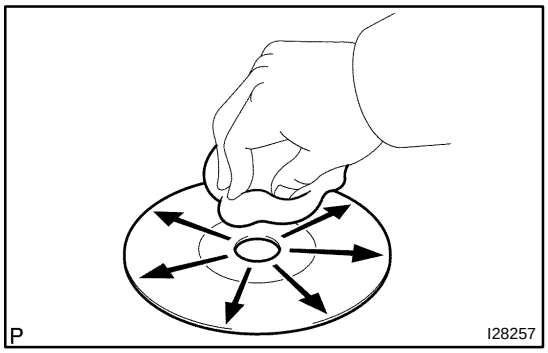
Dardoor.com

DIDCQ–01

CD sound skips

INSPECTION PROCEDURE

1	**Check CD.**

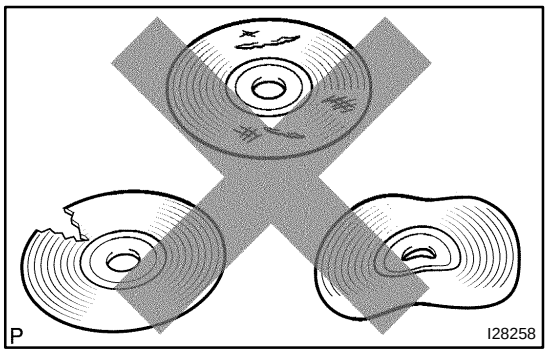


CHECK:
Check for dirt on the CD surface.
OK:
The CD is clean.
HINT:
If dirt is on the CD surface, wipe it with a soft cloth from inside to outside in a radial direction.
NOTICE:
Do not use conventional record cleaner or anti–static preservative.

NG → **Clean CD.**

OK

2	**Check CD.**



CHECK:
Check that the CD is not deformed or cracked.
OK:
No deformations or cracks appear on the CD.

NG → **Replace CD.**

OK

Dardoor.com

3	**Check using another CD.**

CHECK:

Check if the problem recurs using another CD.

OK:

The problem does not recur.

OK → **Replace CD.**

NG

4	**Check radio and navigation assy.**

CHECK:

Check that the radio and navigation assy is properly installed.

OK:

Radio and navigation assy is properly installed.

NG → **Reinstall radio and navigation assy properly.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

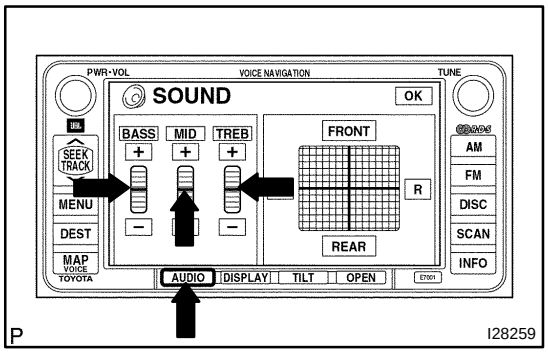
Dardoor.com

DIDCR–01

Poor sound quality in all modes (Low volume)

INSPECTION PROCEDURE

1	**Check audio settings.**



PREPARATION:

Enter the sound adjustment screen by pressing the ”SOUND” switch on the AUDIO display.

CHECK:

Set ”BASS” and ”TREB” to the initial values and check if sound is normal.

OK:

Returns to normal.

HINT:

Sound quality adjustment items vary depending on the type of the amplifier.

OK	**End.**

NG

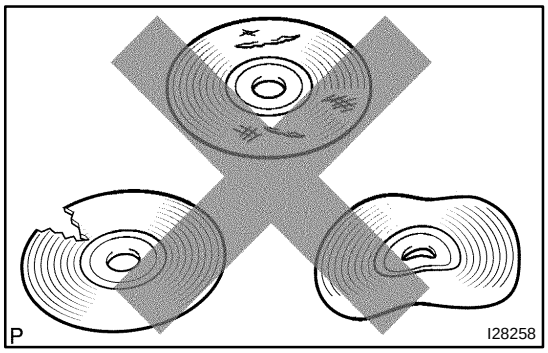
Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

Dardoor.com

Map disc cannot be inserted

INSPECTION PROCEDURE

1	**Check map disc.**

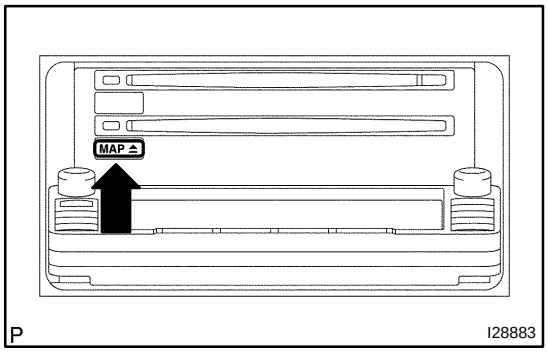


CHECK:
Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks appear on the map disc.

NG → **Check map disc.**

OK

2	**Check radio and navigation assy.**



CHECK:
Check if the ”MAP” indicator near the disc slot is on.
OK:
It is not on.

NG → **Press eject switch to eject disc.**

OK

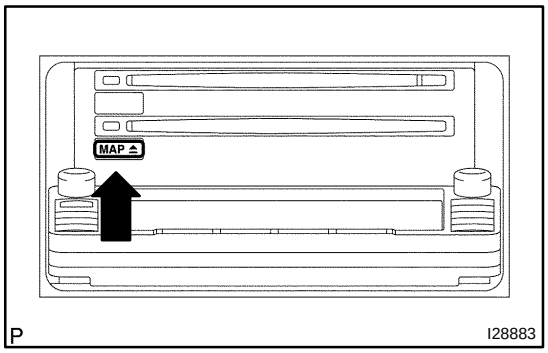
Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

Dardoor.com

Map disc cannot be ejected

INSPECTION PROCEDURE

1	**Check radio and navigation assy.**

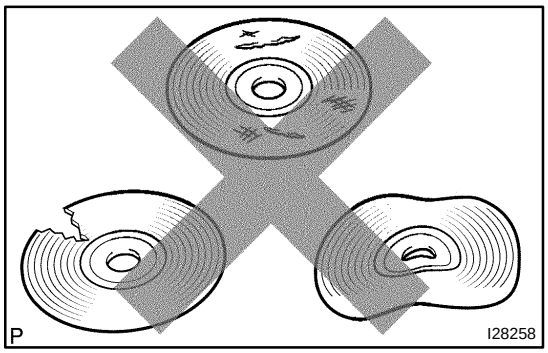


PREPARATION:
Turn the ignition switch to the ACC position.
CHECK:
Keep pressing the ”MAP” eject switch for 5 seconds and check if the disc is ejected by forced ejection.
OK:
The disc is ejected.
HINT:
The above operation can only be performed with the ignition switch in the ACC position.

NG → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).**

OK

2	**Check map disc.**



CHECK:
Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks appear on the map disc.

NG → **Replace map disc.**

OK

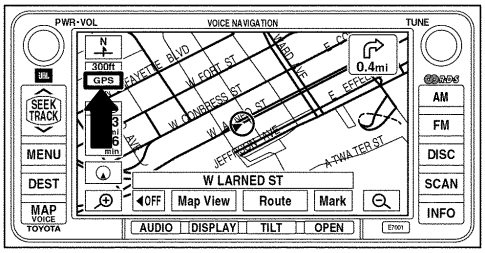
Normal operation.

Dardoor.com

Vehicle position mark deviates greatly

INSPECTION PROCEDURE

1	**Check GPS mark.**



P I28260

CHECK:

Check that the GPS mark is displayed.

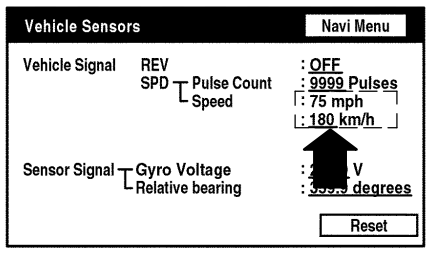
OK:

The GPS mark is displayed.

NG	**Go to "GPS mark is not displayed" in flow chart (See page DI–2245).**

OK

2	**Navigation check mode (Vehicle sensors check).**



P I28261

PREPARATION:

Enter the "Navigation Check" mode (Vehicle Sensors) (See page DI–2180).

CHECK:

While driving, compare the "SPD" indicator to the reading on the speedometer. Check that these readings are almost the same.

OK:

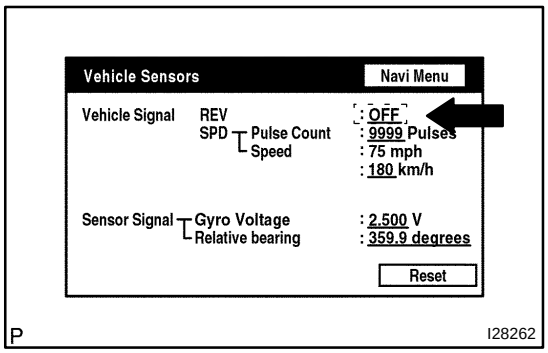
The readings are almost the same.

NG	**Go to "speed signal circuit" in flow chart (See page DI–2291).**

OK

Dardoor.com

3	Navigation check mode (Vehicle sensors check).



CHECK:

Check the ”REV” display according to the table below.

OK:

Shift lever	Display
R	ON
Any position except R	OFF

HINT:

The display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

NG → **Go to ”reverse signal circuit” in flow chart (See page DI–2294).**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

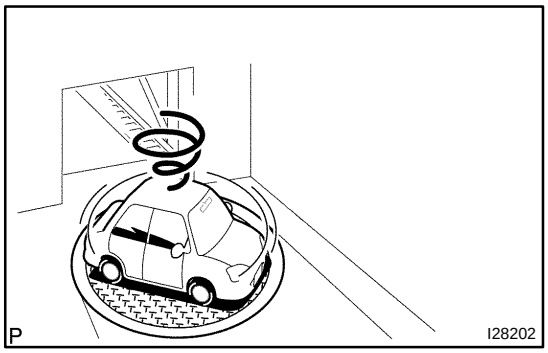
Dardoor.com

DIDCX–01

Cursor or map rotates when vehicle is stopped

INSPECTION PROCEDURE

1	**Check condition.**



CHECK:

Check with the customer if the vehicle has been turned by a turntable at parking.

OK:

The vehicle has not been turned by a turntable.

HINT:

If the ignition switch is turned to the ACC or ON position while the vehicle is being turned by a turntable, the system may store the angular velocity at this time. For this reason, the vehicle position cursor could deviate.

NG → **Turn ignition switch to on position when vehicle is completely stopped.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

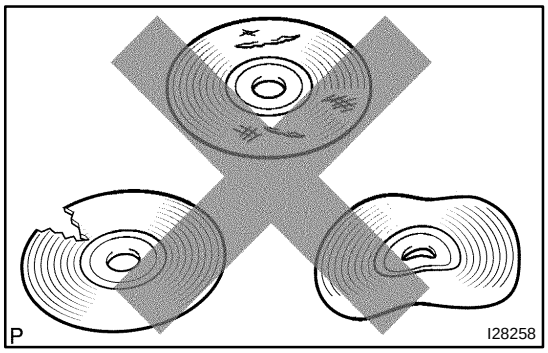
Dardoor.com

DIDCY–01

Vehicle position mark is not updated

INSPECTION PROCEDURE

1	**Check map disc.**



CHECK:
Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks appear on the map disc.

NG → **Replace map disc.**

OK

2	**Check map display.**

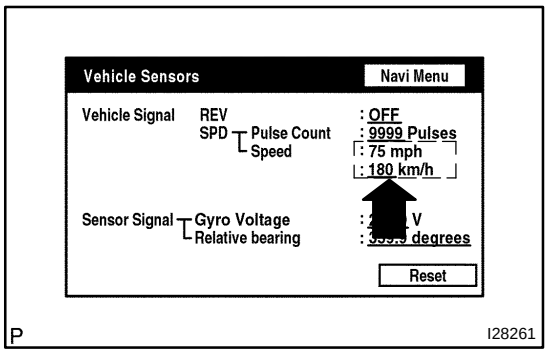
CHECK:
Check if a touch scroll can be performed on the map display.
OK:
Touch scroll can be performed.

NG → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).**

OK

Dardoor.com

3	Navigation check mode (Vehicle sensors check).



PREPARATION:

Enter the ”Navigation Check” mode (Vehicle Sensors) (See page DI–2176).

CHECK:

While driving, compare the ”SPD” indicator to the reading on the speedometer. Check if these readings are almost the same.

OK:

The readings are almost the same.

NG → **Go to ”speed signal circuit” in flow chart (See page DI–2291).**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

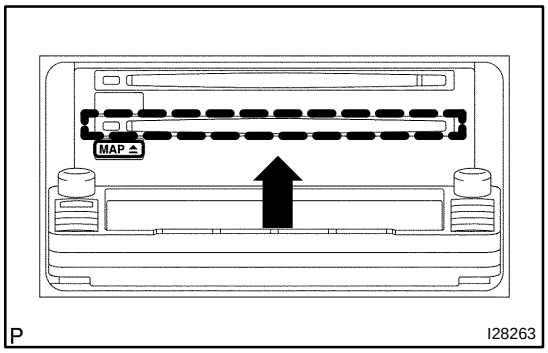
Dardoor.com

DIDD0–01

Current position display does not appear

INSPECTION PROCEDURE

1	**Check radio and navigation assy.**

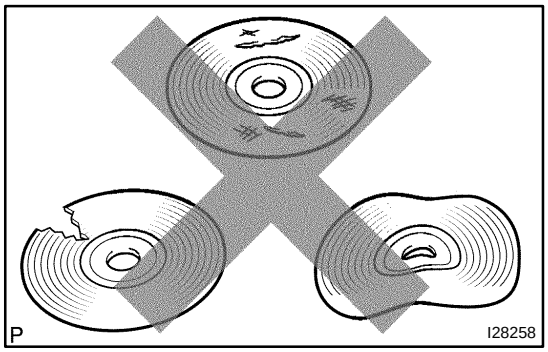


CHECK:
Check if a map disc is inserted in the map disc slot.
OK:
A map disc is inserted.

NG → **Insert map disc in "MAP" side slot.**

OK

2	**Check map disc.**



CHECK:
Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks appear on the map disc.

NG → **Replace map disc.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

Dardoor.com

DIDD1–01

GPS mark is not displayed

INSPECTION PROCEDURE

1	**Check cabin.**

CHECK:

Check the cabin for any object that might interrupt radio reception on the instrument panel. If such an object exists, remove it and check if the GPS mark reappears.

HINT:

GPS works using extremely weak radio waves originating from satellites. If the signal is interrupted by obstructions or another radio wave, the GPS system may not be able to properly receive the signal.

OK:

Mark appears.

OK → **Normal operation.**

NG

2	**Check surroundings.**

CHECK:

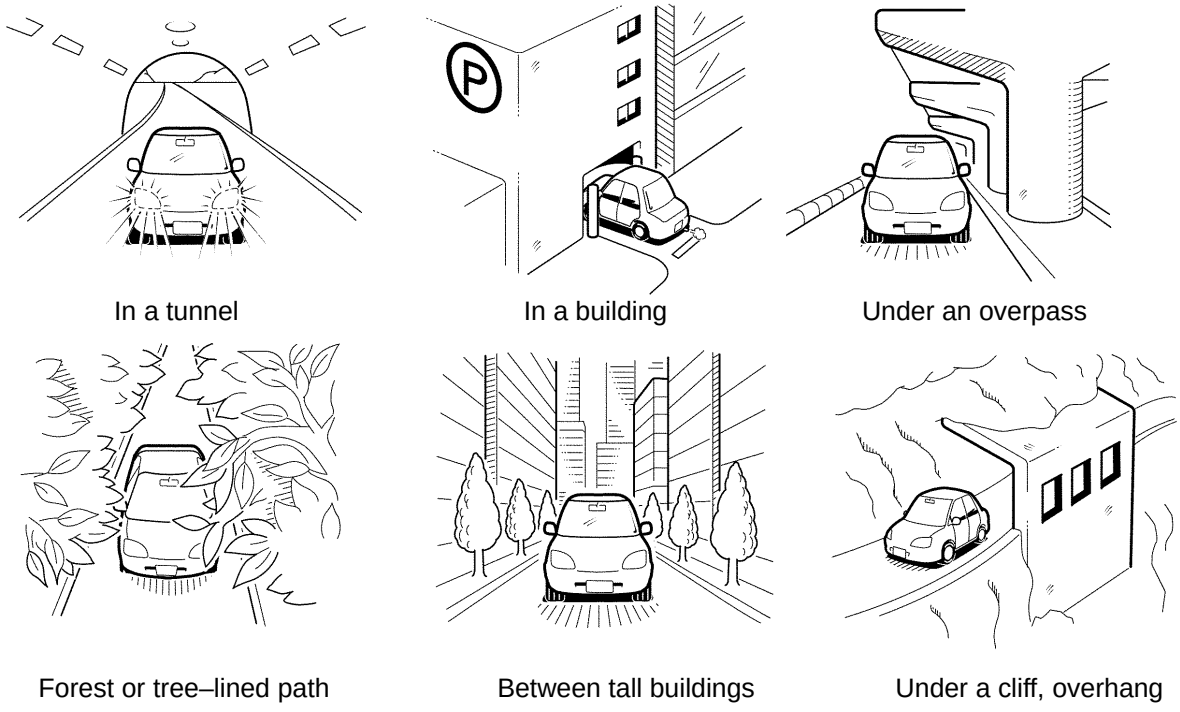
Check if the vehicle is in a location where GPS signal reception is bad. If the vehicle is in such a place, move it elsewhere and check if the GPS mark reappears.

HINT:

- GPS uses 24 satellites in 6 orbits so that at any time 4 satellites will be in line–of–sight of your vehicle.
- GPS signals may not be received, however, based on surroundings, vehicle direction, and time.

Dardoor.com

▶ The following illustrations show some conditions where it may be difficult to receive GPS signals.



OK:

GPS mark is displayed.

OK	**Returns to normal.**

NG

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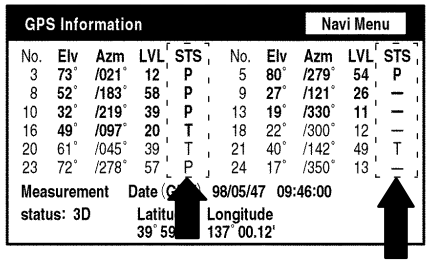
3	Navigation check mode (GPS information).



P I28265

PREPARATION:

Enter the ”Navigation Check” mode (GPS information) (See page DI–2180).

CHECK:

Check how many of the following codes occur in the ”STS” column.

For DENSO Models: T, P
For AISIN AW Models: 04H, 08H
Standard: At least 3 codes occur.

OK → **Replace radio and navigation assy.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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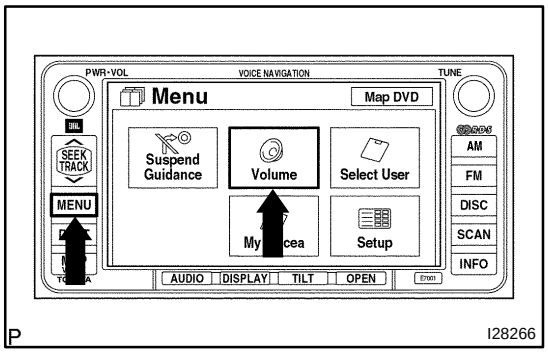
DIDD2–01

Voice guidance does not function

INSPECTION PROCEDURE

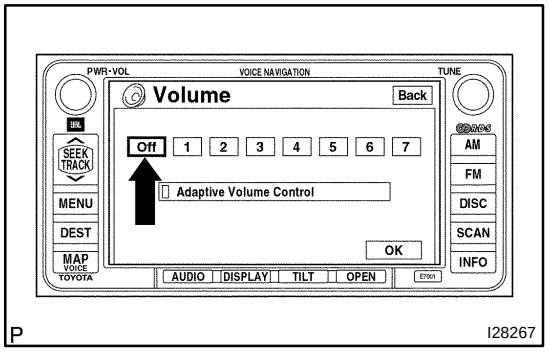
1	**Check navigation system setting.**



PREPARATION:

(a) Enter the "MENU" screen by pressing the "MENU" switch.

(b) Enter the volume adjustment screen by pressing the "Volume" switch.



CHECK:

Check that "OFF" is not selected.

OK:

OFF is not selected.

NG → **Turn voice guidance volume up to 4 using voice adjustment switches.**

OK

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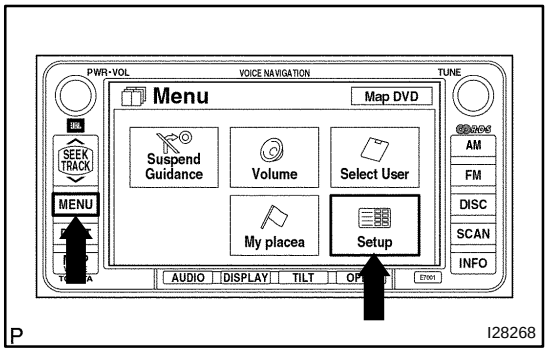
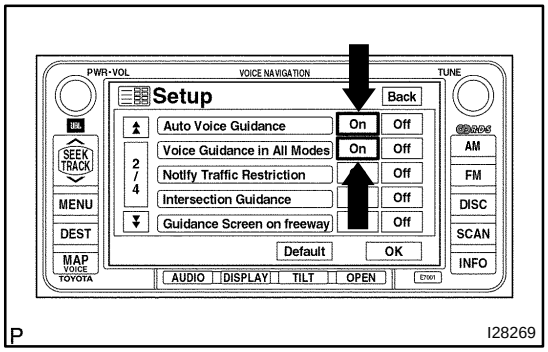
2	Check navigation setting.



PREPARATION:

(a) Enter the ”MENU” screen by pressing the ”MENU” switch.

(b) Enter the ”Setup” screen by pressing the ”Setup” switch.



CHECK:

Check that ”Auto Voice Guidance” is not OFF.

OK:

Auto voice guidance is not OFF.

CHECK:

Check that ”Voice Guidance in All Modes” is not OFF.

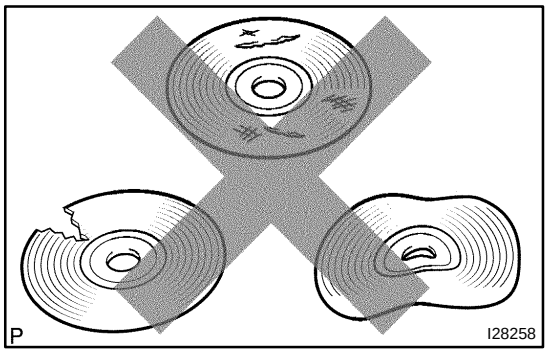
OK:

Voice guidance in all modes is not OFF.

NG	Turn auto voice guidance to ”ON”.

OK

3	Check map disc.



CHECK:

Check that the map disc is not deformed or cracked.

OK:

No deformations or cracks appear on the map disc.

NG	Replace map disc.

OK

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4	**Check radio and navigation assy.**

CHECK:

Check if audio sound can be heard from the driver's side speaker.

OK:

Audio sound can be heard.

NG → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).**

OK

Replace radio and navigation assy.

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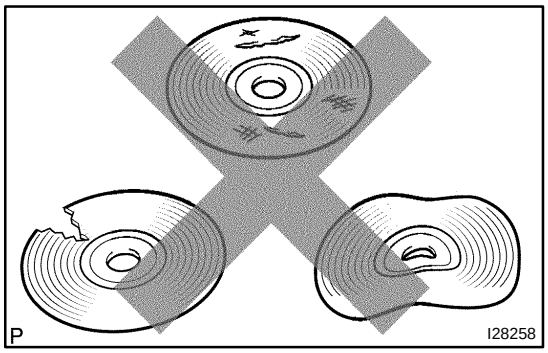
DIDD4–01

Map display incomplete

INSPECTION PROCEDURE

1	**Check map disc.**



CHECK:
Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks appear on the map disc.

NG → **Replace map disc.**

OK

2	**Check display.**

CHECK:
Check that displays other than the navigation display are complete.
OK:
No other incomplete displays are found.

NG → **Replace radio and navigation assy.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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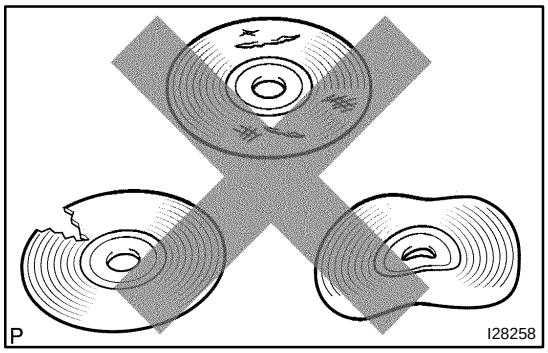
DIDD5–01

Route cannot be calculated

INSPECTION PROCEDURE

1	**Check map disc.**



CHECK:
Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks appear on the map disc.

NG → **Replace map disc.**

OK

2	**Set destination.**

CHECK:
Set another destination and check if the system can calculate the route correctly.
OK:
Route can be correctly calculated.

OK → **Normal operation.**

NG

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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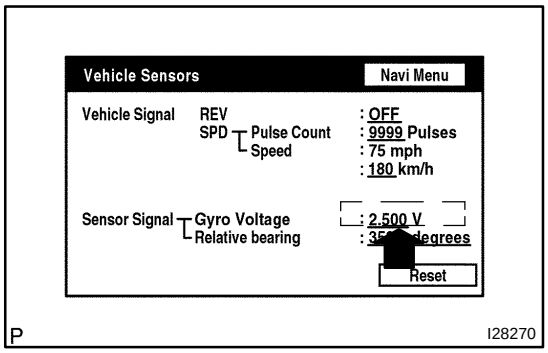
Gyro error

INSPECTION PROCEDURE

1	**Navigation check mode (Vehicle sensors check).**



PREPARATION:

Enter the ”Navigation Check” mode (Vehicle Sensors) (See page DI–2180).

CHECK:

Check the gyro voltage.

OK:

0.1 to 4.5 V

NG → **Replace radio and navigation assy.**

OK →

Proceed to next circuit inspection shown in diagnostic trouble code chart (See page DI–2184).

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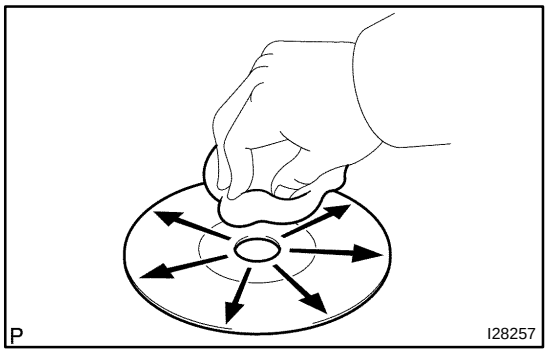
DIDD8–01

Map disc read error

INSPECTION PROCEDURE

1	**Check map disc.**

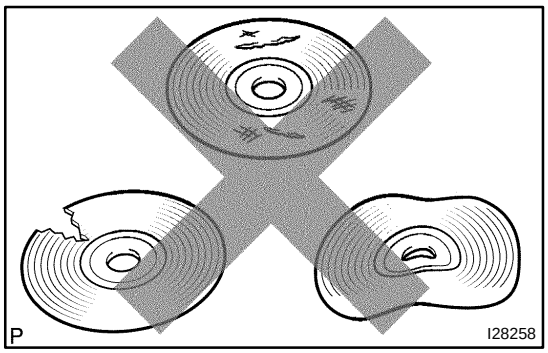


CHECK:
Check for dirt on the map disc surface.
OK:
No dirt is on the map disc surface.
HINT:
If dirt is on the map disc surface, wipe it with a soft cloth from inside to outside in a radial direction.
NOTICE:
Do not use conventional record cleaner or anti–static preservative.

NG → **Clean map disc.**

OK

2	**Check map disc.**



CHECK:
Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks appear on the map disc.

NG → **Replace map disc.**

OK

Proceed to next circuit inspection shown in diagnostic trouble code chart (See page DI–2184).

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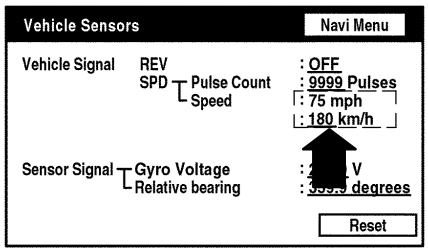
Speed signal error

INSPECTION PROCEDURE

1	**Navigation check mode (Vehicle sensors check).**



CHECK:

(a) Enter the "Navigation Check" mode (Vehicle Sensors) (See page DI–2180).

(b) While driving, compare the "SPD" indicator to the reading on the speedometer. Check if these readings are almost the same.

OK:

The readings are almost the same.

OK → **Replace radio and navigation assy.**

NG

Proceed to next circuit inspection shown in diagnostic trouble code chart (See page DI–2203).

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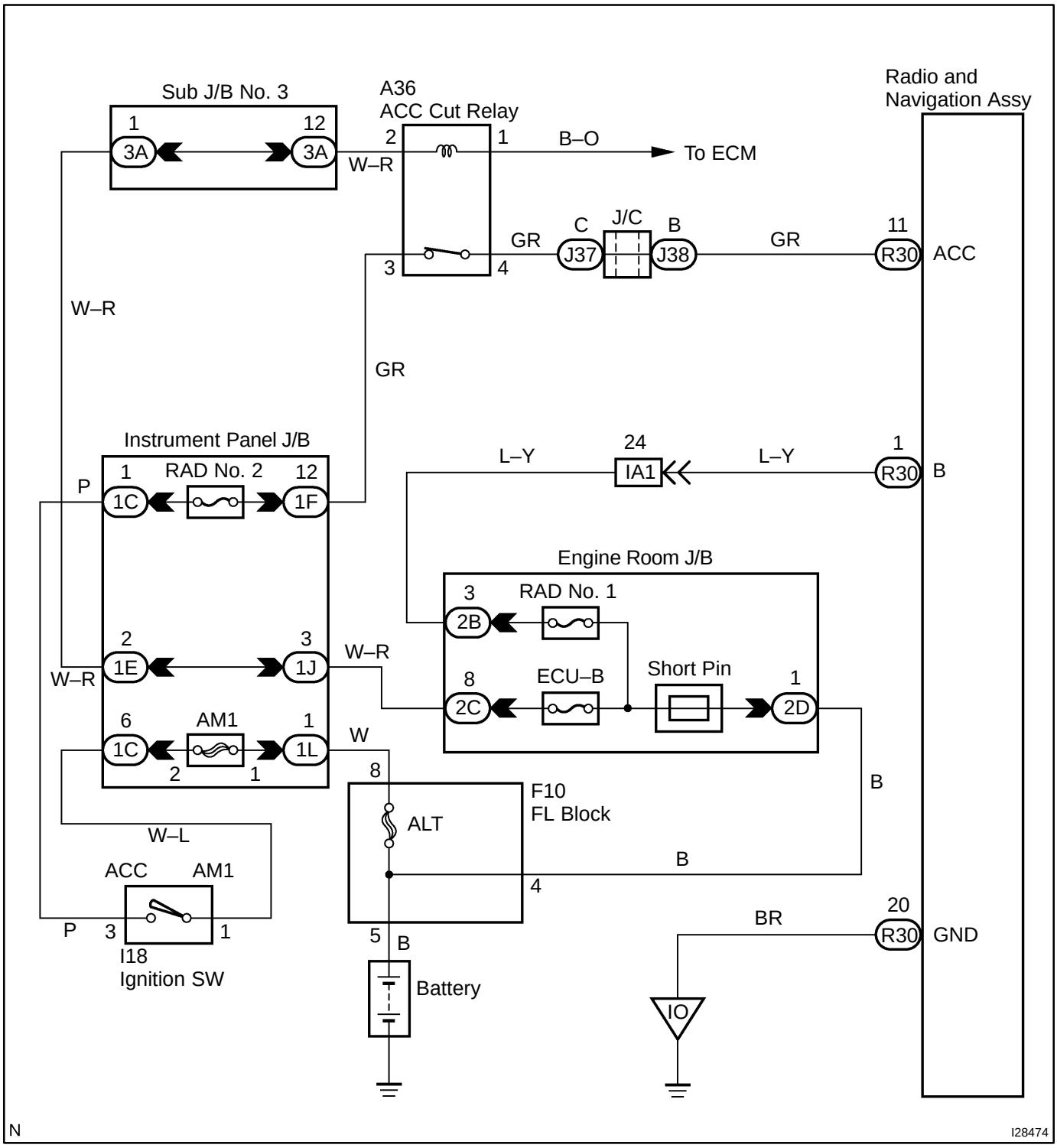
DIDDB–01

Power source circuit (Radio and navigation assy)

CIRCUIT DESCRIPTION

This circuit provides power to the radio and navigation assy.

WIRING DIAGRAM



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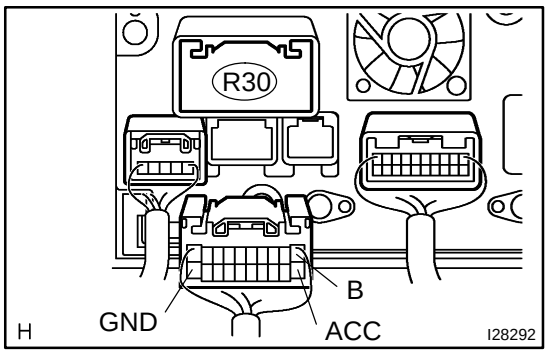
INSPECTION PROCEDURE

1	**Inspect radio and navigation assy (B, ACC, GND).**



PREPARATION:

Disconnect the radio and navigation assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
GND (R30–20) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
B (R30–1) – GND (R30–20)	Always	10 to 14 V
ACC (R30–11) – GND (R30–20)	Ignition switch is in ACC	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table or diagnostic trouble code chart (See page DI–2203 or DI–2184).

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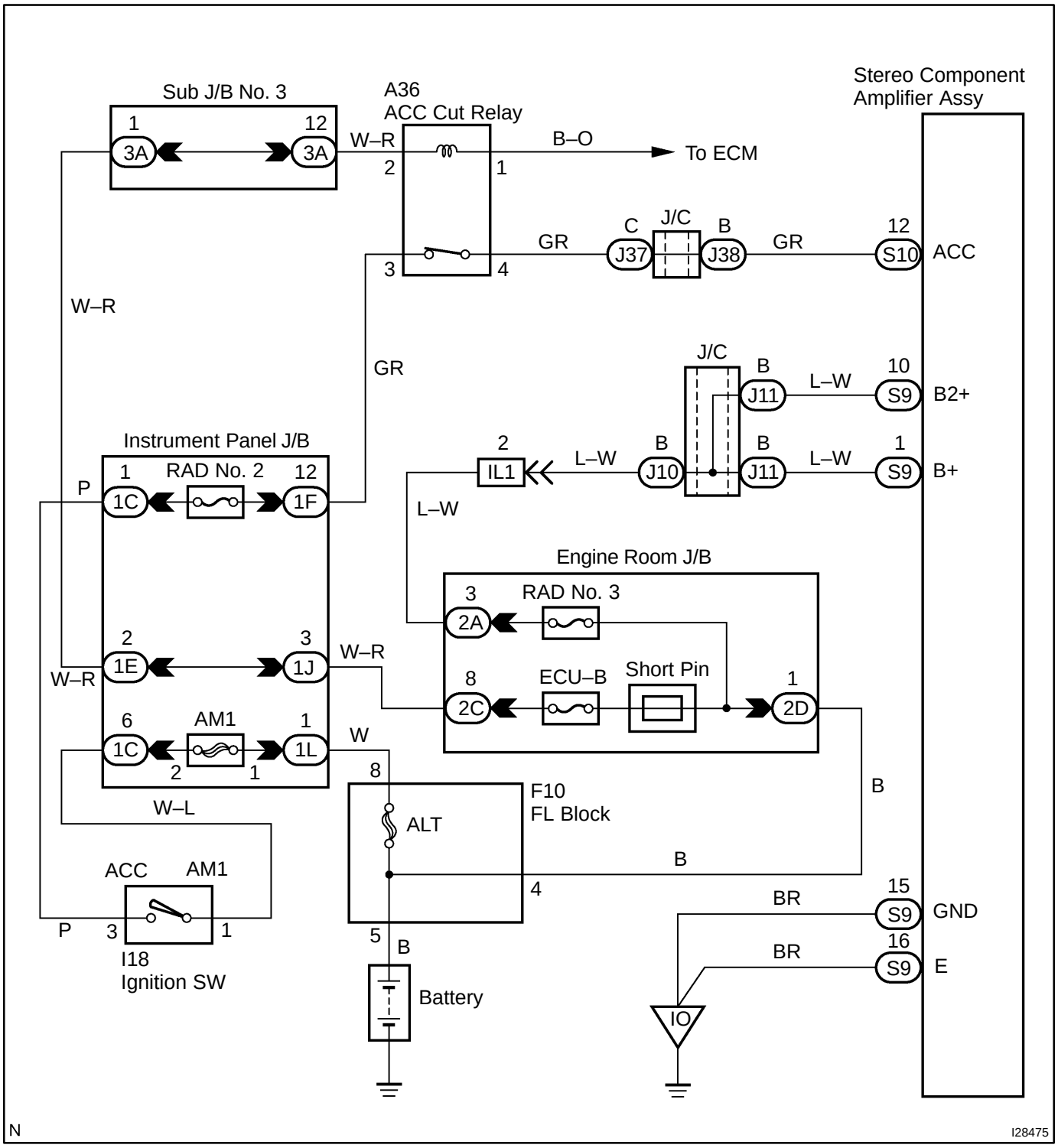
DIDD–01

Power source circuit (Stereo component amplifier assy)

CIRCUIT DESCRIPTION

This circuit provides power to the stereo component amplifier assy.

WIRING DIAGRAM



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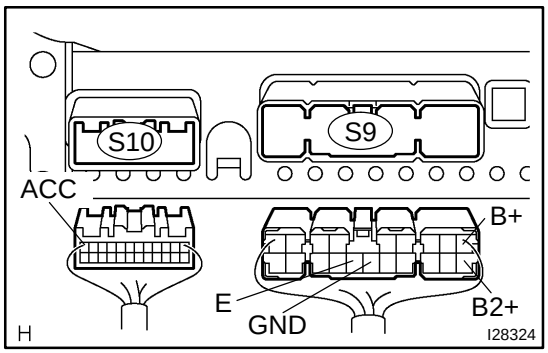
INSPECTION PROCEDURE

1	**Inspect stereo component amplifier assy (B+, B2+, ACC, GND, E).**



PREPARATION:

Disconnect the stereo component amplifier assy connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
E (S9–16) – Body ground	Always	Below 1 Ω
GND (S9–15) – Body ground	Always	Below 1 Ω

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
B+ (S9–1) – GND (S9–15)	Always	10 to 14 V
B2+ (S9–10) – GND (S9–15)	Always	10 to 14 V
ACC (S10–12) – GND (S9–15)	Ignition SW ACC	10 to 14 V

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table or diagnostic trouble code chart (See page DI–2203 or DI–2184).

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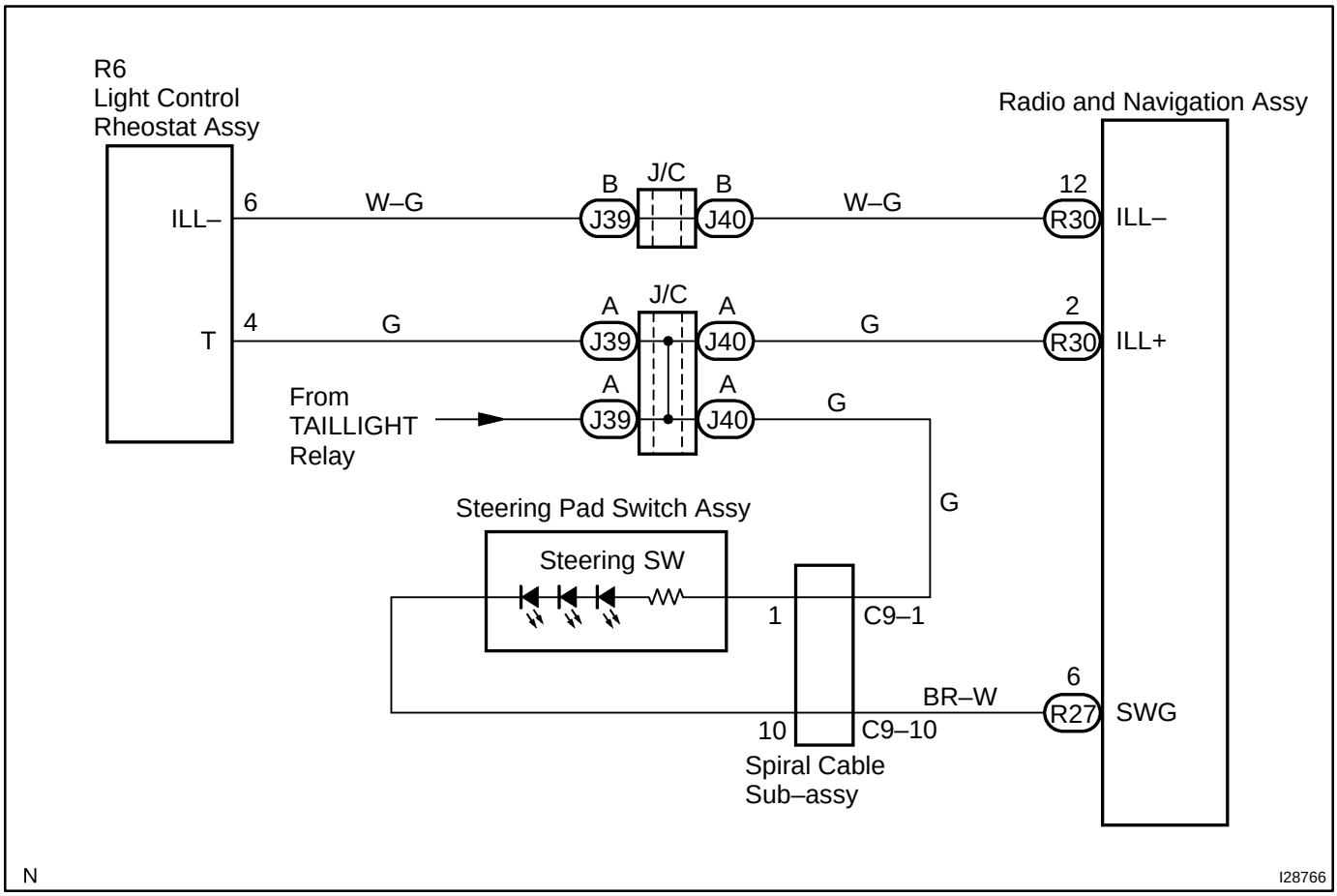
DIDDF–01

Illumination circuit

CIRCUIT DESCRIPTION

Power is supplied to the radio and navigation panel illumination when the light control switch is in the TAIL or HEAD position. The body ECU determines the external brightness based on the brightness level detected by the automatic light control sensor, and then operates the TAILLIGHT relay. Power can also be supplied by operating the relay.
The intensity of the radio receiver panel illumination can be adjusted by the rheostat switch.

WIRING DIAGRAM



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INSPECTION PROCEDURE

NOTICE:

The vehicle is equipped with SRS (Supplemental Restraint System) such as airbags. Before servicing (including removal or installation of parts), be sure to read the precautionary notice for the supplemental restraint system (See page RS–1).

1	**Check illumination.**

CHECK:

Check if the illumination for the radio and navigation assy, steering pad switch assy or others (A/C switch, cigarette lighter, etc.) comes on when the light control switch is turned to the HEAD or TAIL position.

RESULT:

Components with illumination	Go to step
Illumination comes on for all components except radio and navigation assy.	A
Illumination comes on for all components except steering pad switch.	B
Illumination comes on for all components except radio and navigation assy, steering pad switch, Rear heater control panel, each switch, etc.	C
All illumination does not come on. (Radio and navigation assy, steering pad switch, Combination meter, Rear heater control panel, each switch, etc.)	D

HINT:

If the illuminations have malfunctions, check the rheostat switch.

B → **Go to step 4.**

C → **Go to step 8.**

D → **Go to combination meter system (See page DI–1645).**

A

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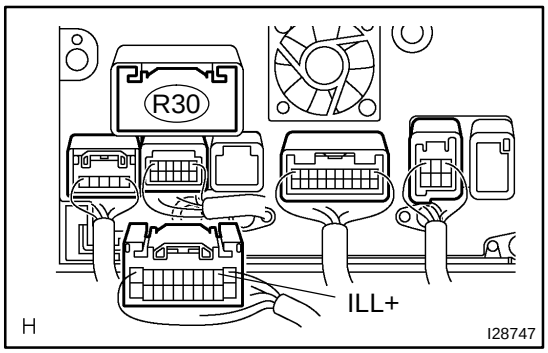
2	Check radio and navigation assy (ILL+).



PREPARATION:

Disconnect the radio and navigation assy connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
ILL+ (R30–2) – Body ground	Light control switch TAIL	10 to 14 V

NG → **Repair or replace wire harness or connector (Radio and navigation assy – battery).**

OK

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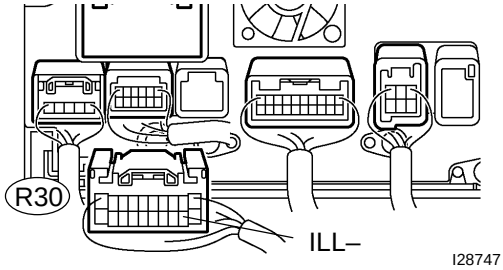
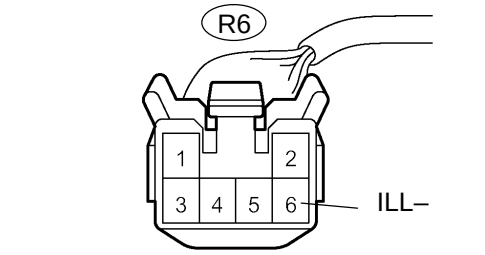
3	Check harness and connector (Radio and navigation assy – light control rheostat).

Radio and Navigation Assy Wire Harness View:



Light Control Rheostat Wire Harness View:



PREPARATION:

Disconnect the radio and navigation assy and light control rheostat connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
ILL– (R30–12) – ILL– (R6–6)	Always	Below 1 Ω
ILL– (R30–12) – Body ground	Always	10 kΩ or higher

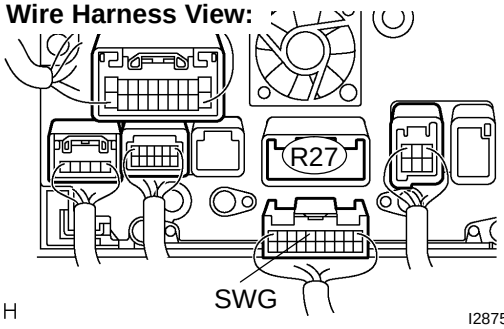
NG → **Repair or replace wire harness or connector.**

OK

Replace radio and navigation assy.

4	Check radio and navigation assy.

Wire Harness View:



PREPARATION:

Disconnect the radio and navigation assy connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symptom (Tester connection)	Condition	Specified condition
SWG (R27–6) – Body ground	Light control switch TAIL	10 to 14 V

OK → **Replace radio and navigation assy.**

NG

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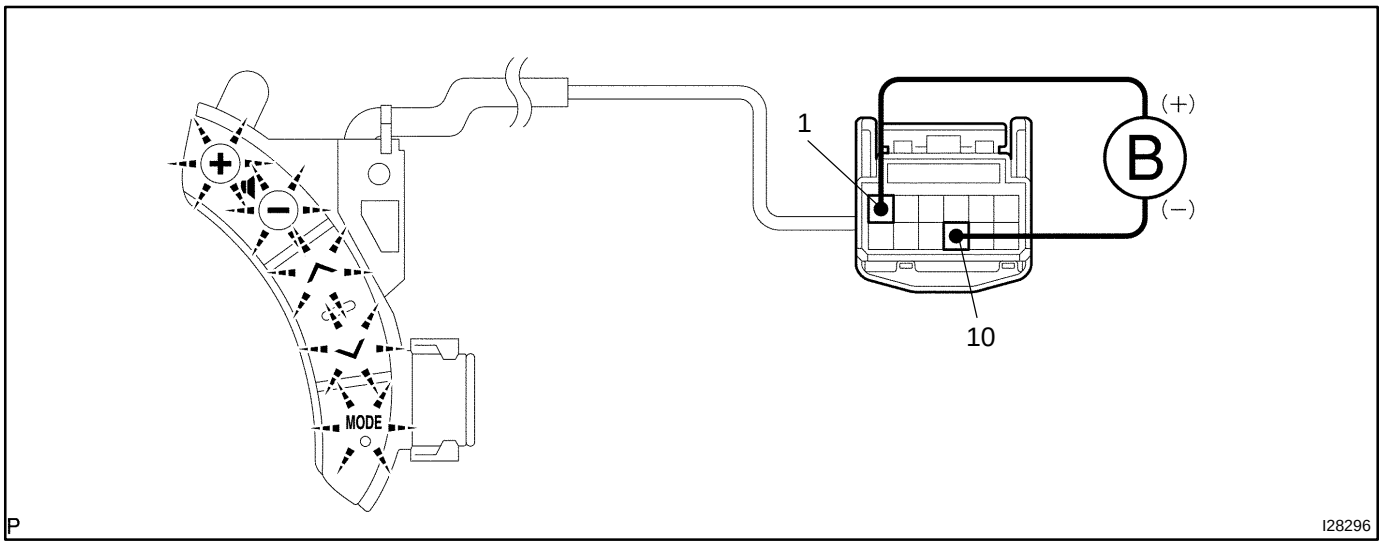
5	Inspect steering pad switch assy.



PREPARATION:

(a) Disconnect the steering pad switch connector.

(b) Connect the positive (+) lead to terminal 1 and the negative (–) lead to terminal 10 of steering pad switch assy connector.

CHECK:

Check if the illumination for the steering pad switch assy comes on.

OK:

Illumination for the steering pad switch assy comes on.

NG → **Replace steering pad switch assy.**

OK

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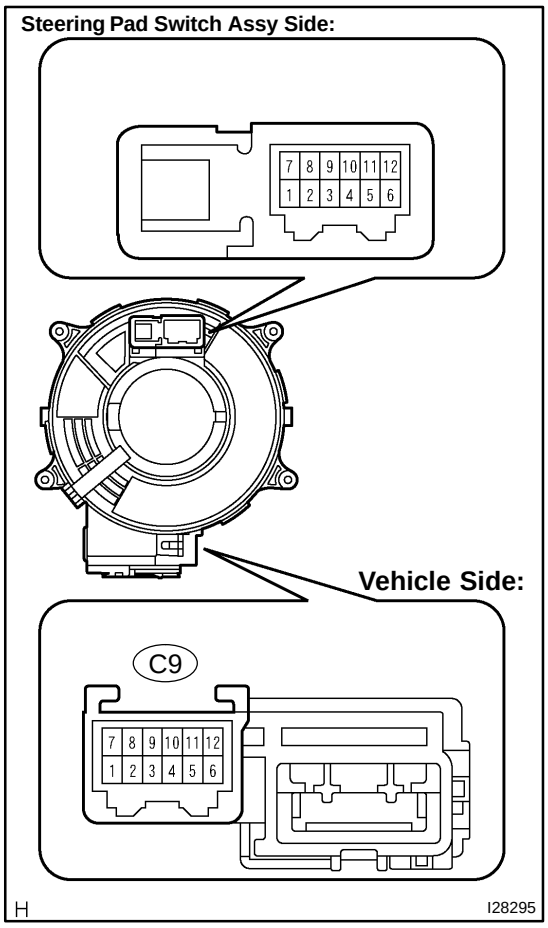
6	Inspect spiral cable sub–assy.



PREPARATION:

Remove the spiral cable sub–assy.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
C9–1 – 1	Always	Below 1 Ω
C9–10 – 10	Always	Below 1 Ω

NG → **Replace spiral cable sub–assy.**

OK

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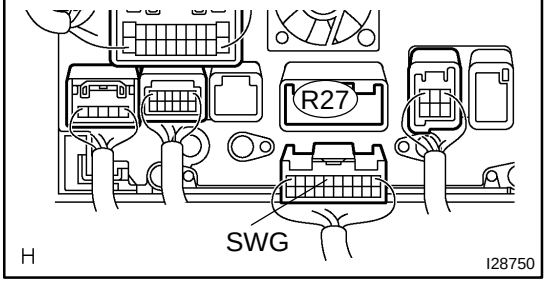
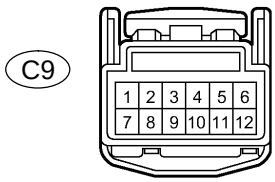
7	Check harness and connector (Radio and navigation assy – spiral cable sub–assy).

Radio and Navigation Assy Wire Harness View:



Spiral Cable Sub–assy Connector Front View:



PREPARATION:

Disconnect the spiral cable sub–assy and radio and navigation assy connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

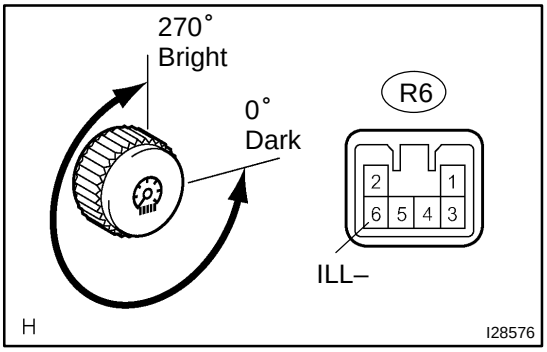
Symbol (Tester connection)	Condition	Specified condition
SWG (R27–6) – Spiral cable terminal 10	Always	Below 1 Ω
SWG (R27–6) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness or connector (Radio and navigation assy – spiral cable sub–assy).**

OK

Repair or replace wire harness or connector (Battery – spiral cable sub–assy).

8	Inspect light control rheostat.



PREPARATION:

(a) Reconnect the light control rheostat switch connector.
(b) Ignition switch is ON.
(c) Light control switch is TAIL or HEAD.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
ILL– (R6–6) – Body ground	Rheostat knob to fully counterclockwise → fully clockwise	Below 1 V → 10 to 14 V

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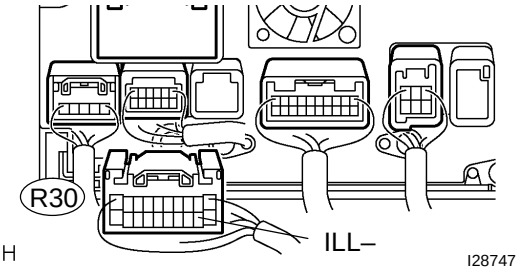
NG → **Replace light control rheostat.**

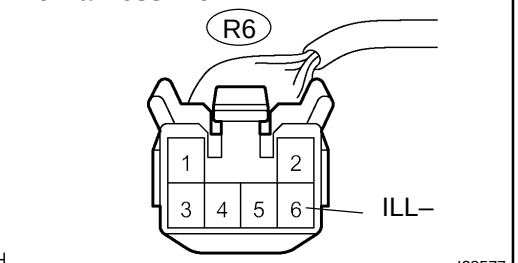
OK

9	**Check harness and connector (Radio and navigation assy – light control rheostat).**

Radio and Navigation Assy Wire Harness View:



Light Control Rheostat Wire Harness View:



PREPARATION:

Disconnect the radio and navigation assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
ILL– (R30–12) – ILL– (R6–6)	Always	Below 1 Ω
ILL– (R30–12) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace wire harness or connector.**

OK

Replace radio and navigation assy.

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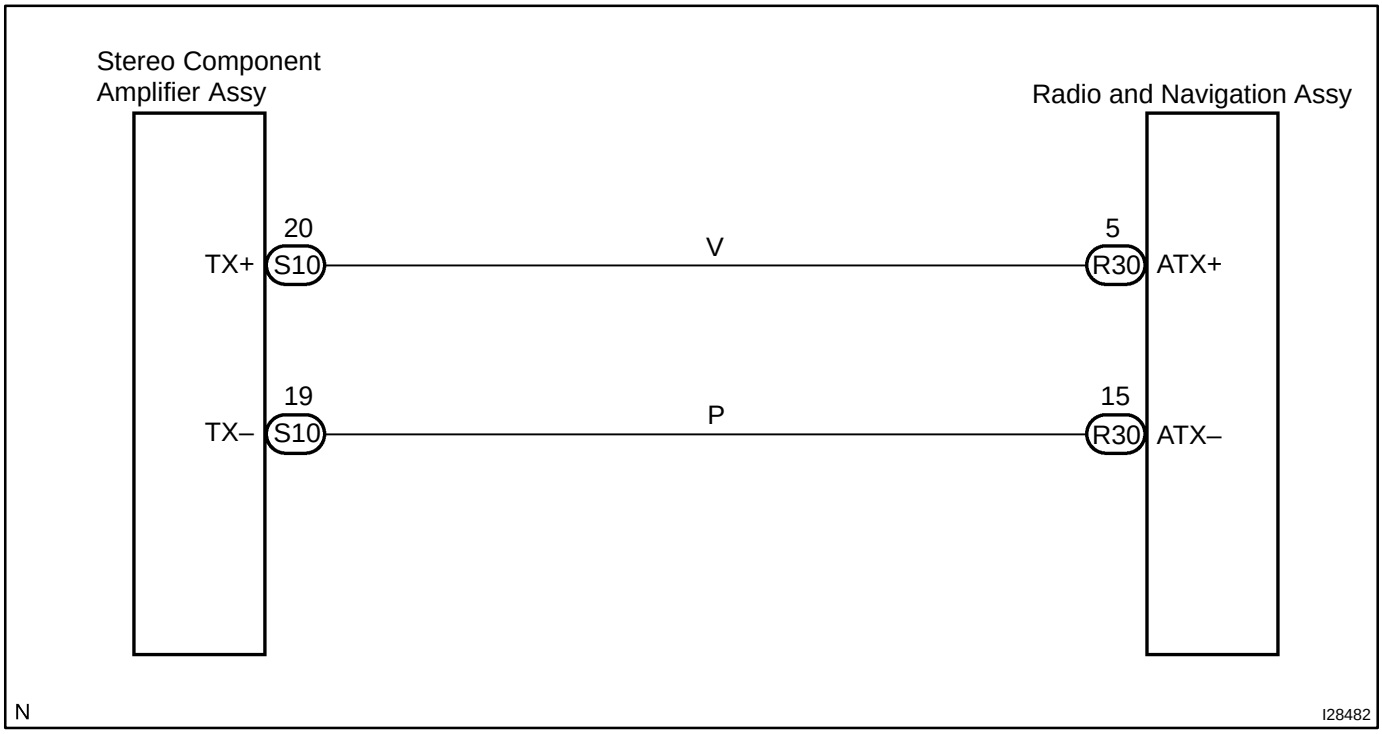
AVC–LAN circuit (Radio and navigation assy – stereo component amplifier assy)

CIRCUIT DESCRIPTION

Each unit of the audio system connected to the AVC–LAN (communication bus) transfers the signal of each switch by communication.
When a short to +B or short to ground occurs in this AVC– LAN, the audio system will not function normally as communication is discontinued.
In this AVC–LAN, the radio and navigation assy becomes the master of the communication and the has resistance necessary for communication.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Service check mode (Stereo component amplifier assy).**

CHECK:

Start the diagnostic system and read the check result for the stereo component amplifier assy (See page DI–2191).

RESULT:

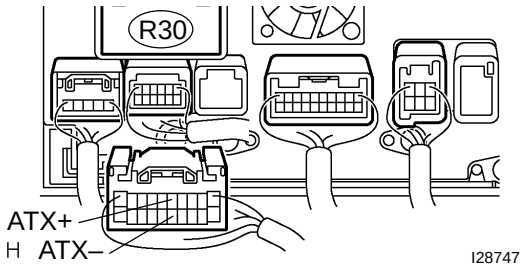
”NCON” is displayed or result is not displayed (DSP AMP)	Go to step A
”GOOD” is displayed	Go to step B

B → **Proceed to next circuit inspection shown in problem symptoms table or diagnostic trouble code chart (See page DI–2184 or DI–2203)**

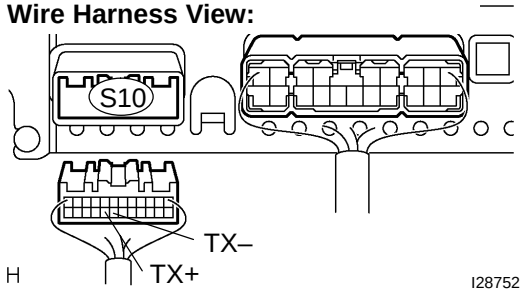
A

2	**Check harness and connector (Radio and navigation assy – stereo component amplifier assy).**

Radio and Navigation Assy Wire Harness View:



Stereo Component Amplifier Assy Wire Harness View:



PREPARATION:

Disconnect the radio and navigation assy and stereo component amplifier assy connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
ATX+ (R30–5) – TX+ (S10–20)	Always	Below 1 Ω
ATX– (R30–15) – TX– (S10–19)	Always	Below 1 Ω
ATX+ (R30–5) – Body ground	Always	10 kΩ or higher
ATX– (R30–15) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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Replace stereo component amplifier assy.

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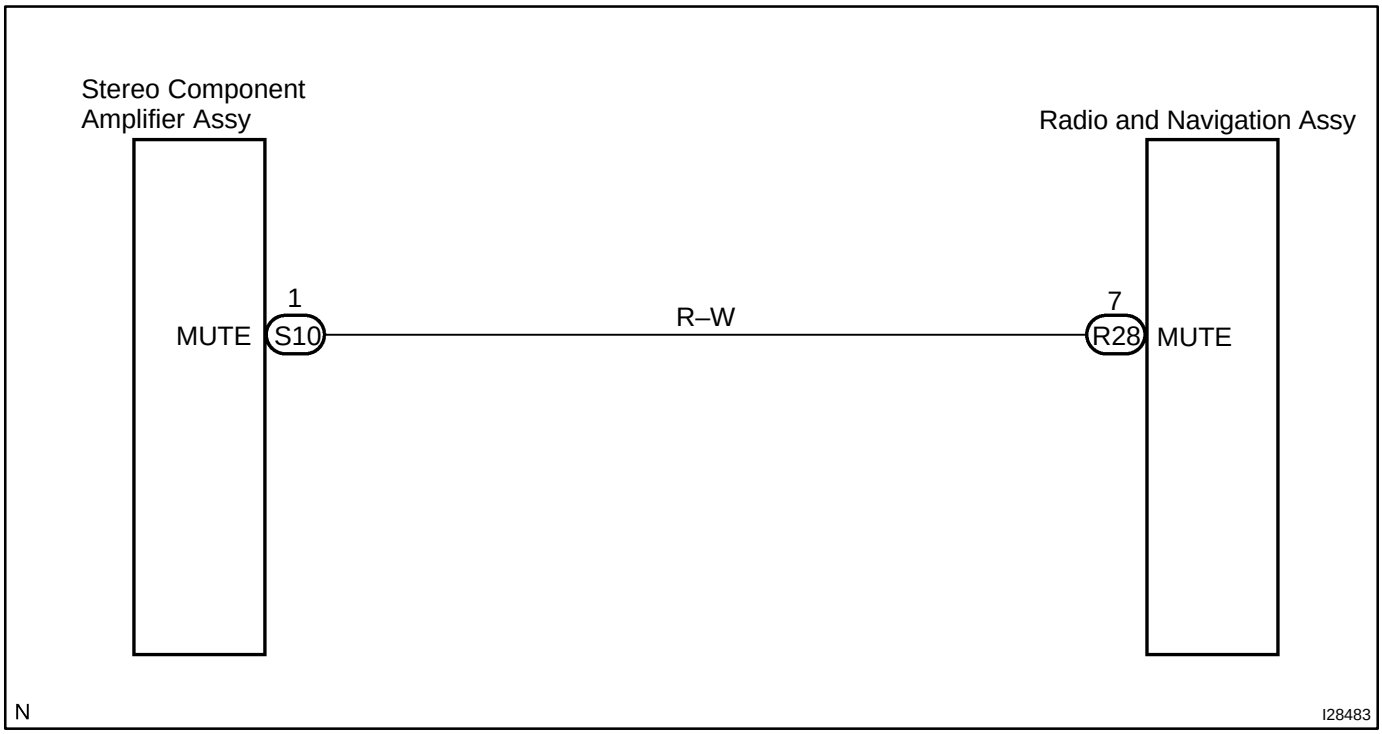
Amplifier mute signal circuit

CIRCUIT DESCRIPTION

This circuit sends a signal to the stereo component amplifier to mute noise. Because of that, the noise produced by changing the sound source ceases.
If there is an open in the circuit, noise can be heard from the speakers when changing the sound source.
If there is a short in the circuit, even though the stereo component amplifier assy is normal, no sound or only an extremely small sound can be produced.

WIRING DIAGRAM



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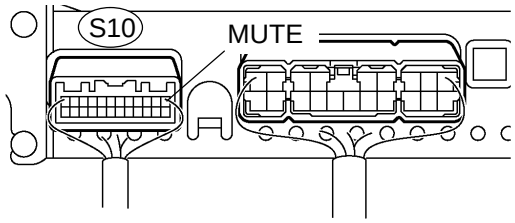
INSPECTION PROCEDURE

1	Inspect stereo component amplifier assy.

Stereo Component Amplifier Assy Wire Harness View:



PREPARATION:

Make sure that the stereo component amplifier assy connector is connected.

CHECK:

Measure the voltage according to the value in the table below.

OK:

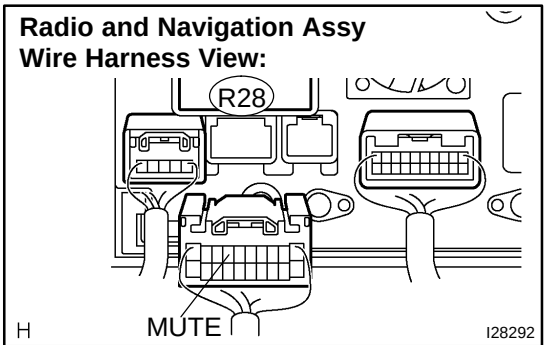
Symbol (Tester connection)	Condition	Specification
MUTE (S10–1) – Body ground	Turn ignition switch to ACC, Audio system is playing → Changing mode	Above 3.5 V → Below 1 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).**

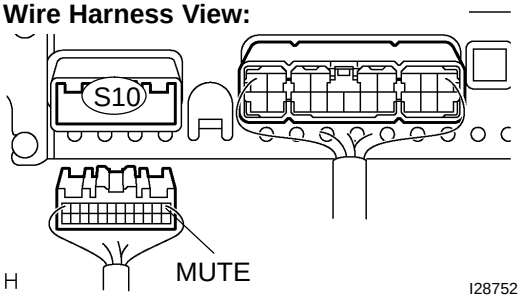
NG

2	Check harness and connector (Radio and navigation assy – stereo component amplifier assy).

Radio and Navigation Assy Wire Harness View:



Stereo Component Amplifier Assy Wire Harness View:



PREPARATION:

Disconnect the radio and navigation assy and stereo component amplifier assy connectors.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
MUTE (R28–7) – MUTE (S10–1)	Always	Below 1 Ω
MUTE (R28–7) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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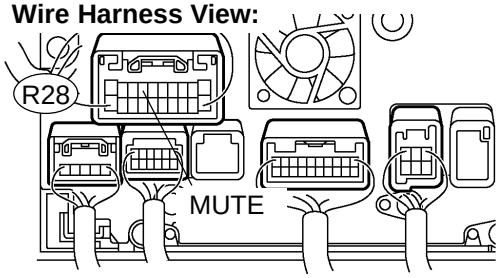
3	Inspect radio and navigation assy.

Wire Harness View:



PREPARATION:

Reconnect the radio and navigation assy connector.

CHECK:

Measure the voltage according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
MUTE (R28–7) – Body ground	Ignition switch ON	Above 3.5 V

OK → **Replace stereo component amplifier assy.**

NG

Replace radio and navigation assy.

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DIDDJ–01

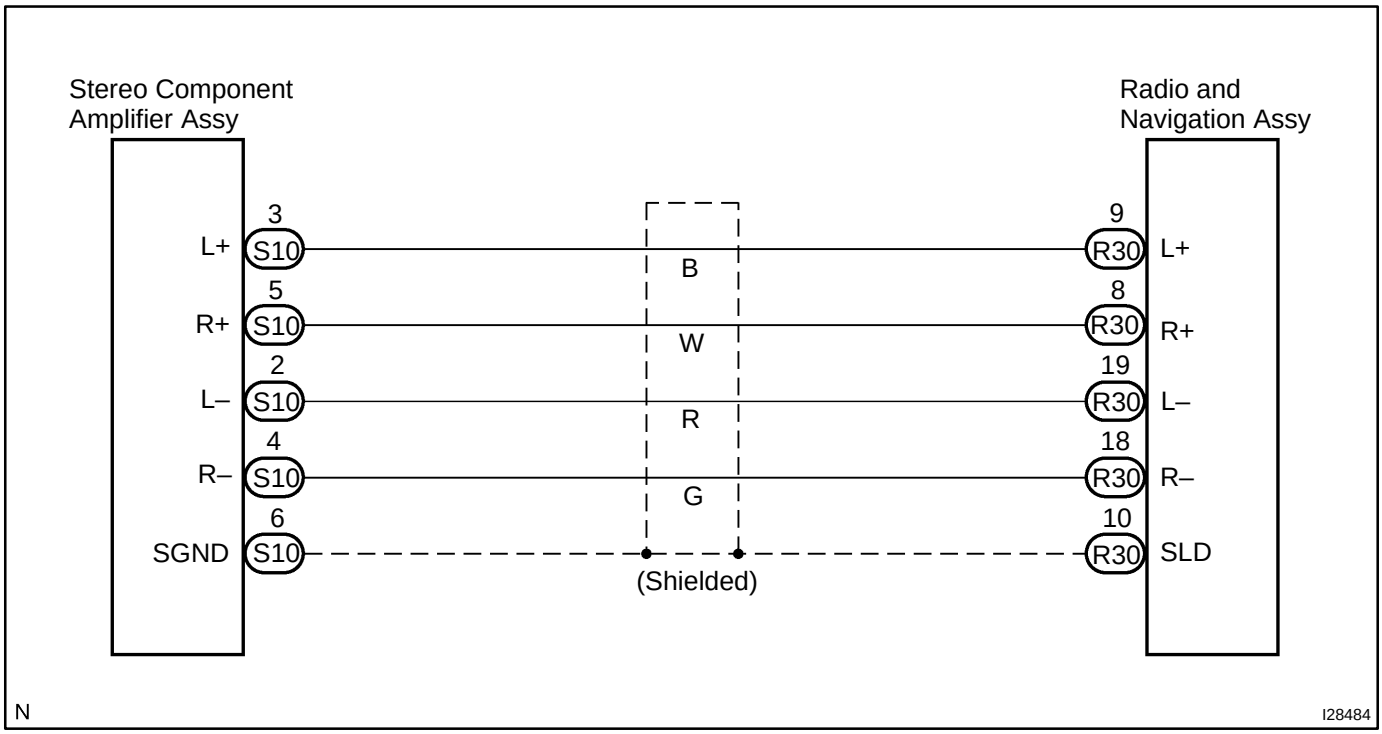
Amplifier sound signal circuit

CIRCUIT DESCRIPTION

The radio receiver assy sends a sound signal to the stereo component amplifier assy through this circuit. The sound signal that has been sent is amplified by the stereo component amplifier assy, and then sent to the speakers.

If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier assy or the speakers.

WIRING DIAGRAM



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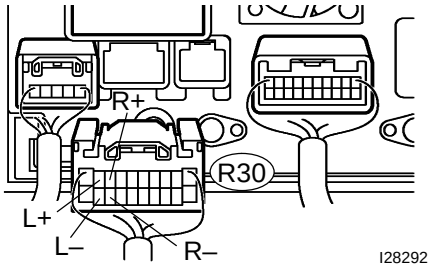
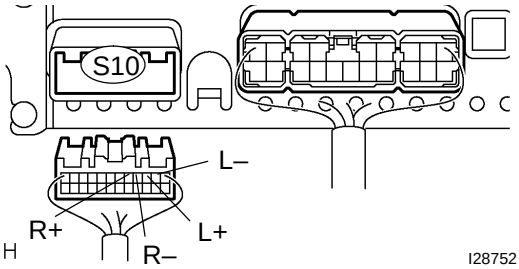
INSPECTION PROCEDURE

1	**Check harness and connector (Radio and navigation assy – stereo component amplifier assy).**

Radio and Navigation Assy Wire Harness View:



Stereo Component Amplifier Assy Wire Harness View:



PREPARATION:

Disconnect the radio and navigation assy and stereo component amplifier assy connectors.

CHECK:

Measure the resistance according to the values in the table below.

OK:

Symbol (Tester connection)	Specified condition
L+ (R30–9) – L+ (S10–3)	Below 1 Ω
L– (R30–19) – L– (S10–2)	Below 1 Ω
R+ (R30–8) – R+ (S10–5)	Below 1 Ω
R– (R30–18) – R– (S10–4)	Below 1 Ω
L+ (R30–9) – Body ground	10 kΩ or higher
L– (R30–19) – Body ground	10 kΩ or higher
R+ (R30–8) – Body ground	10 kΩ or higher
R– (R30–18) – Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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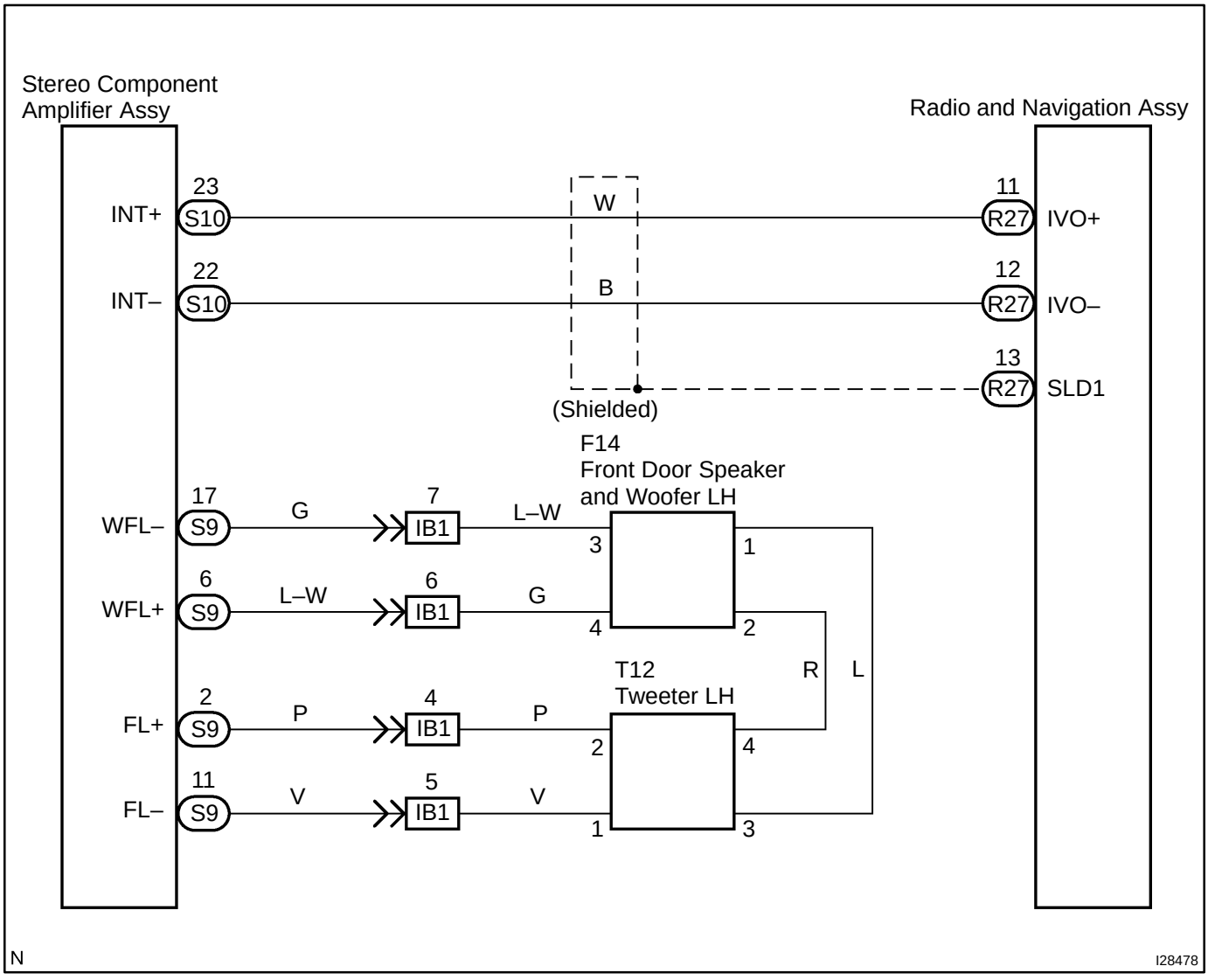
DIDDL–01

Speaker circuit (Navigation voice)

CIRCUIT DESCRIPTION

This circuit is used when the voice guidance in the radio and navigation assy is on.
Voice guidance of the navigation system is heard from the front door speaker LH via the tweeter LH.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Inspect apparatus.**

CHECK:

Choose the apparatus to be inspected.

RESULT:

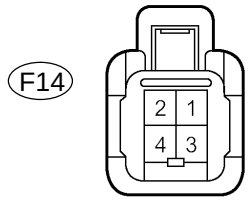
Apparatus	Go to step
Front door speaker LH	A
Front door speaker LH and tweeter LH	B

B → **Go to step 5.**

A

2	**Inspect front door speaker assy.**

Connector Front View:



PREPARATION:

Disconnect the speaker connector.

CHECK:

Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

OK:

Tester connection	Specified condition
1 – 2	Approx. 3.15 Ω
3 – 4	Approx. 2.78 Ω

NG → **Replace front door speaker.**

OK

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3	Inspect tweeter.

CHECK:

Check that the malfunction disappears when another tweeter in good condition is installed.

OK:

Malfunction disappears.

HINT:

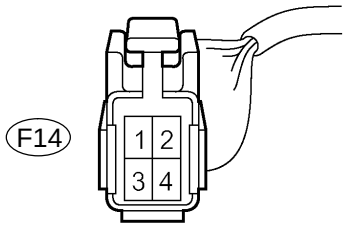
- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one with the left one.

OK	Replace tweeter.

NG

4	Check harness and connector (Front door speaker – tweeter).

Front Door Speaker Connector Front View:



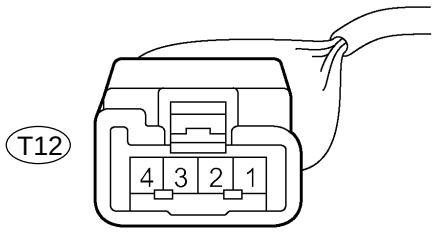
CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
F14–1 – T12–3	Always	Below 1 Ω
F14–2 – T12–4	Always	Below 1 Ω
F14–1 – Body ground	Always	10 kΩ or higher
F14–2 – Body ground	Always	10 kΩ or higher

Tweeter Connector front View:



NG	Repair or replace harness or connector.

NG

Proceed to next circuit inspection shown on problem symptoms table (See page DI–2184).

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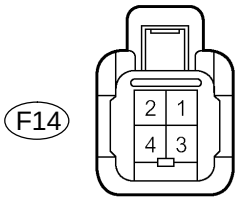
5	Inspect front door speaker assy.

Connector Front View:



PREPARATION:

Disconnect the speaker connector.

CHECK:

Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

OK:

Tester connection	Specified condition
1 – 2	Approx. 3.15 Ω
3 – 4	Approx. 2.78 Ω

NG	Replace front door speaker.

OK

6	Inspect tweeter.

CHECK:

Check that the malfunction disappears when another tweeter in good condition is installed.

OK:

Malfunction disappears.

HINT:

- Connect all the connectors to the speakers.
- When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one with the left one.

OK	Replace tweeter.

NG

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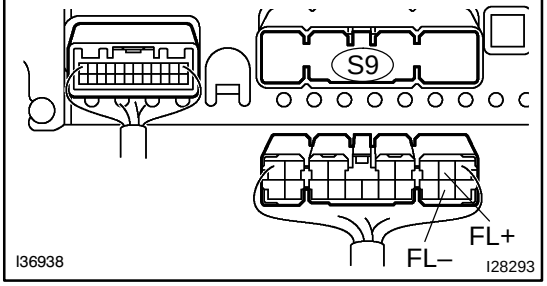
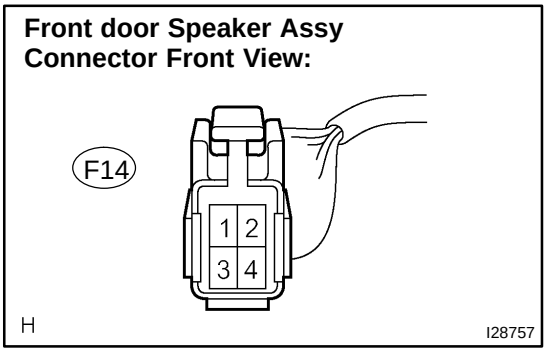
7	Check harness and connector (Front door speaker assy – tweeter, stereo component amplifier assy)

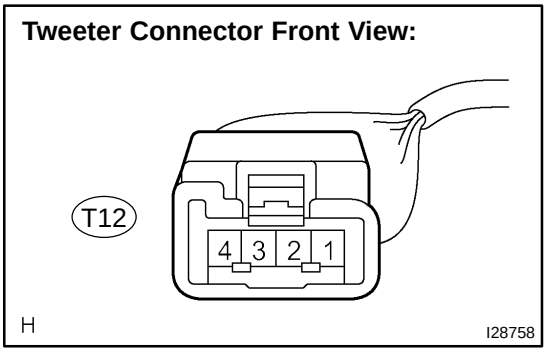
Stereo Component Amplifier Assy Wire Harness View:



Front door Speaker Assy Connector Front View:



Tweeter Connector Front View:



PREPARATION:

Disconnect the stereo component amplifier assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection (Symbol)	Condition	Specified condition
F14–1 – T12–3	Always	Below 1 Ω
F14–2 – T12–4	Always	Below 1 Ω
T12–2 – S9–2 (FL+)	Always	Below 1 Ω
T12–1 – S9–11 (FL–)	Always	Below 1 Ω
F14–1 – Body ground	Always	10 kΩ or higher
F14–2 – Body ground	Always	10 kΩ or higher
T12–1 – Body ground	Always	10 kΩ or higher
T12–2 – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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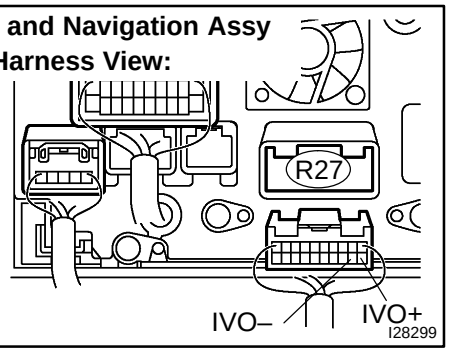
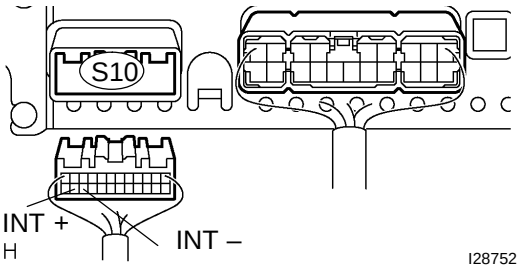
8	Check harness and connector (Radio and navigation assy – stereo component amplifier assy)

Radio and Navigation Assy Wire Harness View:



Stereo Component Amplifier Assy Wire Harness View:



PREPARATION:

Disconnect the radio and navigation assy and stereo component amplifier assy connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
IVO+ (R27–11) – INT+ (S10–23)	Always	Below 1 Ω
IVO– (R27–12) – INT– (S10–22)	Always	Below 1 Ω
IVO+ (R27–11) – Body ground	Always	10 kΩ or higher
IVO– (R27–12) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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DIDDM–01

Speaker circuit

CIRCUIT DESCRIPTION

A sound signal amplified by the amplifier located in the radio and navigation assy is sent to each speaker through this circuit.

If there is a short in this circuit, the stereo component amplifier assy detects it and stops output to the speakers.

Thus sound can not be heard from the speakers even if there is no malfunction in the stereo component amplifier or the speakers.

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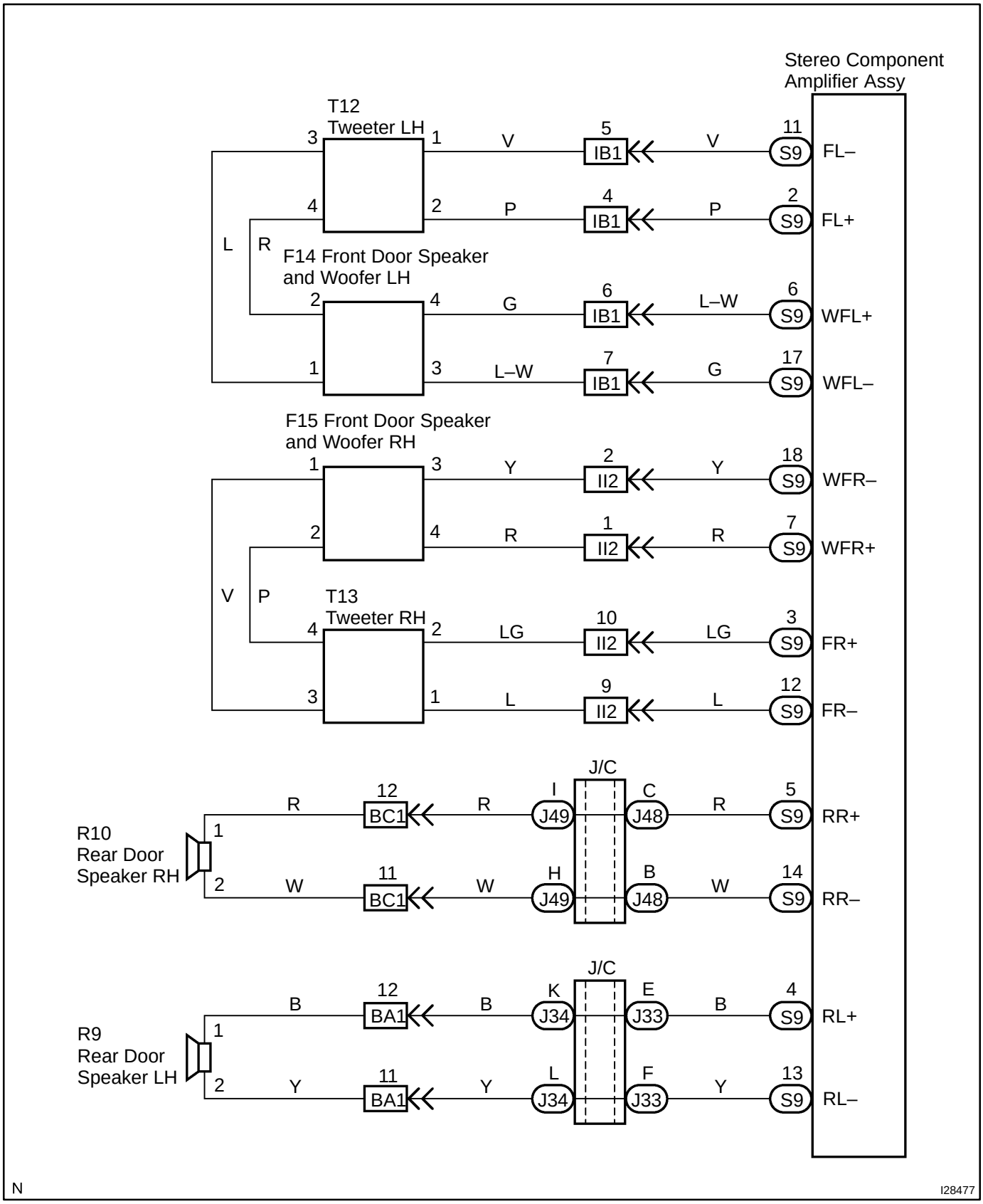
WIRING DIAGRAM



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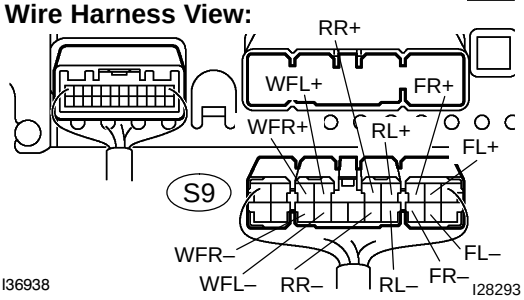
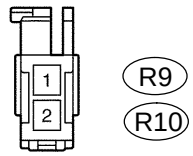
INSPECTION PROCEDURE

1	Check harness and connector (Stereo component amplifier assy – speaker assy).

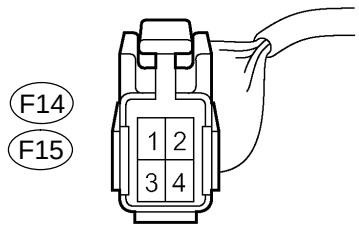
Stereo Component Amplifier Assy Wire Harness View:



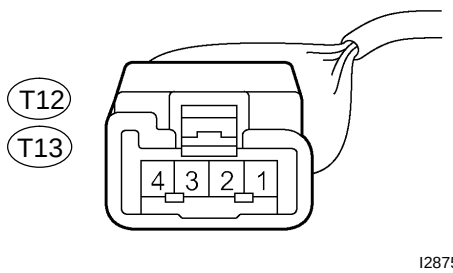
Rear Speaker Connector Front View:



Front Door Speaker Assy and Woofer Connector Front View:



Tweeter Connector Front View:



PREPARATION:

Disconnect the connectors from the stereo component amplifier assy and speakers.

CHECK:

Measure the resistance between the speaker and the stereo component amplifier to check for an open circuit in the wire harness.

OK:

Below 1 Ω

CHECK:

Measure the resistance between the speaker and body ground to check for a short circuit in wire harness.

OK:

10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

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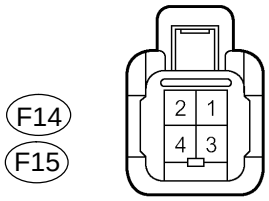
2	Inspect front door speaker and woofer.

Connector Front View:



CHECK:

Measure the resistance according to the value(s) in the table below.

NOTICE:

The speaker should not be removed for checking.

OK:

Tester connection	Specified condition
1 – 2	Approx. 3.15 Ω
3 – 4	Approx. 2.78 Ω

NG → **Replace front door speaker and woofer.**

OK

3	Inspect tweeter.

CHECK:

Check that the malfunction disappears when another tweeter in good condition is installed.

OK:

Malfunction disappears.

HINT:

- ▶ Connect all the connectors to the speakers.
- ▶ When there is a possibility that either right or left front speaker is defective, inspect by interchanging the right one with the left one.

OK → **Replace tweeter.**

NG

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4	**Inspect rear speaker assy.**

CHECK:

Measure the resistance between the terminals of the speaker.

NOTICE:

The speaker should not be removed for checking.

OK:

2.6 ± 0.2 Ω

NG → **Replace rear speaker assy.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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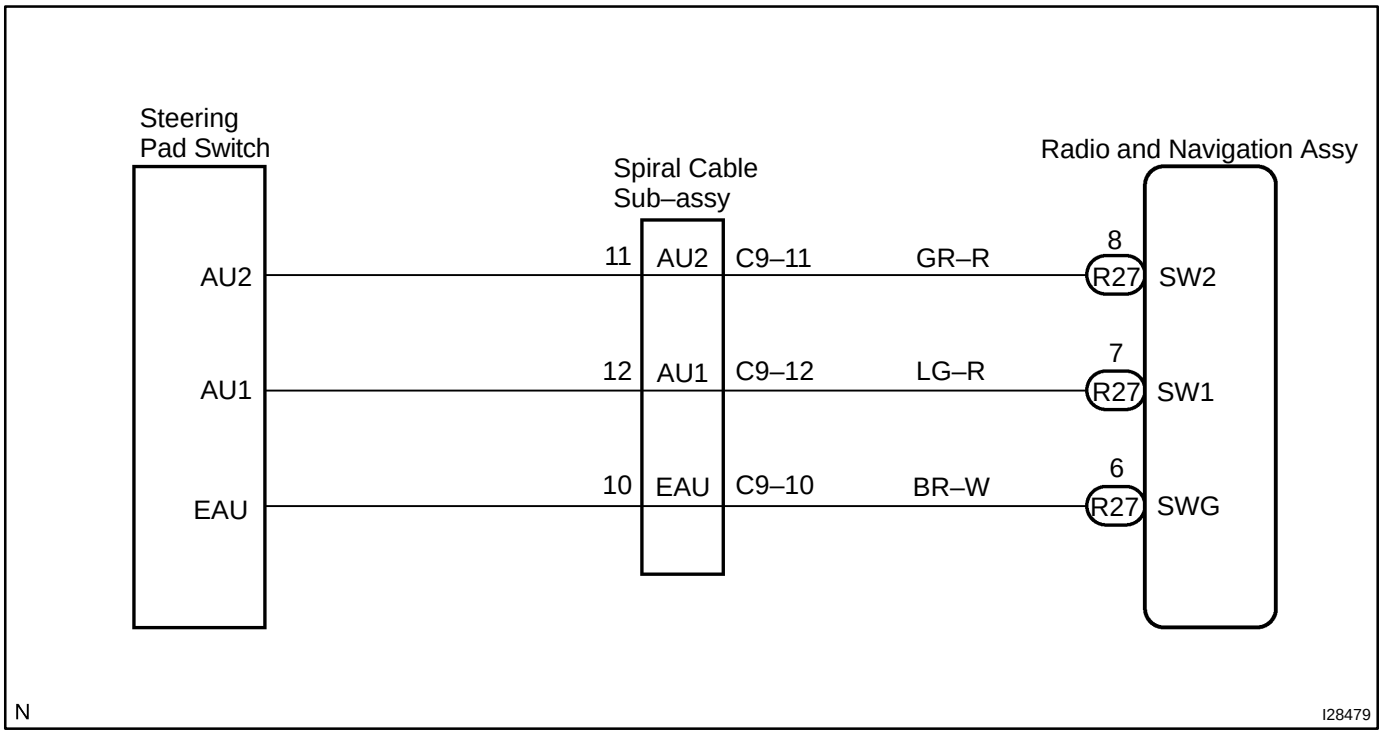
DIDDO–01

Steering pad switch circuit

CIRCUIT DESCRIPTION

This circuit sends an operation signal from the steering pad switch assy to the radio and navigation assy. If there is an open in the circuit, the audio system cannot be operated by the steering pad switch assy. If there is a short in the circuit, the resulting condition is the same as if the switch were continuously depressed. Therefore, the radio and navigation assy cannot be operated by the steering pad switch assy, and the radio and navigation assy itself cannot function.

WIRING DIAGRAM



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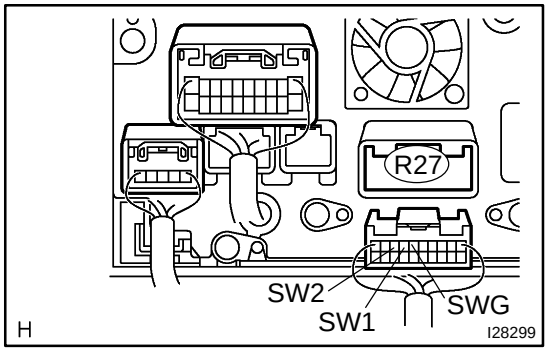
INSPECTION PROCEDURE

NOTICE:

The vehicle is equipped with SRS (Supplemental Restraint System) such as airbags. Before servicing (including removal or installation of parts), be sure to read the precautionary notice for the supplemental restraint system (See page RS–1).

1	**Inspect radio and navigation assy.**



PREPARATION:

Disconnect the radio and navigation assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
SW1 (R27–7) – SWG (R27–6)	No switch is pushed	Approx. 100 kΩ
SW1 (R27–7) – SWG (R27–6)	SEEK+ switch: push	Approx. 0 Ω
SW1 (R27–7) – SWG (R27–6)	SEEK– switch: push	Approx. 0.3 kΩ
SW1 (R27–7) – SWG (R27–6)	VOL+ switch: push	Approx. 1 kΩ
SW1 (R27–7) – SWG (R27–6)	VOL– switch: push	Approx. 3.2 kΩ
SW2 (R27–8) – SWG (R27–6)	No switch is pushed	Approx. 100 kΩ
SW2 (R27–8) – SWG (R27–6)	MODE switch: push	Approx. 0 Ω

NG	**Go to step 2.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2184).

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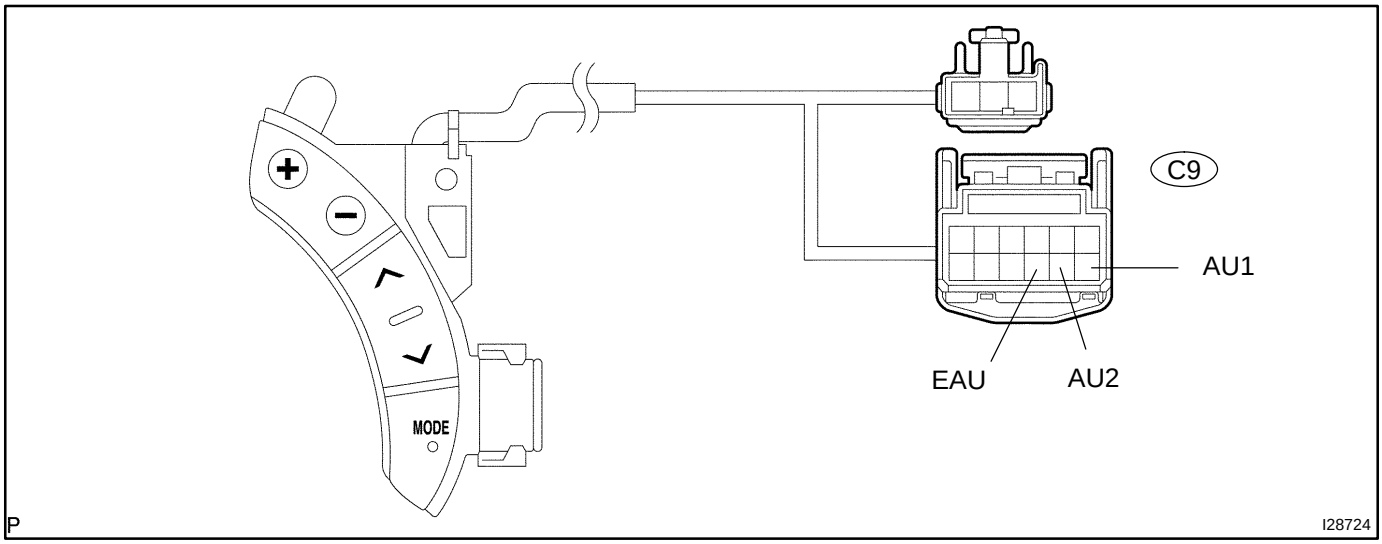
2	Inspect steering pad switch assy.



PREPARATION:

Disconnect the steering pad switch assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
AU1 (C9–12) – EAU (C9–10)	No switch is pushed	Approx. 100 kΩ
AU1 (C9–12) – EAU (C9–10)	SEEK+ switch: push	Approx. 0 Ω
AU1 (C9–12) – EAU (C9–10)	SEEK– switch: push	Approx. 0.3 kΩ
AU1 (C9–12) – EAU (C9–10)	VOL+ switch: push	Approx. 1 kΩ
AU1 (C9–12) – EAU (C9–10)	VOL– switch: push	Approx. 3.2 kΩ
AU2 (C9–11) – EAU (C9–10)	No switch is pushed	Approx. 100 kΩ
AU2 (C9–11) – EAU (C9–10)	MODE switch: push	Approx. 0 Ω

NG → **Replace steering pad switch assy.**

OK

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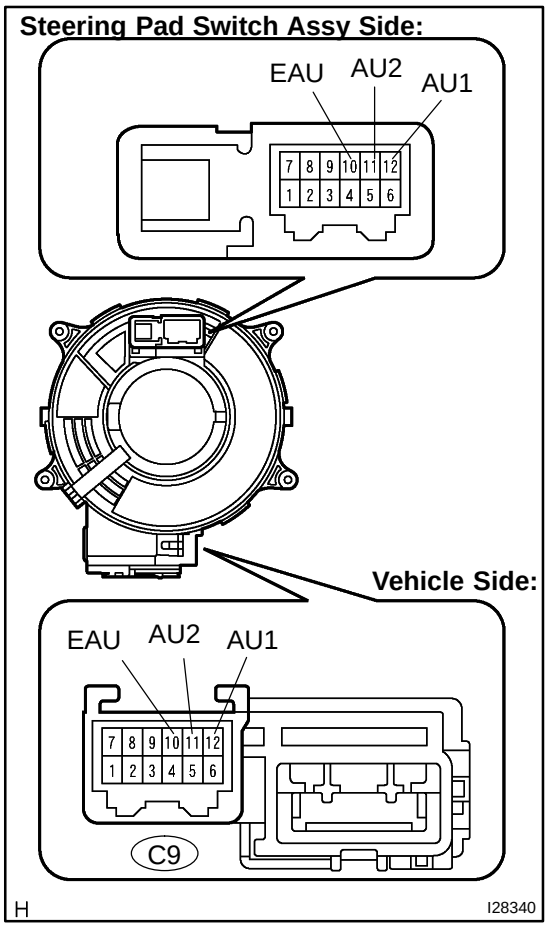
3	Inspect spiral cable sub–assy.



PREPARATION:

Disconnect the steering pad switch assy and spiral cable sub–assy connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Specified condition
EAU – EAU	Below 1 Ω
AU1 – AU1	Below 1 Ω
AU2 – AU2	Below 1 Ω

NG → **Replace spiral cable sub–assy.**

OK

Repair or replace harness or connector (Radio and navigation assy – spiral cable).

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DIDDP–01

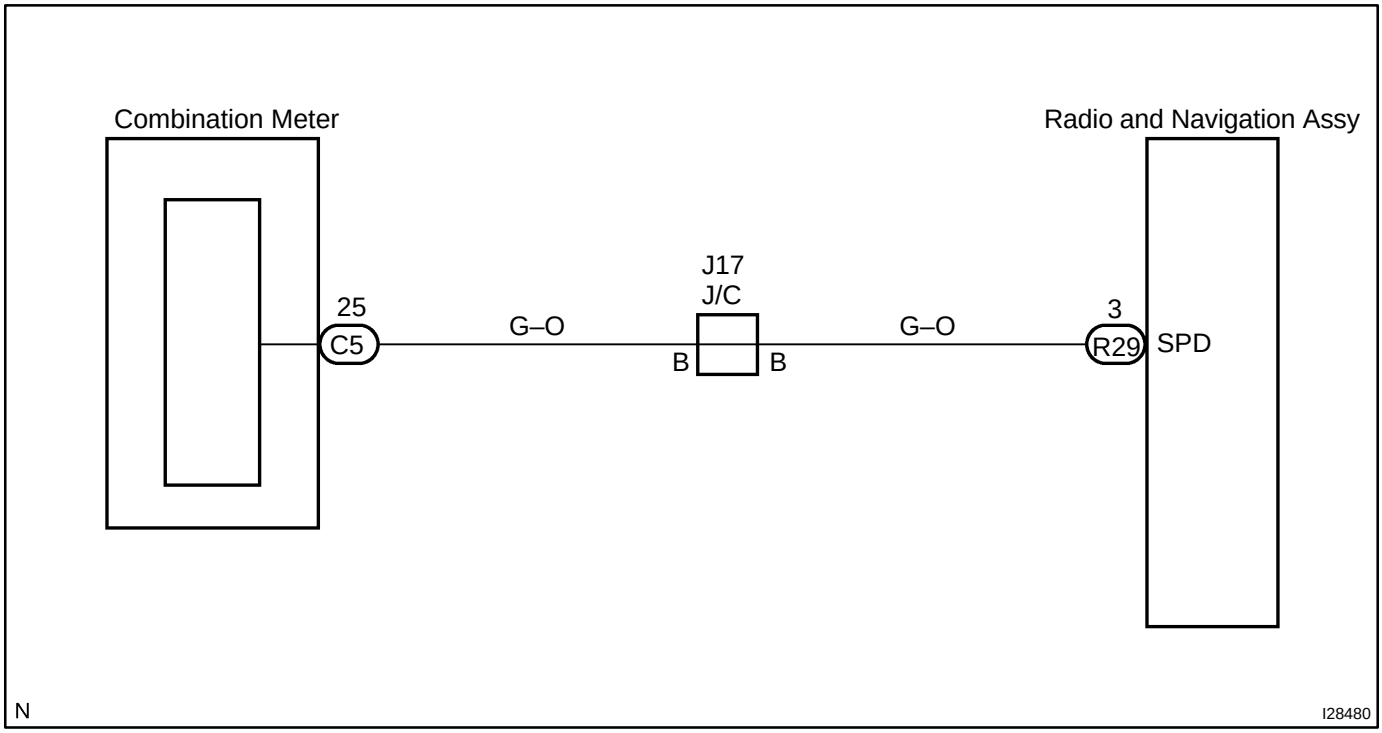
Speed signal circuit

CIRCUIT DESCRIPTION

The navigation ECU (built in the radio and navigation assy) receives a vehicle speed signal from the combination meter assy and information about the GPS antenna, and then adjusts vehicle position.
HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the speed signal circuit will not operate normally.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check operation of speedometer.**

CHECK:

Drive the vehicle and check if the function of the speedometer in the combination meter is normal.

OK:

Actual vehicle speed and the speed indicated on the speedometer and the same.

HINT:

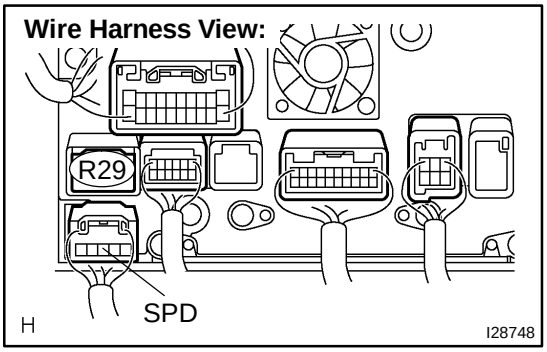
The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **Check combination meter assy (See page DI–1645).**

OK

2	**Inspect combination meter assy.**

Wire Harness View:



PREPARATION:

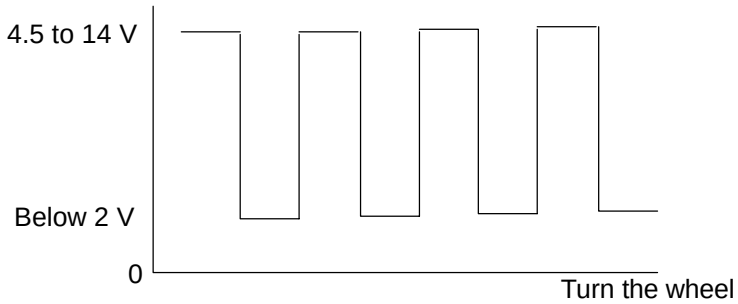
Disconnect the radio and navigation assy connector.

CHECK:

(a) Move the shift lever to the neutral position.
(b) Jack up either one of the front wheels.
(c) Turn the ignition switch on.
(d) Measure the voltage between terminal SPD and body ground of the radio and navigation assy when the front wheels are turned slowly.

OK:

Voltage is pulses as shown below.



OK → **Replace radio and navigation assy.**

NG

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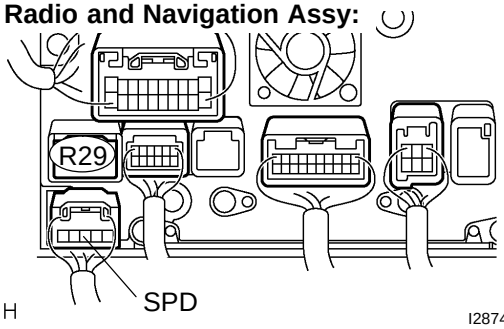
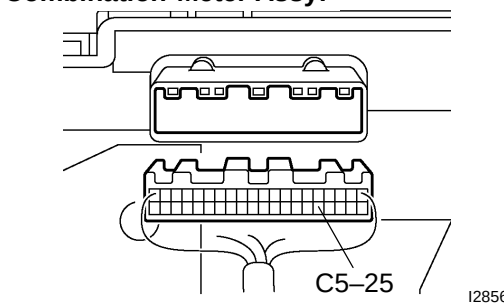
3	Check harness and connector (Combination meter assy – Radio and navigation assy).

Radio and Navigation Assy:



Combination Meter Assy:



PREPARATION:

Disconnect the radio and navigation assy and combination meter assy connectors.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Tester connection	Condition	Specified condition
SPD (R29–3) – C5–25	Ignition switch OFF	Below 1 Ω
SPD (R29–3) – Body ground	Ignition switch OFF	10 kΩ or higher

HINT:

If the resistance between terminal SPD and body ground is less than 10 kΩ, there may be a short in a wire harness, connector, or ECU.

NG → **Repair or replace harness or connector.**

OK

Replace combination meter assy.

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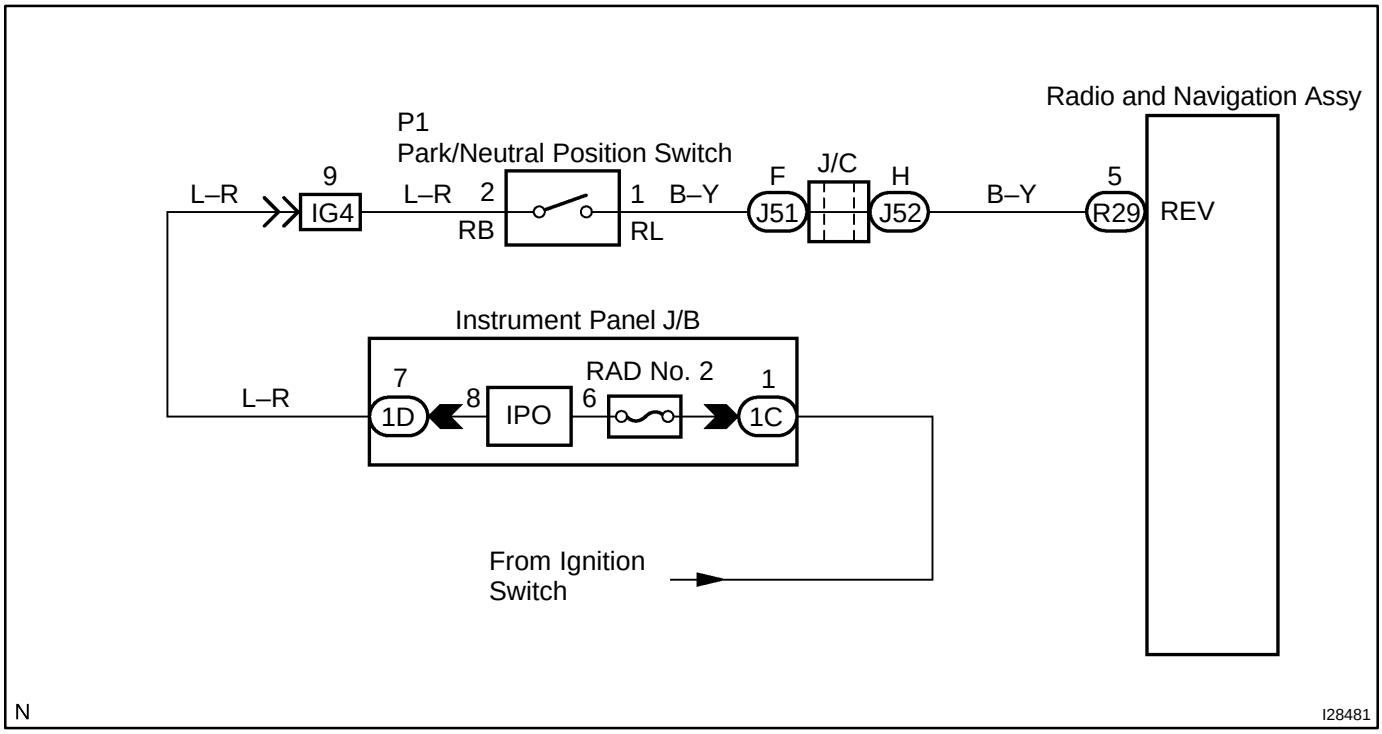
DIDDQ–01

Reverse signal circuit

CIRCUIT DESCRIPTION

The radio and navigation assy receives the reverse signal from the park/neutral position switch and information about the GPS antenna, and then adjusts the vehicle position.

WIRING DIAGRAM



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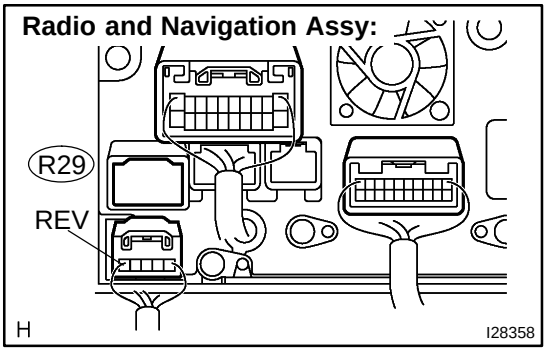
INSPECTION PROCEDURE

1	**Inspect radio and navigation assy (REV).**

Radio and Navigation Assy:



PREPARATION:

Disconnect the radio and navigation assy connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
REV (R29–5) – Body ground	Ignition switch is on. Shift lever is moved to R position.	10 to 14 V
REV (R29–5) – Body ground	Ignition switch is on. Shift lever is moved to any position except R.	Below 1 V

OK → **Replace radio and navigation assy.**

NG

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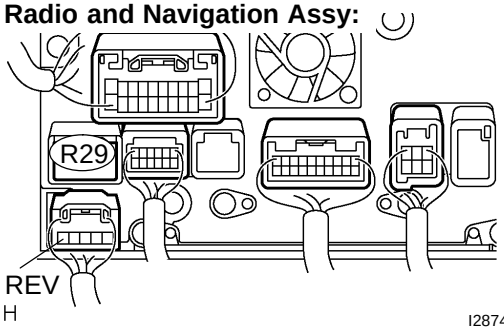
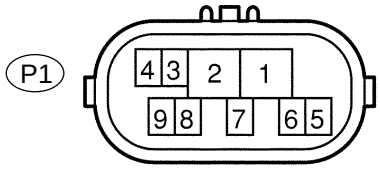
2	Check harness and connector (Radio and navigation assy – Park/neutral position switch).

Radio and Navigation Assy:



Park/Neutral Position Switch Connector Front View:



PREPARATION:

Disconnect the park/neutral position switch connector.

CHECK:

Measure the resistance according to the value(s) in the table below.

OK:

Symbol (Tester connection)	Condition	Specified condition
REV (R29–5) – P1–1	Always	Below 1 Ω
REV (R29–5) – Body ground	Always	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Go to back–up light system (See page BE–45).

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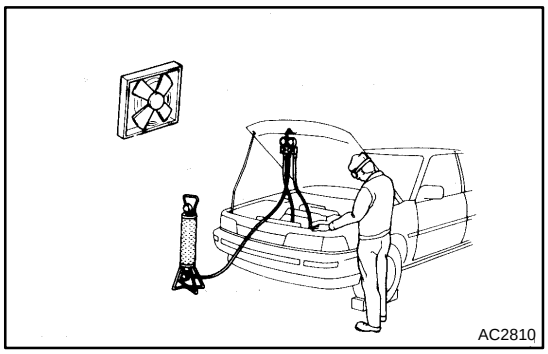

AC2810

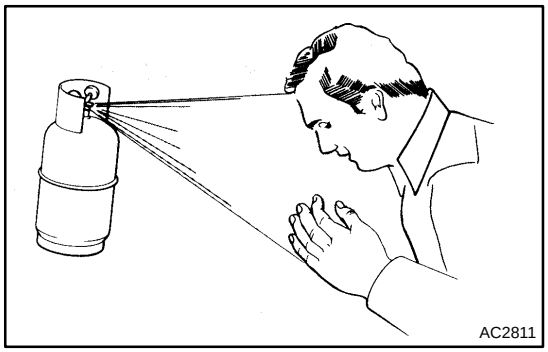
AIR CONDITIONING SYSTEM

DIDKM–01

PRECAUTION

1. DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME

2. ALWAYS WEAR EYE PROTECTION


AC2811

3. BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN

If liquid refrigerant gets in your eyes or on your skin:

(a) wash the area with lots of cool water.

CAUTION:

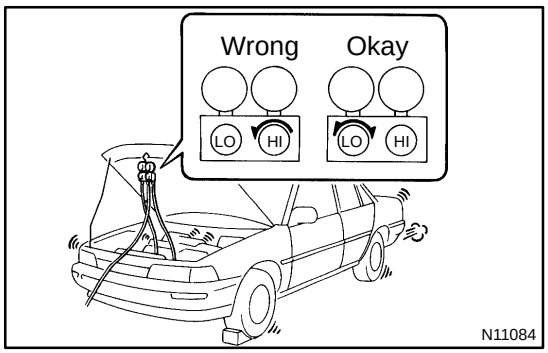
Do not rub your eyes or skin.

(b) apply clean petroleum jelly to the skin.

(c) go immediately to a hospital or see a physician for professional treatment.

4. NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME

5. BE CAREFUL NOT TO DROP CONTAINER OR APPLY PHYSICAL SHOCKS TO IT



N11084

6. DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERATION SYSTEM

If there is not enough refrigerant in the refrigerant system, oil lubrication will be insufficient and compressor burnout may occur. Necessary care should be taken to avoid this.

7. DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATE

Open and close only the low pressure valve. If the high pressure valves are opened, refrigerant flows in the reverse direction causing the charging cylinder to rupture.

8. BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT

If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating etc.

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9. SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

The SEQUOIA is equipped with an SRS (Supplemental Restraint System) such as the driver, passenger, side, curtain shield airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices tn the RS section.

10. INITIALIZATION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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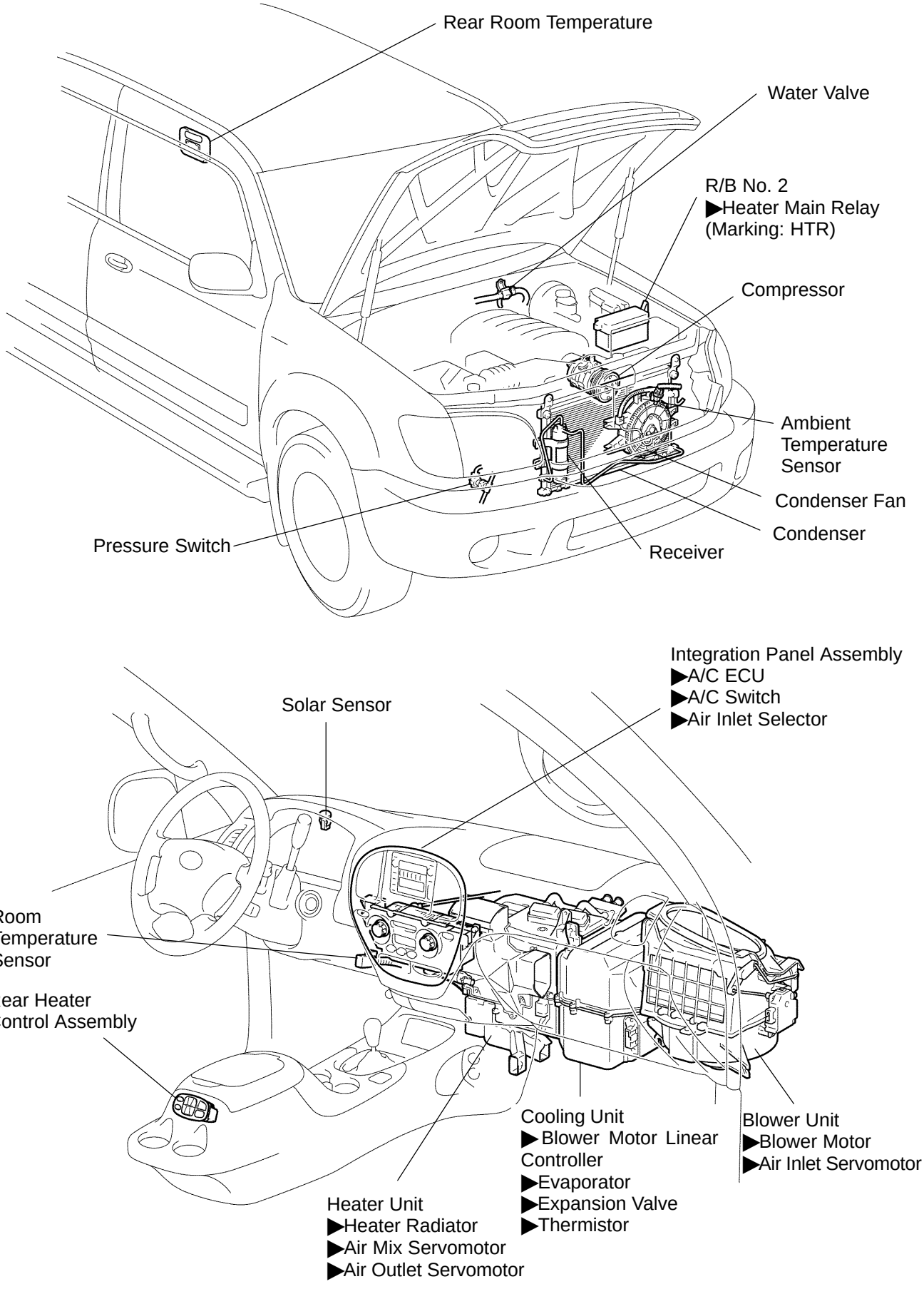
DIDKN–01

LOCATION



I28851

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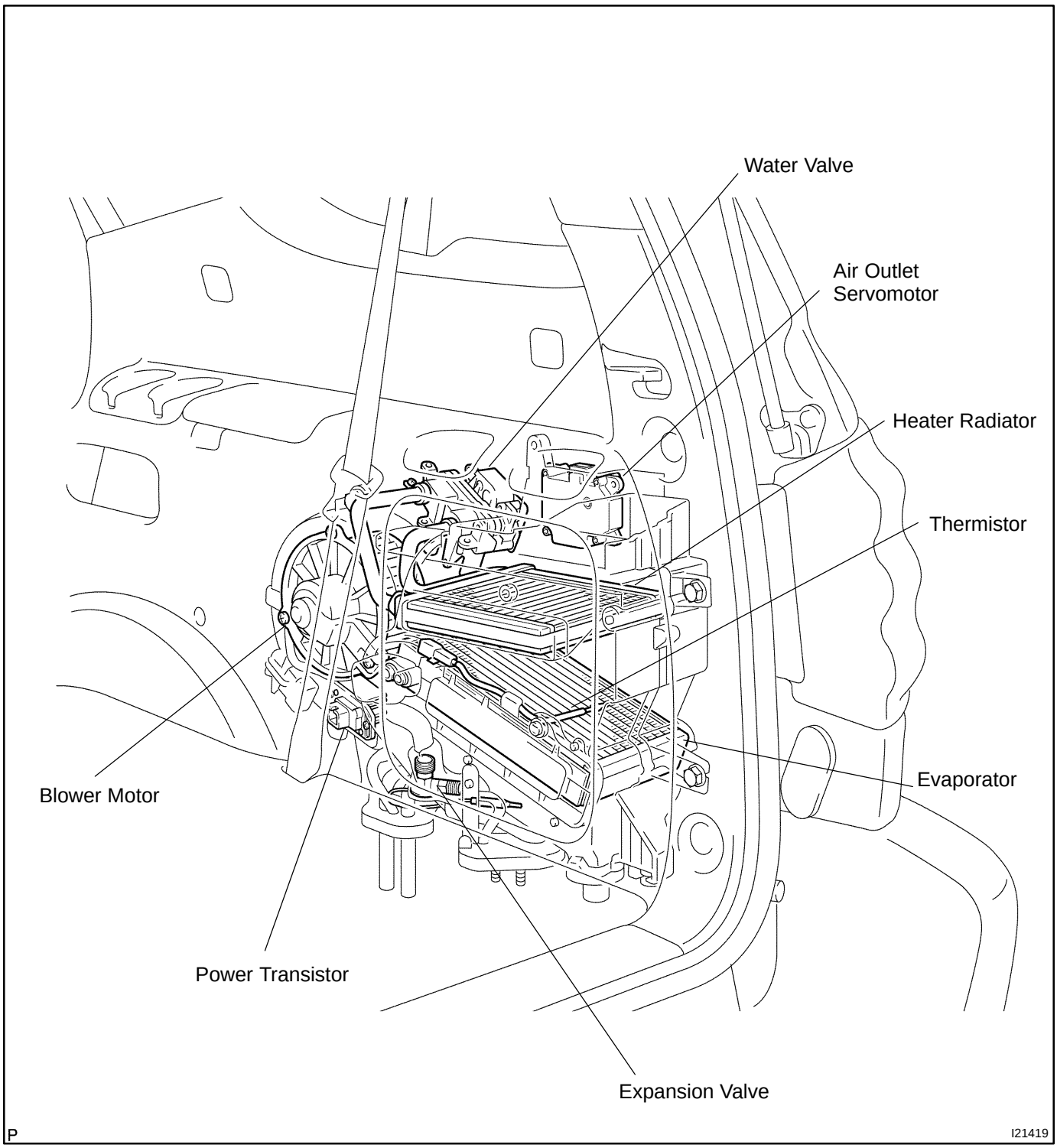
Water Valve
Air Outlet Servomotor
Heater Radiator
Thermistor
Evaporator
Blower Motor
Power Transistor
Expansion Valve
P
I21419

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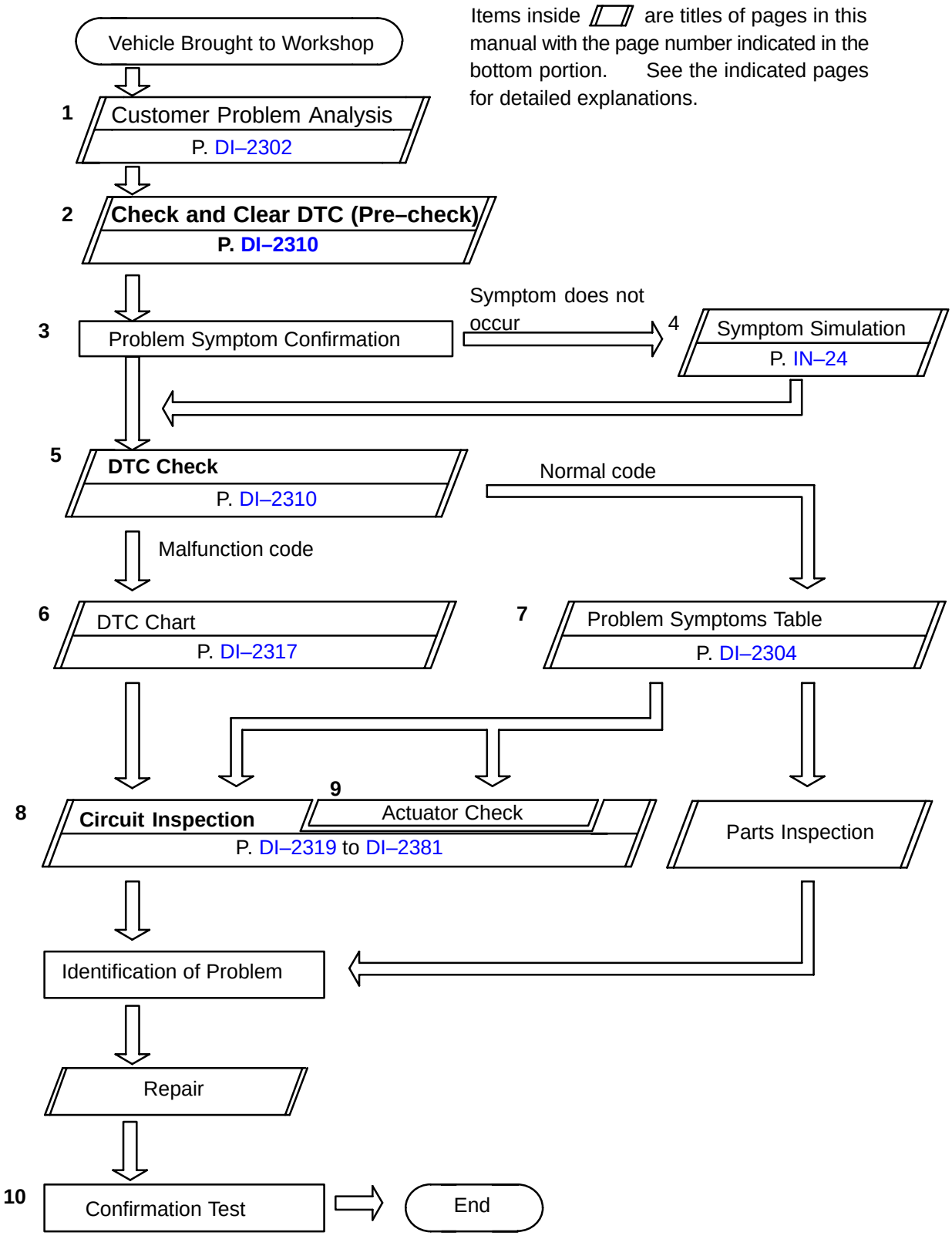
DI3EY–08

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting in accordance with the procedure on the following page.



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DI3EZ–06

CUSTOMER PROBLEM ANALYSIS CHECK

AIR CONDITIONING SYSTEM Check Sheet

Inspector's name:

Customer's Name		**VIN**	
		Production Date	
		Licence Plate No.	
Date vehicle Brought In	/ /	**Odometer Reading**	**km miles**

Date of Problem Occurrence	/ /
How Often does Problem Occur?	▶ Continuous ▶ Intermittent (times a day)
Weather	▶ Fine ▶ Cloudy ▶ Snowy ▶ Various /Other
Outdoor Temperature	▶ Hot ▶ Warm ▶ Cool ▶ Cold (Approx. °F °C)

Symptoms	**Air Flow Control is Faulty**	▶ Blower motor does not operate ▶ Blower motor speed does not change (Always Hi, Always Med, Always Lo)
	Temperature Control is Faulty	▶ Cabin temperature does not go down ▶ Cabin temperature does not rise ▶ Response is slow
	Air Inlet Control is Faulty	▶ Cannot change between FRS and REC (Always Fresh or always Recirculating)
	Vent Control is Faulty	▶ Mode will not change ▶ Will not enter the desired mode

DTC Check	**1st Time**	▶ Normal Code ▶ Malfunction Code (Code)
	2nd Time	▶ Normal Code ▶ Malfunction Code (Code)

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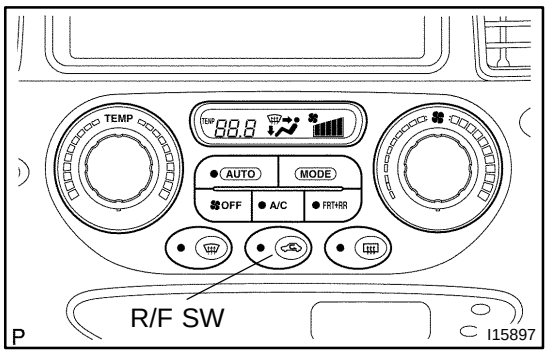
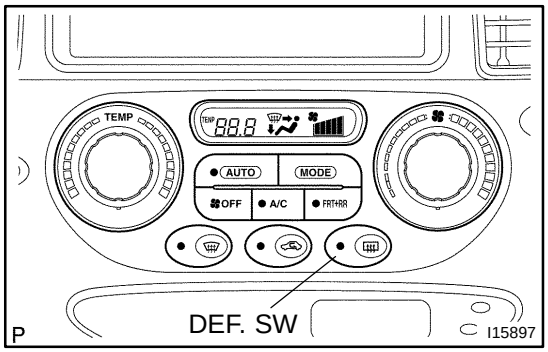
DIDKO–01

ACTUATOR CHECK





1. ACTUATOR CHECK

(a) After entering the sensor check mode, press the R/F switch (See page DI–2312).

(b) Since each damper, motor and relay automatically operates at 1 second intervals beginning in order from 20 in the temperature display, check the temperature and air flow visually and by hand.

If a slower display is desired, press the DEF. (Fr.) switch and change it to step operation. Each time the DEF. (Fr.) switch is pressed, the display changes by 1 step.

HINT:

- Codes are displayed in order from the smallest to the largest numbers.
- To cancel the check mode, press the OFF switch.

STEP	DISPLAY CODE	Fr BLOWER LEVEL	Fr OUTLET	INLET	COMPRESSOR	Fr A/M DAMPER	Rr BLOWER LEVEL	Rr OUTLET	Rr A/M DAMPER
1	0	0	FACE	FRS	OFF	–14%	0	FACE1	0.0%
2	1	1	↑	↑	↑	↑	1	↑	↑
3	2	16	↑	↑	ON	↑	10	↑	40.0%
4	3	↑	↑	R/F (50%)	↑	↑	↑	FACE2	↑
5	4	↑	↑	REC	↑	50.0%	↑	B/L1	60.0%
6	5	↑	B/L	↑	↑	↑	↑	B/L2	↑
7	6	↑	FOOT	↑	↑	113.5%	↑	↑	↑
8	7	↑	↑	↑	↑	↑	↑	FOOT	86.5%
9	8	↑	F/D	↑	↑	↑	↑	↑	↑
10	9	31	DEF	↑	↑	↑	31	↑	↑

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DI3F3–10

PROBLEM SYMPTOMS TABLE

Front A/C:

Symptom	Suspected Area	See page
Whole functions of the A/C system do not operate	4. Integration control and panel 5. IG power source circuit	IN–35 DI–2363
Air Flow Control: No blower operation	1. IG power source circuit 2. Heater main relay 3. Blower motor circuit 4. Integration control and panel 5. Blower motor controller	DI–2363 AC–95 DI–2374 IN–35 AC–83
Air Flow Control: No blower control	1. Blower motor circuit 2. Integration control and panel 3. Solar sensor circuit 4. Blower motor controller	DI–2374 IN–35 DI–2336 AC–83
Air Flow Control: Insufficient air flow	1. Blower motor circuit	DI–2374
Temperature Control: No cool air comes out	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Compressor circuit 5. Pressure switch circuit 6. Front air mix damper position sensor circuit 7. Front air mix damper control servomotor circuit 8. Front room temp. sensor circuit 9. Ambient temp. sensor circuit 10. Vehicle speed signal circuit 11. Integration control and panel	AC–23 AC–15 AC–3 DI–2381 DI–2342 DI–2346 DI–2355 DI–2319 DI–2322 DI–2370 IN–35
Temperature Control: No warm air comes out	1. Front air mix damper position sensor circuit 2. Front air mix damper control servomotor circuit 3. Front room temp. sensor circuit 4. Ambient temp. sensor circuit 5. Vehicle speed signal circuit 6. Front evaporator temp. sensor circuit 7. Integration control and panel	DI–2346 DI–2355 DI–2319 DI–2322 DI–2370 DI–2325 IN–35
Temperature Control: Output air is warmer or cooler than the set temperature or response is slow	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Cooling fan system 5. Solar sensor circuit 6. Front room temp. sensor circuit 7. Ambient temp. sensor circuit 8. Vehicle speed signal circuit 9. Front evaporator temp. sensor circuit 10. Front air mix damper position sensor circuit 11. Front air mix damper control servomotor circuit 12. Front air inlet damper position sensor circuit 13. Front air inlet damper control servomotor circuit 14. Condenser 15. Evaporator 16. Heater radiator 17. Expansion valve 18. Integration control and panel	AC–23 AC–15 AC–3 AC–96 DI–2336 DI–2319 DI–2322 DI–2370 DI–2325 DI–2346 DI–2355 DI–2349 DI–2358 AC–65 AC–24 AC–35 AC–29 IN–35

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Symptom	Suspected Area	See page
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Front room temp. sensor circuit 2. Ambient temp. sensor circuit 3. Front air mix damper position sensor circuit 4. Front air mix damper control servomotor circuit 5. Integration control and panel	DI–2319 DI–2322 DI–2346 DI–2355 IN–35
No air inlet control	1. Front air inlet damper position sensor circuit 2. Front air inlet damper control servomotor circuit 3. Integration control and panel	DI–2349 DI–2358 IN–35
No air flow control	1. Air outlet damper position sensor circuit 2. Air outlet damper control servomotor circuit 3. Integration control and panel	AC–35 AC–35 IN–35
Engine idle up does not occur, or is continuous	1. Compressor circuit 2. ECM	DI–2381 DI–34
No DTC is recorded. Set mode is cleared when IG switch is turned off.	1. Back–up power source circuit 2. Integration control and panel	DI–2366 IN–35

Rear A/C:

Symptom	Suspected Area	See page
Whole functions of the rear A/C system do not operate	1. Heater control assembly 2. Integration control and panel 3. ACC power source circuit	IN–35 DI–2368 DI–2368
Air Flow Control: No blower operation	1. ACC power source circuit 2. Rear heater main relay 3. Rear blower motor 4. Rear blower motor controller 5. Heater control assembly 6. Integration control and panel	DI–2368 AC–95 AC–45 – IN–35 DI–2368
Air Flow Control: No blower control	1. Rear heater main relay 2. Rear blower motor 3. Rear blower motor controller 4. Heater control assembly 5. Integration control and panel 6. Solar sensor circuit	AC–95 AC–45 – IN–35 DI–2336 DI–2368
Air Flow Control: Insufficient air flow	1. Rear blower motor 2. Rear blower resister	AC–45 –
Temperature Control: No cool air comes out	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Compressor circuit 5. Pressure switch circuit 6. Water valve damper position sensor circuit 7. Water valve damper control servomotor circuit 8. Rear room temp. sensor circuit 9. Ambient temp. sensor circuit 10.ECM 11.Heater control assembly 12.Integration control and panel	AC–23 AC–15 AC–3 DI–2381 DI–2342 DI–2352 DI–2361 DI–2333 DI–2322 DI–34 DI–2368 IN–35
Temperature Control: No warm air comes out	1. Water valve damper position sensor circuit 2. Water valve damper control servomotor circuit 3. Rear room temp. sensor circuit 4. Ambient temp. sensor circuit 5. Rear evaporator temp. sensor circuit 6. Heater control assembly 7. Integration control and panel	DI–2352 DI–2361 DI–2333 DI–2322 DI–2330 IN–35 IN–35

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Temperature Control: Output air is warmer or cooler than the set temperature or response is slow	1. Refrigerant volume 2. Drive belt tension 3. Refrigeration system inspection with manifold gauge set 4. Cooling fan system 5. Solar sensor circuit 6. Rear room temp. sensor circuit 7. Ambient temp. sensor circuit 8. Rear evaporator temp. sensor circuit 9. Water valve damper position sensor circuit 10. Water valve damper control servomotor circuit 11. Condenser 12. Evaporator 13. Heater radiator 14. Expansion valve 15. Heater control assembly 16. Integration control and panel	AC–23 AC–15 AC–3 AC–96 DI–2336 DI–2333 DI–2322 DI–2330 DI–2352 DI–2361 AC–65 AC–70 AC–45 AC–76 IN–35 IN–35
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Rear room temp. sensor circuit 2. Ambient temp. sensor circuit 3. Water valve damper position sensor circuit 4. Water valve damper control servomotor circuit 5. Heater control assembly 6. Integration control and panel	DI–2333 DI–2322 DI–2352 DI–2361 IN–35 IN–35

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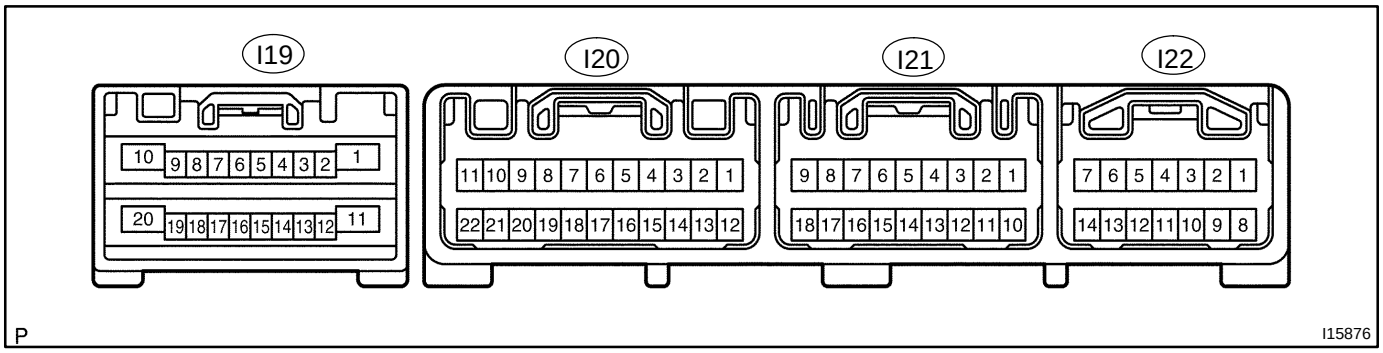
DIDKP–01

TERMINALS OF ECU

Integration Control and Panel



Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B ↔ GND (I19–1 ↔ I19–10)	R ↔ O	Power source (Back–up)	Always	10 to 14 V
IG+ ↔ GND (I19–2 ↔ I19–10)	R–L ↔ O	Power source (IG)	IG switch OFF → ON	10 to 14 V
PSW ↔ GND (I19–6 ↔ I19–10)	L–B ↔ O	Pressure switch signal	A/C refrigerant pressure: less than 0.19 MPa (2.0 kgf/cm^2) or more than 3.14 MPa (32 Kgf/cm^2)	10 to 14 → Below 1.0 V
HR ↔ GND (I22–6 ↔ I19–10)	L–Y ↔ O	Blower motor operation signal	Blower fan OFF → ON	10 to 14 → Below 1.0 V
GND ↔ Body ground (I19–10 ↔ Body ground)*1	O ↔ Body ground	Ground for main power supply	Constant	Continuity
ACC ↔ GND (I19–11 ↔ I19–10)	P ↔ O	Power source (ACC)	Turn ignition switch ACC	10 to 14 V
TAM ↔ SG–TAM (I19–8 ↔ I19–20)	LG–B ↔ Y–B	Ambient temperature sensor signal	IG ON, Ambient temp.: 25˚C (77˚F)	1.3 to 1.8 V
			IG ON, Ambient temp.: 40˚C (104˚F)	0.8 to 1.3 V
BLW ↔ GND (I19–4 ↔ I19–10)	G–B ↔ O	Blower motor operation signal	Blower fan OFF → ON	10 to 14 → Below 1.0 V
RrCLK (I21–15)*1	B	Communication signal	Communication circuit (Built in Fr A/C control panel → Rr A/C control panel)	–
RrDPD (I21–5)*1	R	Communication signal	Communication circuit (Built in Fr A/C control panel → Rr A/C control panel)	–
RrSWD (I21–6)*1	W	Communication signal	Communication circuit (Built in Fr A/C control panel → Rr A/C control panel)	–
RrAMH ↔ GND (I21–8 ↔ I19–10)*1	R–G ↔ O	Rear air mix control servomotor operation signal	Rr temp. control switch: Max. COOL → Max. HOT	Below 1.0 → 10 to 14 V for 16 sec.
RrAMC ↔ GND (I21–9 ↔ I19–10)*1	L–B ↔ O	Rear air mix control servomotor operation signal	Rr temp. control switch: Max. HOT → Max. COOL	Below 1.0 → 10 to 14 V for 16 sec.
RrSG ↔ GND (I21–10 ↔ I19–10)*1	L–R ↔ O	Ground for rear evaporator temperature sensor	Constant	Continuity
RrS5 ↔ RrSG (I22–4 ↔ I21–10)*1	L–Y ↔ L–R	Power supply for rear air mix control servomotor	IG ON	4.5 to 5.5 V

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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RrTP ↔ RrSG (I21–18 ↔ I21–10)*1	W ↔ L–R	Rear air mix damper position sensor signal	Rr temp. control switch: Max. COOL → Max. HOT	4.0 to 1.0 V
AC1 ↔ GND (I22–4 ↔ I19–10)	G – B ↔ O	Compressor operation signal	IG ON, A/C switch: OFF → ON	3.7 to 4.5 → 1.3 to 2.6 V
RrFACE2 ↔ GND (I21–11 ↔ I19–10)*1	P–B ↔ O	Rear air outlet control servomotor operation signal	Rr A/C control panel switch: except FACE → FACE	10 to 14 → Below 1.0 V
RrBLK (I21–4)*1	LG–B	Communication signal	Communication circuit (Built in Fr. A/C control panel → Rr. A/C control panel)	–
RrSTX (I21–14)*1	G–Y	Communication signal	Communication circuit (Built in Fr. A/C control panel → Rr. A/C control panel)	–
RrVM ↔ GND (I21–7 ↔ I19–10)*1	W–G ↔ O	Rear blower motor control signal	Rr blower control switch: LO → MID → HI	7.2 → 4.2 → 0.5 V
RrHR ↔ GND (I22–7 ↔ I19–10)*1	L–O ↔ O	Rear blower motor operation signal	Rr blower control switch: OFF → LO	10 to 14 → Below 1.0 V
RrBLW ↔ GND (I21–16 ↔ I19–10)*1	L ↔ O	Rear blower motor operation signal	Rr blower control switch: OFF → LO	Below 1.0 → 1.5 to 3.0 V
RrFACE ↔ GND (I21–2 ↔ I19–10)*1	Y–B ↔ O	Rear air outlet control servomotor control signal	Rr A/C control panel FACE switch: OFF → ON	10 to 14 → Below 1.0 V while switch is pushed
RrB/L ↔ GND (I21–3 ↔ I19–10)*1	BR–W ↔ O	Rear air outlet control servomotor control signal	Rr A/C control panel B/L switch: OFF → ON	10 to 14 → Below 1.0 V while switch is pushed
RrFOOT ↔ GND (I21–13 ↔ I19–10)*1	G–R ↔ O	Rear air outlet control servomotor control signal	Rr A/C control panel FOOT switch: OFF → ON	10 to 14 → Below 1.0 V while switch is pushed
RrTE ↔ RrSG (I21–17 ↔ I21–10)*1	LG–R ↔ L–R	Rear evaporator temperature sensor signal	Rr evaporator temp.: 0°C (32°F)	2.0 to 2.4 V
			Rr evaporator temp.: 15°C (59°F)	2.0 to 2.4 V
RrB/L2 ↔ GND (I21–12 ↔ I19–10)*1	P–G ↔ O	Rear air outlet control servomotor control signal	Rr A/C control panel switch: except B/L → B/L	10 to 14 → Below 1.0 V
FOOT ↔ GND (I21–17 ↔ I19–10)	Y–B ↔ O	Air outlet control servomotor control signal	Mode control switch except: FOOT → FOOT	10 to 14 → Below 1.0 V
FDEF ↔ GND (I20–7 ↔ I19–10)	LG–R ↔ O	Air outlet control servomotor control signal	Mode control switch except: FOOT/DEF → FOOT/DEF	10 to 14 → Below 1.0 V
DEF ↔ GND (I20–18 ↔ I19–10)	B–W ↔ O	Air outlet control servomotor control signal	Mode control switch except: DEF → DEF	10 to 14 → Below 1.0 V
AMH ↔ GND (I20–10 ↔ I19–10)	R–L ↔ O	Air mix control servomotor operation signal	IG ON, Set temp.: Max. Cool	Below 1.0 V
			IG ON, Set temp.: Max. Hot	10 to 14 V
S5–AM ↔ SG–TP (I20–22 ↔ I20–12)	R–Y ↔ L–R	Power supply for air mix control servomotor	IG ON	4.5 to 5.5 V
TP ↔ SG–TP (I20–15 ↔ I20–12)	G–R ↔ L–R	Air mix damper position sensor signal	IG ON, Set temp.: Max. Cool	3.5 to 4.5 V
			IG ON, Set temp.: Max. Hot	0.5 to 1.5 V
AMC ↔ GND (I20–9 ↔ I19–10)	W–L ↔ O	Air mix control servomotor control signal	IG ON, Set temp.: Max. Cool	10 to 14 V
			IG ON, Set temp.: Max. Hot	Below 1.0 V
S5–AI ↔ SG–TPI (I20–11 ↔ I20–13)	L–B ↔ Y–R	Air inlet control servomotor control signal	IG ON	4.5 to 5.5 V
TR ↔ SG–TR (I20–3 ↔ I20–1)	L–W ↔ R–W	Room temperature sensor signal	IG ON, Cabin temp.: 25°C (77°F)	1.8 to 2.2 V
			IG ON, Cabin temp.: 40°C (104°F)	1.2 to 1.6 V

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Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TS ↔ S5–TS (I20–14 ↔ I20–21)	LG ↔ B	Solar sensor signal	IG ON	0.8 to 4.3 V
AIR ↔ GND (I20–20 ↔ I19–10)	G–W ↔ O	Air inlet control servomotor operation signal	IG ON, Push FRS switch	Below 1.0 V
			IG ON, Push REC switch	10 to 14 V
AIF ↔ GND (I20–8 ↔ I19–10)	R ↔ O	Air inlet control servomotor operation signal	IG ON, Push FRS switch	10 to 14 V
			IG ON, Push REC switch	Below 1.0 V
TPI ↔ SG–TPI (I20–16 ↔ I20–13)	W ↔ Y–R	Air inlet control servomotor control signal	IG ON, Push REC switch	3.5 to 4.5 V
			IG ON, Push FRS switch	0.5 to 1.5 V
RrTR ↔ SG–RrTR (I22–13 ↔ I22–14)*1	GR–R ↔ R–Y	Rear room temperature sensor signal	IG ON, Rr room temp.: 25˚C (77˚F)	1.8 to 2.2 V
			IG ON, Rr room temp.: 40˚C (104˚F)	1.2 to 1.6 V
FACE ↔ GND (I20–5 ↔ I19–10)	GR ↔ O	Air outlet control servomotor control signal	Mode control switch: except FACE → FACE	10 to 14 → Below 1.0 V
B/L ↔ GND (I20–6 ↔ I19–10)	BR–W ↔ O	Air outlet control servomotor control signal	Mode control switch: except BI–LEVEL → BI–LEVEL	10 to 14 → Below 1.0 V
IGN ↔ GND (I22–3 ↔ I19–10)	Y–G ↔ O	Engine revolution signal	Engine idling	Pulse generation
TW ↔ GND (I22–2 ↔ I19–10)	W–R ↔ O	Engine coolant temperature sensor signal	IG ON	Pulse generation
ACT ↔ GND (I22–5 ↔ I19–10)	LG–B ↔ O	Compressor operation signal	IG ON, A/C switch: OFF → ON	Below 1.0 → 10 to 14 V
TE ↔ SG–TE (I20–4 ↔ I20–2)	G–B ↔ W–G	Evaporator temperature sensor signal	IG ON, Evaporator temp.: 0˚C (32˚F)	2.0 to 2.4 V
			IG ON, Evaporator temp.: 15˚C (59˚F)	1.4 to 1.8 V
MGC ↔ GND (I19–5 ↔ I19–10)	L ↔ O	Magnetic clutch control signal	Engine start A/C switch: OFF → ON	10 to 14 → Below 1.0 V
LOCK ↔ GND (I19–9 ↔ I19–10)	W–R ↔ O	Compressor lock sensor signal	Engine start A/C switch: OFF → ON	Pulse generation

*1: w/ Rear A/C

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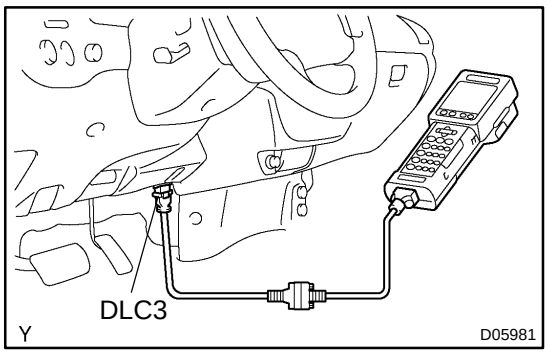
DIDKQ–01

DTC CHECK / CLEAR



1. DTC CHECK USING HAND–HELD TESTER

(a) Hook up the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Read the DTCs following the prompts on the tester screen.
Refer to the hand–held tester operator's manual for further details.

(d) Clear the DTCs.

HINT:

After repairing the malfunctions, clear the DTCs.

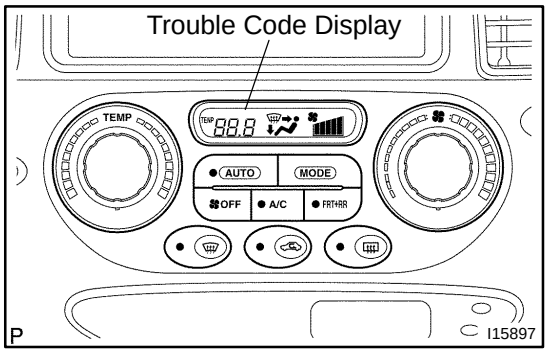
(1) Connect the hand–held tester to the DLC3.

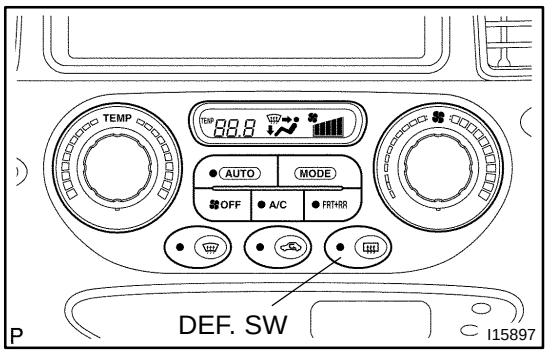
(2) Turn the ignition switch to the ON position.

(3) Erase the DTCs following the prompts on the tester screen.

HINT:

Refer to the hand–held tester operator's manual for further details.





2. DTC CHECK (SENSOR CHECK)

(a) Perform an indicator check. After the indicator check is completed, the system enters the DTC check mode automatically (See page DI–2312).

(b) Read the DTC displayed on the panel. Refer to the list of DTCs on page DI–2317 when reading the DTCs (DTCs are output on the temperature display.).
If the slower display is desired, press the DEF. SW and change it to step operation. Each time the Temp. Control switch is pressed, the display changes by 1 step.

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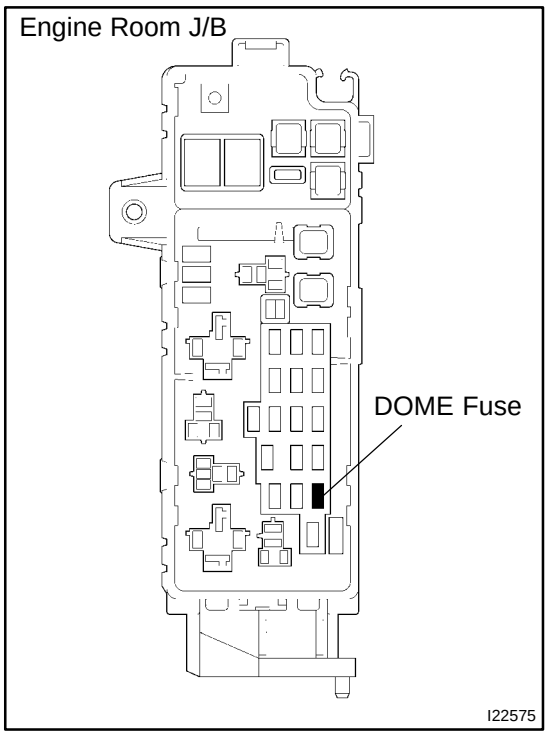

3. CLEARING DTC

(a) Pull out the DOME fuse from the engine room J/B for 10 sec. or longer to clear the diagnostic DTC's memory.

(b) After reinserting the fuse, check that the normal code is output.

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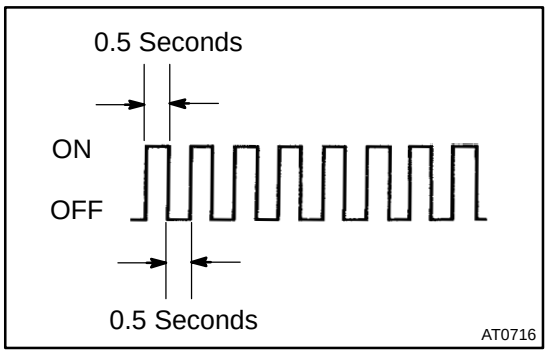
DIDKR–01



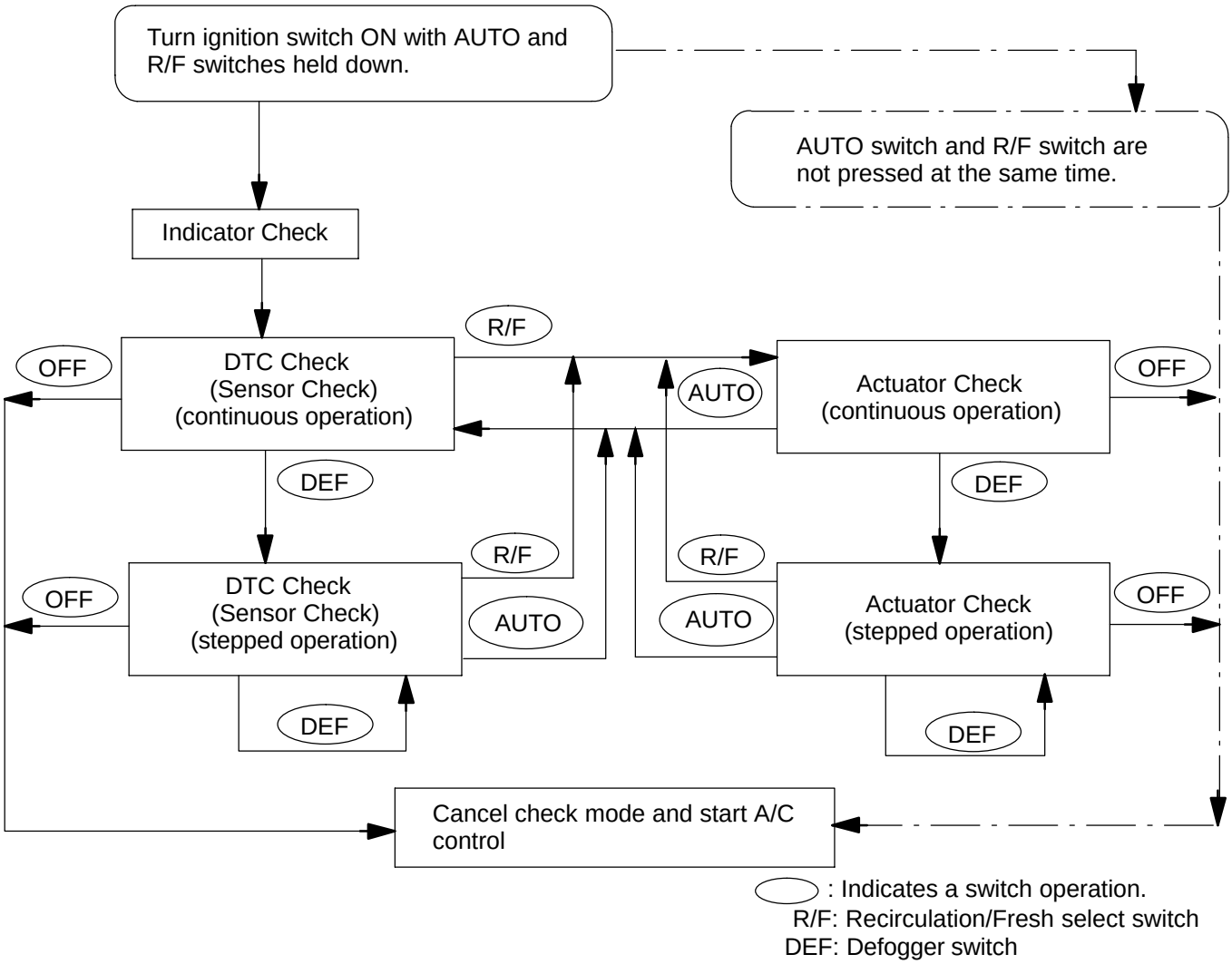
CHECK MODE PROCEDURE

1. WARNING FOR A/C COMPRESSOR LOCK

If compressor lock occurs during A/C operation, the A/C switch indicator on the A/C control assembly starts blinking.
When this occurs, check for compressor lock (DTC 22) using diagnosis trouble code check then proceed to inspect the circuit or the component.
Compressor lock sensor circuit. → (See page DI–2339)

2. LIST OF OPERATION METHODS

By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnosis check mode.



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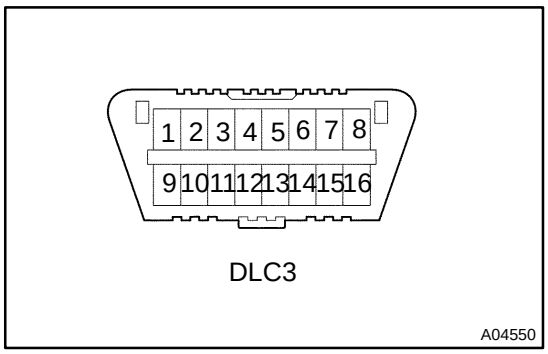
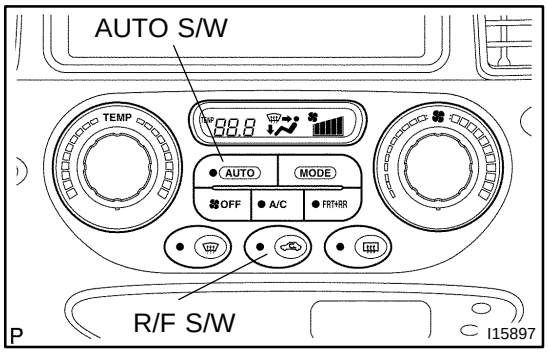


3. CHECK DLC3

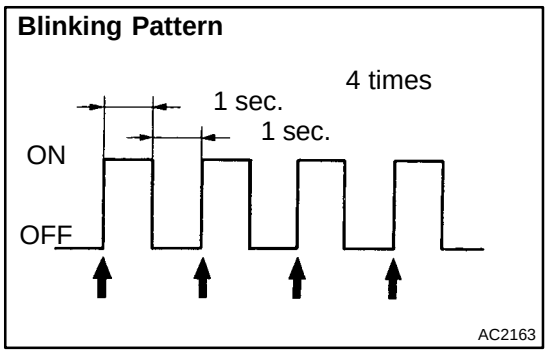
The vehicle's ECM uses the ISO 9141–2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) – SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) – Body ground	Chassis ground	Always	Below 1 Ω
SG (5) – Body ground	Signal ground	Always	Below 1 Ω
BAT (16) – Body ground	Battery positive	Always	11 to 14 V



4. INDICATOR CHECK

(a) Turn the ignition switch on while pressing the A/C control AUTO switch and R/F SW simultaneously.



(b) Check that all the indicators light up and go off at 1 second intervals 4 times in succession.

HINT:

- ▶ After the indicator check is ended, the diagnostic trouble code check begins automatically.
- ▶ Press the OFF switch when desiring to cancel the check mode.

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DIDKS–01

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

From the DATA LIST displayed on the hand–held tester, you can read the values of the displays, sensors, actuators and so on without part removal. Reading the DATA LIST as the first step of troubleshooting is one way to shorten labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) From the display on the tester, select ”DATA LIST”.

AIR CONDITIONING:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ROOM TEMP	Room temperature sensor / min.: –6.5˚C (20.3˚F) max.: 57.25˚C (135.05˚F)	Actual room temperature is displayed	Open in the circuit: –6.5˚C (20.3˚F) Short in the circuit: 57.25˚C (135.05˚F)
AMBI TEMP SENS	Ambient temperature sensor / min.: –30.8˚C (–23.44˚F) max.: 50.8˚C (123.44˚F)	Actual ambient temperature is displayed	Open in the circuit: –30.8˚C (–23.44˚F) Short in the circuit: 50.8˚C (123.44˚F)
EVAP TEMP	Evaporator temperature sensor / min.: –29.7˚C (–21.46˚F) max.: 59.55˚C (139.19˚F)	Actual evaporator temperature is displayed	Open in the circuit: –29.7˚C (–21.46˚F) Short in the circuit: 59.55˚C (139.19˚F)
SOLAR SENS–D	Solar sensor (Driver side) / min.: 0 max.: 255	Increases as brightness increases	Open in the circuit: 0 Short in the circuit: 255
COOLANT TEMP	Engine coolant temperature / min.: 1.3˚C (34.34˚F) max.: 90.55˚C (194.99˚F)	Actual engine coolant temperature is displayed while the engine is warmed up	–
SET TEMP–D	Set temperature (Driver side) / min.: 0 max.: 255	Set temperature and displayed temperature are the same	–
ESTIMATE TEMP–D	Estimated temperature (Driver side) / min.: –200˚C (–328˚F) max.: 200˚C (392˚F)	Damper is at ”MAX. COOL”: –200˚C (–328˚F) Damper is at ”MAX. HOT”: 200˚C (392˚F)	–
A/M DAMP POS–D	Air mix damper position (Driver side) / min.: –14% max.: 113.5%	Damper is at ”MAX. COOL”: –10.0% Damper is at ”MAX. HOT”: 100.0%	–
A/I DAMP POS	Air inlet damper position / min.: –9% max.: 109%	Damper is at ”RECIRCULATION”: –9% Damper is at ”FRESH”: 109.0% Damper is at ”HALF–RECIRCULATION”: 30.0 to 80.0%	Open in the circuit: 50.0%
A/M DAMP TARG–D	Air mix damper target position (Driver side) / min.: –14% max.: 113.5%	Damper is at ”MAX. COOL”: –10.0% Damper is at ”MAX. HOT”: 100.0%	–
A/I DAMP TARG	Air inlet damper target position / min.: –9% max.: 109%	Damper is at ”RECIRCULATION”: –9% Damper is at ”FRESH”: 109.0% Damper is at ”HALF–RECIRCULATION”: 30.0 to 80.0%	Open in the circuit: 50.0%

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BLOWER LEVEL	Blower motor speed level / min.: Level 0 max.: 31	Increases within a range between 0 and 31 as the speed increases.	–
AMBI TEMP	Adjusted ambient temperature / min.: –30.8˚C (–23.44˚F) max.: 50.8˚C (123.44˚F)	–	–
SET TEMP SHIFT	Shift set temperature / +2C, +1C, NORMAL, –1C, –2C	Customized value will be displayed	–
AIR INLET MODE	Air inlet mode / AUTO, MANUAL	Customized value will be displayed	–
COMPRESSOR MODE	Compressor mode / AUTO, MANUAL	Customized value will be displayed	–
COMPRS/DEF OPER	Compressor / DEF operation mode / LINK, NORMAL	Customized value will be displayed	–
FOOT/DEF MODE	Foot / DEF auto mode / ON, OFF	Customized value will be displayed	–
DESTINATION	Destination / DOMEST, USA, EUROPE, AUSTRAL, MIDEAST, NO INFO	Changes with destination	–
REAR ROOM TEMP	Room temperature sensor (Rear) / min.: –6.5˚C (20.3˚F) max.: 57.25˚C (135.05˚F)	Actual room temperature is displayed	Open in the circuit: –6.5˚C (20.3˚F) Short in the circuit: 57.25˚C (135.05˚F)
R–EVAP TEMP	Evaporator temperature sensor / min.: –29.7˚C (–21.46˚F) max.: 59.55˚C (139.19˚F)	Actual evaporator temperature is displayed	Open in the circuit: –29.7˚C (–21.46˚F) Short in the circuit: 59.55˚C (139.19˚F)
SET TEMP REAR	Set temperature (Rear side) / min.: 0 max.: 255	Set temperature and displayed temperature are the same.	–
ESTIMATE TEMP–R	Estimated temperature (Rear side) / min.: –200˚C (–328˚F) max.: 200˚C (392˚F)	Damper is at ”MAX. COOL”: –200˚C (–328˚F) Damper is at ”MAX. HOT”: 200˚C (392˚F)	–
A/M DAMP POS–R	Air mix damper position (Rear side) / min.: –14% max.: 113.5%	Damper is at ”MAX. COOL”: –10.0% Damper is at ”MAX. HOT” 100.0%	–
A/M DAMP TARG–R	Air mix damper target position (Rear side) / min.: –14% max.: 113.5%	Damper is at ”MAX. COOL”: –10.0% Damper is at ”MAX. HOT” 100.0%	–
BLOWER LEVEL–R	Blower motor speed level / min.: Level 0 max.: 31	Increases within a range between 0 and 31 as the speed increases.	–
#CODES	Number of trouble codes / min.: 0 max.: 255	Number of DTCs will be displayed	–

ENGINE AND ECT / ALL:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/C SIG	A/C signal / ON or OFF	A/C ON: ON	–
A/C MAG CLUTCH	A/C magnet clutch / ON or OFF	A/C magnet clutch ON: ON	–

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2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand–held tester allows the relay, VSV, actuator and so on to operate without part removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) From the display on the tester, perform the ”ACTIVE TEST”.

AIR CONDITIONING:

Item	Test Details / Display (Range)	Diagnostic Note
BLOWER MOTOR	Blower motor / min.: 0 max.: 31	–
AIR MIX DAMP–D	Air mix damper (Driver side) / min.: –14% max.: 113.5%	–
A/I DAMP–LINEAR	Air inlet damper position (Linear) / min.: –14% max.: 113.5%	–
REAR BLOWER	Blower motor (Rear) / min.: 0 max.: 31	–
AIR MIX DAMP–R	Air mix damper (Rear) / min.: –14% max.: 113.5%	–
A/C MAG CLUTCH	A/C magnetic clutch relay / OFF, ON	–
DEFOGGER RLY–R	Defogger relay (Rear) / OFF, ON	–

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DI3F1–09

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit.)

DTC No. (See page)	Detection Item	Trouble Area	Memory
00	Normal	–	–
11 *1 (DI–2319)	Front room temperature sensor circuit	▶Front room temp. sensor ▶Harness or connector between front room temp. sensor and integration control and panel ▶Integration control and panel	◀ (8.5 min. or more)
12 *2 (DI–2322)	Ambient temperature sensor circuit	▶Ambient temp. sensor ▶Harness or connector between ambient temp. sensor and integration control and panel ▶Integration control and panel	◀ (8.5 min. or more)
13 (DI–2325)	Front evaporator temperature sensor circuit	▶Front evaporator temp. sensor ▶Harness or connector between front evaporator temp. sensor and integration control and panel ▶Integration control and panel	◀ (8.5 min. or more)
14 (DI–2328)	Engine coolant temperature sensor circuit	▶Engine coolant temp. sensor ▶Harness or connector between engine coolant temp. sensor and ECM ▶Harness or connector between ECM and integration control and panel ▶Integration control and panel ▶ECM	–
17 (DI–2330)	Rear evaporator temperature sensor circuit	▶Rear evaporator temp. sensor ▶Harness or connector between rear evaporator temp. sensor and integration control and panel ▶Integration control and panel	◀ (8.5 min. or more)
19 *1 (DI–2333)	Rear room temperature sensor circuit	▶Rear room temp. sensor ▶Harness or connector between rear room temp. sensor and integration control and panel ▶Integration control and panel	◀ (8.5 min. or more)
21 *3 (DI–2336)	Solar sensor circuit (Open)	▶Solar sensor ▶Harness or connector between solar sensor and integration control and panel ▶Integration control and panel	–
	Solar sensor circuit (Short)		◀ (8.5 min. or more)
22 *4 (DI–2339)	All conditions below are detected for 3 sec. or more (a) Engine speed: 450 rpm or more (b) Ratio between engine and compressor rpm deviates 20% or more in comparison to normal operation.	▶Compressor drive belt ▶Compressor lock sensor ▶Compressor ▶Harness or connector between compressor lock sensor and integration control and panel ▶Integration control and panel	–
23 (DI–2342)	Open in pressure sensor circuit Abnormal refrigerant pressure [below 196 kPa (2.0 kgf/cm^2, 28 psi) over 3,140 kPa (32.0 kgf/cm^2, 455 psi)]	▶Pressure switch ▶Harness or connector between pressure switch and integration control and panel ▶Refrigerant pipe line ▶Integration control and panel	–

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31 (DI–2346)	Front air mix damper position sensor circuit	▶Front air mix damper position sensor ▶Harness or connector between front air mix damper position sensor and integration control and panel ▶Integration control and panel	◀ (1 min. or more)
32 (DI–2349)	Air inlet damper position sensor circuit	▶Air inlet damper position sensor ▶Harness or connector between air inlet damper position sensor and integration control and panel ▶Integration control and panel	◀ (1 min. or more)
37 (DI–2352)	Water valve damper position sensor circuit	▶Water valve damper position sensor ▶Harness or connector between water valve damper position sensor and integration control and panel ▶Integration control and panel	◀ (1 min. or more)
41 (DI–2355)	Front air mix damper control servomotor circuit	▶Front air mix damper control servomotor ▶Front air mix damper position sensor ▶Harness or connector between integration control and panel and front air mix damper control servomotor ▶Harness or connector between air mix position sensor and integration control and panel front ▶Integration control and panel	◀ (15 sec. or more)
42 (DI–2358)	Air inlet damper control servomotor circuit	▶Air inlet damper control servomotor ▶Air inlet damper position sensor ▶Harness or connector between air inlet damper control servomotor and integration control and panel ▶Harness or connector between air inlet damper position sensor and integration control and panel ▶Integration control and panel	◀ (15 sec. or more)
47 (DI–2361)	Water valve damper control servomotor circuit	▶Water valve damper control servomotor ▶Water valve damper position sensor ▶Harness or connector between water valve damper control servomotor and integration control and panel ▶Harness or connector between water valve damper position sensor and integration control and panel ▶Integration control and panel	◀ (15 sec. or more)

HINT:

▶ *1 If the room temp. is approx. –20°C (–4°F) or lower, this DTC may be output even though the system is normal.

▶ *2 If the ambient temp. is approx. –50°C (–58°F) or lower, DTC 12 may be output even though the system is normal.

▶ *3 If the check is being performed in a dark place, DTC 21 (solar sensor circuit abnormal) could be displayed. In this case, perform DTC check again while illuminating the solar sensor with an inspection light etc.. If DTC 21 is still displayed, there could be trouble in the solar sensor circuit.

▶ *4 Compressor lock (DTC 22) is indicated only for a current malfunction. (See page DI–2339)

To confirm DTC 22, preform the following steps.

(1) With the engine ON, enter the DTC check mode.
(2) Press the R/F switch to enter actuator check mode, and set the operation to Step No. 3.
(3) Press the AUTO switch to return to DTC check mode.
(4) The DTC is displayed after approx. 3 sec.

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DIDKT–01

CIRCUIT INSPECTION

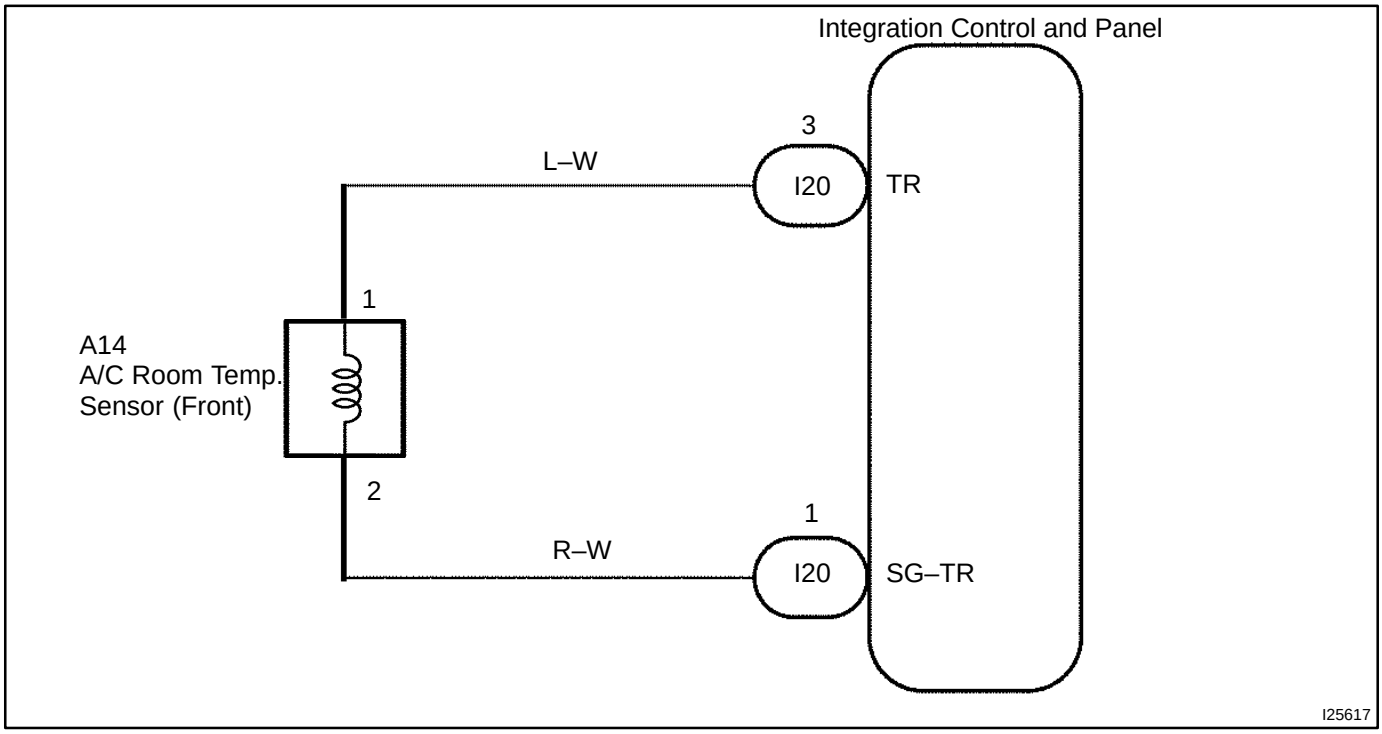
DTC	11	Front Room Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the integration control and panel.

DTC No.	Detection Item	Trouble Area
11	Open or short in front room temperature sensor circuit.	▶Front room temp. sensor ▶Harness or connector between front room temp. sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM

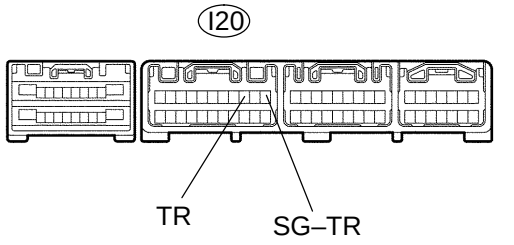


Dardoor.com

INSPECTION PROCEDURE

1	**Check voltage between terminals TR and SG–TR of integration control and panel.**

Integration Control and Panel:



PREPARATION:

Remove integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between terminals TR and SG–TR of the integration control and panel connector at each temperature.

OK:

Voltage :
at 25˚C (77˚F) : 1.8 to 2.2 V
at 40˚C (104˚F) : 1.2 to 1.6 V

HINT:

As the temperature increases, the voltage decreases.

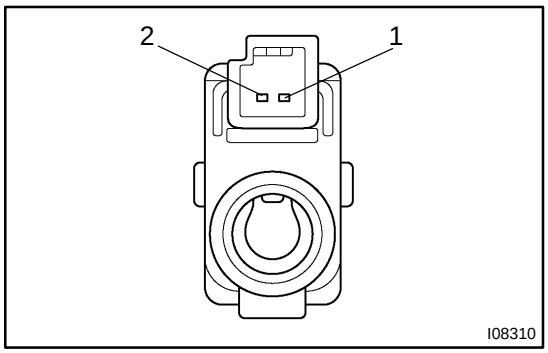
NG	**Go to step 2.**

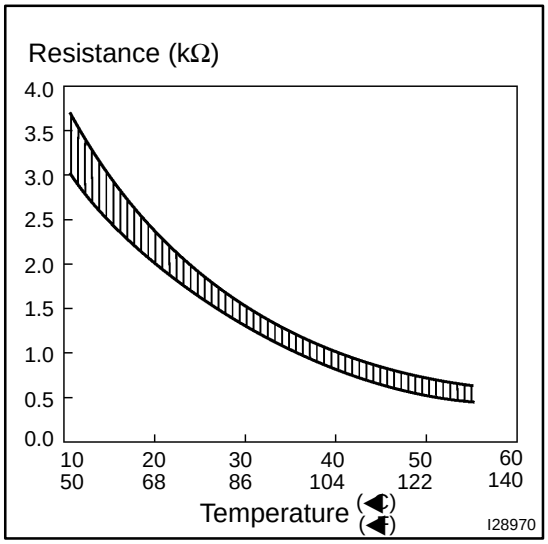
OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC 11 is displayed, replace integration control and panel.

Dardoor.com

2	Check front room temperature sensor.





PREPARATION:

Disconnect the room temperature sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the room temperature sensor connector at each temperature.

OK:

Tester connection	Condition	Specified condition
1–2	10◀C (50◀F)	3.00 to 3.73 kΩ
1–2	15◀C (59◀F)	2.45 to 2.88 kΩ
1–2	20◀C (68◀F)	1.95 to 2.30 kΩ
1–2	25◀C (77◀F)	1.60 to 1.80 kΩ
1–2	30◀C (86◀F)	1.28 to 1.47 kΩ
1–2	35◀C (95◀F)	1.00 to 1.22 kΩ
1–2	40◀C (104◀F)	0.80 to 1.00 kΩ
1–2	45◀C (113◀F)	0.65 to 0.85 kΩ
1–2	50◀C (122◀F)	0.50 to 0.70 kΩ
1–2	55◀C (131◀F)	0.44 to 0.60 kΩ
1–2	60◀C (140◀F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph on the left).

NG → **Replace front room temperature sensor.**

OK

3	Check harness and connector between front room temperature sensor and integration control and panel (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

Dardoor.com

DIDKU–01

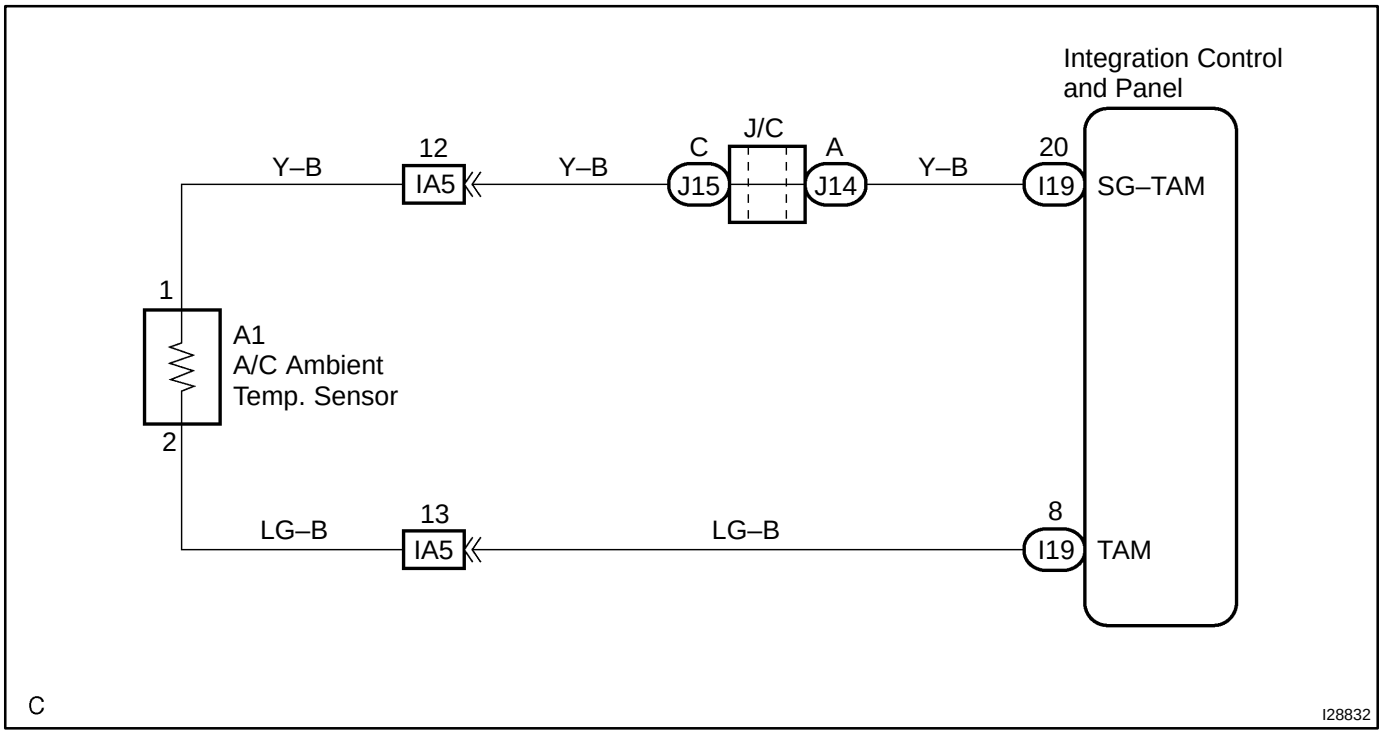
DTC	12	Ambient Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the ambient temperature and sends the appropriate signals to the integration control and panel.

DTC No.	Detection Item	Trouble Area
12	Open or short in ambient temperature sensor circuit.	▶Ambient temp. sensor ▶Harness or connector between ambient temp. sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM

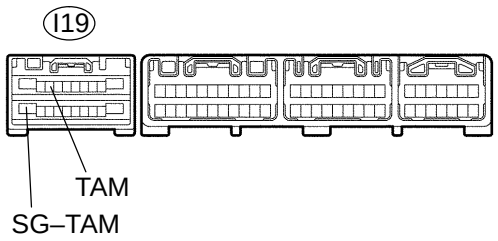


Dardoor.com

INSPECTION PROCEDURE

1	**Check voltage between terminals TAM and SG–TAM of integration control and panel.**

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between terminals TAM and SG–TAM of the integration control and panel connector at each temperature.

OK:

Voltage :
at 25˚C (77˚F) : 1.35 to 1.75 V
at 40˚C (104˚F) : 0.85 to 1.25 V

HINT:

As the temperature increases, the voltage decreases.

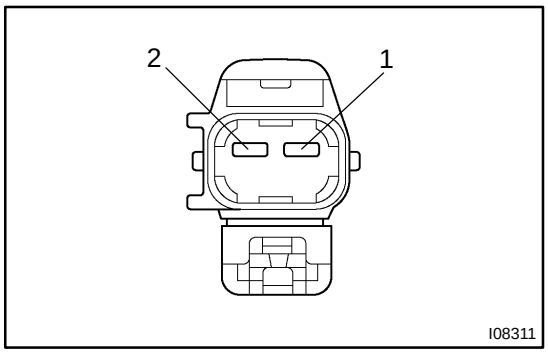
NG	**Go to step 2.**

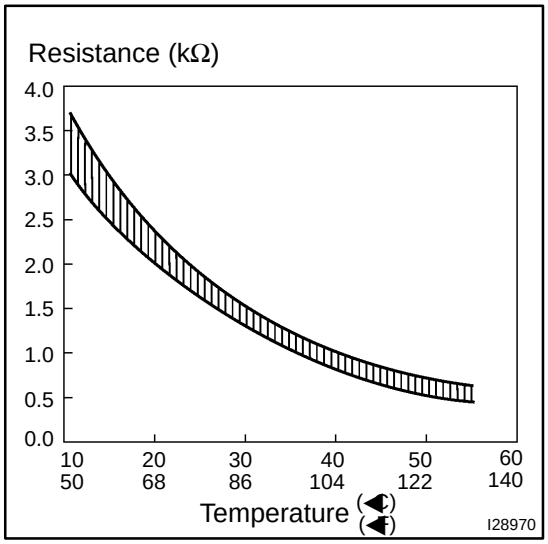
OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC 12 is displayed, replace integration control and panel.

Dardoor.com

2	Check ambient temperature sensor.





PREPARATION:

Disconnect the ambient temperature sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the ambient temperature sensor connector at each temperature.

OK:

Tester connection	Condition	Specified condition
1–2	10°C (50°F)	3.00 to 3.73 kΩ
1–2	15°C (59°F)	2.45 to 2.88 kΩ
1–2	20°C (68°F)	1.95 to 2.30 kΩ
1–2	25°C (77°F)	1.60 to 1.80 kΩ
1–2	30°C (86°F)	1.28 to 1.47 kΩ
1–2	35°C (95°F)	1.00 to 1.22 kΩ
1–2	40°C (104°F)	0.80 to 1.00 kΩ
1–2	45°C (113°F)	0.65 to 0.85 kΩ
1–2	50°C (122°F)	0.50 to 0.70 kΩ
1–2	55°C (131°F)	0.44 to 0.60 kΩ
1–2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph on the left).

NG → **Replace ambient temperature sensor.**

OK

3	Check harness and connector between ambient temperature sensor and integration control and panel (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

Dardoor.com

DIDKV–01

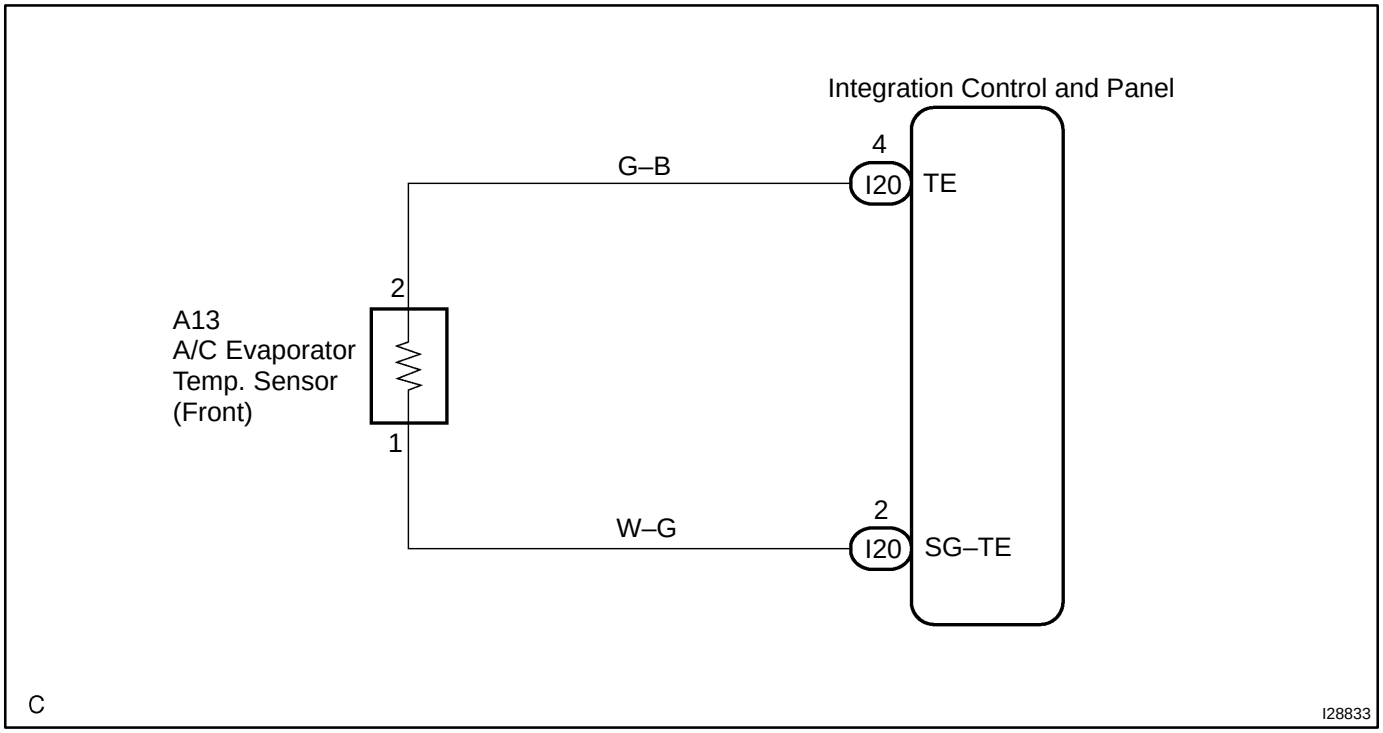
DTC	13	Front Evaporator Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cooling unit and sends the appropriate signals to the integration control and panel.

DTC No.	Detection Item	Trouble Area
13	Open or short in front evaporator temperature sensor circuit.	▶Front evaporator temp. sensor ▶Harness or connector between front evaporator temp. sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM

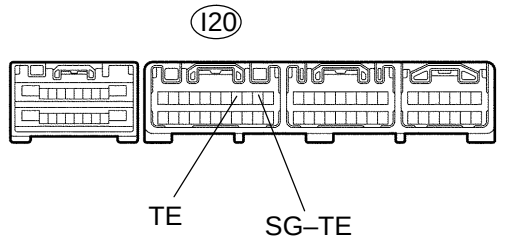


Dardoor.com

INSPECTION PROCEDURE

1	**Check voltage between terminals TE and SG–TE of integration control and panel.**

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between terminals TE and SG–TE of the integration control and panel connector at each temperature.

OK:

Voltage :
at 0˚C (32˚F) : 2.0 to 2.4 V
at 15˚C (59˚F) : 1.4 to 1.8 V

HINT:

As the temperature increases, the voltage decreases.

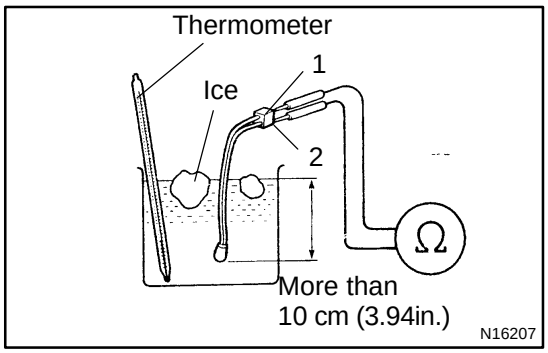
NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC 13 is displayed, replace integration control and panel.

Dardoor.com

2	Check front evaporator temperature sensor.



PREPARATION:

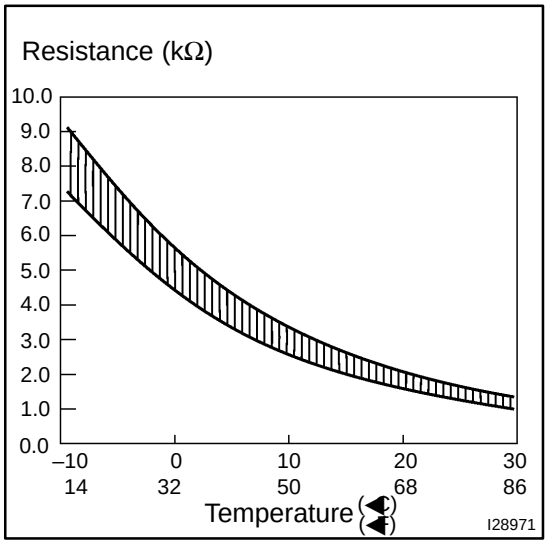
Remove the front evaporator temperature sensor.

CHECK:

Measure the resistance between terminals 1 and 2 of the evaporator temperature sensor connector at each temperature.

OK:

Tester connection	Condition	Specified condition
1–2	–10°C (14°F)	7.40 to 9.20 kΩ
1–2	–5°C (23°F)	5.65 to 7.00 kΩ
1–2	0°C (32°F)	4.35 to 5.40 kΩ
1–2	5°C (41°F)	3.40 to 4.20 kΩ
1–2	10°C (50°F)	2.68 to 3.30 kΩ
1–2	15°C (59°F)	2.10 to 2.60 kΩ
1–2	20°C (68°F)	1.66 to 2.10 kΩ
1–2	25°C (77°F)	1.32 to 1.66 kΩ
1–2	30°C (86°F)	1.05 to 1.35 kΩ



NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph on the left).

NG → **Replace front evaporator temperature sensor.**

OK

3	Check harness and connector between front evaporator temperature sensor and integration control and panel (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

Dardoor.com

DI935–03

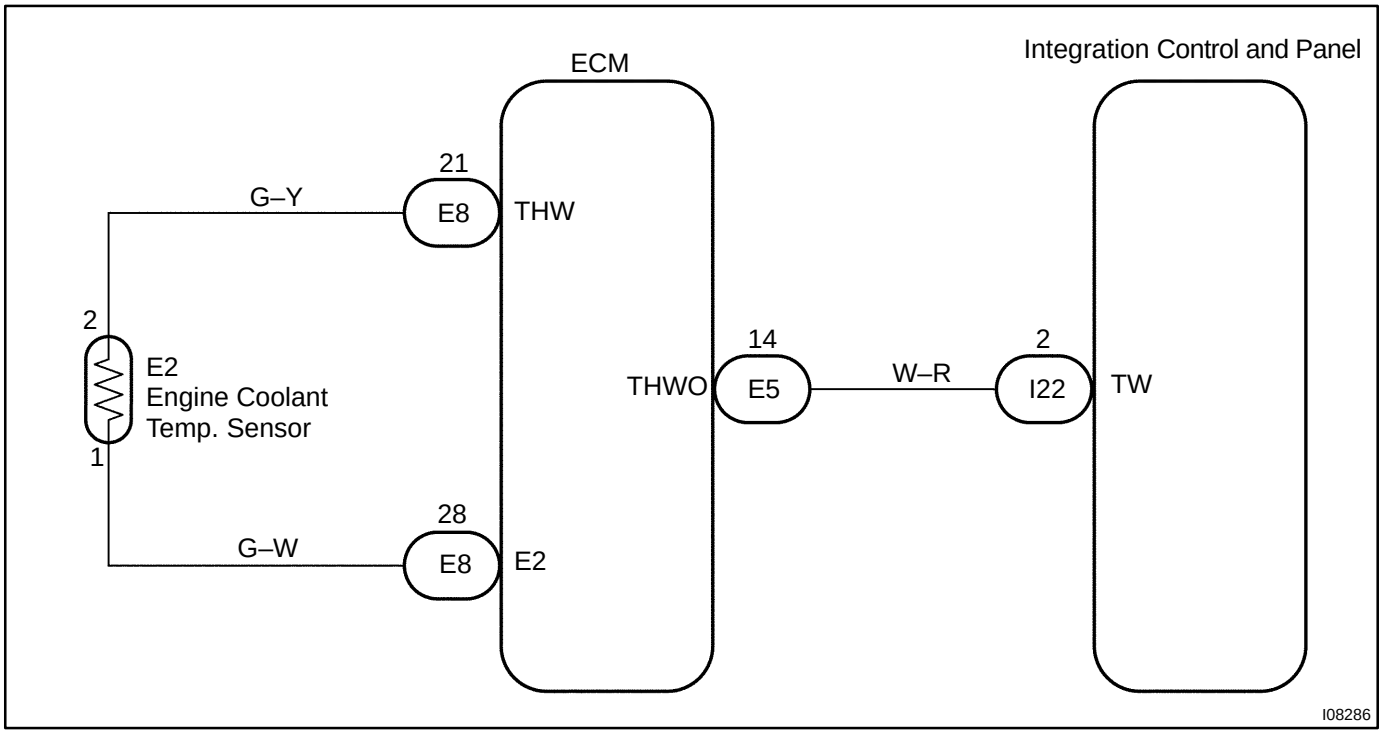
DTC	14	Engine Coolant Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the engine coolant temperature and sends the appropriate signals to the integration control and panel. These signals are used for warm up control when the engine is cold.

DTC No.	Detection Item	Trouble Area
14	Open or short in engine coolant temperature sensor circuit.	▶Engine coolant temp. sensor ▶Harness or connector between engine coolant temp. sensor and ECM ▶Harness or connector between ECM and integration control and panel ▶ECM ▶Integration control and panel

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	Is DTC P0115, P0117 or P0118 output?

YES → Go to engine troubleshooting (See page DI–9).

NO

2	Check harness and connector between ECM and integration control and panel.

NG → Repair or replace harness or connector.

OK

Replace integration control and panel.

Dardoor.com

DIDKW–01

DTC	17	Rear Evaporator Temperature Sensor Circuit

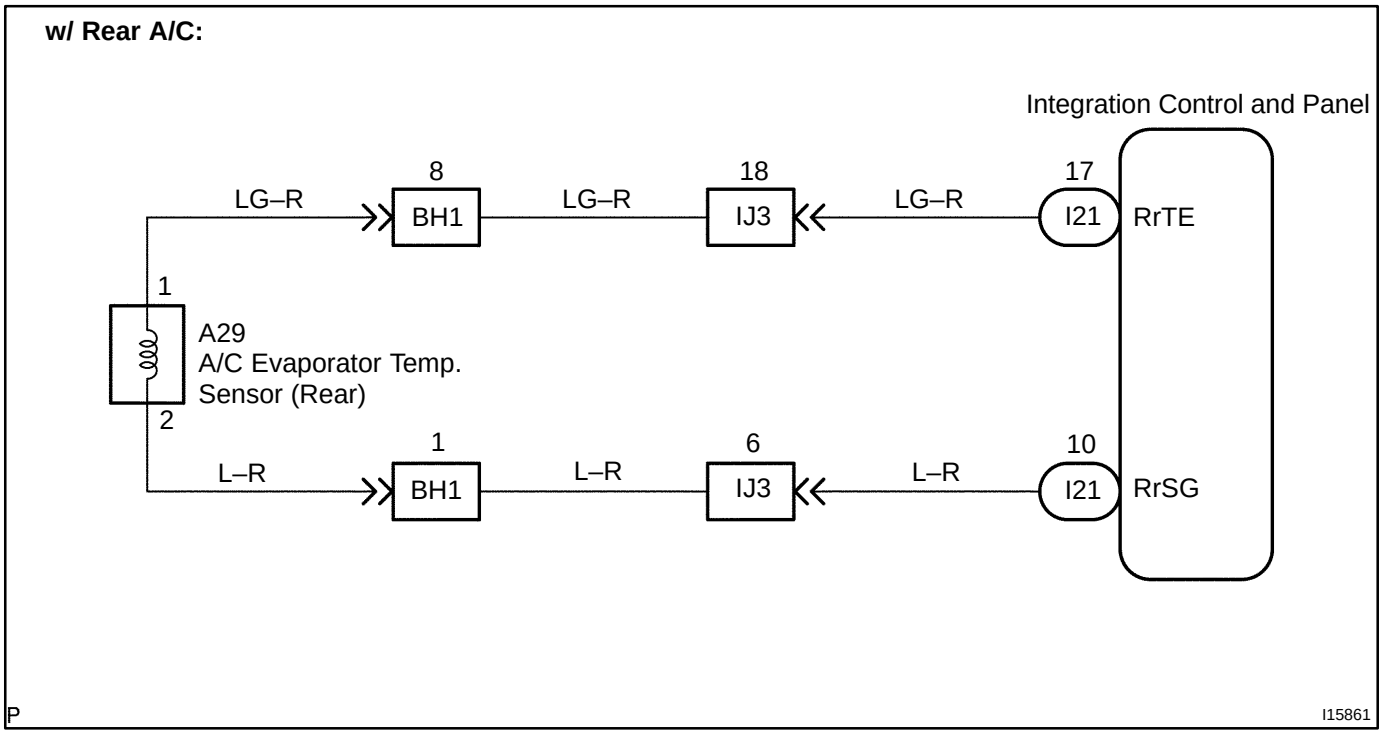
CIRCUIT DESCRIPTION

This sensor detects the rear evaporator temperature and sends the appropriate signals to the integration control and panel.

DTC No.	Detection Item	Trouble Area
17	Open or short in rear evaporator temperature sensor circuit.	▶Rear evaporator temp. sensor ▶Harness or connector between rear evaporator temp. sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM

w/ Rear A/C:

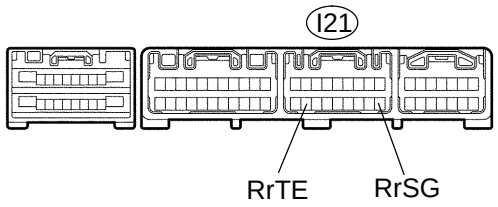


Dardoor.com

INSPECTION PROCEDURE

1	**Check voltage between terminals RrTE and RrSG of integration control and panel.**

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between terminals RrTE and RrSG of the integration control and panel connector at each temperature.

OK:

Voltage :
at 0˚C (32˚F) : 2.0 to 2.4 V
at 15˚C (59˚F) : 1.4 to 1.8 V

HINT:

As the temperature increases, the voltage decreases.

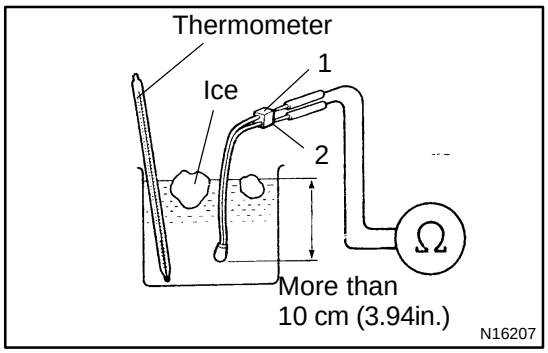
NG → **Go to step 2.**

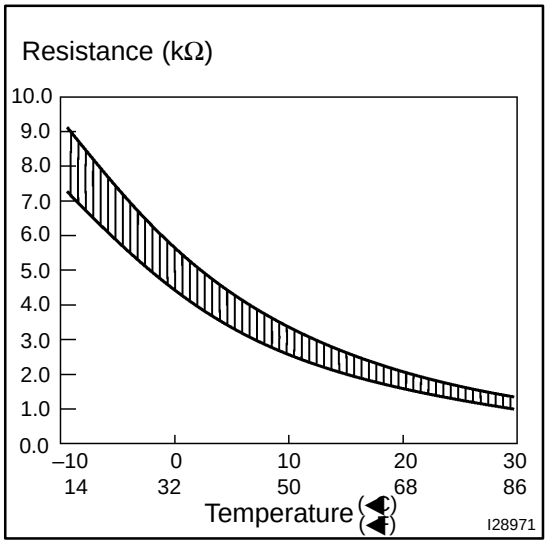
OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC 17 is displayed, replace integration control and panel.

Dardoor.com

2	Check rear evaporator temperature sensor.





PREPARATION:

Remove the rear evaporator temperature sensor (See page AC–42).

CHECK:

Measure the resistance between terminals 1 and 2 of the evaporator temperature sensor connector at each temperature.

OK:

Tester connection	Condition	Specified condition
1–2	–10°C (14°F)	7.40 to 9.20 kΩ
1–2	–5°C (23°F)	5.65 to 7.00 kΩ
1–2	0°C (32°F)	4.35 to 5.40 kΩ
1–2	5°C (41°F)	3.40 to 4.20 kΩ
1–2	10°C (50°F)	2.68 to 3.30 kΩ
1–2	15°C (59°F)	2.10 to 2.60 kΩ
1–2	20°C (68°F)	1.66 to 2.10 kΩ
1–2	25°C (77°F)	1.32 to 1.66 kΩ
1–2	30°C (86°F)	1.05 to 1.35 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph on the left).

NG → **Replace rear evaporator temperature sensor.**

OK

3	Check harness and connector between rear evaporator temperature sensor and integration control and panel (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

Dardoor.com

DIDKX–01

DTC	19	Rear Room Temperature Sensor Circuit

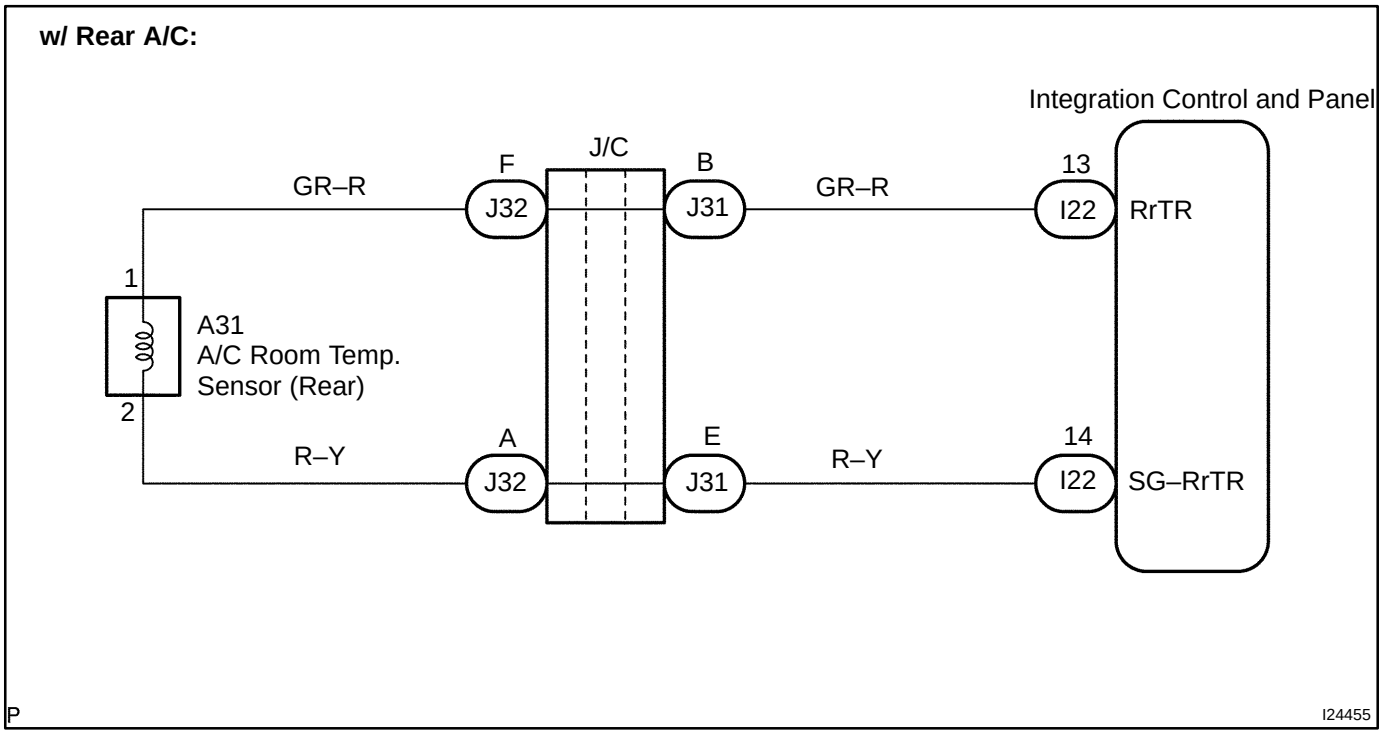
CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the integration control and panel.

DTC No.	Detection Item	Trouble Area
19	Open or short in rear room temperature sensor circuit.	▶Rear room temp. sensor ▶Harness or connector between rear room temp. sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM

w/ Rear A/C:

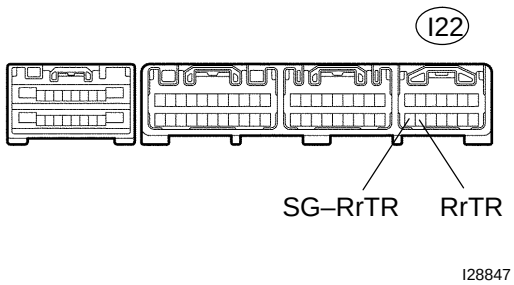


Dardoor.com

INSPECTION PROCEDURE

1	**Check voltage between terminals RrTR and SG–RrTR of integration control and panel.**

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between terminals RrTR and SG–RrTR of the integration control and panel connector at each temperature.

OK:

Voltage :
at 25˚C (77˚F) : 1.8 to 2.2 V
at 40˚C (104˚F) : 1.2 to 1.6 V

HINT:

As the temperature increases, the voltage decreases.

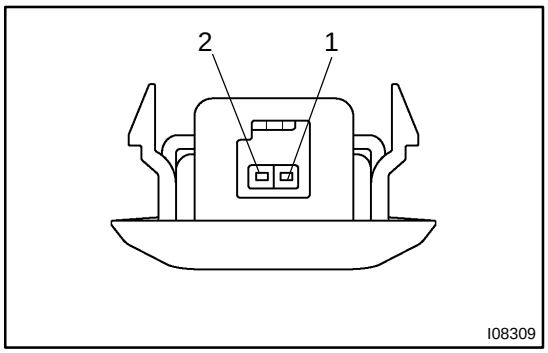
NG → **Go to step 2.**

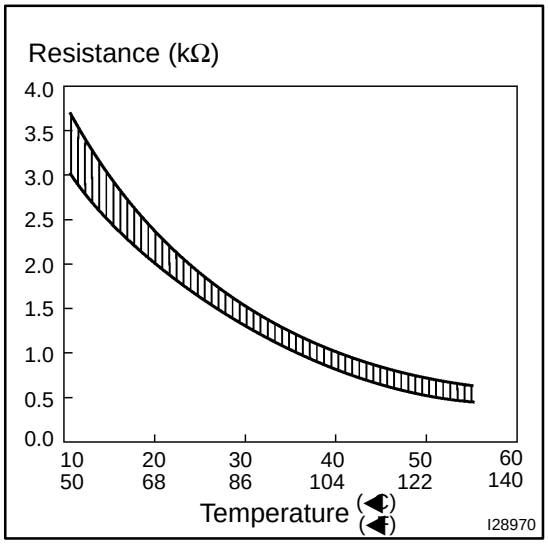
OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC19 is displayed, replace integration control and panel.

Dardoor.com

2	Check rear room temperature sensor.





PREPARATION:

Disconnect the rear room temperature sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the room temperature sensor connector at each temperature.

OK:

Tester connection	Condition	Specified condition
1–2	10°C (50°F)	3.00 to 3.73 kΩ
1–2	15°C (59°F)	2.45 to 2.88 kΩ
1–2	20°C (68°F)	1.95 to 2.30 kΩ
1–2	25°C (77°F)	1.60 to 1.80 kΩ
1–2	30°C (86°F)	1.28 to 1.47 kΩ
1–2	35°C (95°F)	1.00 to 1.22 kΩ
1–2	40°C (104°F)	0.80 to 1.00 kΩ
1–2	45°C (113°F)	0.65 to 0.85 kΩ
1–2	50°C (122°F)	0.50 to 0.70 kΩ
1–2	55°C (131°F)	0.44 to 0.60 kΩ
1–2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph on the left).

NG → **Replace rear room temperature sensor.**

OK

3	Check harness and connector between rear room temperature sensor and integration control and panel (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

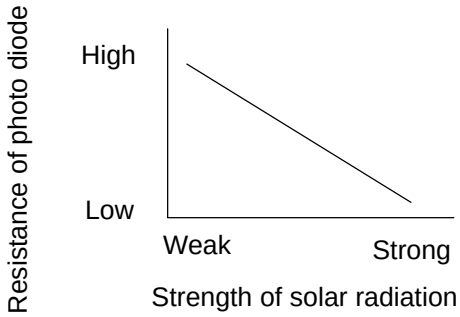
Replace integration control and panel.

Dardoor.com

DI3FB–11

DTC	21	Solar Sensor Circuit

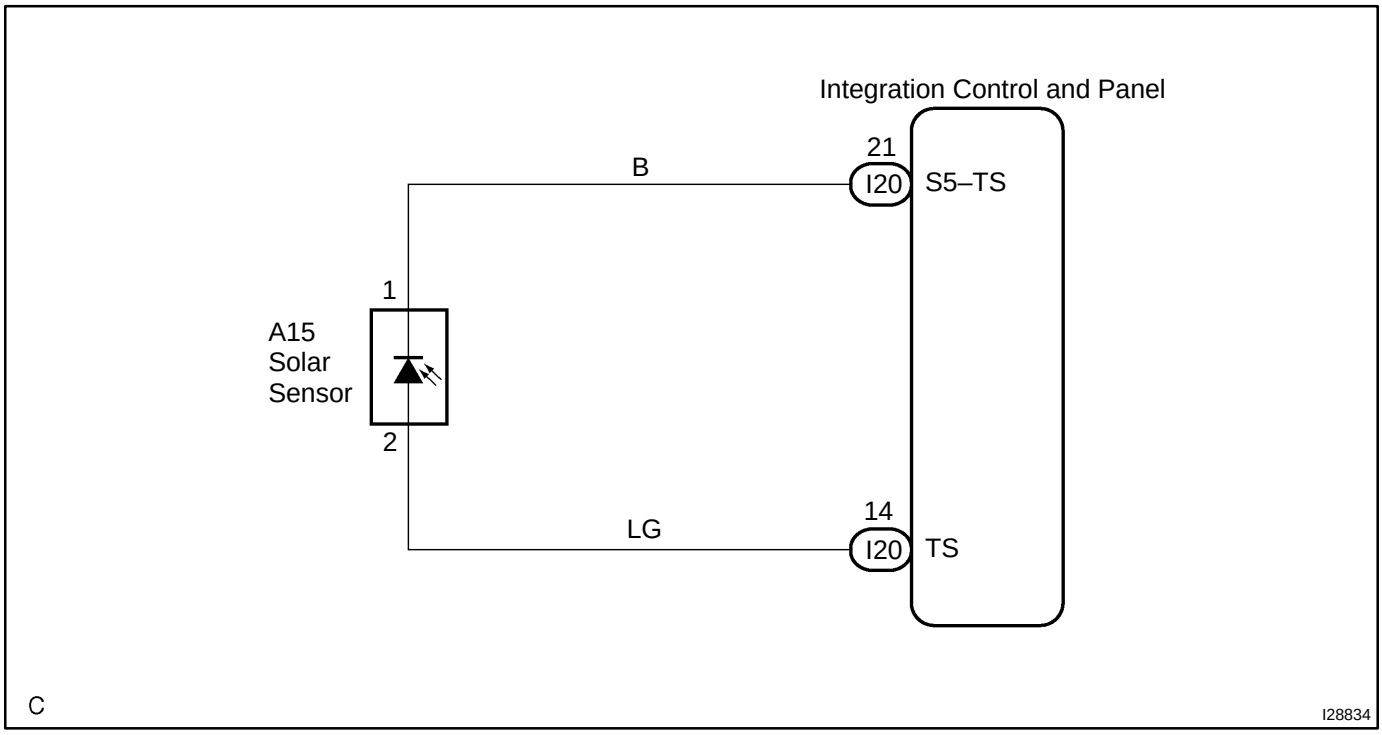
CIRCUIT DESCRIPTION



A photo diode in the solar sensor detects solar radiation and sends signals to the integration control and panel.

DTC No	Detection Item	Trouble Area
21	Open or short in solar sensor circuit. Note that output of diagnostic trouble code 21 is not abnormal when the sensor is not receiving solar radiation.	▶Solar sensor ▶Harness or connector between solar sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM

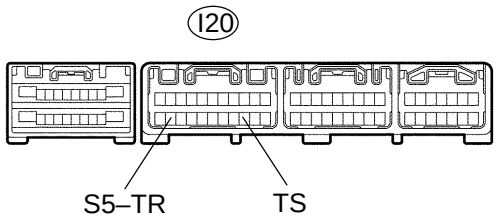


Dardoor.com

INSPECTION PROCEDURE

1	Check voltage between terminals TS and S5–TS of integration control and panel.

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between terminals TS and S5–TS of the integration control and panel connector when the solar sensor is subjected to an electric light, and when the sensor is covered by a cloth.

OK:

Condition	Voltage
Move the light away from the sensor	Voltage increases
Move the light closer to the sensor	Voltage decreases

HINT:

Use an incandescent lamp for inspection. Bring it within 30 cm (11.8 in.) of the solar sensor.

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC 21 is displayed, replace integration control and panel.

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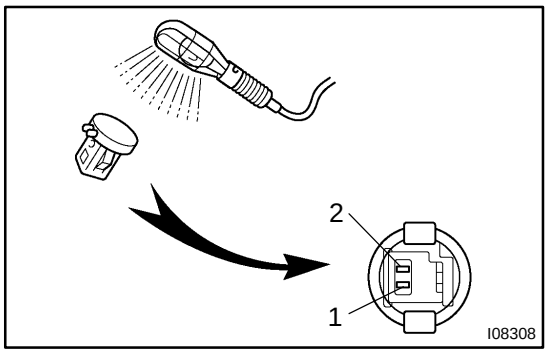
2	**Check solar sensor.**



PREPARATION:

Remove the solar sensor.

CHECK:

(a) Cover the sensor with a cloth.

(b) Measure the resistance between terminals 1 and 2 of the solar sensor connector.

HINT:

Connect the positive (+) lead of the ohmmeter to terminal 2 and the negative (–) lead to terminal 1 of the solar sensor.

OK:

Tester connection	Condition	Specified condition
A15–1 – A15–2	Sensor is subject to electric light	Except ∞ Ω
A15–1 – A15–2	Sensor is covered with a cloth	∞ Ω (No continuity)

NOTICE:

The connection procedure for using a digital tester such as an TOYOTA electrical tester is shown above. When using an analog tester, connect the positive (+) lead to terminal 1 and negative (–) lead to terminal 2 of the A/C solar sensor.

HINT:

- As the inspection light is moved away from the sensor, the voltage increases.
- Use an incandescent lamp for inspection. Bring it within 30 cm (11.8 in.) of the A/C solar sensor.

NG → **Replace solar sensor.**

OK

3	**Check harness and connector between solar sensor and integration control and panel (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

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DIDKY–01

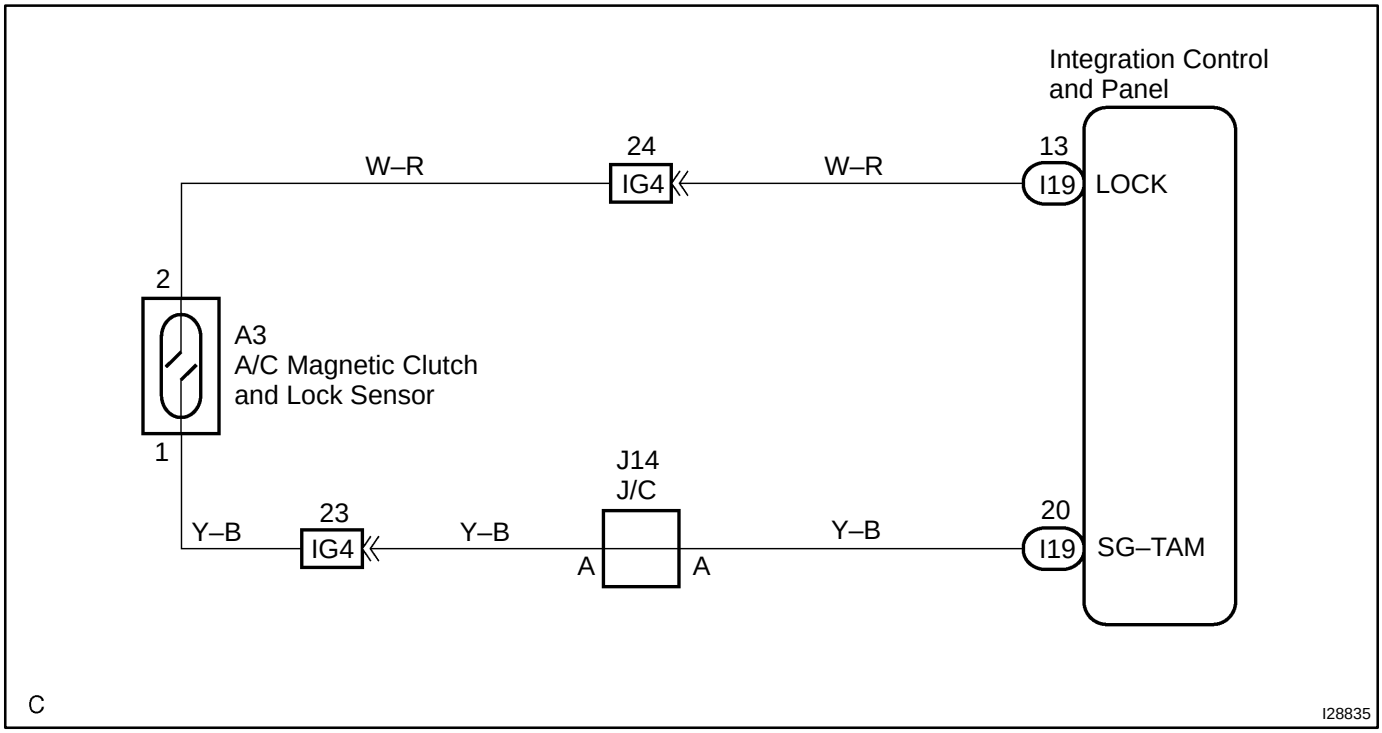
DTC	22	Compressor Lock Sensor Circuit

CIRCUIT DESCRIPTION

This sensor sends 1 pulse per engine revolution to the integration control and panel.
If the compressor speed divided by the engine speed is smaller than a predetermined value, the integration control and panel turns the compressor OFF. The indicator flashes at about 1 second intervals.

DTC No.	Detection Item	Trouble Area
22	All conditions below are detected for 3 sec. or more (a) Engine speed: 450 rpm or more (b) Ratio of engine to compressor speed deviates 20% or more in comparison to normal operation.	▶Compressor drive belt ▶Compressor lock sensor ▶Compressor ▶Harness or connector between compressor lock sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Check compressor.**

PREPARATION:

(a) Check and adjust compressor drive belt tension (See page AC–15).

CHECK:

(a) Check that the compressor does not lock when starting the engine and turning the A/C switch on.

OK: Cooler compressor assy does not lock during operation

HINT:

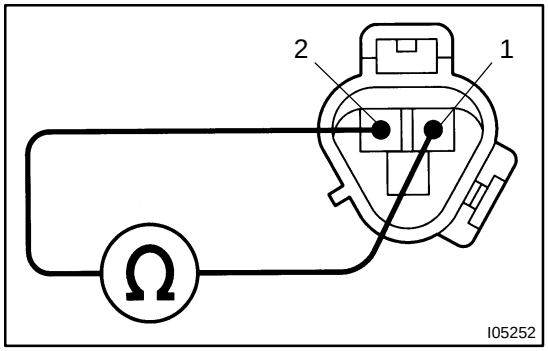
If the compressor drive belt slips when the A/C switch is on, the magnet clutch seems to be locked.

If the condition continues for more than 3 seconds, the A/C amplifier turns off the magnet clutch for compressor drive belt protection.

NG → **Replace compressor.**

OK

2	**Check compressor lock sensor.**



PREPARATION:

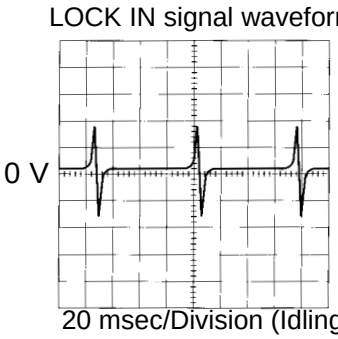
Disconnect the compressor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the compressor lock sensor connector.

OK:

Resistance : 65 to 125 Ω at 20˚C (68 ˚F)



Reference: Inspection using oscilloscope

During cranking or idling, measure the voltage between terminals LOCK and SG–TAM of the integration control and panel.

HINT:

The correct waveform appears as shown in the illustration on the left.

NG → **Replace compressor.**

OK

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3	**Check harness and connector between compressor lock sensor and integration control and panel (See page IN–24).**

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

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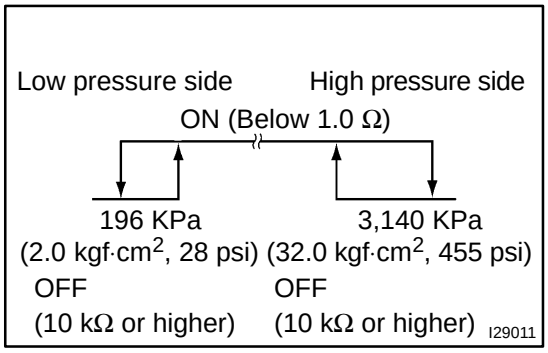
DI3FD–09

DTC	23	Pressure Switch Circuit

CIRCUIT DESCRIPTION



The pressure switch sends the appropriate signals to the A/C amplifier when the A/C refrigerant pressure drops too low or rises too high. When the A/C amplifier receives these signals, it outputs signals through the A/C amplifier to turn the magnet clutch relay off and turns the magnetic clutch off.

DTC No.	Detection Item	Trouble Area
23	▶Open in pressure sensor circuit. ▶Abnormal refrigerant pressure. below 196 kPa (2.0 kg/cm^2, 28 psi) over 3,140 kPa (32.0 kgf/cm^2, 455 psi)	▶Pressure switch ▶Harness or connector between pressure switch and integration control and panel ▶Refrigerant pipe line ▶Integration control and panel

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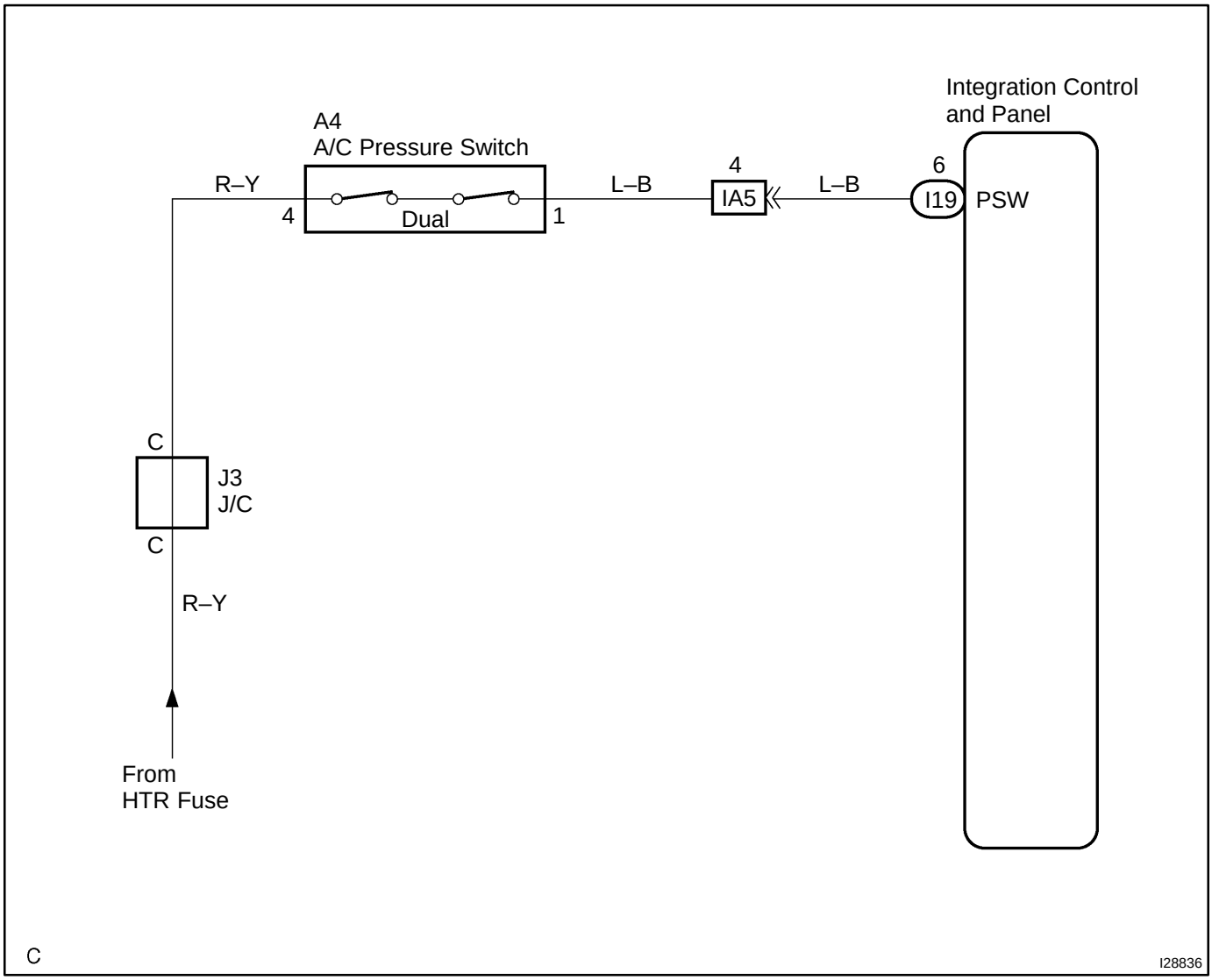
WIRING DIAGRAM



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INSPECTION PROCEDURE

1	Check refrigerant pressure.

(a) Set the manifold gauge.
(b) Read the manifold gauge pressure when these conditions are established.
Test conditions:
- Temperature at the air inlet with the switch set at RECIRC is 30 to 35˚C (86 to 95˚F)
- Engine running at 1,500 rpm
- Blower speed control switch at ”HI” position
- Temperature control dial at ”COOL” position
- Air conditioning switch ON
- Fully open doors

Standard:
Pressure on high pressure side:
1.37 to 1.57 MPa (13.9 to 16.0 kgf·cm^2, 198 to 228 psi)

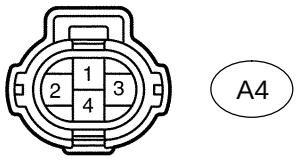
HINT:
If the refrigerant pressure is below 196 KPa (2.0 kgf·cm^2, 28 psi), the refrigerant amount the air conditioning cycle may have decreased significantly for reasons such as a gas leakage.

NG → **Check air conditioning cycle (See page AC–3).**

OK

2	Check air conditioning operation.

Pressure switch:



I29010

(a) Disconnect the pressure switch connector.
(b) Connect terminals 1 and 4 of the connector of the pressure switch on the vehicle wire harness side using a service wire.
(c) Start the engine.
(d) Turn the air conditioning switch is on and check that the magnet clutch is turned on.
(e) Check that the magnet clutch is turned off when disconnecting terminals 1 and 4 (that are connected in the prior step).
OK:
Terminals 1 and 4 connected: magnet clutch is on
Terminals 1 and 4 disconnected: magnet clutch is off

NG → **Go to step 3.**

OK

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Replace pressure switch.

3	**Check harness and connector between pressure switch and integration control and panel (See page IN–35).**

Result:

NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

A → **Repair or replace harness or connector.**

B → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304).**

OK

Replace integration control and panel.

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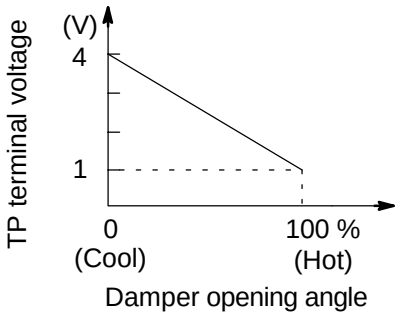
DI3FF–10

DTC	31	Front Air Mix Damper Position Sensor Circuit

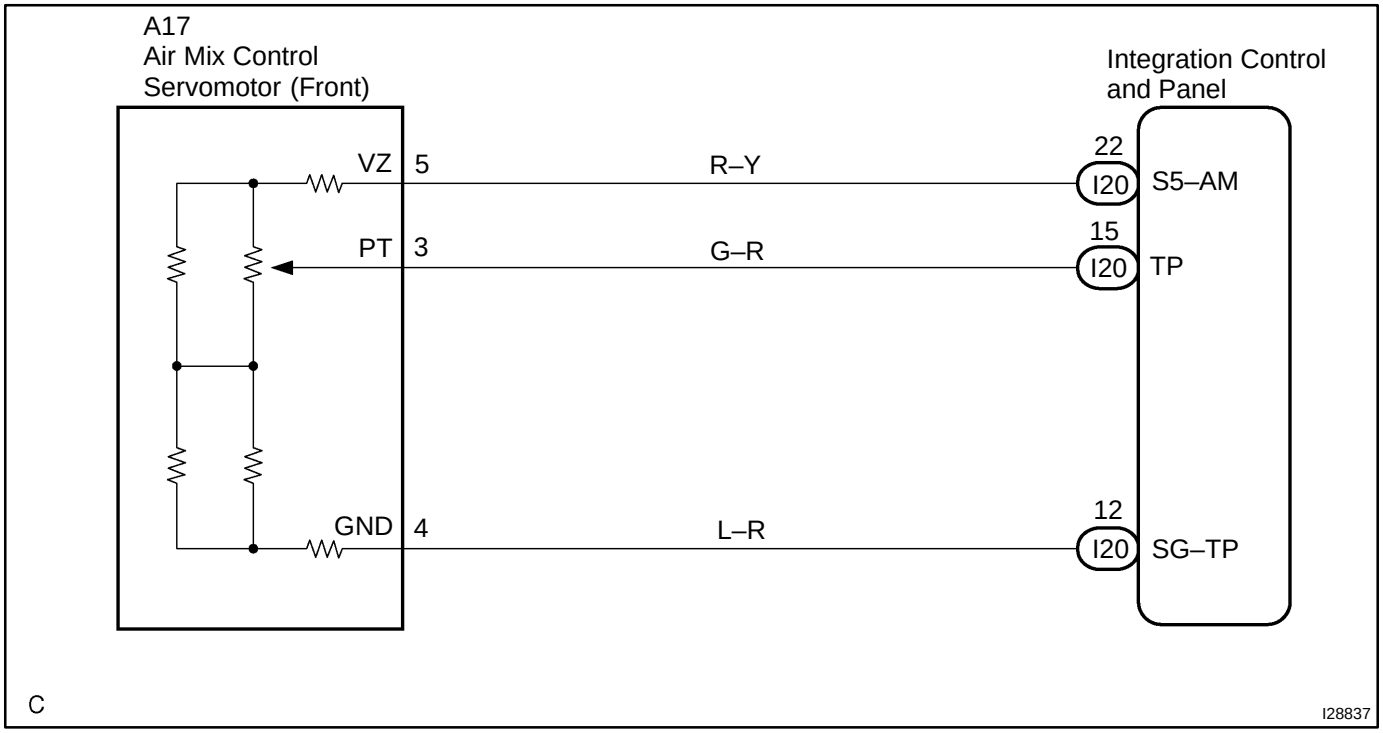
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the integration control and panel.
The position sensor is built into the air mix damper control servomotor assembly.

DTC No.	Detection Item	Trouble Area
31	Short to ground or short to power source circuit in front air mix damper position sensor circuit.	▶Front air mix damper position sensor ▶Harness or connector between front air mix damper position sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM



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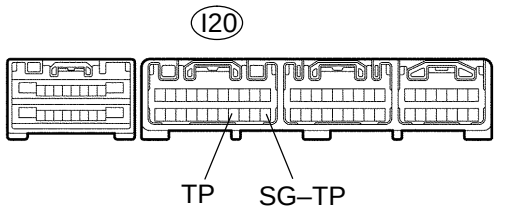
INSPECTION PROCEDURE

1	**Check voltage between terminals TP and SG–TP of integration control and panel.**

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Change the set temperature to activate the front air mix damper control servomotor, and measure the voltage between terminals TP and SG–TP of the integration control and panel connector each time the set temperature is changed.

OK:

Set Temperature	Voltage
Max. cool	3.5 to 4.5 V
Max. hot	0.5 to 1.5 V

HINT:

As the set temperature increases, the voltage decreases.

NG → **Go to step 2.**

Ok

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC 31 is displayed, replace integration control and panel.

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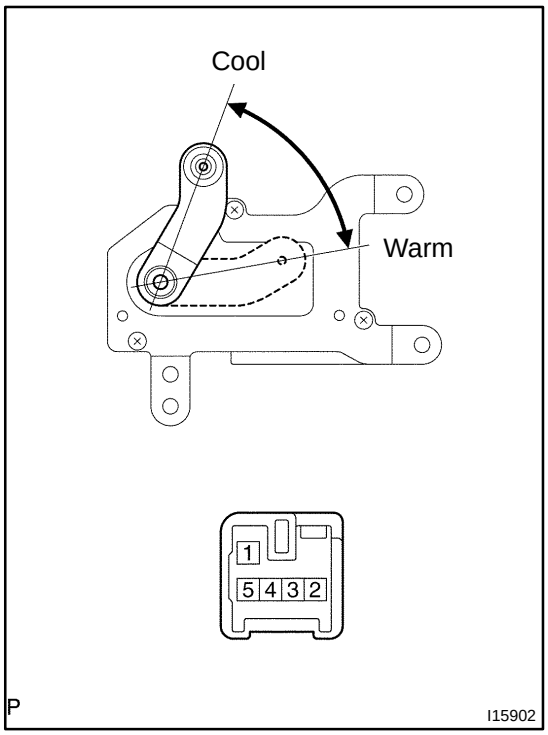
2	Check front air mix damper position sensor.



PREPARATION:
Remove the front air mix servomotor (See page AC–86).
CHECK:
Measure the resistance between terminals 3 and 4 of the front air mix servomotor connector.
OK:
Resistance : 4.2 to 7.8 kΩ
CHECK:
While operating the front air mix servomotor, following the procedure on page DI–2355, measure the resistance between terminals 3 and 4 of the front air mix servomotor connector.
OK:

Position	Resistance
Max. cool	3.6 to 6.8 kΩ
Max. warm	0.5 to 1.1 kΩ

HINT:
As the front air mix servomotor moves from the cool side to the warm side, the resistance decreases.

NG → **Replace front air mix servomotor.**

OK

3	Check harness and connector between front air mix damper position sensor and integration control and panel (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

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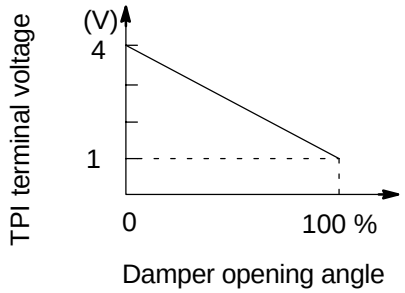
DI3FG–10

DTC	32	Air Inlet Damper Position Sensor Circuit

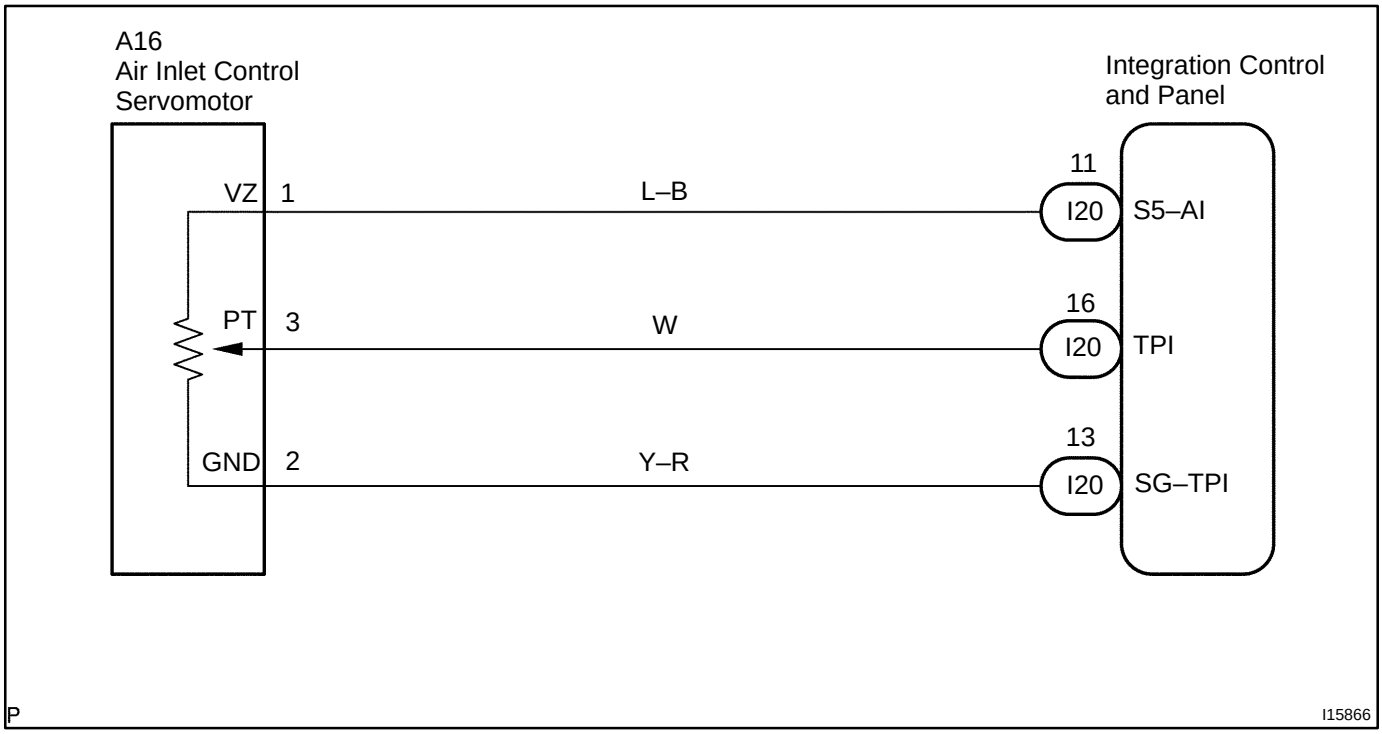
CIRCUIT DESCRIPTION



This sensor detects the position of the air inlet damper and sends the appropriate signals to the integration control and panel.
The position sensor is built into the air inlet damper control servomotor assembly.

DTC No.	Detection Item	Trouble Area
32	Short to ground or short to power source circuit in air inlet damper position sensor circuit.	▶Air inlet damper position sensor ▶Harness or connector between air inlet damper position sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM



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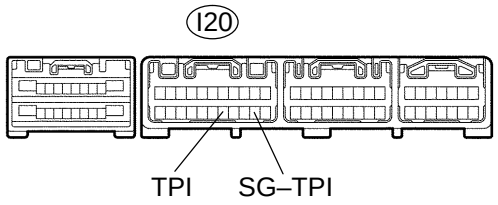
INSPECTION PROCEDURE

1	**Check voltage between terminals TPI and SG–TPI of integration control and panel.**

Integration Control and Panel:



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PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Press the REC/FRS switch to change air inlet between fresh and recirculation air, and measure the voltage between terminals TPI and SG–TPI of the integration control and panel when the air inlet damper control servomotor operates.

OK:

FRS–REC Switch	Voltage
REC	3.5 to 4.5 V
FRS	0.5 to 1.5 V

HINT:

As the air inlet damper control servomotor is moved from the REC side to the FRS side, the voltage decreases.

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC 32 or 42 is displayed, replace integration control and panel.

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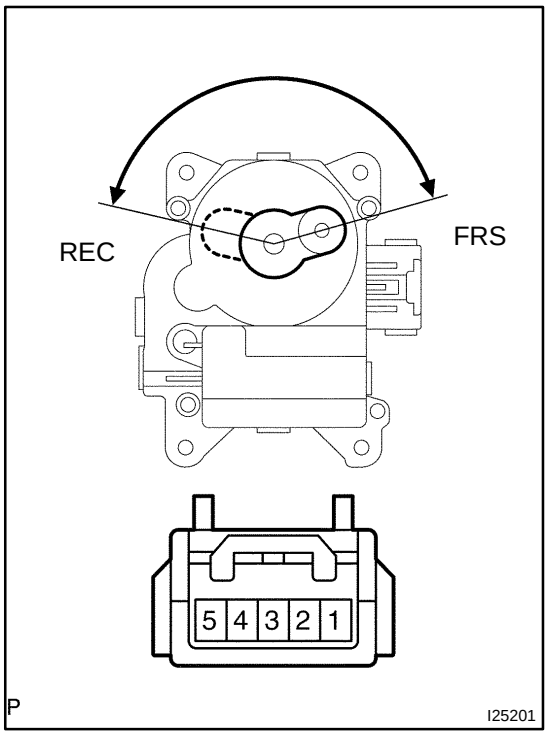
2	Check air inlet damper position sensor.



PREPARATION:

Remove the air inlet servomotor (See page AC–49).

CHECK:

Measure the resistance between terminals 3 and 2 of the air inlet servomotor connector.

OK:

Resistance : 4.2 to 7.8 kΩ

CHECK:

While operating the air inlet servomotor, following the procedure on page DI–2358, measure the resistance between terminals 3 and 2 of the air inlet servomotor connector.

OK:

Resistance

Damper Position	Resistance
REC side	3.1 to 5.8 kΩ
FRS side	0.8 to 1.6 kΩ

HINT:

As the air inlet servomotor moves from the REC side to the FRS side, the resistance decreases.

NG → **Replace air inlet damper servomotor.**

OK

3	Check harness and connectors between air inlet damper position sensor and integration control and panel (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

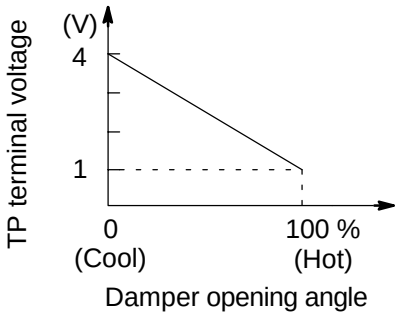
Replace integration control and panel.

Dardoor.com

DI3FH–14

DTC	37	Water Valve Damper Position Sensor Circuit

CIRCUIT DESCRIPTION

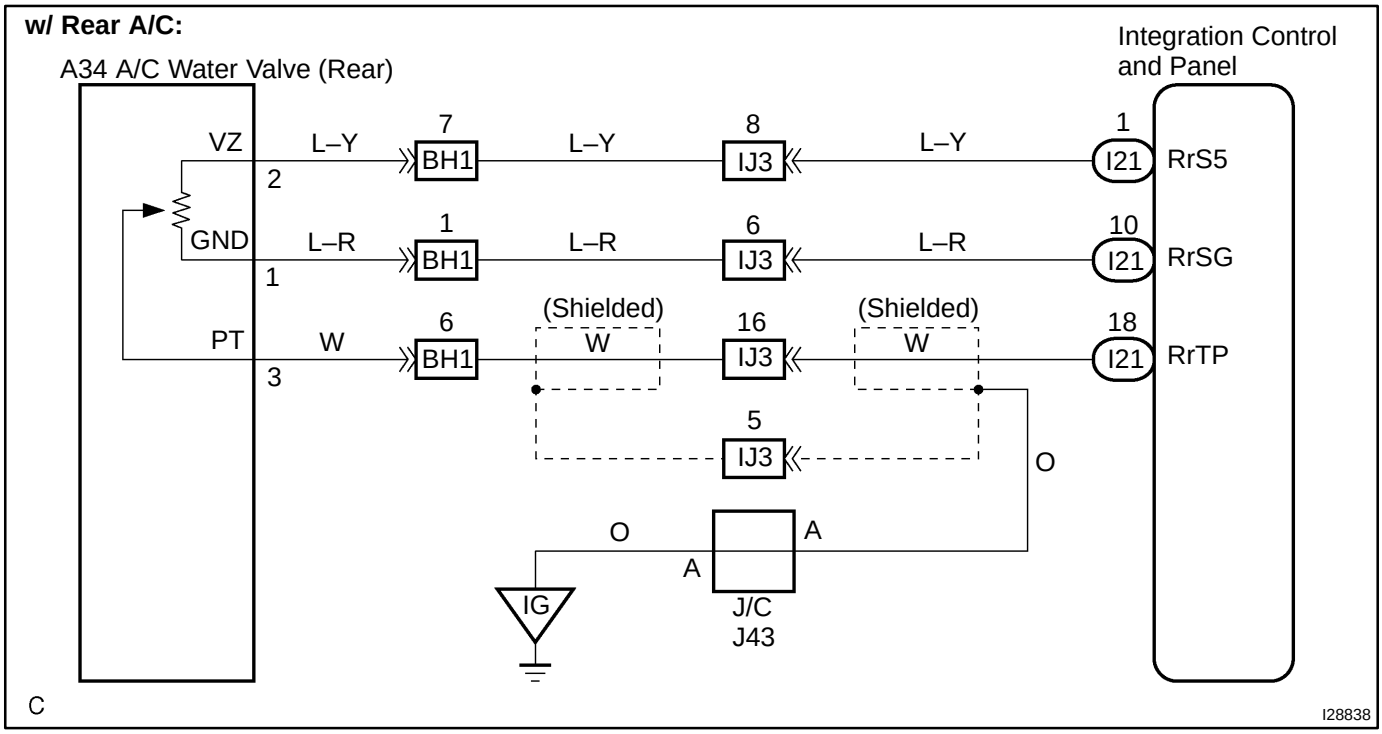


This sensor detects the position of the air mix damper and sends the appropriate signals to the integration control and panel.
The position sensor is built into the water valve damper control servomotor assembly.

DTC No.	Detection Item	Trouble Area
37	Short to ground or short to power source circuit in water valve damper position sensor circuit.	▶Water valve damper position sensor ▶Harness or connector between water valve damper position sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM

w/ Rear A/C:



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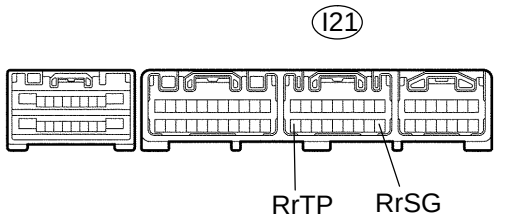
INSPECTION PROCEDURE

1	**Check voltage between terminals RrTP and RrSG of integration control and panel.**

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Change the set temperature to activate the water valve servomotor and measure the voltage between terminals RrTP and RrSG of the integration control and panel connector each time the set temperature is changed.

OK:

Set Temperature	Voltage
Max. cool	3.5 to 4.5 V
Max. hot	0.5 to 1.5 V

HINT:

As the set temperature increases, the voltage decreases.

NG → **Go to step 2.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304). However, if DTC 37 or 47 is displayed, replace integration control and panel.

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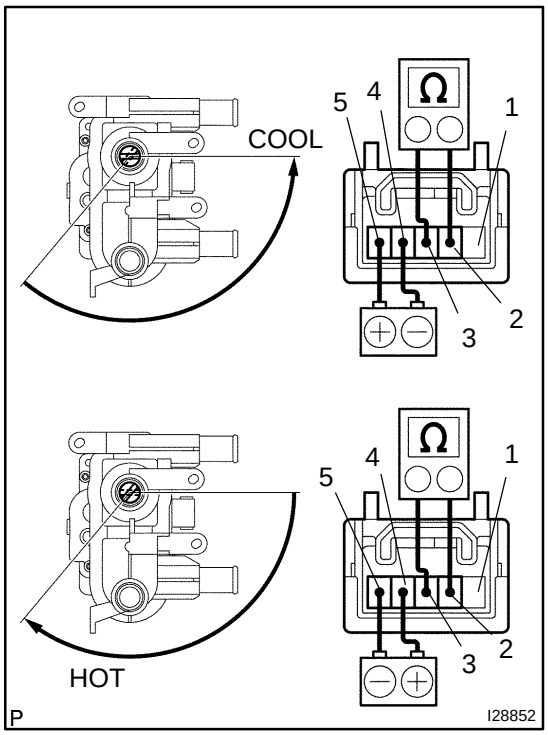
2	Check water valve damper position sensor.



PREPARATION:

Remove the water valve servomotor (See page AC–42).

CHECK:

Measure the resistance between terminals 1 and 2 of the water valve servomotor connector.

OK:

Resistance : 4.2 to 7.8 kΩ

CHECK:

While operating the water valve servomotor, following the procedure on page DI–2361, measure the resistance between terminals 2 and 3 of the water valve servomotor connector.

OK:

Position	Resistance
Max. cool	0.8 to 1.6 kΩ
Max. hot	3 to 5.6 kΩ

HINT:

As the water valve servomotor moves from the cool side to the hot side, the resistance decreases.

NG → **Replace water valve servomotor.**

OK

3	Check harness and connector between water valve damper position sensor and integration control and panel (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

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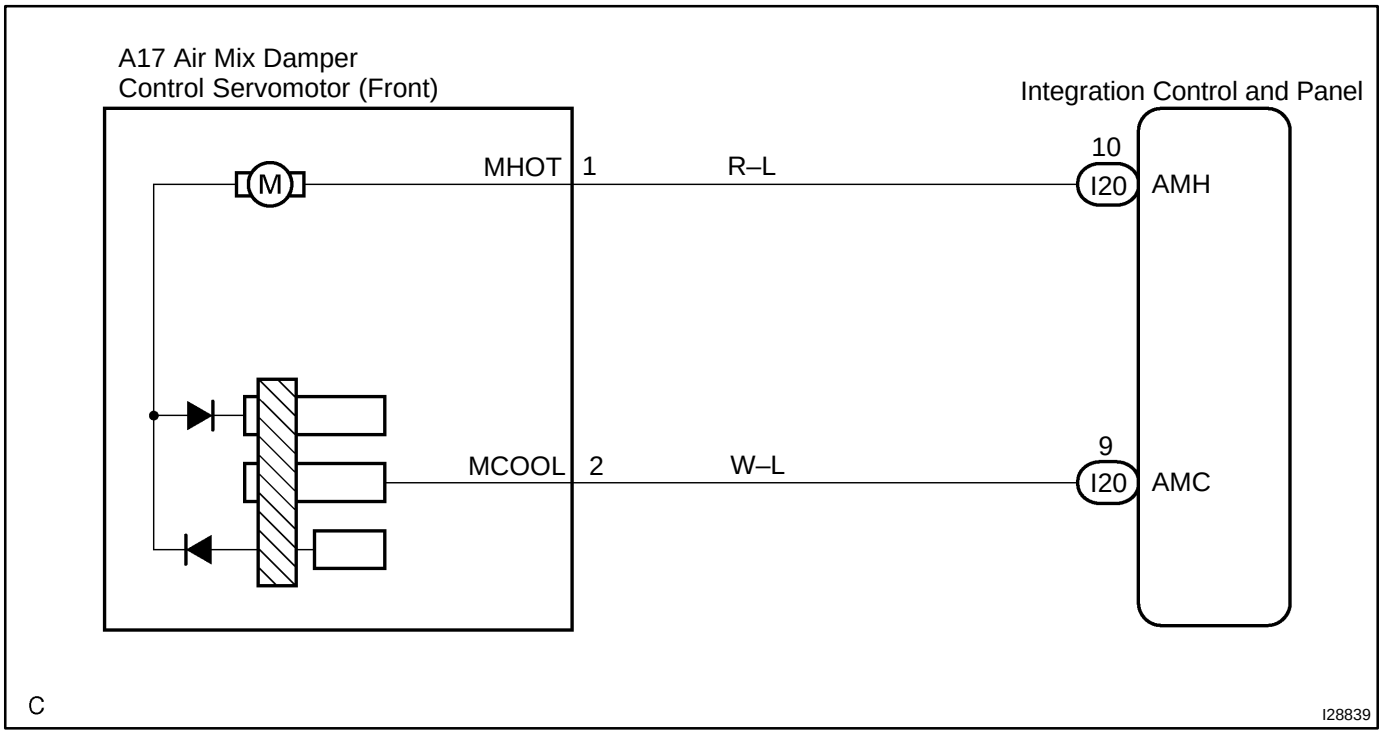
DTC	41	Front Air Mix Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

The front air mix damper control servomotor is controlled by the integration control and panel and moves the air mix damper to the desired position.

DTC No.	Detection Item	Trouble Area
41	Air mix damper position sensor value does not change even if integration control and panel operates air mix damper control servomotor.	▶Front air mix damper control servomotor ▶Front air mix damper position sensor ▶Harness or connector between front air mix position sensor and integration control and panel ▶Harness or connector between air mix damper control servomotor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Actuator check.**

PREPARATION:

(a) Warm up the engine.

(b) Set to the actuator check mode (See page DI–2303).

(c) Press the DEF switch and change it to step operation.

CHECK:

Press the DEF switch and check the operation of the air mix damper and the condition of the blower.

OK:

Display Code	Air Mix Damper	Condition
0 – 3	–14% (Fully closed)	Cool air comes out
4, 5	50%	–
6 – 9	113.5% (Fully opened)	Warm air comes out

HINT:

However, if DTC 41 is displayed, replace the integration control and panel.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304).**

NG

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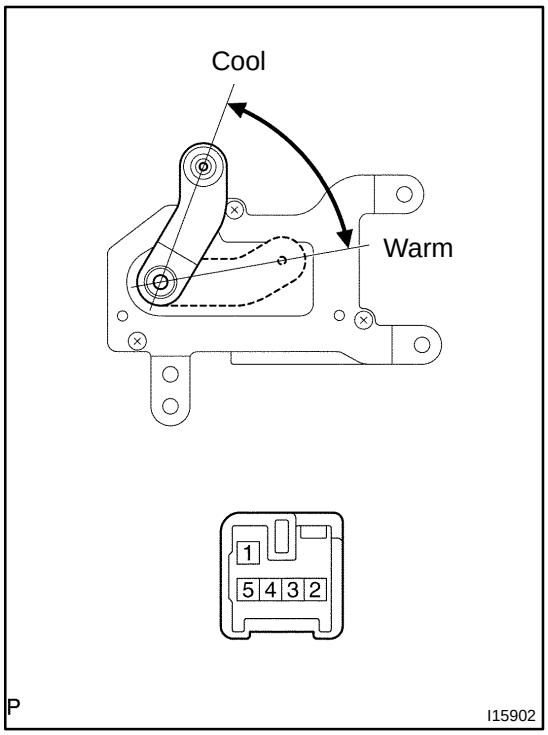
2	**Check front air mix damper control servomotor.**



PREPARATION:
Remove the front air mix servomotor (See page AC–86).
CHECK:
Connect the positive (+) lead to terminal 1 and the negative (–) lead to terminal 2.
OK:
The lever turns smoothly to the warm side.
CHECK:
Connect the positive (+) lead to terminal 2 and the negative (–) lead to terminal 1.
OK:
The lever turns smoothly to the cool side.

NG → **Replace front air mix servomotor.**

OK

3	**Check harness and connector between front air mix servomotor and integration control and panel (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

Dardoor.com

DI3FJ–14

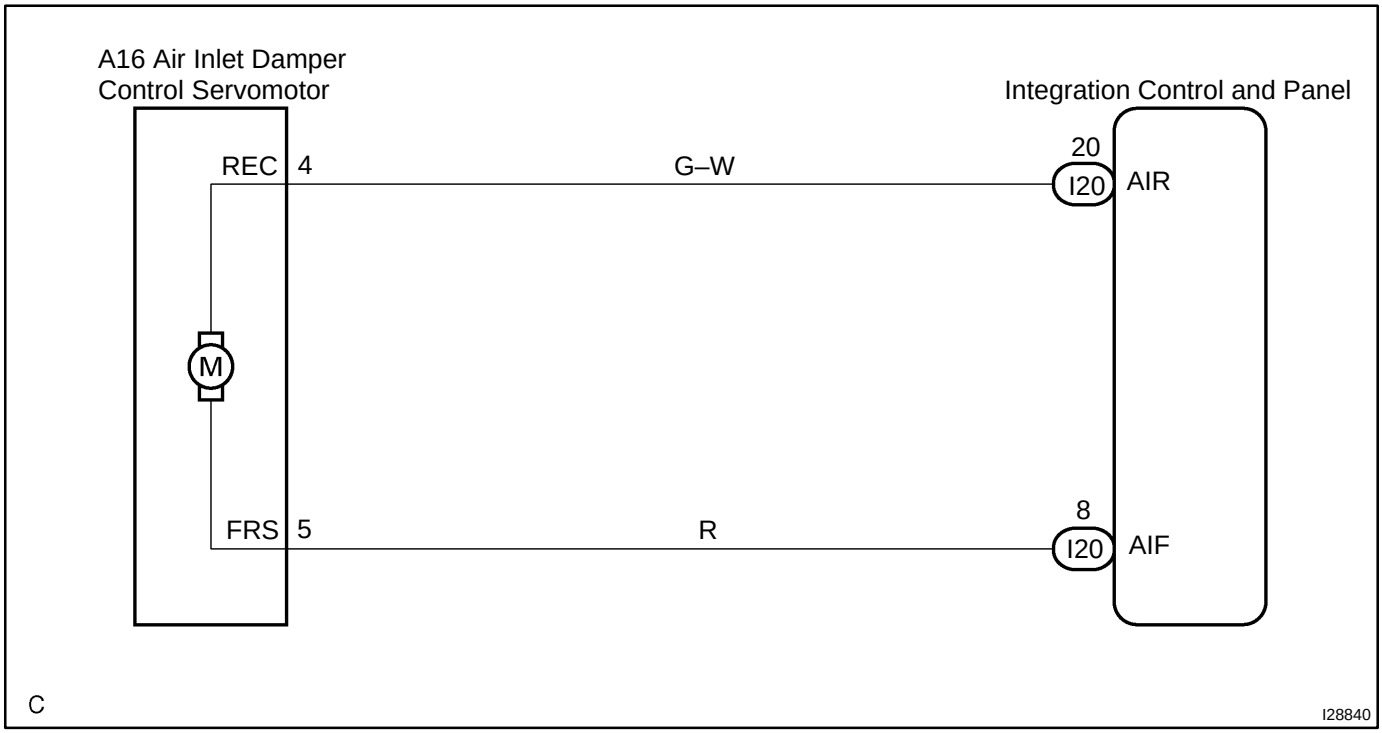
DTC	42	Air Inlet Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

The air inlet damper control servomotor is controlled by the integration control and panel and moves the air inlet damper to the desired position.

DTC No.	Detection item	Trouble Area
42	Air inlet damper position sensor value does not change even if integration control and panel operated air inlet damper control servomotor.	▶Air inlet damper control servomotor ▶Air inlet damper position sensor ▶Harness or connector between air inlet damper control servomotor and integration control and panel ▶Harness or connector between air inlet damper position sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	**Actuator check.**

PREPARATION:

(a) Remove the glove compartment door to see and check the air inlet damper operation.
(b) Set to the actuator check mode (See page DI–2303).
(c) Press the DEF switch and change it to step operation.

CHECK:

Press the DEF switch and check the operation of the air inlet damper.

OK:

Display Code	Air Inlet Damper
0 – 2	FRS
3	REC/FRS
4 – 9	REC

HINT:
However, if DTC 42 is displayed, replace the integration control and panel.

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304).**

NG

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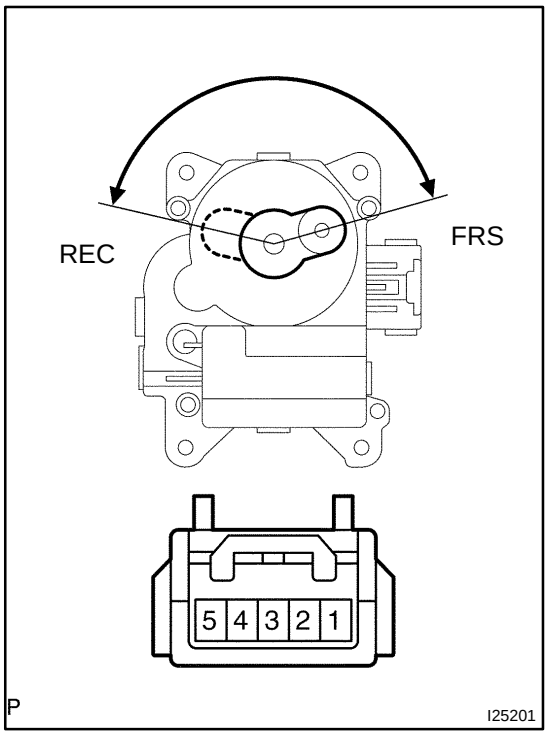
2	**Check air inlet damper control servomotor.**



PREPARATION:
Remove the air inlet servomotor (See page AC–49).
CHECK:
Connect the positive (+) lead to terminal 4 and the negative (–) lead to terminal 5.
OK:
The lever moves smoothly to the REC position.
CHECK:
Connect the positive (+) lead to terminal 5 and the negative (–) lead to terminal 4.
OK:
The lever moves smoothly to the FRS position.

NG → **Replace air inlet servomotor.**

OK

3	**Check harness and connector between air inlet servomotor and integration control and panel (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

Dardoor.com

DI936–04

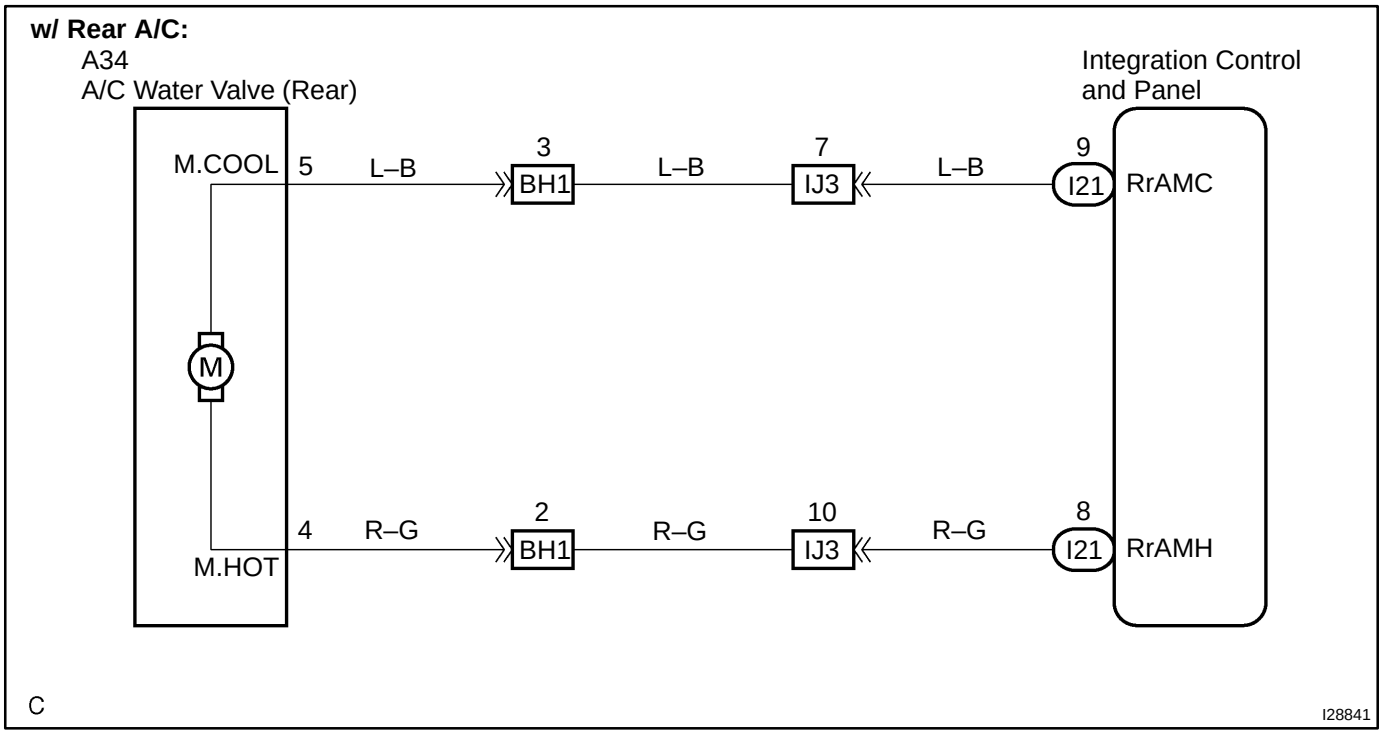
DTC	47	Water Valve Damper Control Servomotor Circuit

CIRCUIT DESCRIPTION

The water valve damper control servomotor is controlled by the integration control and panel and moves the water valve damper to the desired position.

DTC No.	Detection Item	Trouble Area
47	Water valve damper position sensor value does not change even if integration control and panel operates water valve damper control servomotor.	▶Water valve damper control servomotor ▶Water valve damper position sensor ▶Harness or connector between water valve damper control servomotor and integration control and panel ▶Harness or connector between water valve damper position sensor and integration control and panel ▶Integration control and panel

WIRING DIAGRAM



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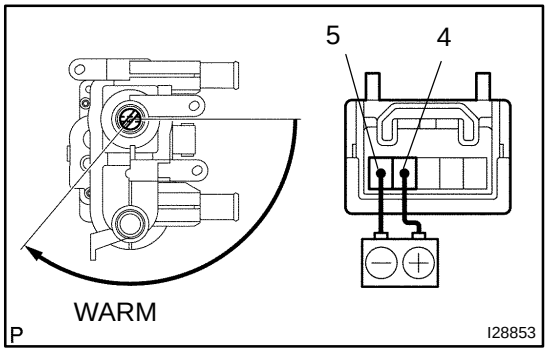
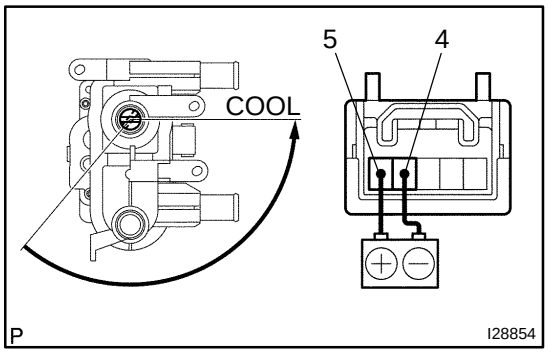
INSPECTION PROCEDURE

1	**Check water valve damper control servomotor.**



PREPARATION:
Remove the water valve servomotor (See page AC–42).
CHECK:
Connect the positive (+) lead to terminal 5 and the negative (–) lead to terminal 4.
OK:
The lever turns smoothly to the warm side.



CHECK:
Connect the positive (+) lead to terminal 4 and the negative (–) lead to terminal 5.
OK:
The lever turns smoothly to the cool side.

NG → **Replace water valve servomotor.**

OK

2	**Check harness and connector between water valve servomotor and integration control and panel (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

Dardoor.com

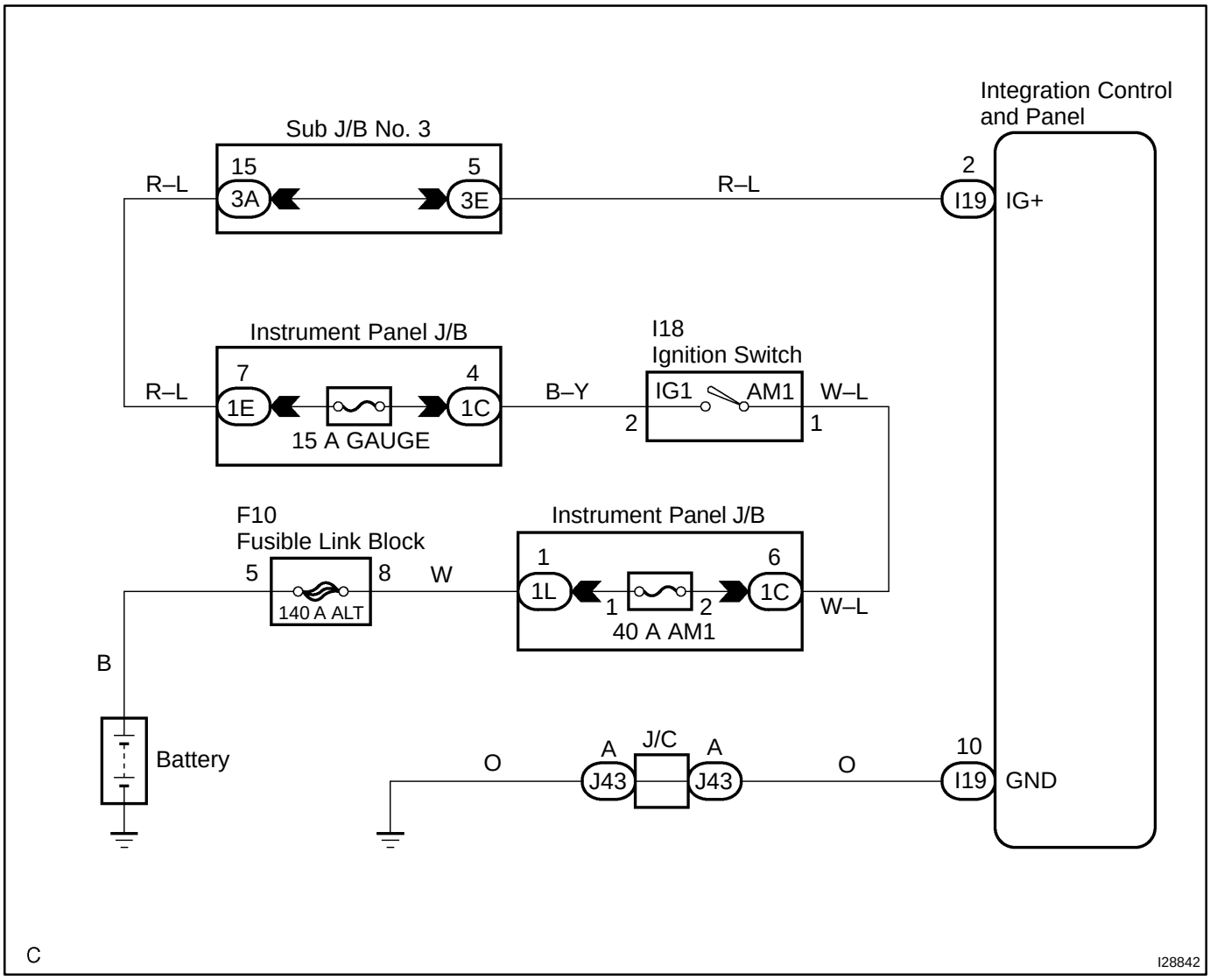
DI937–04

IG Power Source Circuit

CIRCUIT DESCRIPTION

This is the power source for the integration control and panel and servomotors, etc.

WIRING DIAGRAM



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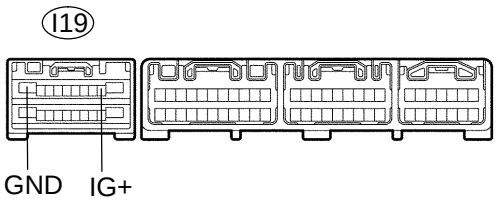
INSPECTION PROCEDURE

1	**Check voltage between terminals IG+ and GND of integration control and panel.**

Integration Control and Panel:



PREPARATION:

(a) Remove the integration control and panel with connectors still connected (See page AC–103).

(b) Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminals IG+ and GND of the integration control and panel.

OK:

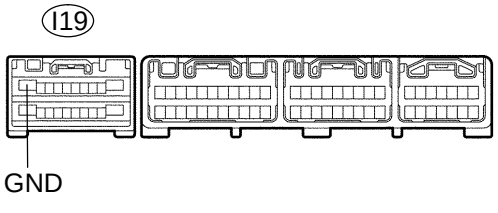
Voltage : 10 to 14 V

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304).**

NG

2	**Check continuity between terminal GND of integration control and panel and body ground.**

Integration Control and Panel:



PREPARATION:

Turn the ignition switch to LOCK.

CHECK:

Measure the resistance between terminal GND of the A/C control assembly and body ground.

OK:

Resistance : Below 1 Ω

NG	**Repair or replace harness or connector.**

OK

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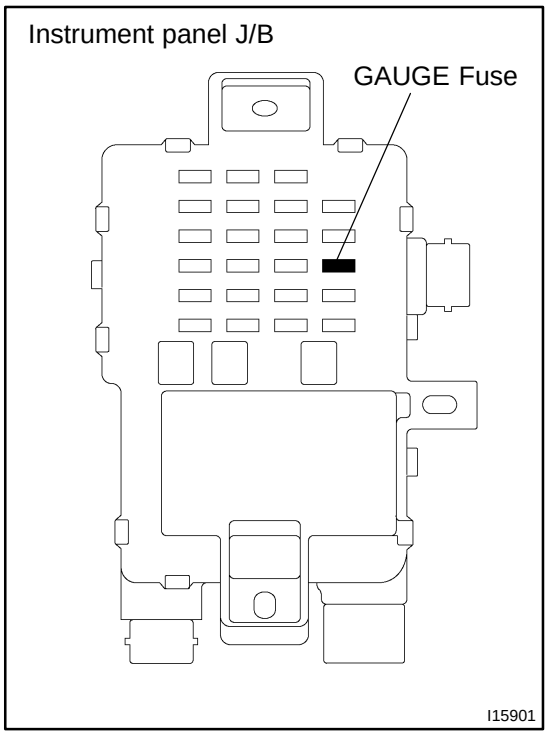
3	Check GAUGE fuse.



PREPARATION:

Remove the GAUGE fuse from the instrument panel J/B.

CHECK:

Check continuity of the GAUGE fuse.

OK:

Continuity exists.

NG → **Check for shot in all the harness and components connected to the GAUGE fuse (See page IN–35).**

OK

Check and repair harness and connector between integration control and panel and battery.

Dardoor.com

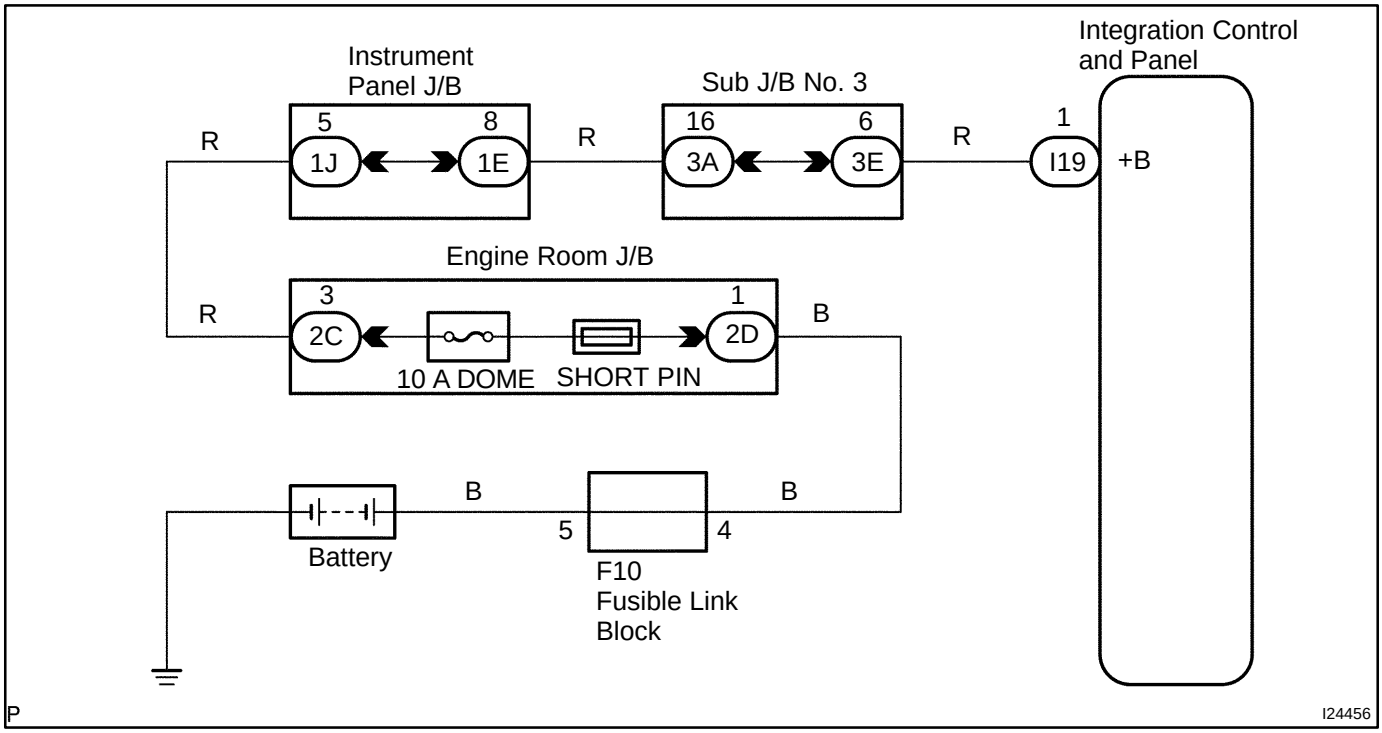
DI3FL–10

Back–up Power Source Circuit

CIRCUIT DESCRIPTION

This is the back up power source for the integration control and panel. Power is supplied even when the ignition switch is off and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM



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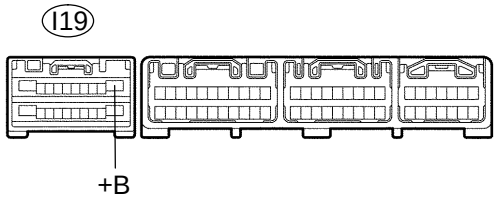
INSPECTION PROCEDURE

1	Check voltage between terminal +B of integration control and panel and body ground.

Integration Control and Panel:

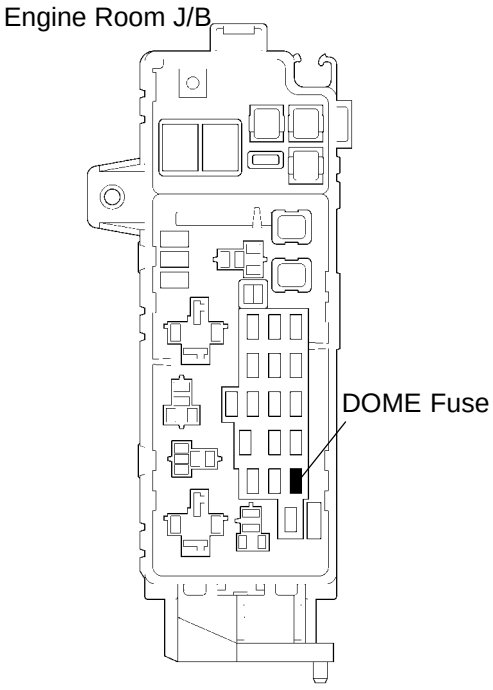


PREPARATION:
Remove the integration control and panel with connectors still connected.
CHECK:
Measure the voltage between terminal +B of the integration control and panel and body ground.
OK:
Voltage : 10 to 14 V

OK	Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304).

NG

2	Check DOME fuse.



PREPARATION:
Remove the DOME fuse from the engine room J/B.
CHECK:
Check continuity of the DOME fuse.
OK:
Continuity

NG	Check for short in all the harness and components connected to the DOME fuse (See attached wiring diagram).

OK

Check and repair harness and connector between integration control and panel and battery.

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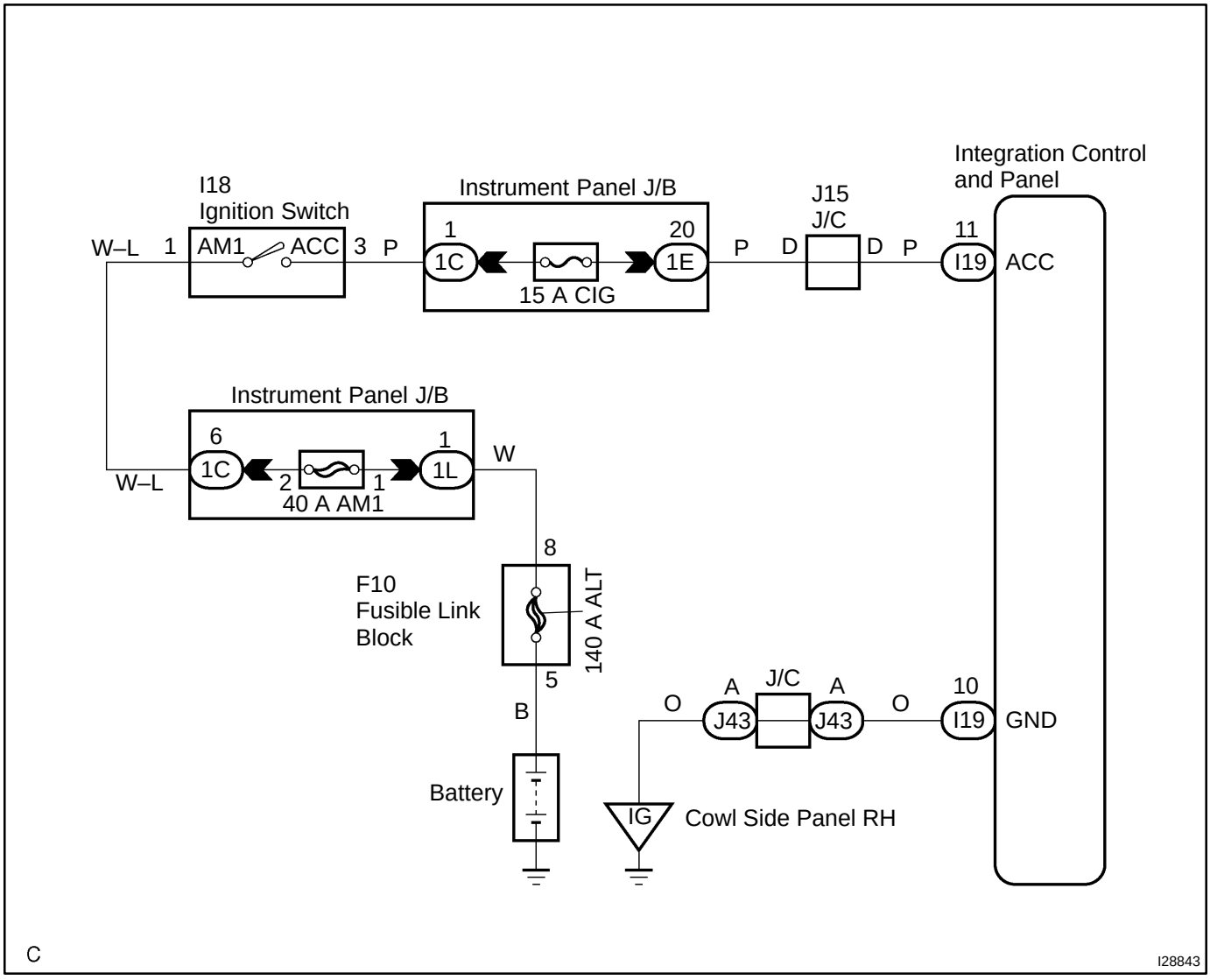
DI938–04

ACC Power Source Circuit

CIRCUIT DESCRIPTION

This circuit supplies power to the integration control and panel. It supplies power to the illumination for the clock.

WIRING DIAGRAM



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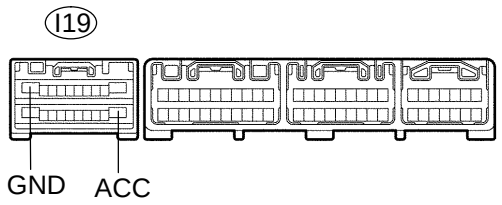
INSPECTION PROCEDURE

1	Check voltage between terminals ACC and GND of integration control and panel.

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ACC.

(b) Measure the voltage between terminals ACC and GND of the integration control and panel.

OK:

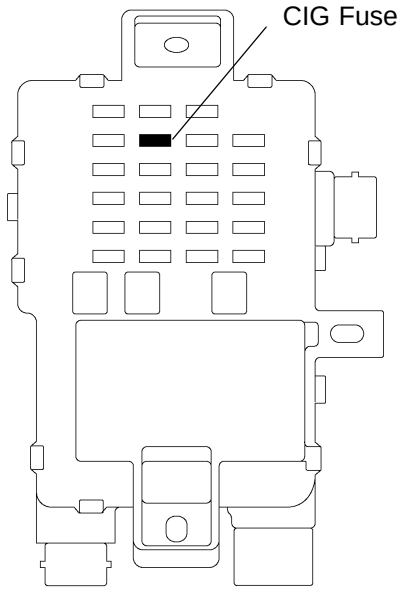
Voltage : 10 to 14 V

OK	Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304).

NG

2	Check CIG fuse.

Instrument Panel J/B



PREPARATION:

Remove the CIG fuse from the cowl side J/B.

CHECK:

Check continuity of the CIG fuse.

OK:

Continuity

NG	Check for short in all the harness and components connected to the CIG fuse (See attached wiring diagram).

OK

Check and repair harness and connector between integration control and panel and battery.

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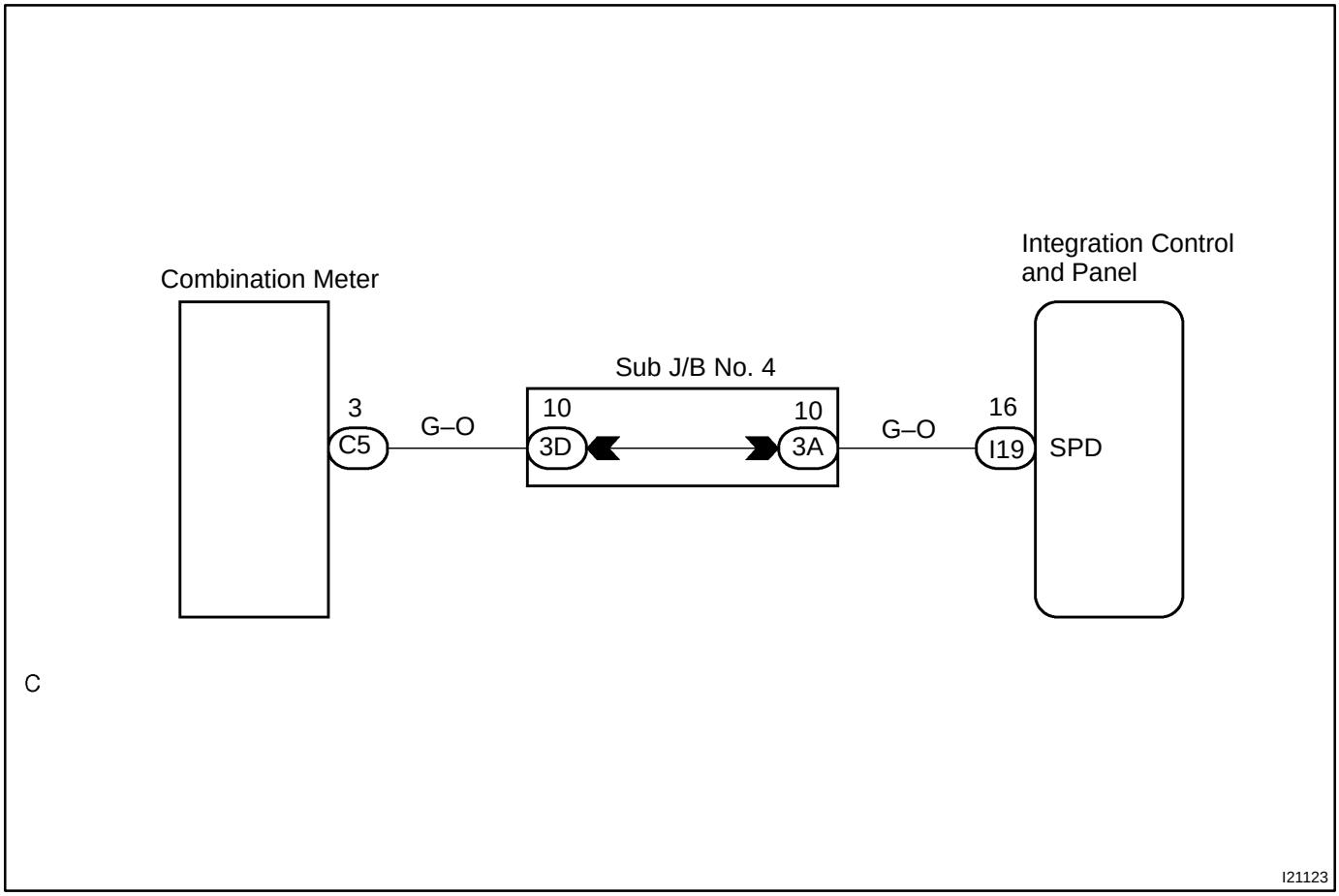
DI3WE–18

Vehicle Speed Signal Circuit

CIRCUIT DESCRIPTION

The integration control and panel monitors the vehicle speed through signals sent from the speed sensor. It uses these signals to receive the ambient temperature sensor signal.

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	**Check operation of speedometer.**

CHECK:

Check that the speedometer operates normally.

NG → **Proceed to combination meter troubleshooting (See page BE–2).**

OK ↓

2	**Check harness and connector between combination meter and integration control and panel (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK ↓

Replace integration control and panel.

Dardoor.com

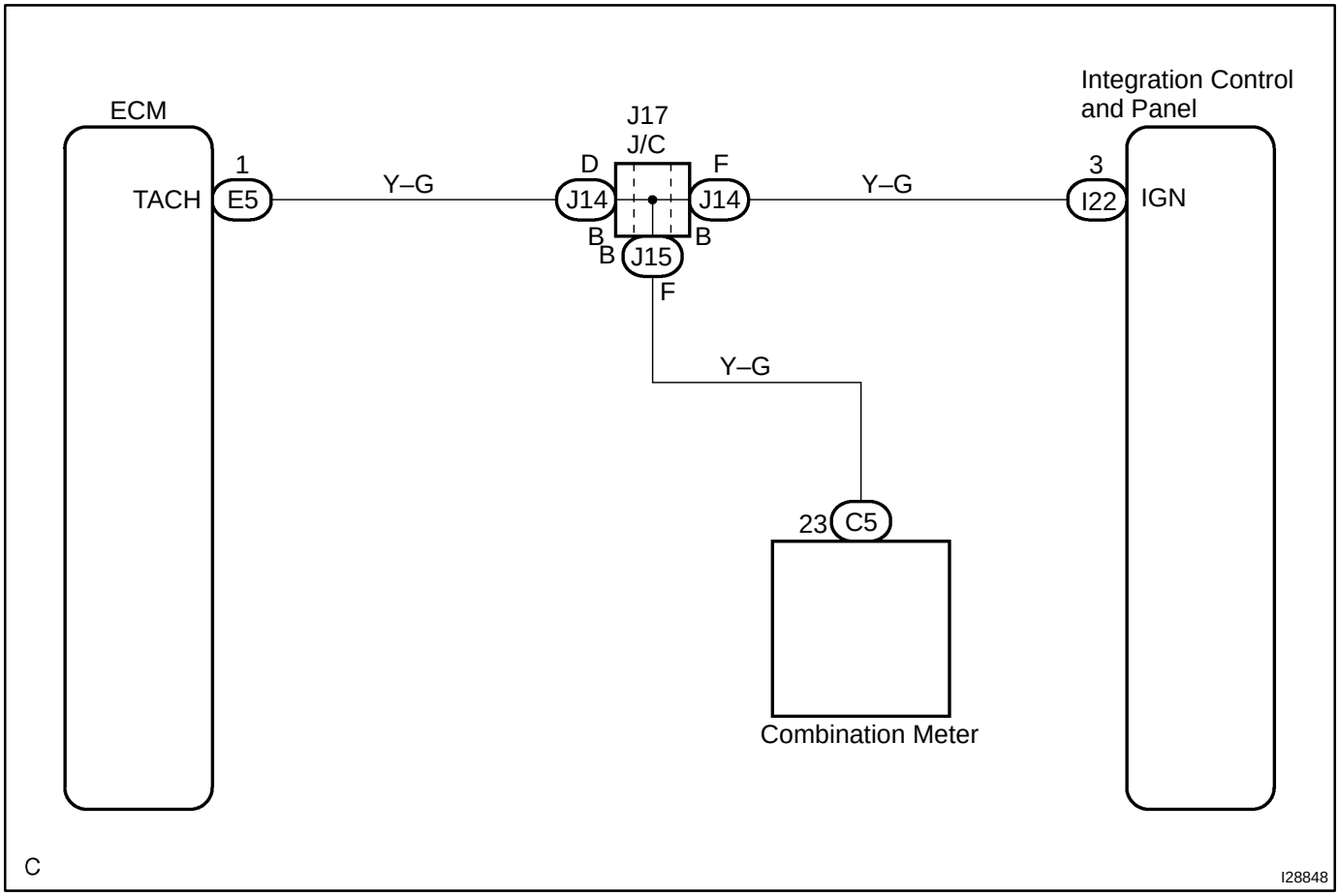
DI3WE–19

Igniter Circuit

CIRCUIT DESCRIPTION

The integration control and panel monitors the engine speed through signals sent from the igniter. It uses these signals and compressor speed signals to detect the compressor lock condition.

WIRING DIAGRAM



Dardoor.com

INSPECTION PROCEDURE

1	**Check operation of tachometer.**

CHECK:

Check that the tachometer operates normally.

NG → **Proceed to combination meter troubleshooting (See page BE–2).**

OK ↓

2	**Check harness and connector between ECM and integration control and panel (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK ↓

3	**Check harness and connector between combination meter and integration control and panel (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK ↓

Replace integration control and panel.

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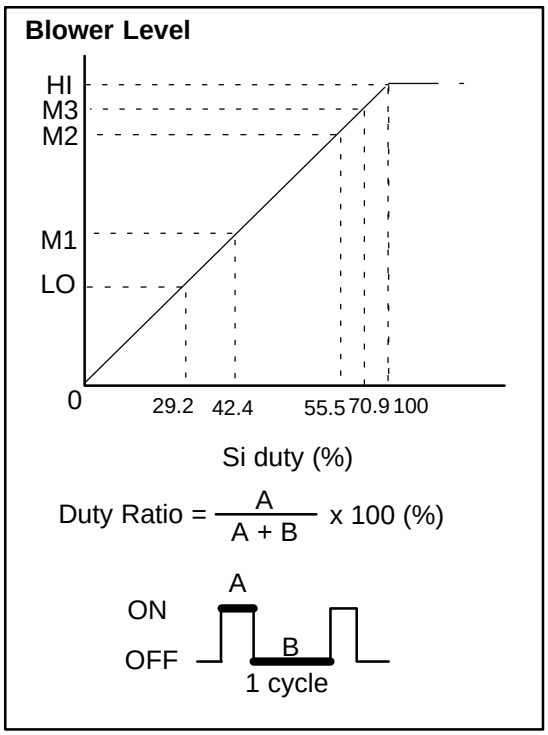
Blower Motor Circuit (Front A/C)



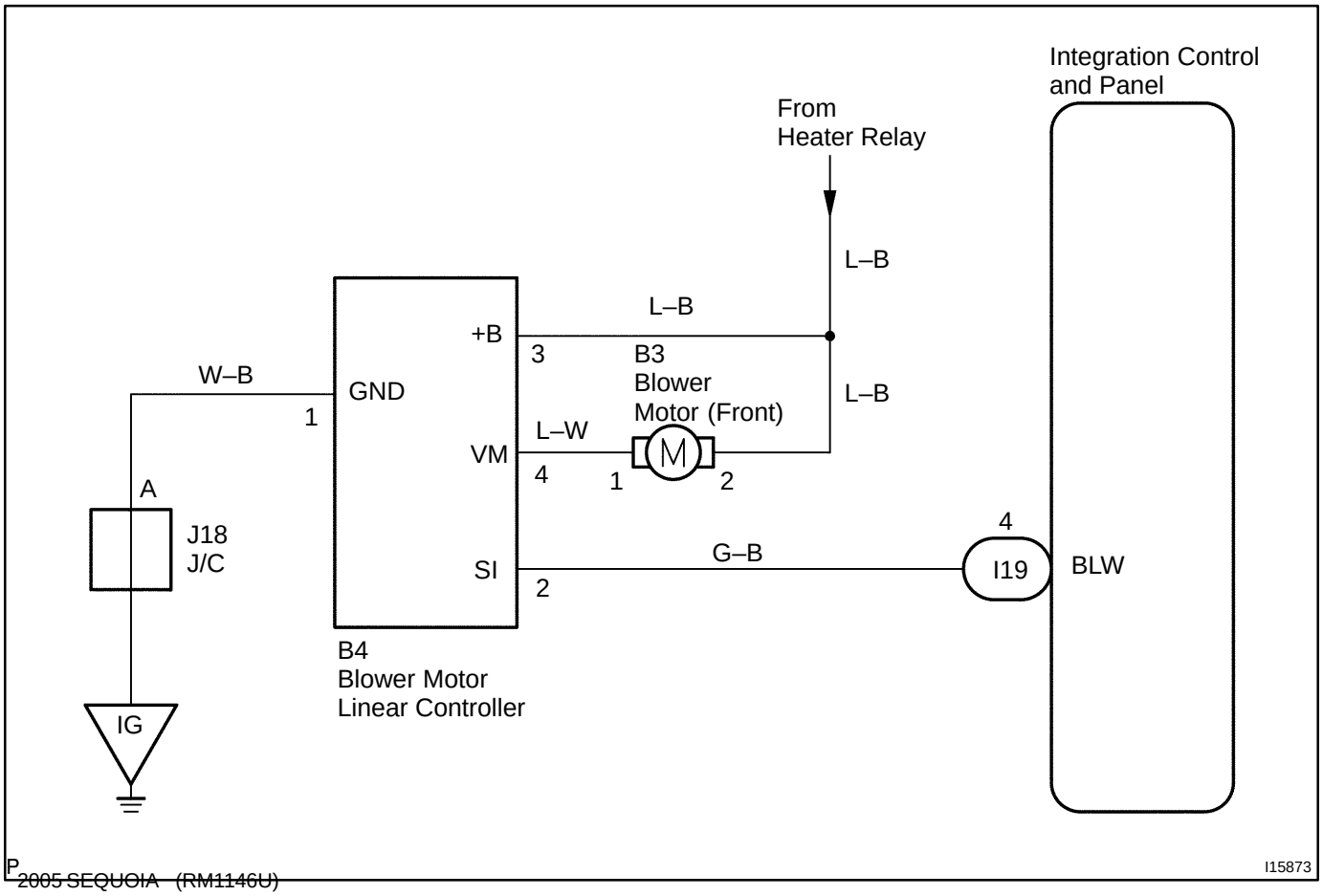
CIRCUIT DESCRIPTION

The blower motor is operated by signals from the integration control and panel. Blower motor speed signals are transmitted by changes in the Duty Ratio.

Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non–continuity, then.

WIRING DIAGRAM



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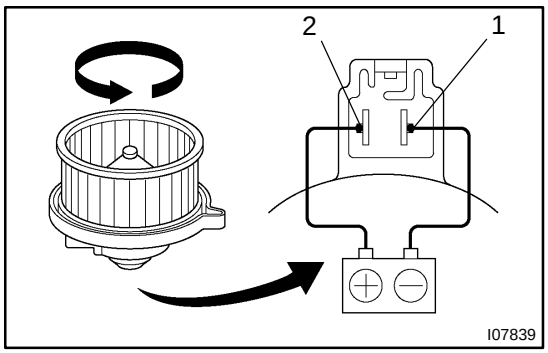
INSPECTION PROCEDURE

1	**Check blower motor.**



PREPARATION:

Remove the blower motor (See page AC–50).

CHECK:

Connect the positive (+) lead connected to terminal 2 of the blower motor connector, and the negative (–) lead to terminal 1.

OK:

Blower motor operates smoothly.

NG → **Replace blower motor.**

OK

2	**Check harness and connector between battery and blower motor linear controller, blower motor linear controller and body ground (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

3	**Check harness and connector between integration control and panel and blower motor linear controller (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

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4	Check integration control and panel (See page IN–35).

NG → Replace integration control and panel.

OK

Replace blower motor linear controller.

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DI8AF–06

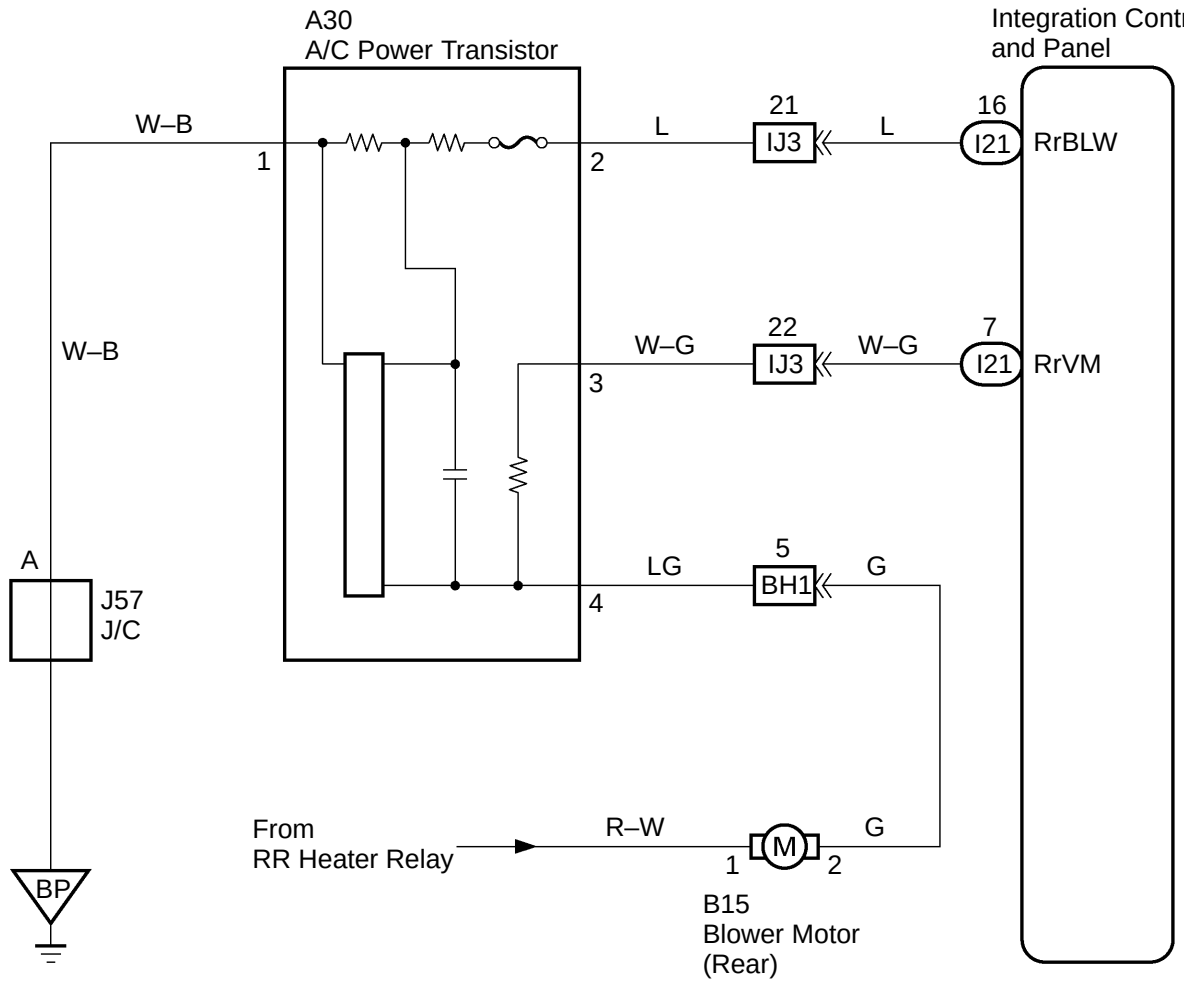
Blower Motor Circuit (Rear A/C)

CIRCUIT DESCRIPTION

This is power source for the blower motor.

WIRING DIAGRAM

w/ Rear A/C:



C

I28844

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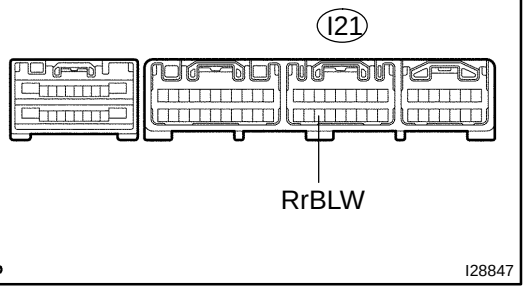
INSPECTION PROCEDURE

1	**Check voltage between terminal RrBLW of integration control and panel and body ground.**

Integration Control and Panel:

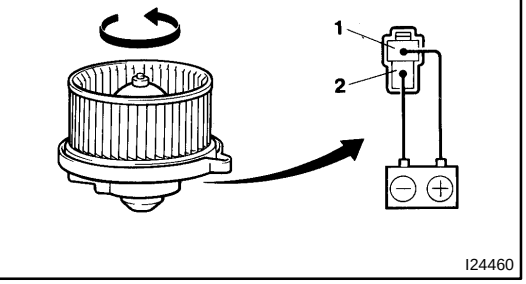


PREPARATION:
Remove the integration control and panel with connectors still connected.
CHECK:
(a) Turn the ignition switch to ON.
(b) Operate the blower motor.
(c) Measure the voltage between terminal RrBLW of the integration control and panel and body ground.
OK:
Voltage: 1 to 3 V

OK	**Go to step 3.**

NG

2	**Check blower motor.**



PREPARATION:
Remove the blower motor.
CHECK:
Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1 of the blower motor connector.
OK:
Blower motor operates smoothly.

NG	**Replace blower motor.**

OK

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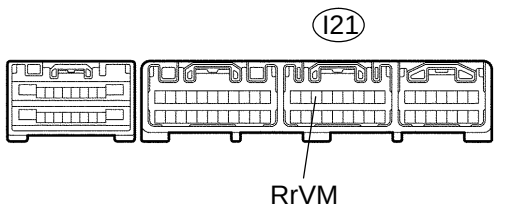
3	**Check voltage between terminal RrVM of integration control and panel and body ground.**

Integration Control and Panel:



PREPARATION:

Remove the integration control and panel with connectors still connected.

CHECK:

(a) Turn the ignition switch to ON.

(b) Operate the rear A/C blower motor.

(c) Measure the voltage between terminal RrVM of the integration control and panel and body ground, when the blower switch is operated as shown in the table below.

OK:

Blower speed	Voltage
LO	7.2 V
ME	4.2 V
HI	0.5 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304).**

NG

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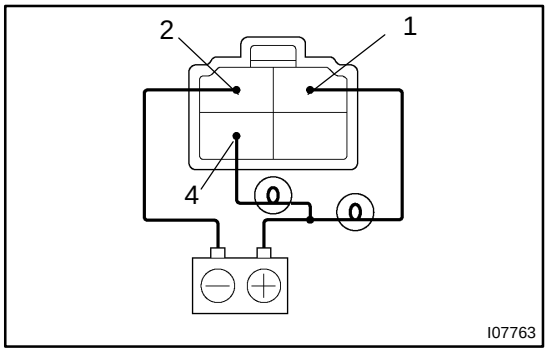
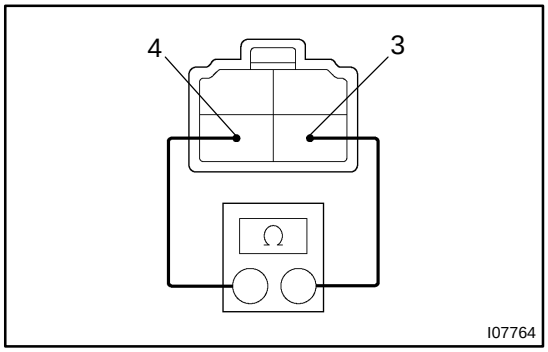
4	**Check power transistor.**



PREPARATION:
Remove the power transistor (See page AC–84).
CHECK:
(a) Connect the positive (+) lead from the battery to terminal 1 through a 12 V – 3.4 W test bulb and the negative (–) lead to terminal 2.
(b) Check the test bulb lights up when another positive (+) lead is connected to terminal 4 through a 12 V – 3.4 W test bulb.
OK:
Test bulb lights up.
CHECK:
Measure the resistance between terminals 3 and 4.
OK:
Resistance: 2.0 to 2.4 kΩ



NG → **Replace power transistor.**

OK →

5	**Check harness and connector between integration control and panel and power transistor, power transistor and body ground (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK →

Replace integration control and panel.

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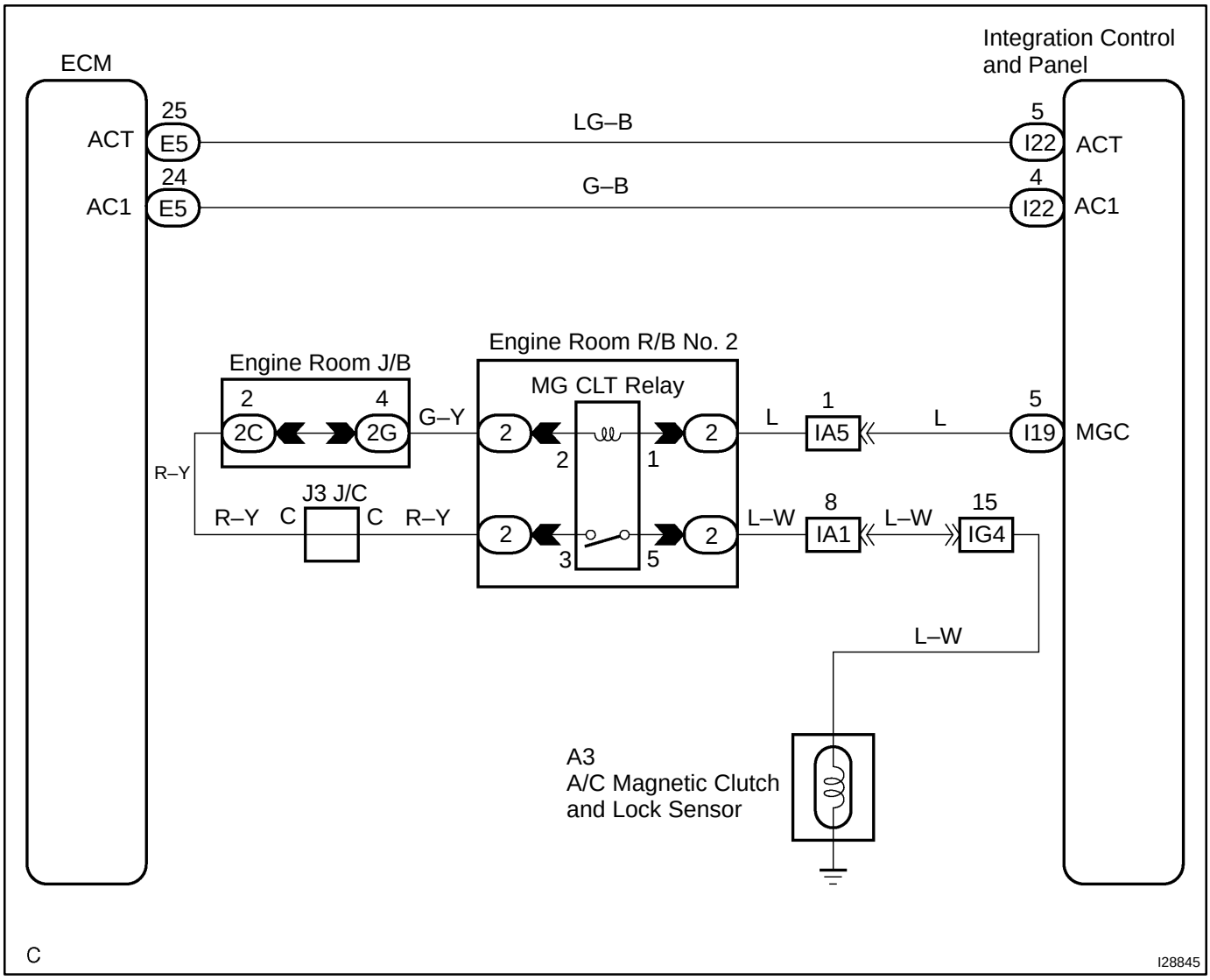
DIAA8–03

Compressor Circuit

CIRCUIT DESCRIPTION

The integration control and panel outputs the magnetic clutch ON signal from terminal AC1 to the ECM. When the ECM receives this signal, it sends a signal from terminal ACT and switches the A/C magnetic clutch relay ON. This turns the A/C magnetic clutch on.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	**Read value of hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand–held tester main SW ON.

CHECK:

Select the item below in the DATA LIST, and read the displays on the hand–held tester.

ENGINE AND ECT / ALL:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/C SIG	A/C signal / ON or OFF	▶A/C SW Pushed: ON ▶A/C SW Released: OFF	–

HINT:

Check with the engine running.

OK:

The display is as specified in the normal condition.

NG → **Go to step 8.**

OK ↓

2	**Read value of hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand–held tester main SW ON.

CHECK:

Select the item below in the DATA LIST, and read the displays on the hand–held tester.

ENGINE AND ECT / ALL:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/C MAG CLUTCH	A/C magnet clutch / ON or OFF	▶A/C SW ON: ON ▶A/C SW OFF: OFF	–

HINT:

Check with the engine running.

OK:

The display is as specified in the normal condition.

NG → **Replace ECM (See page SF–80).**

OK ↓

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3	**Perform active test by hand–held tester.**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand–held tester main SW ON.

CHECK:

Select the item below in the DATA LIST, and read the displays on the hand–held tester.

AIR CONDITIONING:

Item	Test Details / Display (Range)	Diagnostic Note
A/C MAG CLUTCH	Magnet clutch relay / OFF, ON	Operating sound can be heard

HINT:

Check with the engine running.

OK:

The operation sound of the MG CLT relay can be heard.

NG → **Go to step 5.**

OK

4	**Check harness and connector between integration control and panel (ACT terminal) and ECM (ACT terminal) (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI–2304).

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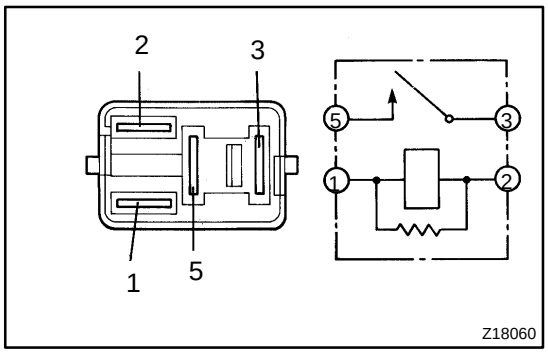
5	Check magnetic clutch relay.



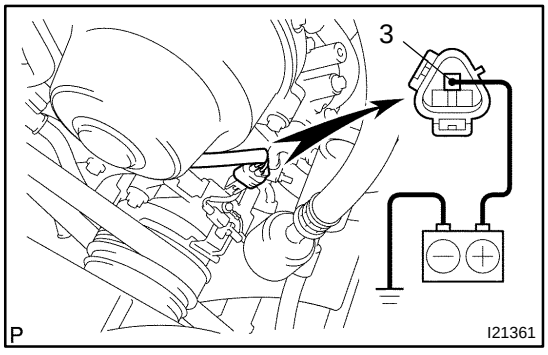
PREPARATION:
Remove the magnetic clutch relay from the engine room J/B.
CHECK:
Measure the resistance according to the value(s) in the table below.
OK:

Tester connection	Condition	Specified condition
3 – 5	Always	10 kΩ or higher
3 – 5	Voltage is applied between terminals 1 and 2	Below 1Ω (Battery voltage is applied between terminals 1 and 2)

NG → **Replace magnetic clutch relay.**

OK

6	Check A/C magnetic clutch.



PREPARATION:
Disconnect the magnetic clutch connector.
CHECK:
Connect the positive (+) battery lead to the magnetic clutch connector terminal 3.
OK:
Magnetic clutch is energized.

NG → **Replace A/C magnetic clutch.**

OK

7	Check harness and connector between integration control and panel (MGC terminal) and body ground (See page IN–35).

NG → **Repair or replace harness or connector.**

OK

Replace integration control and panel.

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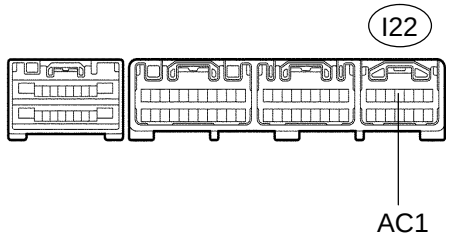
8	**Check harness and connector between integration control and panel (AC1 terminal) and ECM (AC1 terminal) (See page IN–35).**

NG → **Repair or replace harness or connector.**

OK

9	**Check voltage between terminal AC1 of integration control and panel connector and body ground.**

Integration Control and Panel



PREPARATION:

(a) Disconnect the connector from the ECM.
(b) Remove the integration control and panel with the connectors still connected.
(c) Start the engine and push the AUTO switch.

CHECK:

Measure the voltage between terminal AC1 of the integration control and panel connector and body ground when the magnetic clutch is turned ON and OFF by the A/C switch.

OK:

Switch operation	Tester connection	Specified condition
ON	AC1 – Body ground	1.3 to 2.6 V
OFF	AC1 – Body ground	3.7 to 4.5 V

NG → **Replace integration control and panel.**

OK

Replace ECM (See page SF–80).

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CO/HC

INSPECTION

EM0KQ–08

HINT:

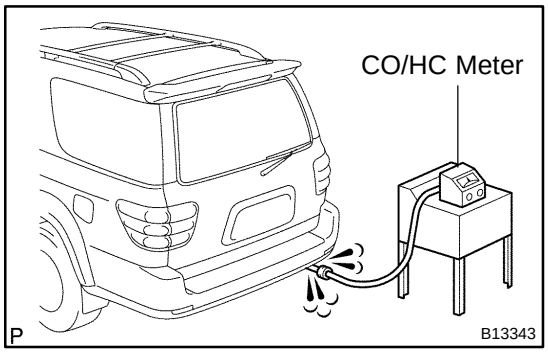
This check is used only to determine whether or not the idle CO/HC complies with regulations.

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
(f) SFI system wiring connectors fully plugged
(g) Ignition timing checked correctly
(h) Transmission in neutral position
(i) Tachometer and CO/HC meter calibrated by hand

2. START ENGINE

3. RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS



4. INSERT CO/HC METER TESTING PROBE AT LEAST 40 cm (1.3 ft) INTO TAILPIPE DURING IDLING

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5. IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM

HINT:

When performing the 2 mode (2,500 rpm and idle) test, follow the measurement orders are prescribed by the applicable local regulations.

If the CO/HC concentration does not comply with regulations, perform troubleshooting in the order given below.

(a) Check the air–fuel ratio sensors and heated oxygen sensors operation.(See page DI–88 and DI–93)

(b) See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idle	7. Faulty ignitions: ▶Incorrect timing ▶Fouled, shorted or improperly gapped plugs 8. Incorrect valve clearance 9. Leaky intake and exhaust valves 10.Leaky cylinders
Low	High	Rough idle (fluctuating HC reading)	1. Vacuum leaks: ▶PCV hoses ▶Intake manifold ▶Throttle body ▶Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty SFI systems: ▶Faulty pressure regulator ▶Defective ECT sensor ▶Faulty ECM ▶Faulty injectors ▶Faulty throttle position sensor ▶Faulty MAF meter

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COMPRESSION

EM0KR–10

INSPECTION

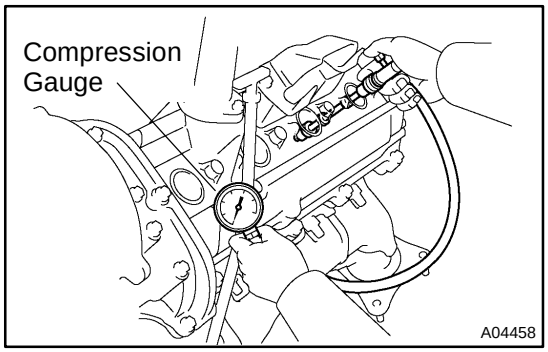
HINT:

If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. WARM UP AND STOP ENGINE

Allow the engine to warm up to normal operating temperature.

2. REMOVE SPARK PLUGS (See page IG–1)



3. CHECK CYLINDER COMPRESSION PRESSURE

(a) Insert a compression gauge into the spark plug hole.

(b) Fully open the throttle.

(c) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain engine speed of 250 rpm or more.

(d) Repeat steps (a) through (c) for each cylinder.

NOTICE:

This measurement must be done in as short a time as possible.

Compression pressure:
1,373 kPa (14.0 kgf/cm^2, 199 psi) or more
Minimum pressure:
1,030 kPa (10.5 kgf/cm^2, 149 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi) or less

(e) If the cylinder compression in one or more cylinders is low, pour small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.

- If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

4. REINSTALL SPARK PLUGS (See page IG–1)

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VALVE CLEARANCE

EM0KS–09

INSPECTION

HINT:

Inspect and adjust the valve clearance when the engine is cold.

1. **REMOVE BATTERY CLAMP COVER**
2. **REMOVE THROTTLE BODY COVER**
3. **REMOVE AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY**
4. **REMOVE NO.3 TIMING BELT COVERS (See page EM–16)**
5. **REMOVE IGNITION COILS (See page IG–5)**
6. **REMOVE RH CYLINDER HEAD COVER**

Remove the 9 bolts, seal washers and cylinder head cover.

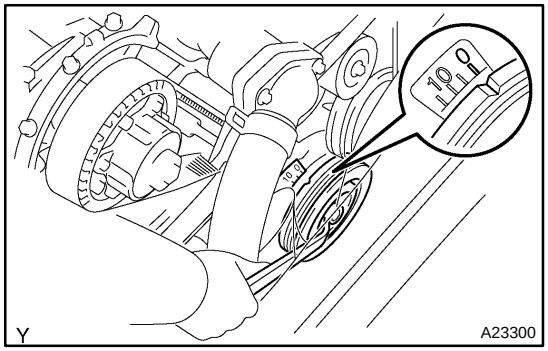
7. **REMOVE LH CYLINDER HEAD COVER**

(a) Remove the oil dipstick for the transmission.

(b) Disconnect the PCV hose.

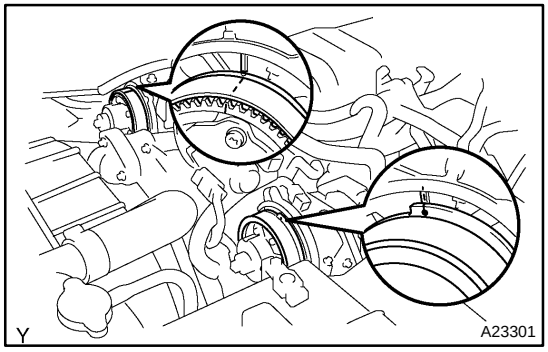
(c) Disconnect the engine wire clamp from the wire bracket on the cylinder head cover.

(d) Remove the 9 bolts, 9 seal washers and cylinder head cover.



8. **SET NO.1 CYLINDER TO TDC/COMPRESSION**

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the No.1 timing belt cover.



(b) Check that the timing marks of the camshaft timing pulleys and timing belt rear plates are aligned.

If not, turn the crankshaft 1 revolution (360˚) and align the mark as above.

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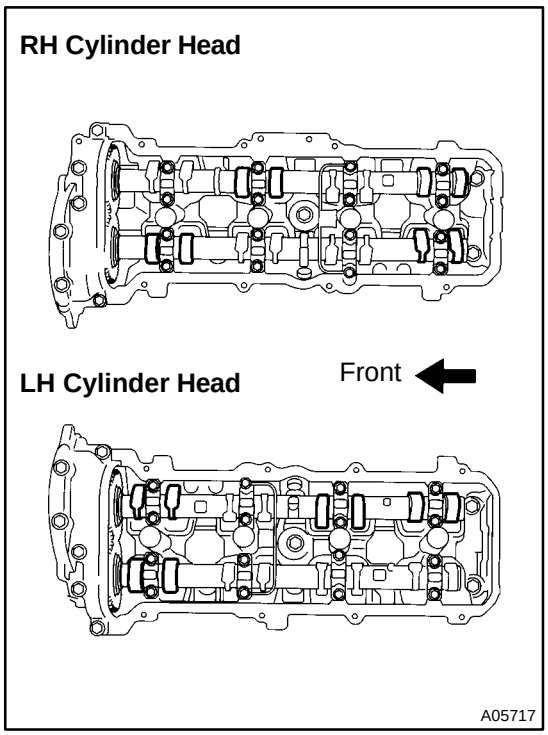


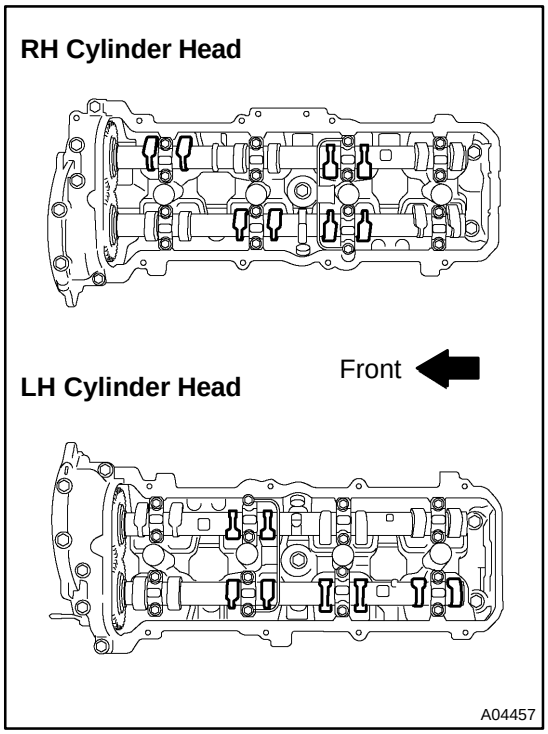
9. INSPECT VALVE CLEARANCE

(a) Check only the valves indicated.

- ▶ Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
- ▶ Record the out–of–specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

Valve clearance (Cold):

Intake	0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust	0.25 – 0.35 mm (0.010 – 0.014 in.)



(b) Turn the crankshaft 1 revolution (360˚) and align the mark as above. (See procedure in step 8)

(c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure in step (a))

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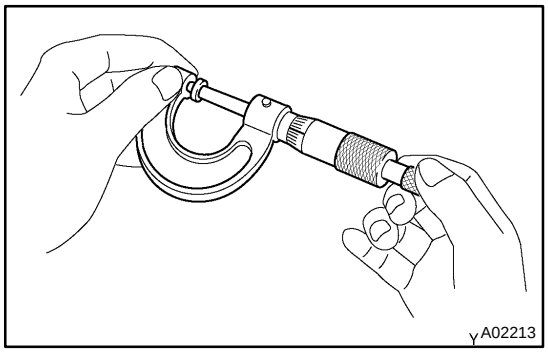
10. ADJUST VALVE CLEARANCE

(a) Remove the timing belt. (See page EM–16)

(b) Remove the camshafts. (See page EM–36)

(c) Remove the valve lifter and adjusting shim.



(d) Determine the replacement adjusting shim size according to these Formula or Charts:

(1) Using a micrometer, measure the thickness of the removed shim.

(2) Calculate the thickness of a new shim so that the valve clearance comes within the specified value.

T ..... Thickness of removed shim
A ..... Measured valve clearance
N ..... Thickness of new shim
Intake: N = T + (A – 0.20 mm (0.008 in.))
Exhaust: N = T + (A – 0.30 mm (0.012 in.))

(3) Select a new shim with thickness as close as possible to the calculated value.

HINT:
Shims are available in 41 increments of 0.020 mm (0.0008 in.), from 2.00 mm (0.0787 in.) to 2.80 mm (0.1102 in.).

(e) Place a new adjusting shim on the valve.

(f) Place the valve lifter.

(g) Reinstall the camshafts. (See page EM–60)

(h) Reinstall the timing belt. (See page EM–23)

(i) Recheck the valve clearance.

11. REINSTALL CYLINDER HEAD COVERS

12. REINSTALL IGNITION COILS

13. REINSTALL NO.3 TIMING BELT COVERS (See page EM–23)

14. REINSTALL AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

15. REINSTALL THROTTLE BODY COVER

16. REINSTALL BATTERY CLAMP COVER

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Adjusting Shim Selection Chart (Intake)

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.000 (0.0787)	2.020 (0.0795)	2.040 (0.0803)	2.060 (0.0811)	2.080 (0.0819)	2.100 (0.0827)	2.120 (0.0835)	2.140 (0.0843)	2.160 (0.0850)	2.180 (0.0858)	2.200 (0.0866)	2.210 (0.0870)	2.220 (0.0874)	2.230 (0.0878)	2.240 (0.0882)	2.250 (0.0886)	2.260 (0.0890)	2.270 (0.0894)	2.280 (0.0898)	2.290 (0.0902)	2.300 (0.0906)	2.310 (0.0909)	2.320 (0.0913)	2.330 (0.0917)	2.340 (0.0921)	2.350 (0.0925)	2.360 (0.0929)	2.370 (0.0933)	2.380 (0.0937)	2.390 (0.0941)	2.400 (0.0945)	2.410 (0.0949)	2.420 (0.0953)	2.430 (0.0957)	2.440 (0.0961)	2.450 (0.0965)	2.460 (0.0969)	2.470 (0.0972)	2.480 (0.0976)	2.490 (0.0980)	2.500 (0.0984)	2.510 (0.0988)	2.520 (0.0992)	2.530 (0.0996)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.570 (0.1012)	2.580 (0.1016)	2.590 (0.1020)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.760 (0.1087)	2.780 (0.1094)	2.800 (0.1102)
0.000–0.030 (0.0000–0.0012)							00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	44	46	48	50	52	54	56	58	60	62
0.031–0.050 (0.0012–0.0020)						00	00	00	00	02	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58	60	62	64
0.051–0.070 (0.0020–0.0028)					00	00	00	00	02	04	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60	62	64	66
0.071–0.090 (0.0028–0.0035)				00	00	00	00	02	04	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	52	54	56	58	60	62	64	66	68
0.091–0.110 (0.0036–0.0043)			00	00	00	00	02	04	06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	54	56	58	60	62	64	66	68	70
0.111–0.130 (0.0044–0.0051)		00	00	00	00	02	04	06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66	68	70	72
0.131–0.149 (0.0052–0.0059)		00	00	00	02	04	06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68	70	72	74
0.150–0.250 (0.0059–0.0098)						

Adjusting Shim Selection Chart (Exhaust)

| Measured clearance mm (in.) \ Installed shim thickness mm (in.) | 2.000 (0.0787) | 2.020 (0.0795) | 2.040 (0.0803) | 2.060 (0.0811) | 2.080 (0.0819) | 2.100 (0.0827) | 2.120 (0.0835) | 2.140 (0.0843) | 2.160 (0.0850) | 2.180 (0.0858) | 2.200 (0.0866) | 2.210 (0.0870) | 2.220 (0.0874) | 2.230 (0.0878) | 2.240 (0.0882) | 2.250 (0.0886) | 2.260 (0.0890) | 2.270 (0.0894) | 2.280 (0.0898) | 2.290 (0.0902) | 2.300 (0.0906) | 2.310 (0.0909) | 2.320 (0.0913) | 2.330 (0.0917) | 2.340 (0.0921) | 2.350 (0.0925) | 2.360 (0.0929) | 2.370 (0.0933) | 2.380 (0.0937) | 2.390 (0.0941) | 2.400 (0.0945) | 2.410 (0.0949) | 2.420 (0.0953) | 2.430 (0.0957) | 2.440 (0.0961) | 2.450 (0.0965) | 2.460 (0.0969) | 2.470 (0.0972) | 2.480 (0.0976) | 2.490 (0.0980) | 2.500 (0.0984) | 2.510 (0.0988) | 2.520 (0.0992) | 2.530 (0.0996) | 2.540 (0.1000) | 2.550 (0.1004) | 2.560 (0.1008) | 2.570 (0.1012) | 2.580 (0.1016) | 2.590 (0.1020) | 2.600 (0.1024) | 2.620 (0.1031) | 2.640 (0.1039) | 2.660 (0.1047) | 2.680 (0.1055) | 2.700 (0.1063) | 2.720 (0.1071) | 2.740 (0.1079) | 2.760 (0.1087) | 2.780 (0.1094) | 2.800 (0.1102) |
|---|---|---

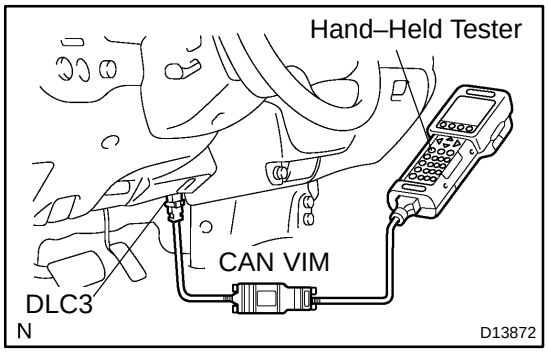
IGNITION TIMING

EM0KT–11

INSPECTION

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.



2. INSPECT IGNITION TIMING

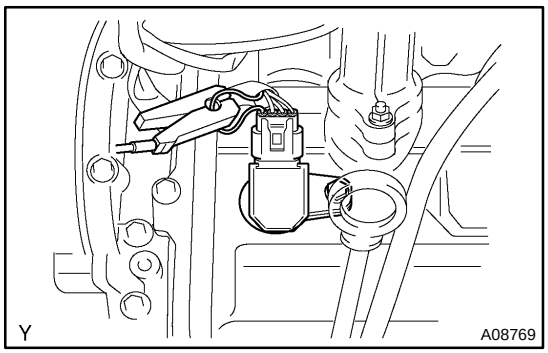
(a) When using a hand–held tester.

(1) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).

(2) Please refer to the hand–held tester operator's manual for further details.

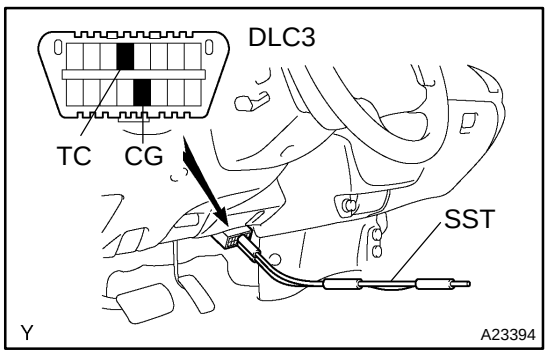
Ignition timing: 5 to 15° BTDC at idle
(Transmission in neutral)

(3) Disconnect the hand–held tester and CAN VIM from the DLC3.



(b) When not using a hand–held tester.

(1) Connect the tester probe of a timing light to the wire (black – red) of the ignition coil connector for the No.1 cylinder.



(2) Using SST, connect terminals TC and CG of the DLC3.

SST 09843–18040

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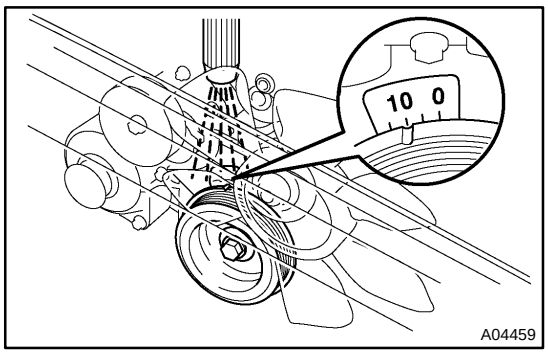

(3) Using a timing light, check the ignition timing.
Ignition timing: 5 to 15° BTDC at idle
(Transmission in neutral)
(4) Remove the SST from the DLC3.
SST 09843–18040
(5) Disconnect the timing light from the engine.

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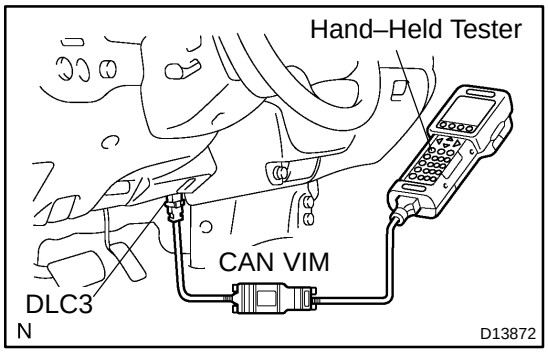
IDLE SPEED

EM1X3–01

INSPECTION

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
(f) SFI system wiring connectors fully plugged
(g) iCorrect gnition timing
(h) Transmission in neutral
(i) Air conditioning switched OFF

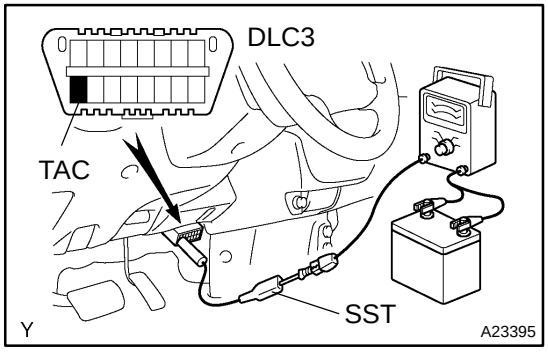


2. INSPECT ENGINE IDLE SPEED

(a) When using a hand–held tester.
  (1) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).
  (2) Please refer to the hand–held tester operator's manual for further details.
  (3) Race the engine speed at 2,500 rpm for approx. 90 seconds.
  (4) Check the idle speed.
  Idle speed: 700 ± 50 rpm
  (Transmission in neutral)

If the idle speed is not as specified, check the air intake system.

  (5) Disconnect the hand–held tester and CAN VIM from the DLC3.



(b) When not using a hand–held tester.
  (1) Using SST, connect the tachometer probe to terminal TAC of the DLC3.
  SST 09843–18030
  (2) Race the engine at 2,500 rpm for approx. 90 seconds.
  (3) Check the idle speed.
  Idle speed: 700 ± 50 rpm
  (Transmission in neutral)

If the idle speed is not as specified, check the air intake system.

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(4) Disconnect the tachometer from the DLC3.

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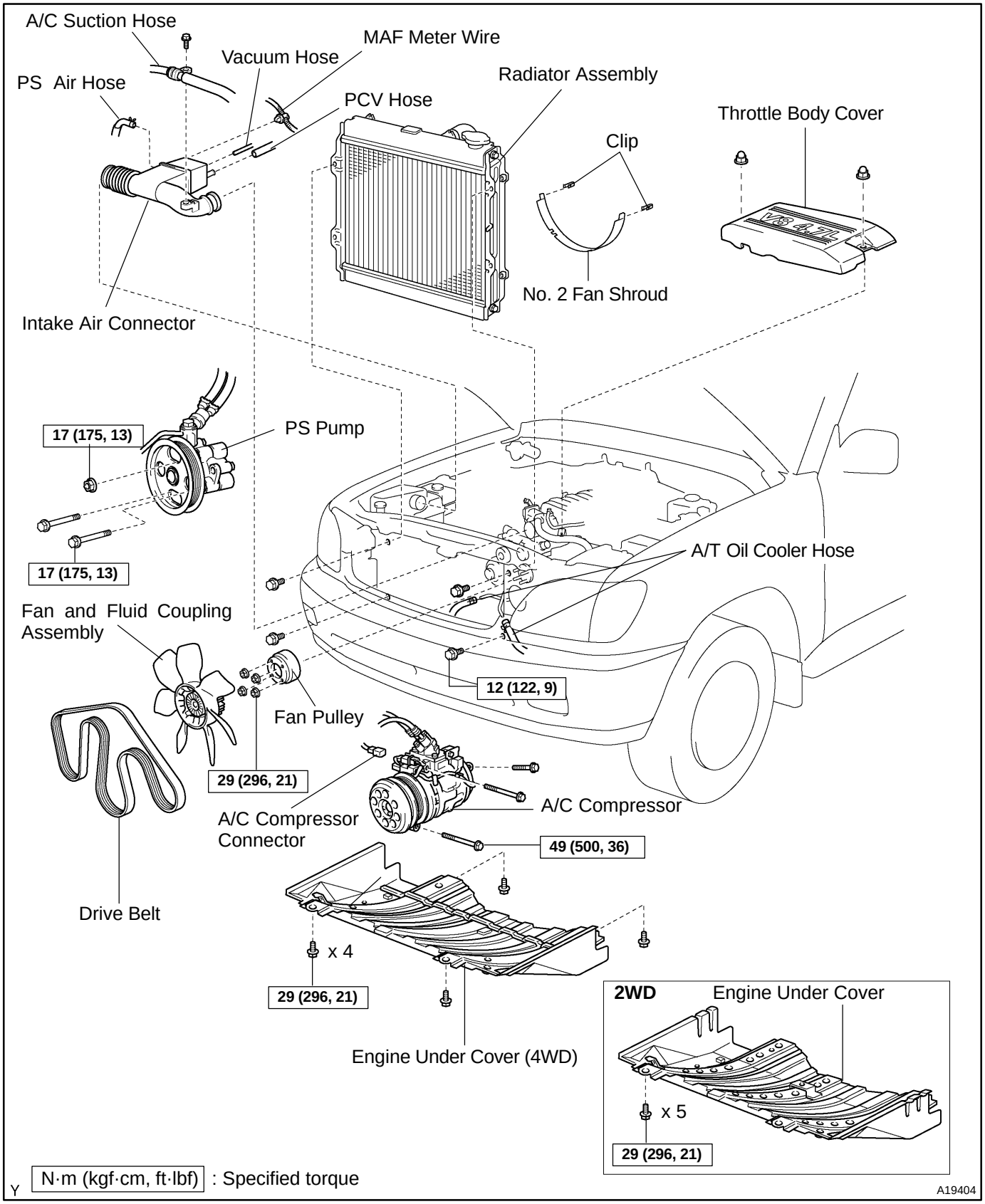
TIMING BELT

COMPONENTS

EM0KV–13



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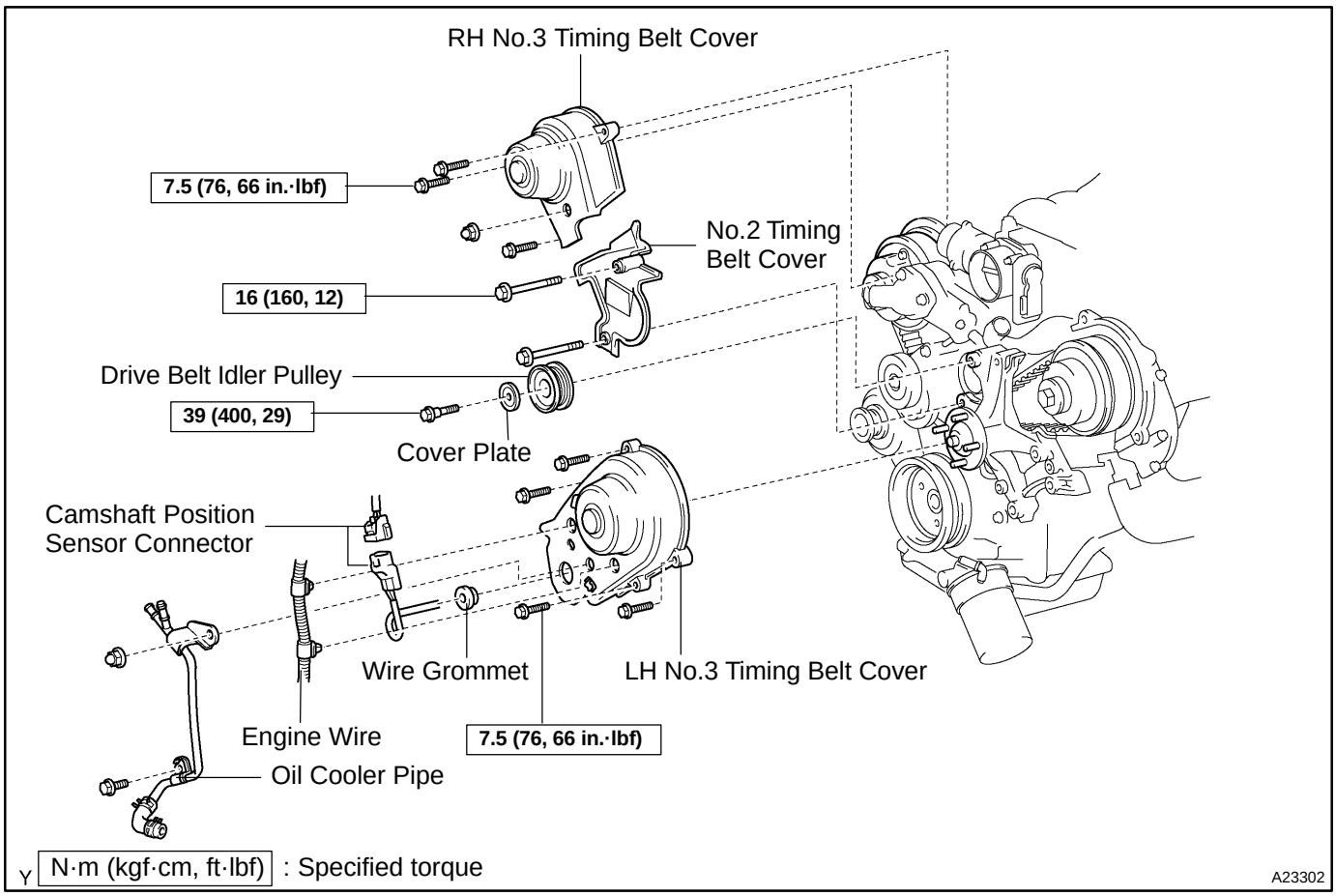
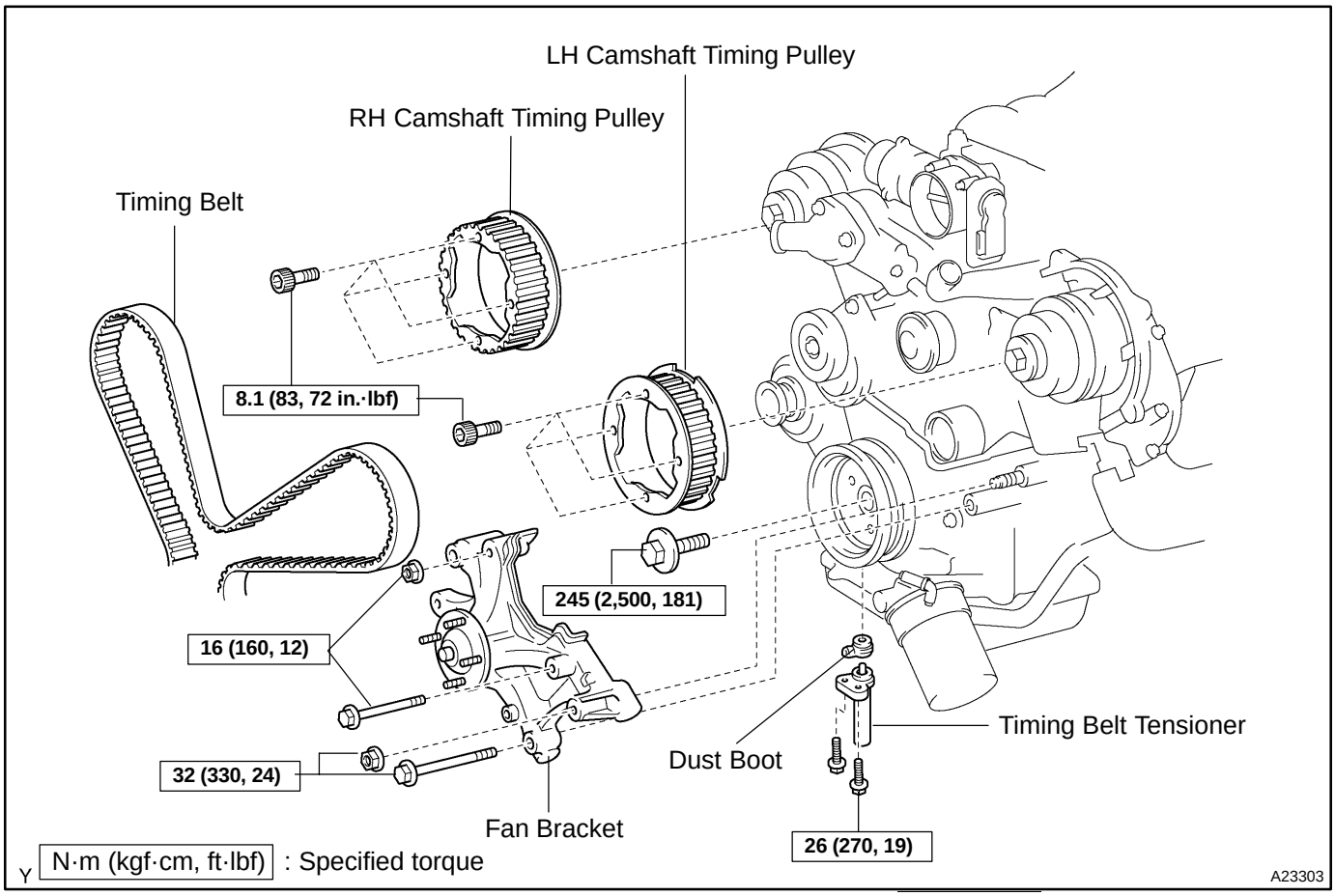

RH No.3 Timing Belt Cover
7.5 (76, 66 in.·lbf)
No.2 Timing Belt Cover
16 (160, 12)
Drive Belt Idler Pulley
39 (400, 29)
Cover Plate
Camshaft Position Sensor Connector
Wire Grommet
LH No.3 Timing Belt Cover
Engine Wire
7.5 (76, 66 in.·lbf)
Oil Cooler Pipe
Y N·m (kgf·cm, ft·lbf) : Specified torque
A23302


LH Camshaft Timing Pulley
RH Camshaft Timing Pulley
Timing Belt
8.1 (83, 72 in.·lbf)
245 (2,500, 181)
16 (160, 12)
Timing Belt Tensioner
Dust Boot
32 (330, 24)
Fan Bracket
26 (270, 19)
Y N·m (kgf·cm, ft·lbf) : Specified torque
A23303

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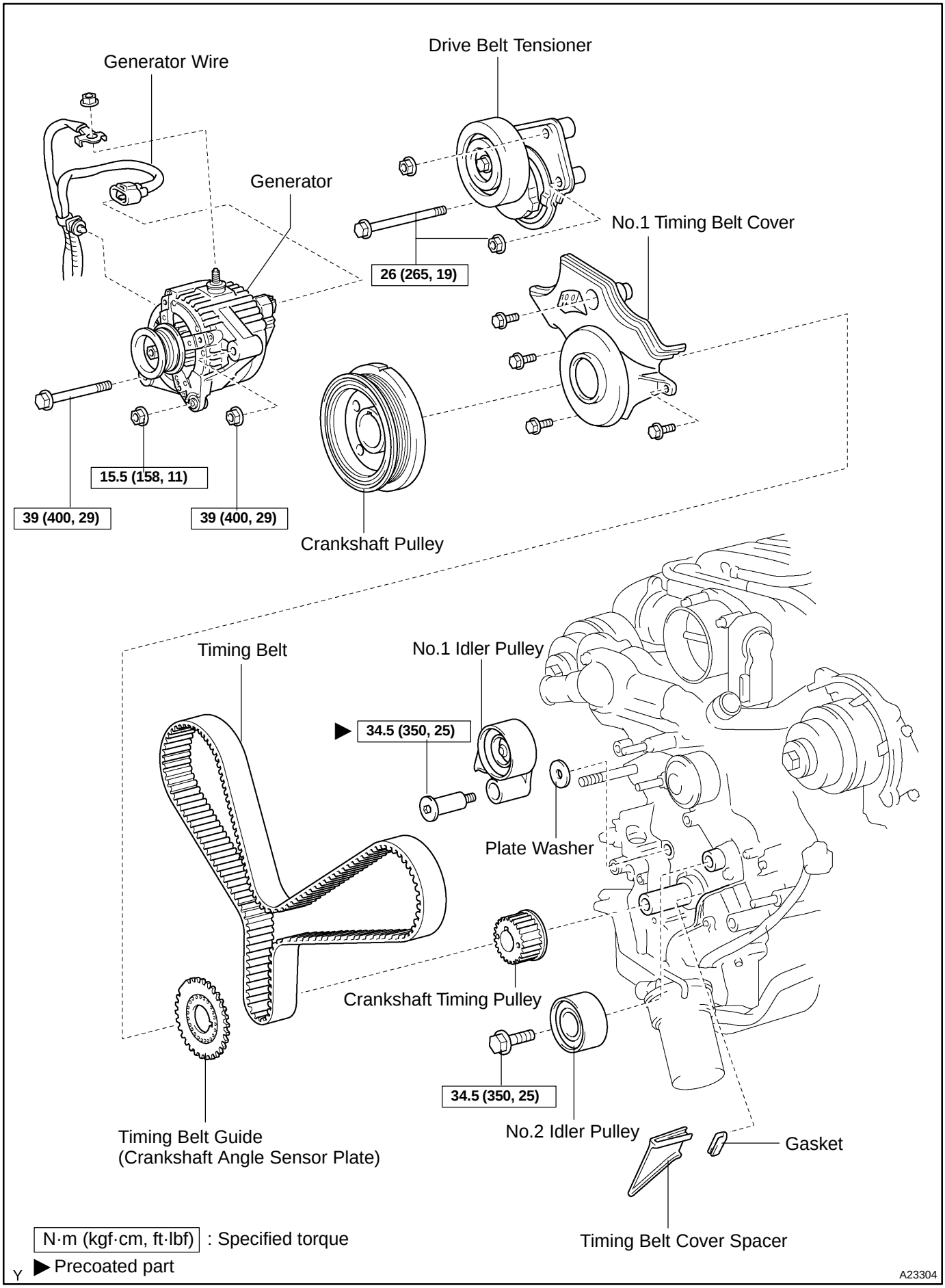
Generator Wire
Drive Belt Tensioner
Generator
No.1 Timing Belt Cover
26 (265, 19)
15.5 (158, 11)
39 (400, 29)
39 (400, 29)
Crankshaft Pulley
Timing Belt
No.1 Idler Pulley
▶ 34.5 (350, 25)
Plate Washer
Crankshaft Timing Pulley
34.5 (350, 25)
No.2 Idler Pulley
Gasket
Timing Belt Guide
(Crankshaft Angle Sensor Plate)
Timing Belt Cover Spacer
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Precoated part
Y
A23304

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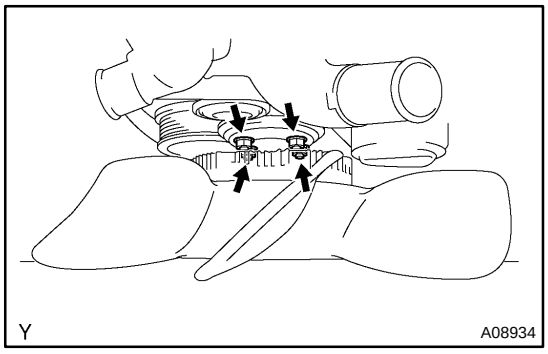
EM1WX–01

REMOVAL

1. REMOVE ENGINE UNDER COVER
2. DRAIN ENGINE COOLANT
3. REMOVE RADIATOR ASSEMBLY (See page CO–17)
4. REMOVE THROTTLE BODY COVER
5. REMOVE INTAKE AIR CONNECTOR ASSEMBLY



6. REMOVE DRIVE BELT, FAN, FLUID COUPLING AND FAN PULLEY

(a) Loosen the 4 nuts holding the fluid coupling to the fan bracket.
(b) Remove the drive belt. (See page CH–7)
(c) Remove the 4 nuts, the fan, fluid coupling assembly and fan pulley.

7. DISCONNECT PS PUMP

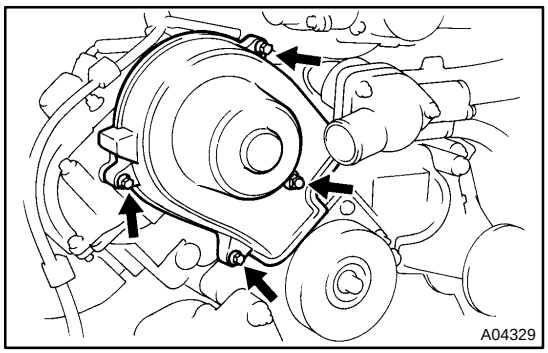
Remove the 3 bolts, and disconnect the PS pump from the engine.

HINT:

Suspend the PS pump securely.

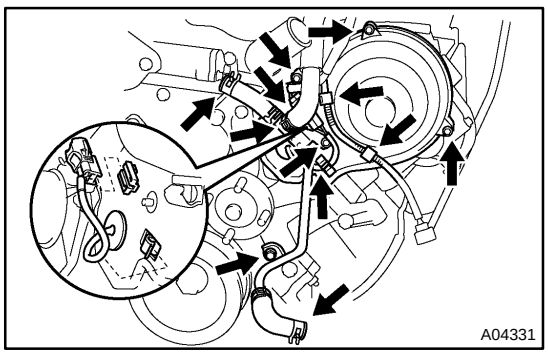
8. REMOVE DRIVE BELT IDLER PULLEY

Remove the pulley bolt, cover plate and idler pulley.



9. REMOVE RH NO.3 TIMING BELT COVER

Remove the 3 bolts, nut and RH No.3 timing belt cover.



10. REMOVE LH NO.3 TIMING BELT COVER

(a) Disconnect the engine wire from the 2 wire clamps.
(b) Remove the 4 bolts and nut.
(c) Disconnect the camshaft position sensor wire from the wire clamp on the LH No.3 timing belt cover.
(d) Disconnect the camshaft position sensor connector from the connector bracket.
(e) Disconnect the camshaft position sensor connector.
(f) Remove the wire grommet from the LH No.3 timing belt cover.

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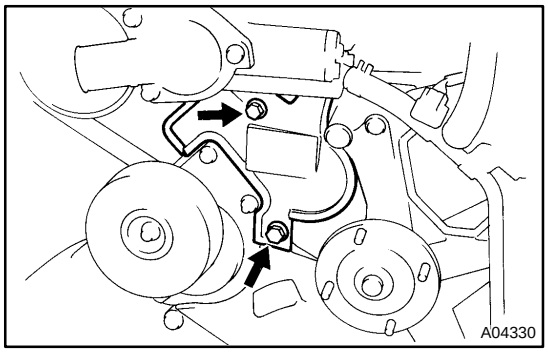
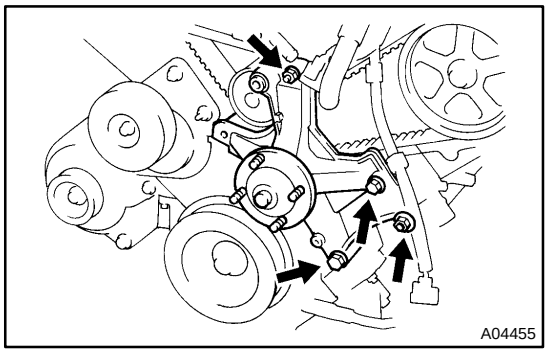
(g) Remove the LH No.3 timing belt cover.
(h) Remove the bolt, nut and oil cooler pipe.



11. REMOVE NO.2 TIMING BELT COVER

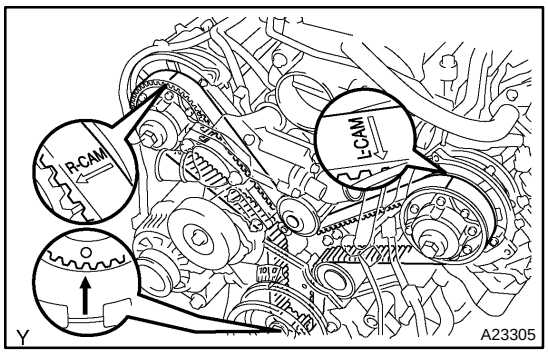
Remove the 2 bolts and No.2 timing belt cover.

12. DISCONNECT A/C COMPRESSOR FROM ENGINE (See page EM–79)



13. REMOVE FAN BRACKET

Remove the 2 bolts, 2 nuts and fan bracket.

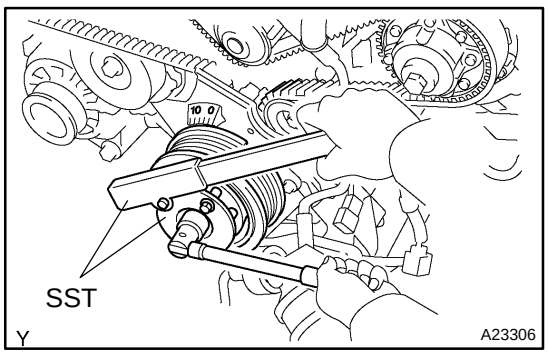


14. IF RE–USING TIMING BELT, CHECK INSTALLATION MARKS ON TIMING BELT

Check that there are 3 installation marks on the timing belt by turning the crankshaft pulley as shown in the illustration.

HINT:

If the installation marks have disappeared, place a new installation mark on the timing belt before removing each part.



15. LOOSEN CRANKSHAFT PULLEY BOLT

Using SST, loosen the pulley bolt.

SST 09213–70011 (90105–08076), 09330–00021

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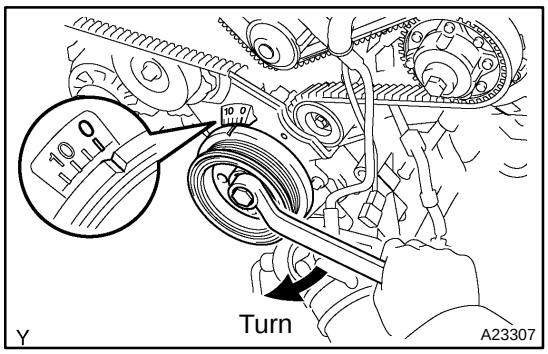
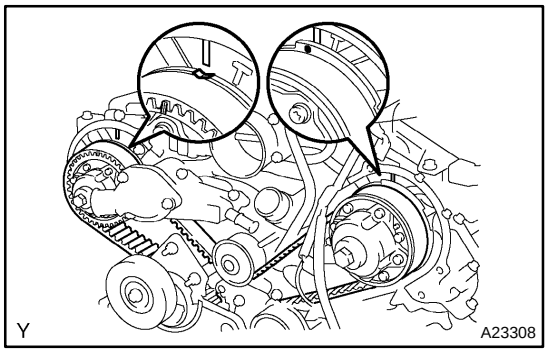


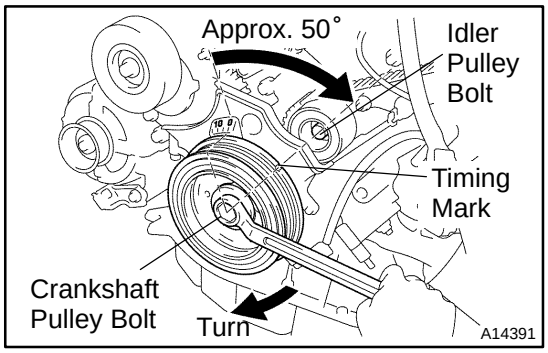
16. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with timing mark ”0” of the No.1 timing belt cover.



(b) Check that the timing marks of the camshaft timing pulleys and timing belt rear plates are aligned.

If not, turn the crankshaft 1 revolution (360˚).



(c) Turn the crankshaft pulley approx. 50˚ clockwise, and align the timing mark of the crankshaft pulley with the centers of the crankshaft pulley bolt and the No.2 timing belt idler pulley bolt.

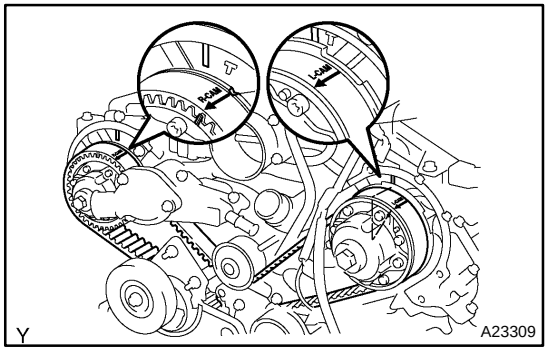
NOTICE:

If the timing belt is disengaged, having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you remove the camshaft timing pulley (step 15), causing damage. So always set the crankshaft pulley at the correct angle.

(d) Remove the crankshaft pulley bolt.

NOTICE:

Do not turn the crankshaft pulley.



17. REMOVE TIMING BELT TENSIONER

HINT:

▶ When re–using the timing belt:
If the installation marks have disappeared, before remove the timing belt, place 2 new installation marks on the timing belt to match the timing marks of the camshaft timing pulleys.

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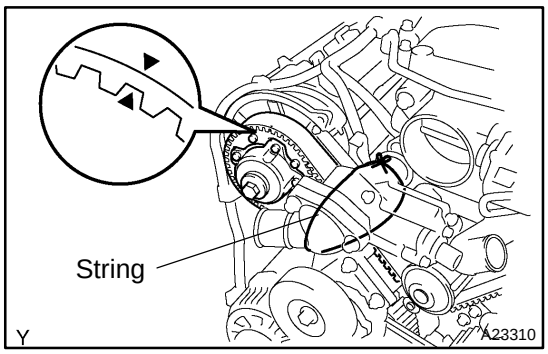
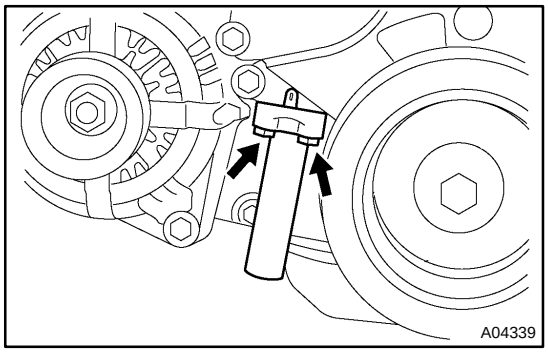
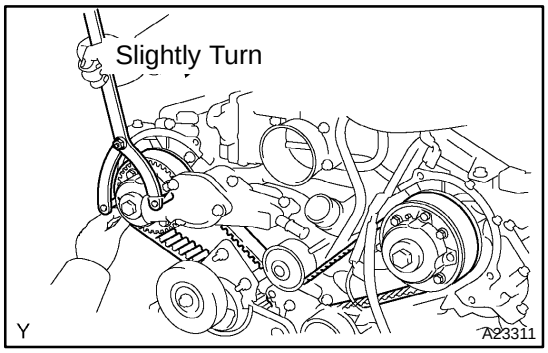


▶ When replacing the timing belt tensioner only:
To avoid meshing of the timing pulley and timing belt, secure one of them with string. And place matchmarks on the timing belt and RH camshaft timing pulley.



Alternately loosen the 2 bolts, and remove them, the belt tensioner and dust boot.

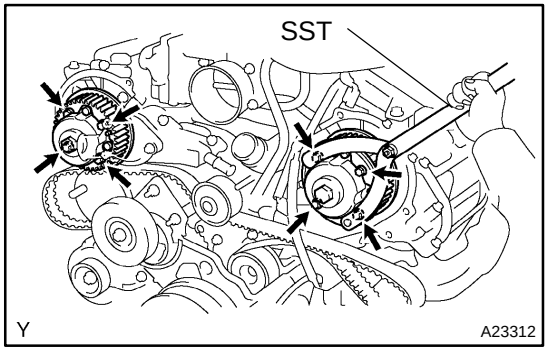


18. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS

(a) Hold the camshaft timing pulley with SST, and loosen the tension spring between the LH and RH camshaft timing pulleys by slightly turning the LH camshaft timing pulley clockwise.
SST 09960–10010 (09962–01000, 09963–01000)

HINT:
Set the SST so that the claw comes in contact with the camshaft timing pulley bolt, and tighten the lock nut of the SST.

(b) Disconnect the timing belt from the camshaft timing pulleys.



19. REMOVE CAMSHAFT TIMING PULLEYS

(a) Hold the camshaft timing pulley with SST, loosen the 4 bolts of the timing pulley.
SST 09960–10010 (09962–01000, 09963–01000)

(b) Remove the 2 timing pulleys.

20. REMOVE GENERATOR (See page CH–7)

21. REMOVE DRIVE BELT TENSIONER

Remove the bolt, 2 nuts and belt tensioner.

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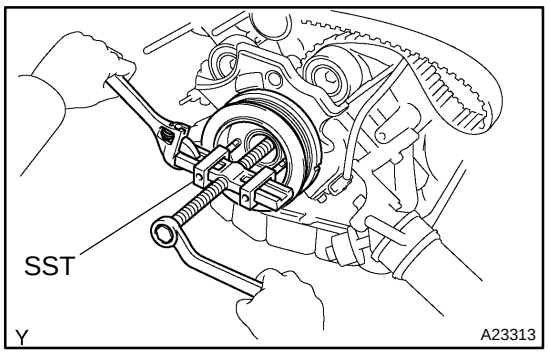


22. REMOVE CRANKSHAFT PULLEY

Using SST, remove the crankshaft pulley.

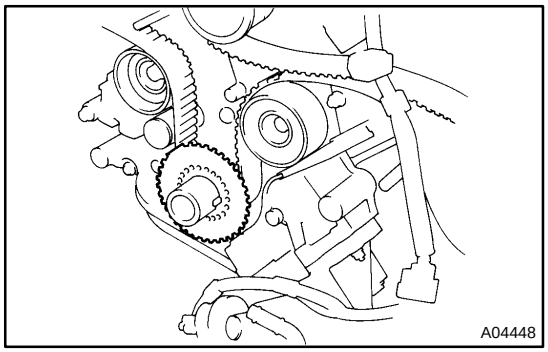
SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05021)

NOTICE:

Do not turn the crankshaft pulley.

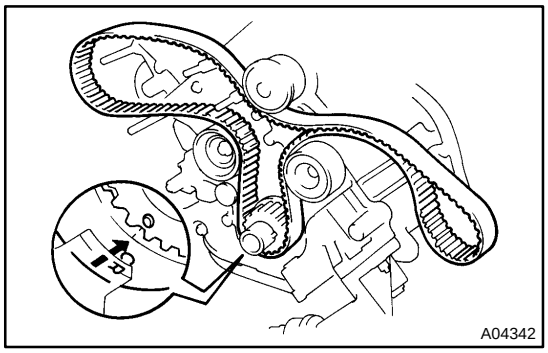
23. REMOVE NO.1 TIMING BELT COVER

Remove the 4 bolts and timing belt cover.



24. REMOVE TIMING BELT GUIDE

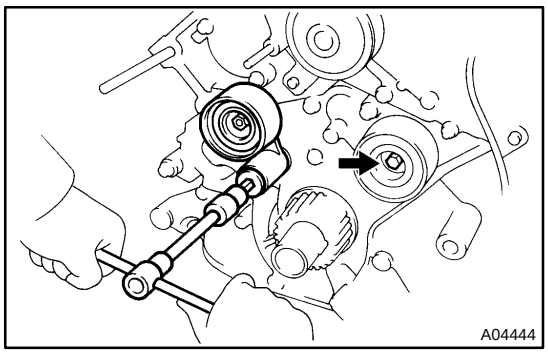
25. REMOVE TIMING BELT COVER SPACER



26. REMOVE TIMING BELT

HINT:

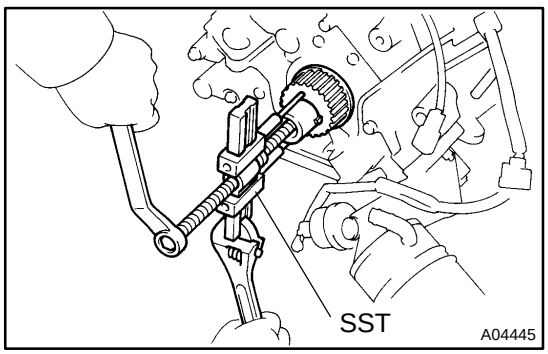
If re–using the belt and the installation mark has disappeared from it, place a new installation mark on the timing belt to the match the dot mark of the crankshaft timing pulley.



27. REMOVE NO.1 IDLER PULLEY AND NO.2 IDLER PULLEY

(a) Using a 10 mm hexagon wrench, remove the bolt, No.1 idler pulley and plate washer.

(b) Remove the bolt and No.2 idler pulley.



28. REMOVE CRANKSHAFT TIMING PULLEY

Using SST, remove the timing pulley.

SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05011)

NOTICE:

Do not turn the timing pulley.

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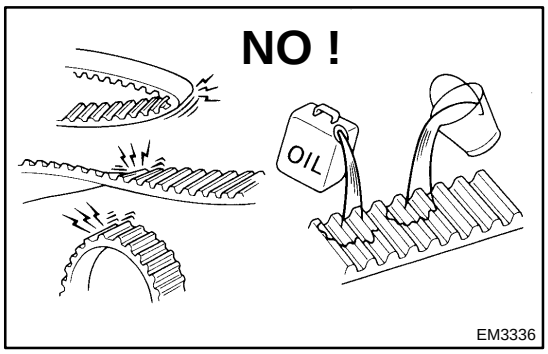


INSPECTION

1. INSPECT TIMING BELT

NOTICE:

- **Do not bend, twist or turn the timing belt inside out.**
- **Do not allow the timing belt to come into contact with oil, water or steam.**
- **Do not utilize timing belt tension when installing or removing the mount bolt of the camshaft timing pulley.**

If there is any defect, as shown in the illustration, check these points:

(a) Premature parting
- Check for proper installation.
- Check the timing cover gasket for damage and proper installation.

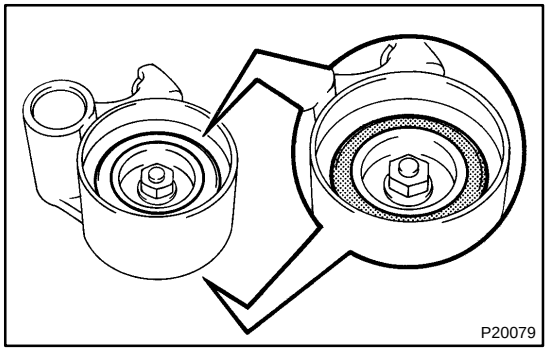
(b) If the belt teeth are cracked or damaged, check to see if either camshaft is locked.

(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock and water pump.

(d) If there is wear or damage on even one side of the belt, check the belt guide and the alignment of each pulley.

(e) If there is noticeable wear on the belt teeth, check timing cover for damage and for foreign material on the pulley teeth.

If necessary, replace the timing belt.



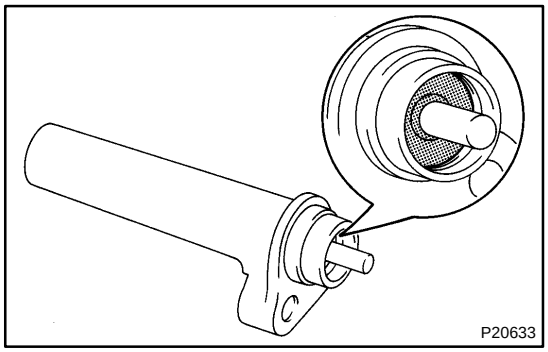
2. INSPECT IDLER PULLEYS

(a) Visually check the seal portion of the idler pulley for oil leakage.

If leakage is found, replace the idler pulley.

(b) Check that the idler pulley turns smoothly.

If necessary, replace the idler pulley.



3. INSPECT TIMING BELT TENSIONER

(a) Visually check the seal portion of the tensioner for oil leakage.

HINT:

If there is only the faintest trace of oil on the seal on the push rod side, the tensioner is all right.

If leakage is found, replace the tensioner.

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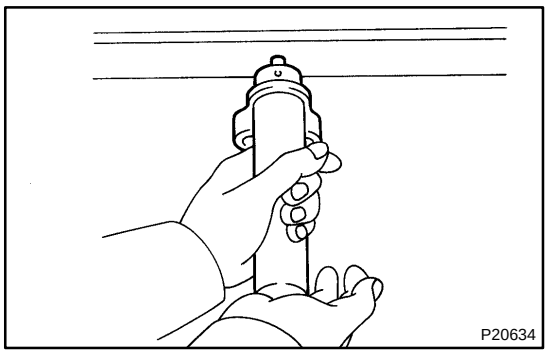
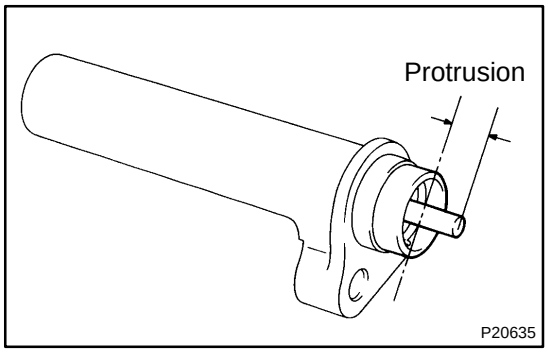


(b) Hold the tensioner with both hands and push the push rod strongly as shown to check that it doesn't move.

If the push rod moves, replace the tensioner.

NOTICE:

Never hold the tensioner push rod facing downward.



(c) Measure the protrusion of the push rod from the housing end.

Protrusion: 10.5 to 11.5 mm (0.413 to 0.453 in.)

If the protrusion is not as specified, replace the tensioner.

4. INSPECT WATER PUMP (See page CO–7)

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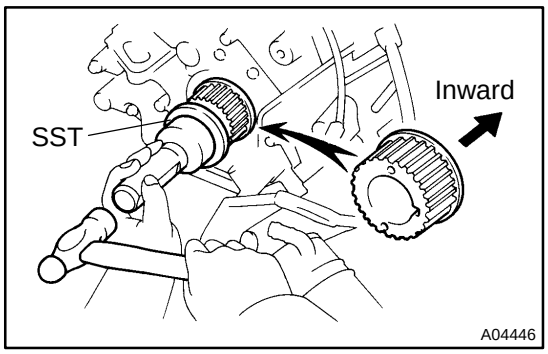
EM1WY–01

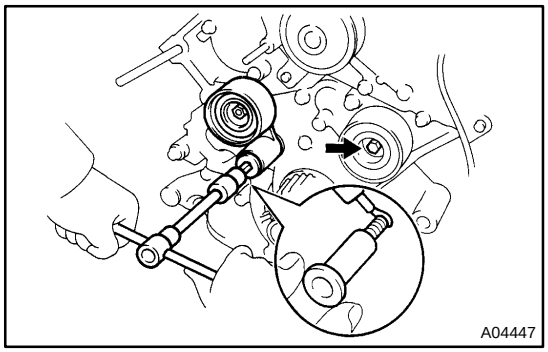
INSTALLATION



1. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the timing pulley set key with the key groove of the pulley.

(b) Using SST and a hammer, tap in the timing pulley, facing the flange side inward.
SST 09223–46011



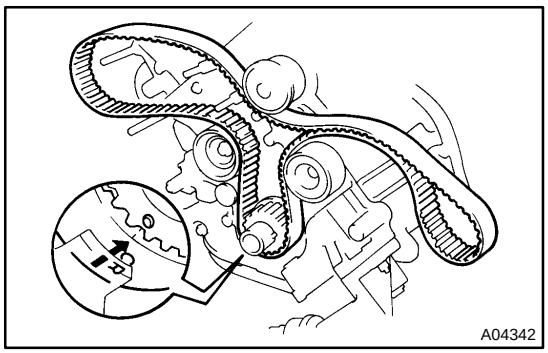
2. INSTALL NO.1 IDLER PULLEY AND NO.2 IDLER PULLEY

(a) Apply adhesive 2 or 3 threads of the pivot bolt.
Adhesive:
Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using a 10 mm hexagon wrench, install the plate washer and No.1 idler pulley with the pivot bolt.
Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

(c) Install the No.2 idler pulley with the bolt.
Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

(d) Check that the No.1 and No.2 idler pulleys moves smoothly.



3. TEMPORARILY INSTALL TIMING BELT

NOTICE:

The engine should be cold.

(a) Remove any oil or water on the crankshaft pulley, oil pump pulley, water pump pulley, No.1 idler pulley and No.2 idler pulley, and keep them clean.

NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

(b) Align the installation mark on the timing belt with the timing mark of the crankshaft timing pulley.

(c) Install the timing belt on the crankshaft timing pulley, No.1 idler pulley and No.2 idler pulley.

4. INSTALL TIMING BELT COVER SPACER

(a) Install the gasket to the cover spacer.

(b) Install the cover spacer.

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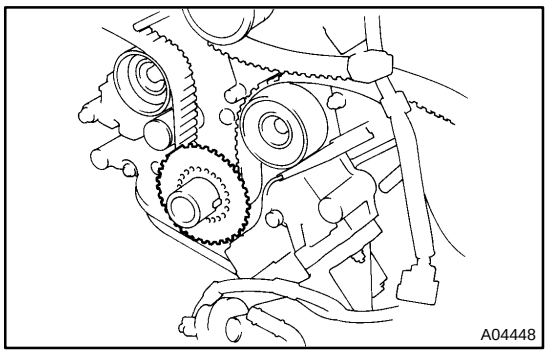
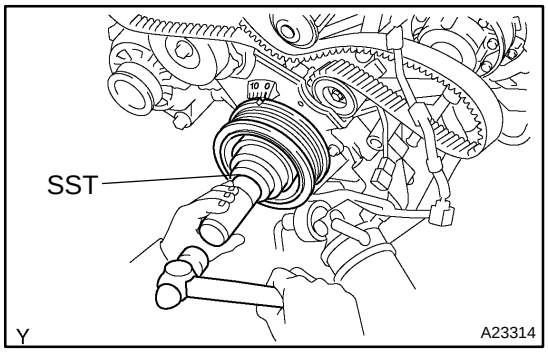


5. INSTALL TIMING BELT GUIDE

Install the belt guide with the cup side facing outward.

6. INSTALL NO.1 TIMING BELT COVER

Install the timing belt cover with the 4 bolts.



7. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the crankshaft pulley.

(b) Using SST and a hammer, tap in the crankshaft pulley.
SST 09223–46011

8. INSTALL DRIVE BELT TENSIONER

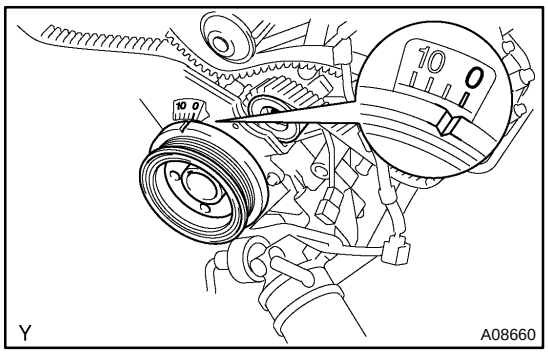
Install the belt tensioner with the bolt and 2 nuts.

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

HINT:

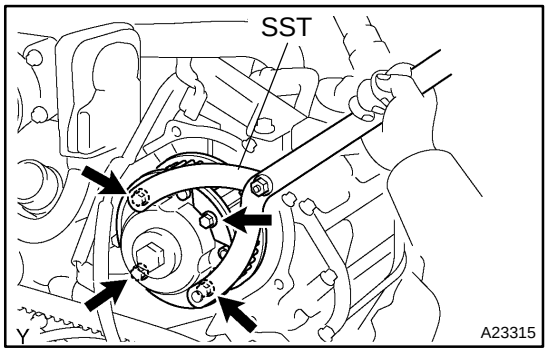
Use a bolt of 106 mm (4.18 in.) in length.

9. INSTALL GENERATOR (See page CH–16)



10. CHECK CRANKSHAFT PULLEY POSITION

Check that the timing mark of the crankshaft pulley is aligned with timing mark ”0” of the No.1 timing belt cover.



11. INSTALL, LH CAMSHAFT TIMING PULLEY

(a) Align the camshaft knock pin with the knock pin groove of the timing pulley, and slide the timing pulley.

(b) Temporarily install the 4 bolts of the camshaft timing pulley.

(c) Hold the camshaft timing pulley with SST, and tighten the pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 8.1 N·m (83 kgf·cm, 72 in.·lbf)

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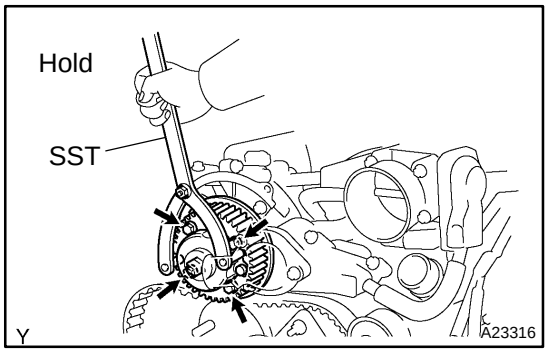
HINT:
Set the SST so that the claw comes in contact with the camshaft timing pulley bolt, and tighten the lock nut of the SST.

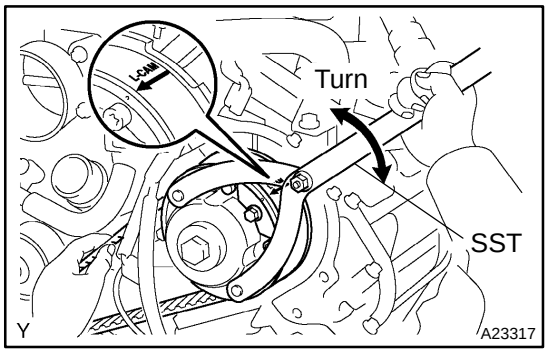


12. INSTALL RH CAMSHAFT TIMING PULLEY

(a) Align the camshaft timing tube knock pin with the knock pin groove of the timing pulley.

(b) Temporarily install the 4 bolts of the camshaft timing pulley.

(c) Hold the camshaft timing pulley with SST, and tighten the pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 8.1 N·m (83 kgf·cm, 72 in.·lbf)

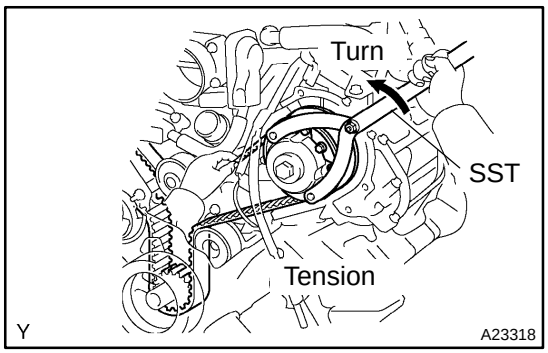


13. CONNECT TIMING BELT TO LH CAMSHAFT TIMING PULLEY

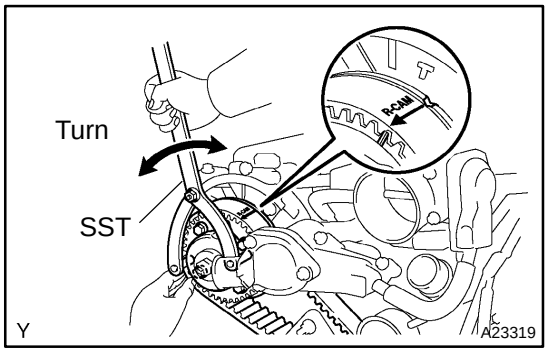
(a) Remove any oil or water on the timing pulley, and keep it clean.

NOTICE:
Only wipe the pulleys; do not use any cleansing agent.

(b) Using SST, turn the timing pulley. Align the installation mark on the timing belt with the timing mark of the timing pulley, and hang the timing belt on the timing pulley.
SST 09960–10010 (09962–01000, 09963–01000)



(c) Using SST, turn the LH camshaft timing pulley counter-clockwise until there is tension between the crankshaft timing pulley and LH camshaft timing pulley.
SST 09960–10010 (09962–01000, 09963–01000)



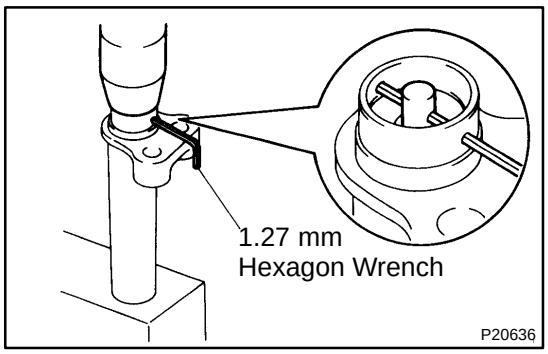
14. CONNECT TIMING BELT TO RH CAMSHAFT TIMING PULLEY

(a) Remove any oil or water on the camshaft timing pulley and water pump pulley, and keep them clean.

NOTICE:
Only wipe the pulleys; do not use any cleansing agent.

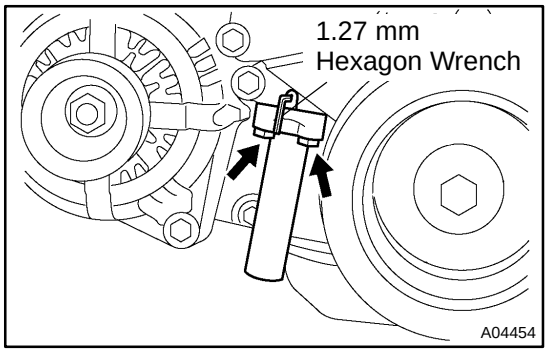
(b) Using SST, turn the timing pulley. Align the installation mark on the timing belt with the timing mark of the timing pulley, and hang the timing belt on the timing pulley.
SST 09960–10010 (09962–01000, 09963–01000)

Dardoor.com



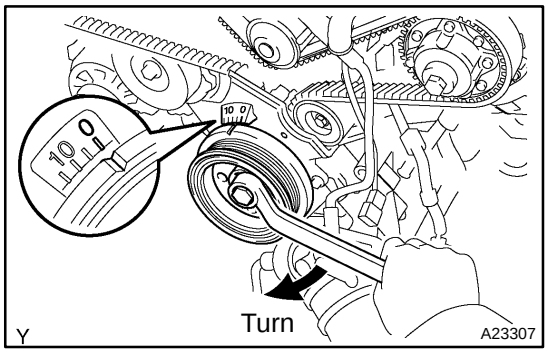
15. SET TIMING BELT TENSIONER

(a) Using a press, slowly press in the push rod using 981 – 9,807 N (100 – 1,000 kgf, 220 – 2,205 lbf) of pressure.
(b) Align the holes of the push rod and housing, and pass a 1.27 mm hexagon wrench through the holes to keep the setting position of the push rod.
(c) Remove the belt tensioner from the press.
(d) Install the dust boot to the belt tensioner.



16. INSTALL TIMING BELT TENSIONER

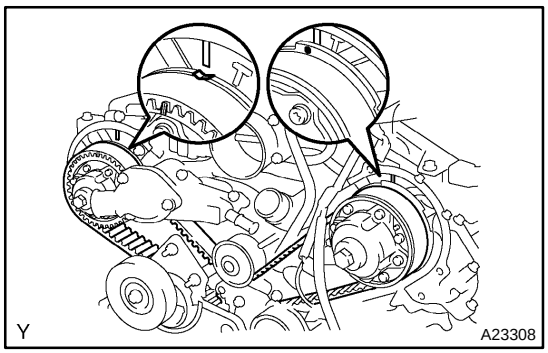
(a) Temporarily install the belt tensioner with the 2 bolts.
(b) Alternately tighten the 2 bolts.
Torque: 26 N·m (270 kgf·cm, 19 ft·lbf)
(c) Using pliers, remove the 1.27 mm hexagon wrench from the belt tensioner.



17. CHECK VALVE TIMING

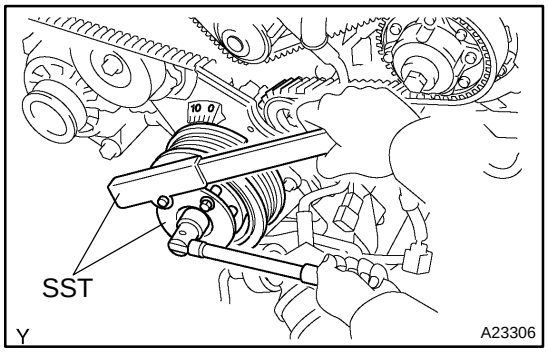
(a) Temporarily install the crankshaft pulley bolt.
(b) Slowly turn the crankshaft pulley 2 revolutions from the TDC to TDC.

NOTICE:
Always turn the crankshaft pulley clockwise.



(c) Check that each pulley aligns with the timing marks as shown in the illustration.

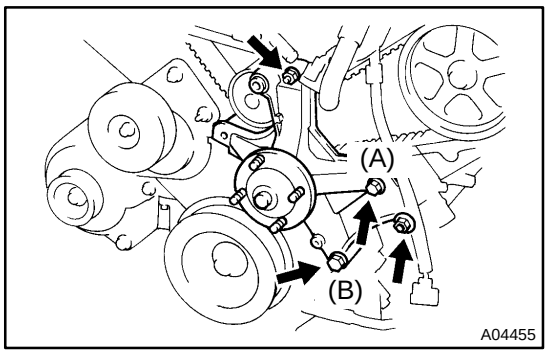
If the timing marks do not align, remove the timing belt and reinstall it.



18. TIGHTEN CRANKSHAFT PULLEY BOLT

Using SST, install the pulley bolt.
SST 09213–70011 (90119–08216), 09330–00021
Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)

Dardoor.com



19. INSTALL FAN BRACKET

Install the fan bracket with the 2 bolts and 2 nuts.

Torque:
12 mm head
16 N·m (160 kgf·cm, 12 ft·lbf) for (A)
14 mm head
32 N·m (330 kgf·cm, 24 ft·lbf) for (B)

HINT:

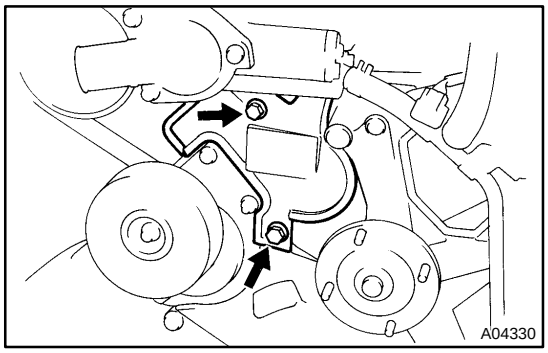
Each bolt length is indicated in the illustration.

Bolt Length:

106 mm (4.17 in.) for 12 mm head (A)

114 mm (4.49 in.) for 14 mm head (B)

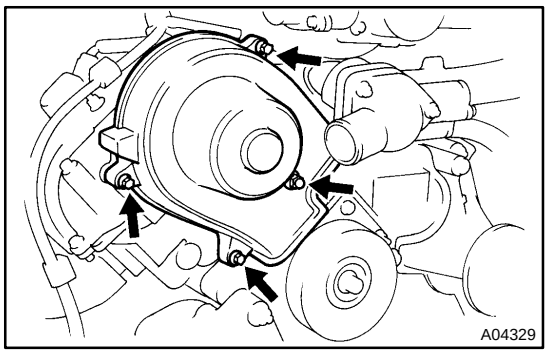
20. INSTALL A/C COMPRESSOR (See page EM–83)



21. INSTALL NO.2 TIMING BELT COVER

Install the No.2 timing belt cover with the 2 bolts.

Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)



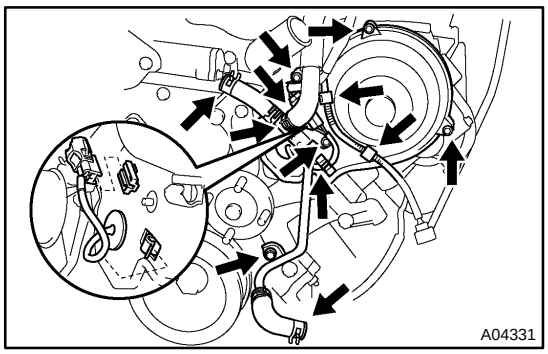
22. INSTALL RH NO.3 TIMING BELT COVER

(a) Fit the RH No.3 timing belt cover, matching it with the fan bracket.

(b) Install the RH No.3 timing belt cover with the 3 bolts and nut.

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

Dardoor.com



23. INSTALL LH NO.3 TIMING BELT COVER

(a) Install the oil cooler pipe with the bolt and nut.

(b) Run the camshaft position sensor wire through the LH No.3 timing belt cover hole.

(c) Fit the LH No.3 timing belt cover, matching it with the fan bracket.

(d) Install the LH No.3 timing belt cover with the 4 bolts and nut.

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(e) Install the wire grommet to the LH No.3 timing belt cover.

(f) Install the camshaft position sensor connector to the connector bracket.

(g) Connect the camshaft position sensor connector.

(h) Install the sensor wire to the wire clamp on the LH No.3 timing belt cover.

(i) Install the engine wire to the 2 wire clamps on the LH No.3 timing belt cover.

24. INSTALL DRIVE BELT IDLER PULLEY

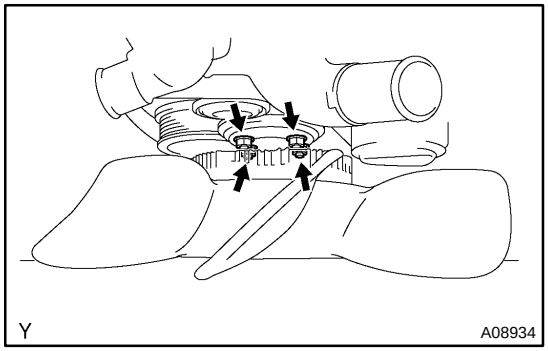
Install the idler pulley and cover plate with the bolt.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

25. INSTALL PS PUMP

Install the PS pump with the 3 bolts.

Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)



26. INSTALL FAN PULLEY, FAN, FLUID COUPLING AND DRIVE BELT

(a) Temporarily install the fan pulley, the fan, fluid coupling assembly with the 4 nuts.

(b) Install the drive belt. (See page CH–16)

(c) Tighten the 4 nuts holding the fluid coupling to the fan bracket.

Torque: 29 N·m (296kgf·cm, 21 ft·lbf)

27. INTAKE AIR CONNECTOR ASSEMBLY

28. INSTALL THROTTLE BODY COVER

29. INSTALL RADIATOR ASSEMBLY (See page CO–18)

30. FILL WITH ENGINE COOLANT

31. START ENGINE AND CHECK FOR LEAKS

32. RECHECK ENGINE COOLANT LEVEL

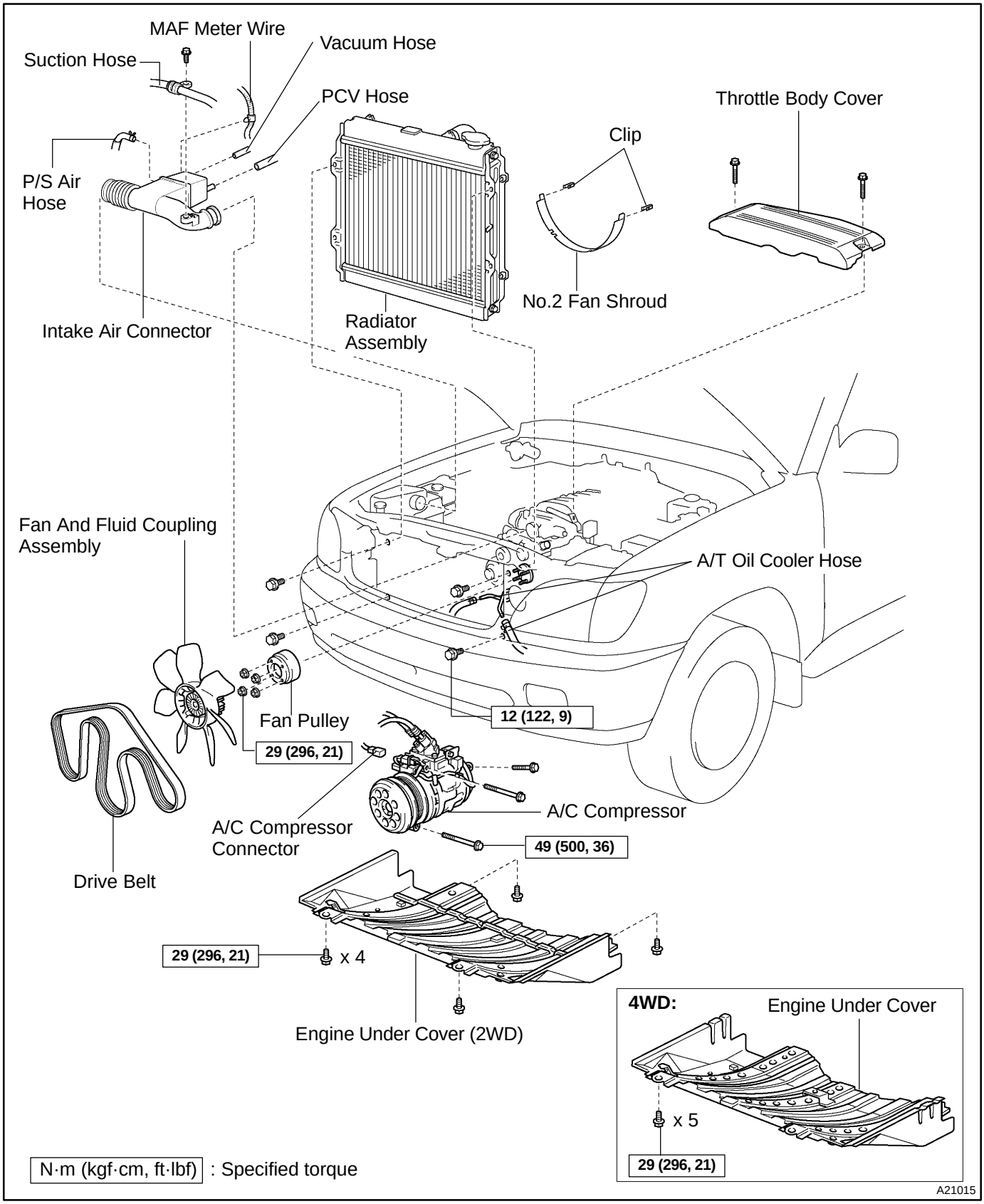
33. INSTALL ENGINE UNDER COVER

Dardoor.com

CYLINDER HEAD

COMPONENTS

EM1WZ–01



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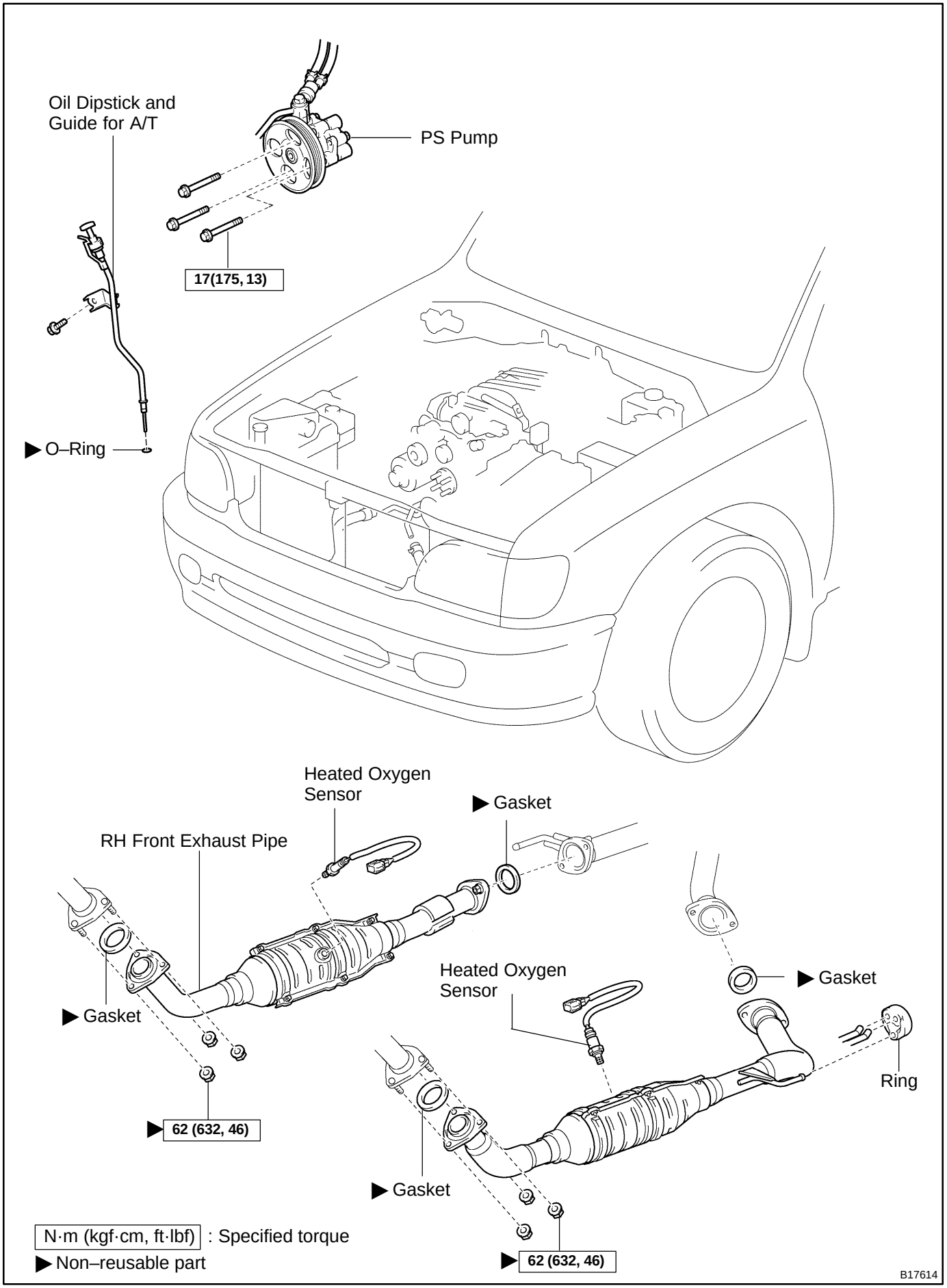
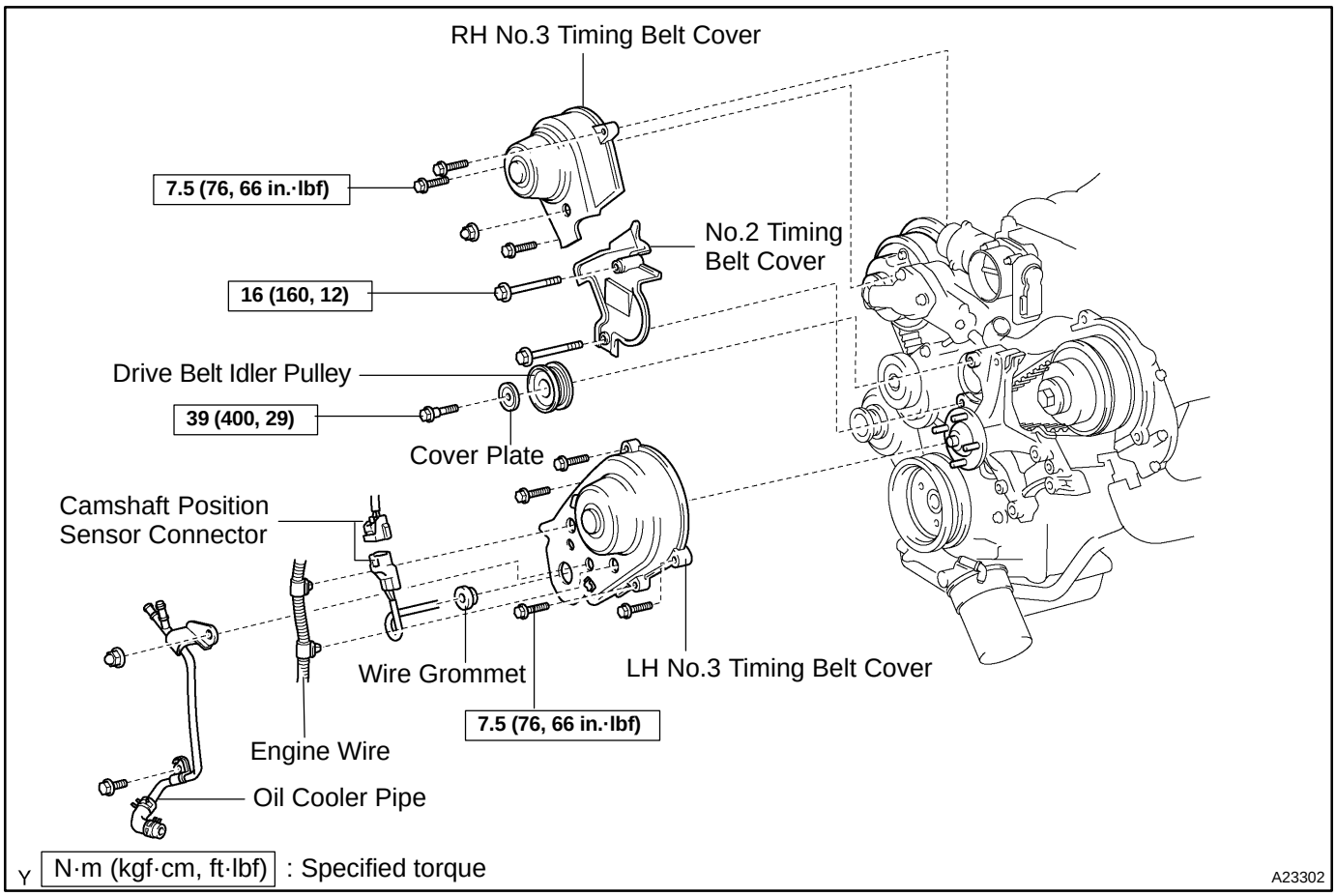
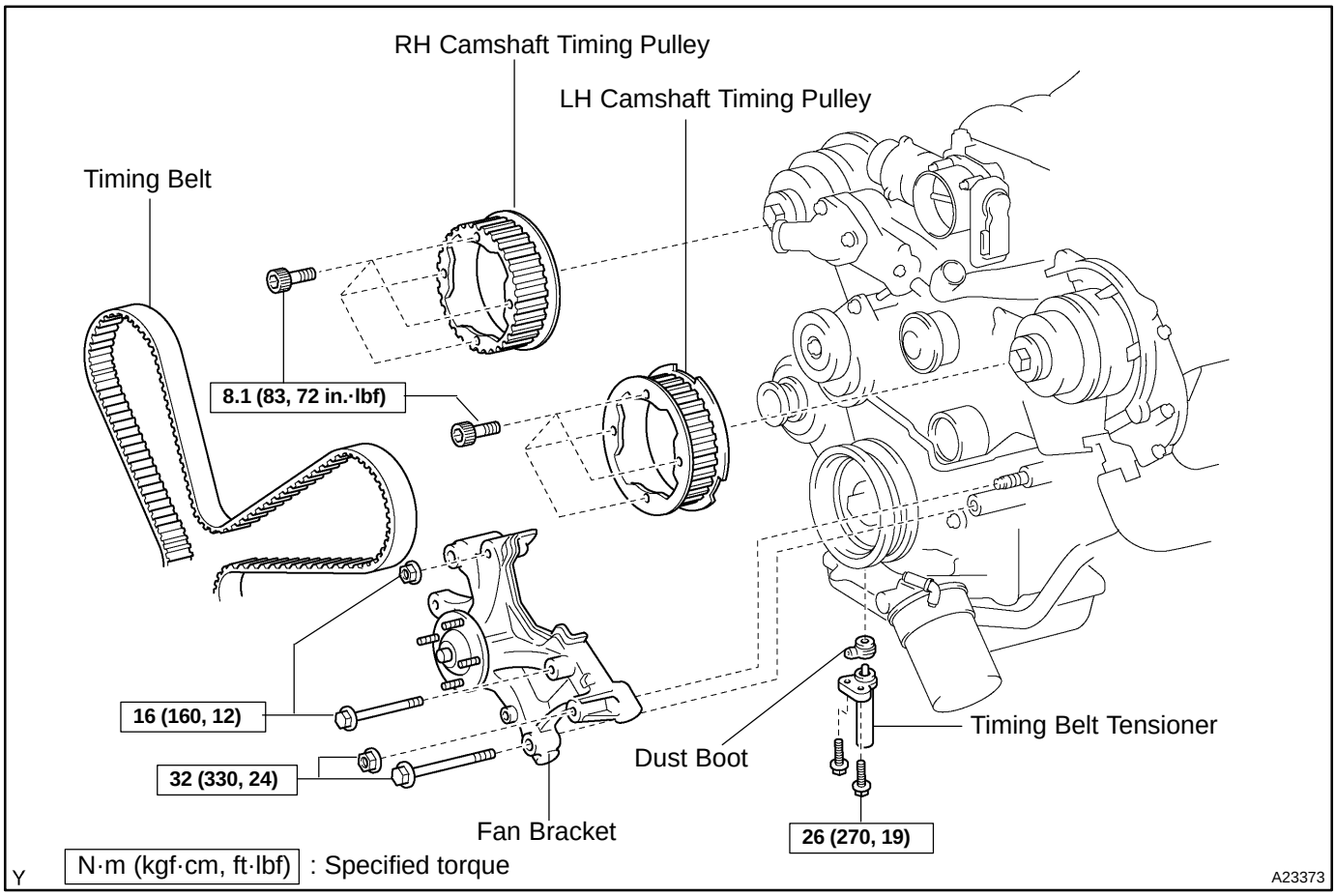
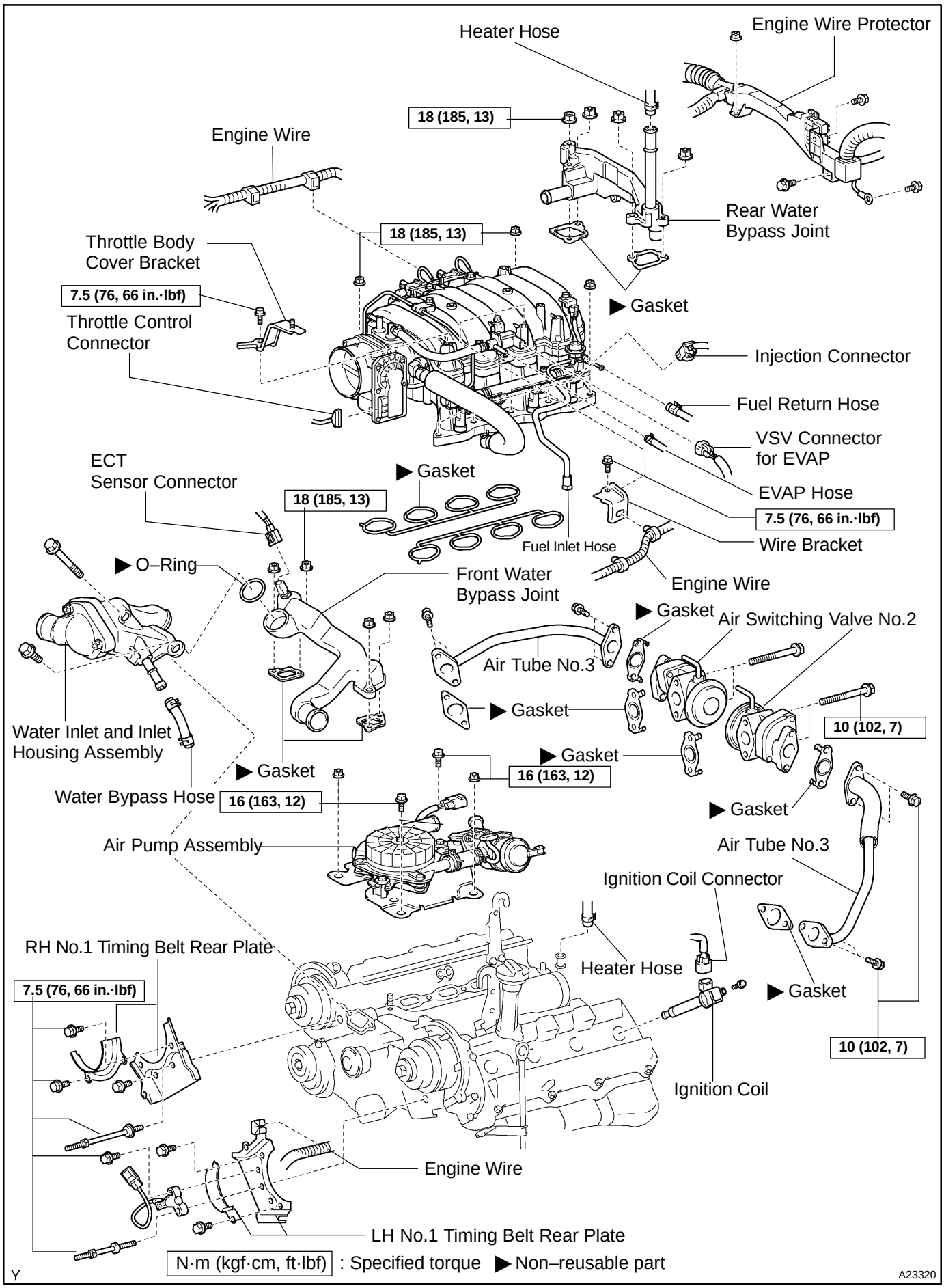

Oil Dipstick and Guide for A/T
PS Pump
17(175, 13)
▶ O–Ring
Heated Oxygen Sensor
▶ Gasket
RH Front Exhaust Pipe
▶ Gasket
▶ 62 (632, 46)
Heated Oxygen Sensor
▶ Gasket
Ring
▶ Gasket
▶ 62 (632, 46)
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
B17614

Dardoor.com

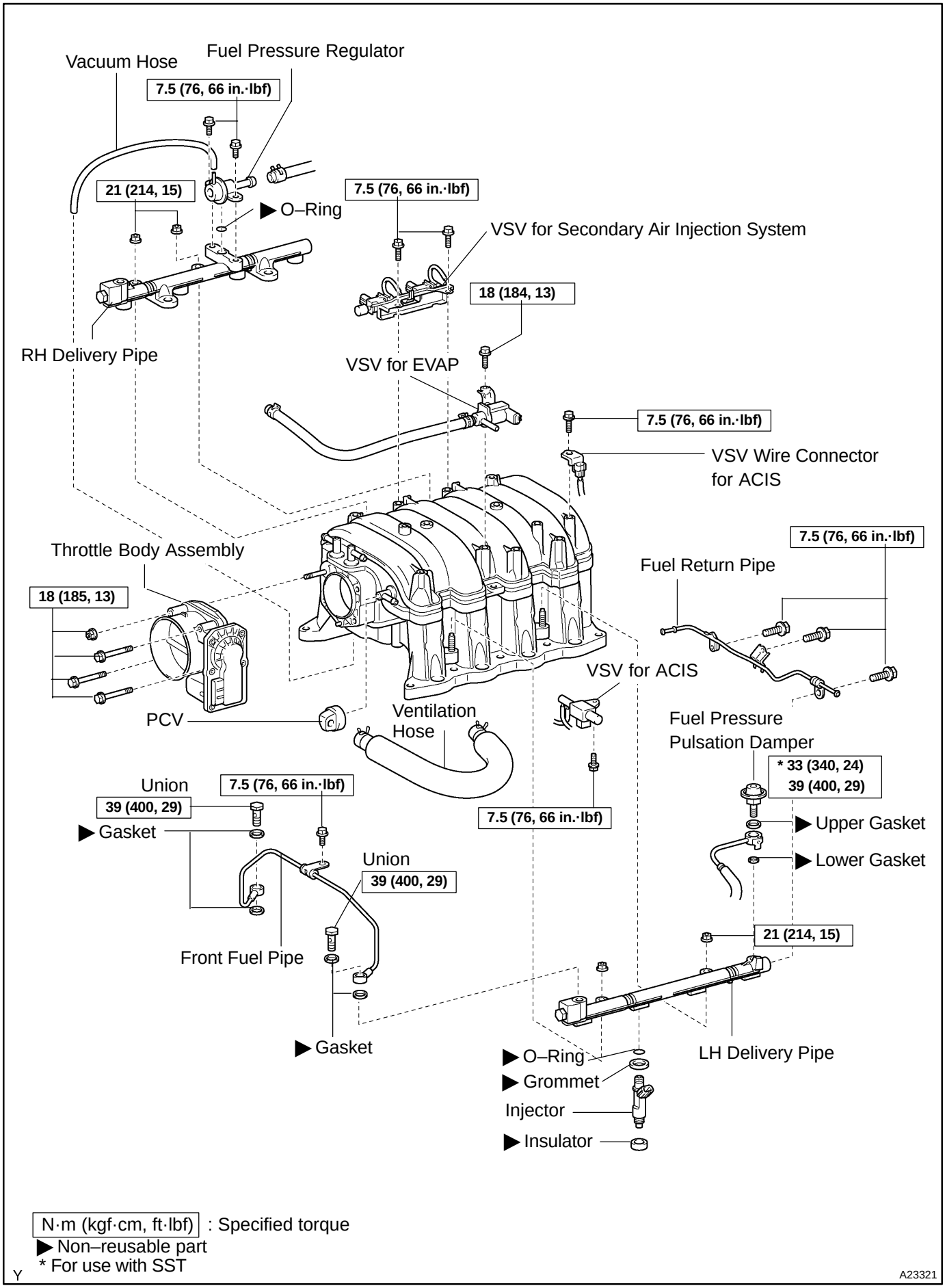

RH No.3 Timing Belt Cover
7.5 (76, 66 in.·lbf)
No.2 Timing Belt Cover
16 (160, 12)
Drive Belt Idler Pulley
39 (400, 29)
Cover Plate
Camshaft Position Sensor Connector
Wire Grommet
LH No.3 Timing Belt Cover
7.5 (76, 66 in.·lbf)
Engine Wire
Oil Cooler Pipe
Y N·m (kgf·cm, ft·lbf) : Specified torque
A23302


RH Camshaft Timing Pulley
LH Camshaft Timing Pulley
Timing Belt
8.1 (83, 72 in.·lbf)
16 (160, 12)
32 (330, 24)
Fan Bracket
Dust Boot
Timing Belt Tensioner
26 (270, 19)
Y N·m (kgf·cm, ft·lbf) : Specified torque
A23373

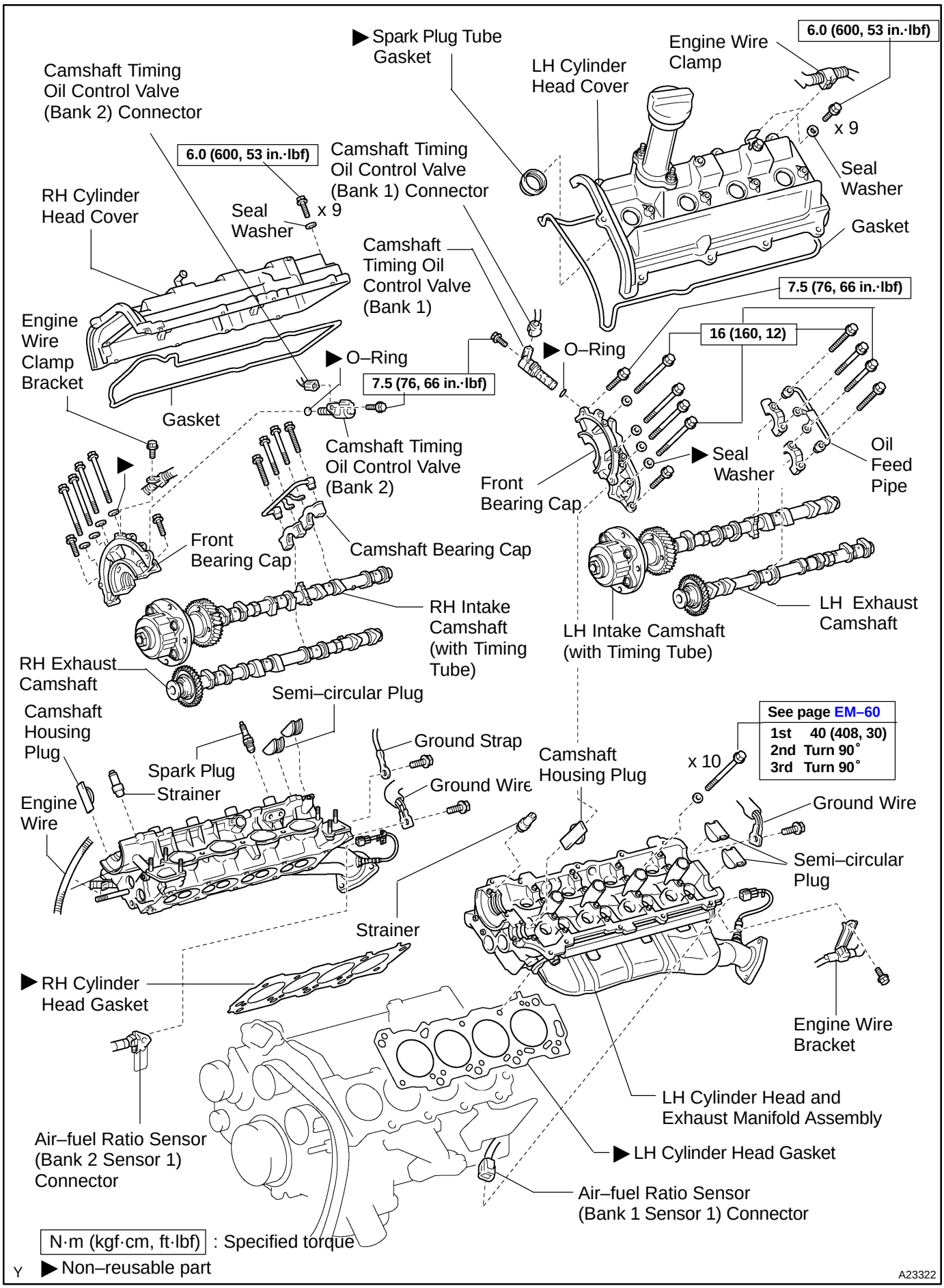
Dardoor.com


Heater Hose
Engine Wire Protector
18 (185, 13)
Engine Wire
Rear Water Bypass Joint
18 (185, 13)
Throttle Body Cover Bracket
7.5 (76, 66 in.·lbf)
Throttle Control Connector
▶ Gasket
Injection Connector
Fuel Return Hose
VSV Connector for EVAP
ECT Sensor Connector
▶ Gasket
EVAP Hose
18 (185, 13)
7.5 (76, 66 in.·lbf)
Fuel Inlet Hose
Wire Bracket
▶ O–Ring
Front Water Bypass Joint
Engine Wire
▶ Gasket
Air Switching Valve No.2
Air Tube No.3
▶ Gasket
10 (102, 7)
Water Inlet and Inlet Housing Assembly
▶ Gasket
16 (163, 12)
▶ Gasket
Water Bypass Hose
16 (163, 12)
▶ Gasket
Air Pump Assembly
Air Tube No.3
Ignition Coil Connector
RH No.1 Timing Belt Rear Plate
Heater Hose
7.5 (76, 66 in.·lbf)
▶ Gasket
10 (102, 7)
Ignition Coil
Engine Wire
LH No.1 Timing Belt Rear Plate
N·m (kgf·cm, ft·lbf) : Specified torque ▶ Non–reusable part
Y
A23320

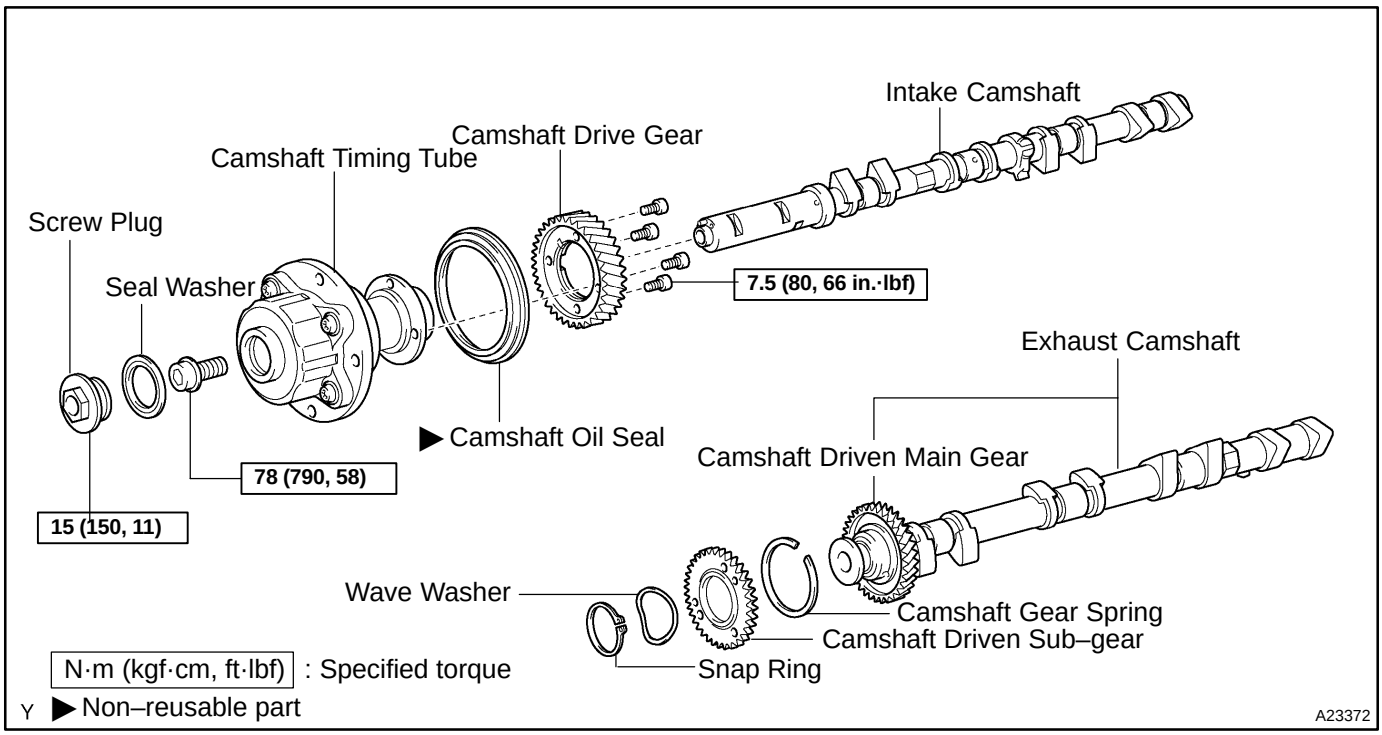
Dardoor.com

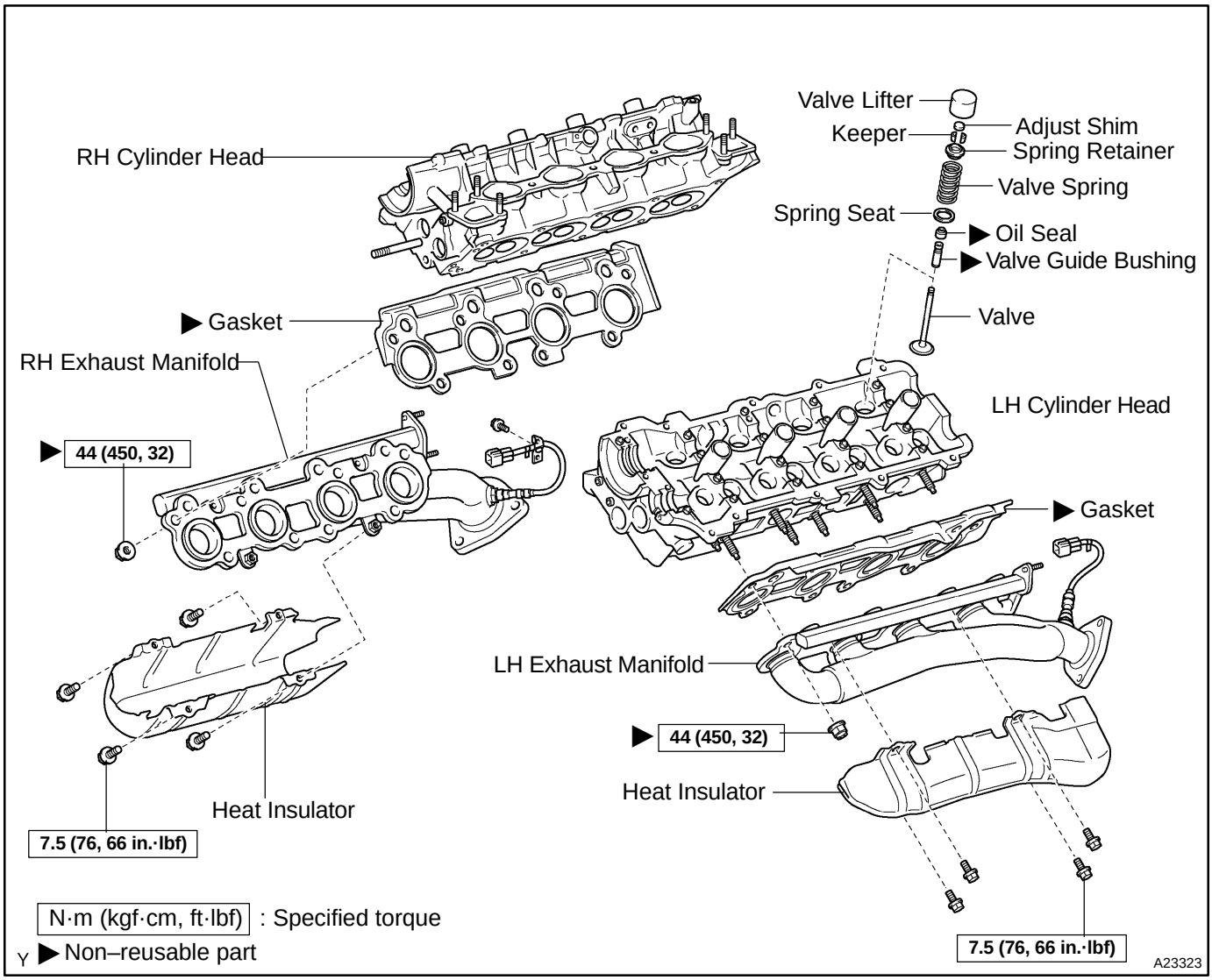

Vacuum Hose
Fuel Pressure Regulator
7.5 (76, 66 in.·lbf)
21 (214, 15)
▶ O–Ring
7.5 (76, 66 in.·lbf)
VSV for Secondary Air Injection System
18 (184, 13)
RH Delivery Pipe
VSV for EVAP
7.5 (76, 66 in.·lbf)
VSV Wire Connector for ACIS
Throttle Body Assembly
18 (185, 13)
7.5 (76, 66 in.·lbf)
Fuel Return Pipe
PCV
Ventilation Hose
VSV for ACIS
Fuel Pressure Pulsation Damper
* 33 (340, 24)
39 (400, 29)
Union
39 (400, 29)
7.5 (76, 66 in.·lbf)
▶ Gasket
7.5 (76, 66 in.·lbf)
▶ Upper Gasket
▶ Lower Gasket
Union
39 (400, 29)
21 (214, 15)
Front Fuel Pipe
▶ Gasket
LH Delivery Pipe
▶ O–Ring
▶ Grommet
Injector
▶ Insulator
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
* For use with SST
Y
A23321

Dardoor.com


▶ Spark Plug Tube Gasket
Engine Wire Clamp
6.0 (600, 53 in.·lbf)
Camshaft Timing Oil Control Valve (Bank 2) Connector
LH Cylinder Head Cover
x 9
6.0 (600, 53 in.·lbf)
Camshaft Timing Oil Control Valve (Bank 1) Connector
Seal Washer
RH Cylinder Head Cover
Seal Washer
x 9
Gasket
Camshaft Timing Oil Control Valve (Bank 1)
7.5 (76, 66 in.·lbf)
16 (160, 12)
Engine Wire Clamp Bracket
▶ O–Ring
▶ O–Ring
7.5 (76, 66 in.·lbf)
Gasket
Camshaft Timing Oil Control Valve (Bank 2)
Front Bearing Cap
▶ Seal Washer
Oil Feed Pipe
Front Bearing Cap
Camshaft Bearing Cap
RH Intake Camshaft (with Timing Tube)
LH Intake Camshaft (with Timing Tube)
LH Exhaust Camshaft
RH Exhaust Camshaft
Semi–circular Plug
Camshaft Housing Plug
Ground Strap
Spark Plug
Strainer
Ground Wire
Engine Wire
See page EM–60
1st 40 (408, 30)
2nd Turn 90°
3rd Turn 90°
x 10
Camshaft Housing Plug
Ground Wire
Semi–circular Plug
Strainer
▶ RH Cylinder Head Gasket
Engine Wire Bracket
LH Cylinder Head and Exhaust Manifold Assembly
Air–fuel Ratio Sensor (Bank 2 Sensor 1) Connector
▶ LH Cylinder Head Gasket
Air–fuel Ratio Sensor (Bank 1 Sensor 1) Connector
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
A23322

Dardoor.com


Intake Camshaft
Camshaft Drive Gear
Camshaft Timing Tube
Screw Plug
Seal Washer
7.5 (80, 66 in.·lbf)
Exhaust Camshaft
▶ Camshaft Oil Seal
Camshaft Driven Main Gear
78 (790, 58)
15 (150, 11)
Wave Washer
Camshaft Gear Spring
Camshaft Driven Sub–gear
Snap Ring
N·m (kgf·cm, ft·lbf) : Specified torque
Y ▶ Non–reusable part
A23372

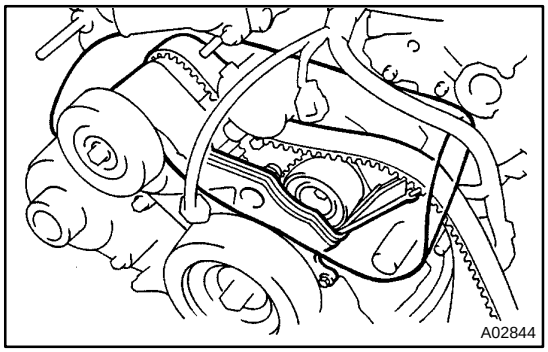

Valve Lifter
Keeper
Adjust Shim
Spring Retainer
Valve Spring
Spring Seat
▶ Oil Seal
▶ Valve Guide Bushing
RH Cylinder Head
▶ Gasket
Valve
RH Exhaust Manifold
LH Cylinder Head
▶ 44 (450, 32)
▶ Gasket
LH Exhaust Manifold
▶ 44 (450, 32)
Heat Insulator
Heat Insulator
7.5 (76, 66 in.·lbf)
N·m (kgf·cm, ft·lbf) : Specified torque
Y ▶ Non–reusable part
7.5 (76, 66 in.·lbf)
A23323

Dardoor.com

EM1X0–01

REMOVAL

1. **DRAIN ENGINE COOLANT**
2. **REMOVE THROTTLE BODY COVER**
3. **DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS (See page EM–16)**


A02844

NOTICE:

- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the belt to come into correct with oil, water or dust.**

4. **REMOVE CAMSHAFT TIMING PULLEYS (See page EM–16)**
5. **REMOVE CAMSHAFT POSITION SENSOR (See page IG–8)**
6. **DISCONNECT PS PUMP FROM ENGINE (See page EM–79)**
7. **REMOVE FRONT EXHAUST PIPE (See page EM–126)**
8. **REMOVE OIL DIPSTICK AND GUIDE FOR A/T**
9. **REMOVE IGNITION COILS (See page IG–5)**
10. **REMOVE TIMING BELT REAR PLATES**

(a) Remove the 3 bolts, stud bolt and RH No.1 timing belt rear plates.
(b) Disconnect the wire clamp from the LH timing belt rear plate.
(c) Remove the 3 bolts, stud bolt and LH No.1 timing belt rear plates.

11. **DISCONNECT FUEL INLET HOSE (See page SF–27) AND FUEL RETURN HOSE**
12. **DISCONNECT CONNECTORS FROM INTAKE MANIFOLD**

(a) Disconnect the throttle control connector.
(b) Disconnect the VSV connector for EVAP.
(c) Disconnect the 8 injector connectors.
(d) Disconnect the ECT sensor connector.
(e) Disconnect the 2 VSV connectors for the air injection system.
(f) Disconnect the 8 ignition coil connectors.
(g) Disconnect the 2 air fuel ratio sensor connectors.

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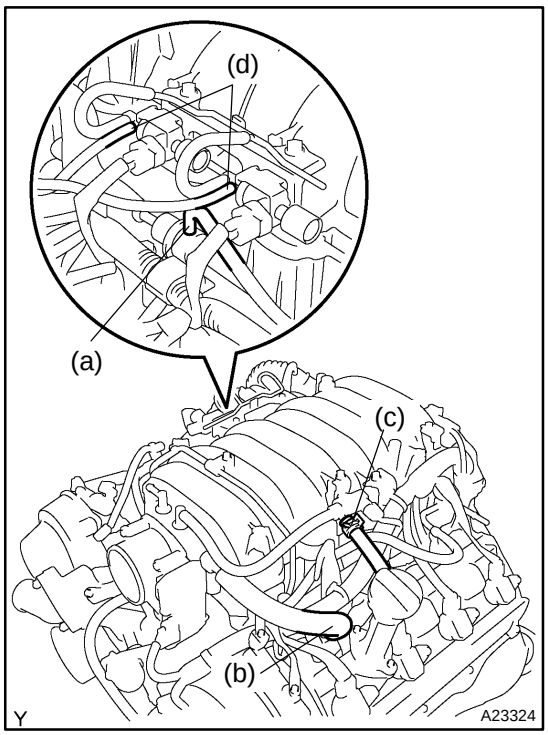


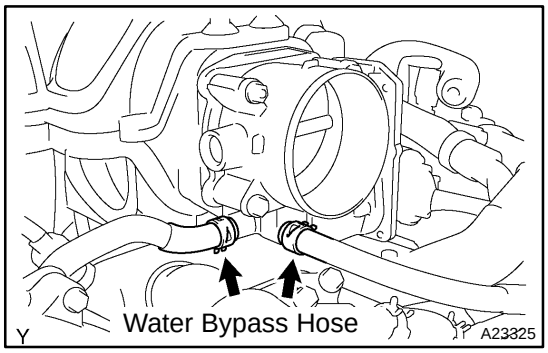
13. DISCONNECT HOSES FROM INTAKE MANIFOLD

(a) Disconnect the vacuum hose from the fuel pressure regulator.

(b) Disconnect the PCV hose from the PCV valve on the LH cylinder head.

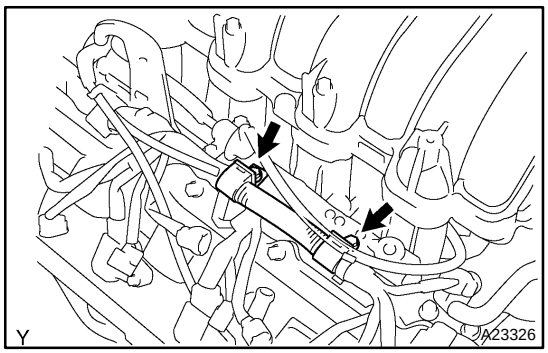
(c) Disconnect the EVAP hose (from charcoal canister) from the VSV for the EVAP.

(d) Disconnect the 2 vacuum hoses from the VSV for the air injection system.

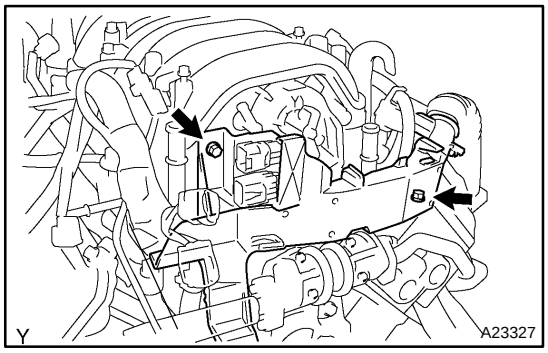


14. REMOVE INTAKE MANIFOLD ASSEMBLY

(a) Disconnect the 2 water bypass hoses from the throttle body.



(b) Disconnect the 2 wire clamps from the wire clamp bracket on the RH delivery pipe.



(c) Remove the 2 bolts holding the engine wire protector from the intake manifold and cylinder head.

(d) Remove the 2 bolts and ground cables from the RH and LH cylinder heads.

(e) Remove the bolt and throttle body cover bracket from the intake manifold.

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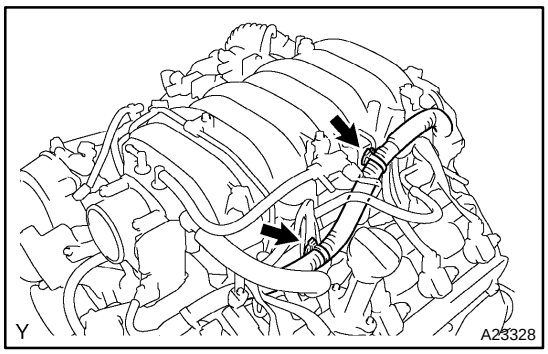
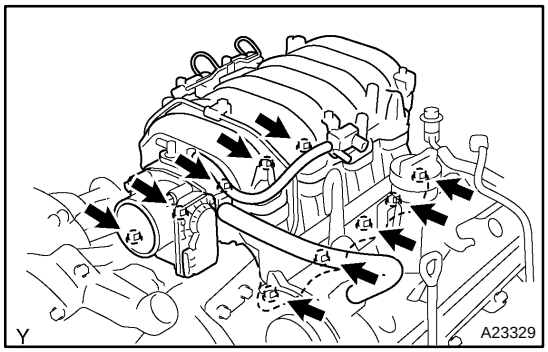
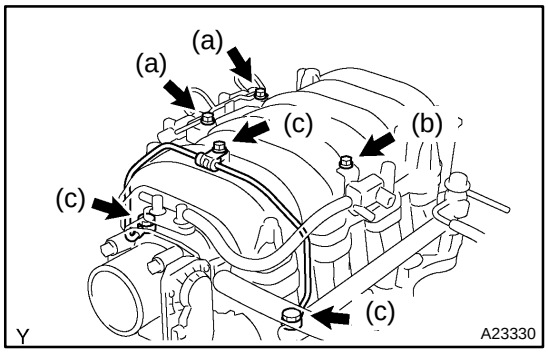


(f) Disconnect the engine wire from the engine hanger and wire bracket.
(g) Remove the wire bracket from the intake manifold.

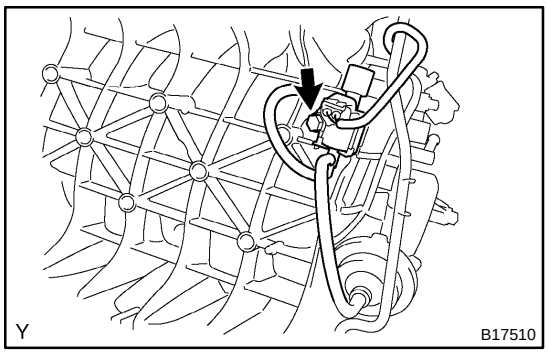


(h) Remove the 6 bolts, 4 nuts, intake manifold assembly and 2 gaskets.

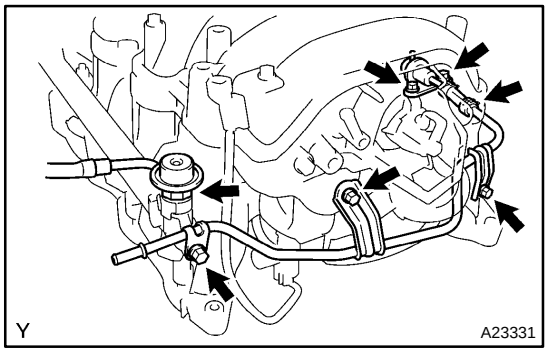


15. DISASSEMBLE INTAKE MANIFOLD

(a) Remove the 2 bolts and VSVs for the air injection system.
(b) Disconnect the EVAP hose from the upper intake manifold, and remove the VSV for EVAP.
(c) Remove the bolt, 2 unions, 4 gaskets and front fuel pipe from the intake manifold.
(d) Remove the throttle body (see page SF–42).



(e) Remove the bolt and VSV for ACIS from the intake manifold.



(f) Disconnect the fuel return hose from the fuel pressure regulator.
(g) Remove the 3 bolts and fuel return pipe from the intake manifold.
(h) Remove the 2 bolts, fuel pressure regulator and O–ring.
(i) Remove the fuel pressure pulsation damper and 2 gaskets.
(j) Remove the 2 delivery pipes and 8 injectors (see page SF–27).

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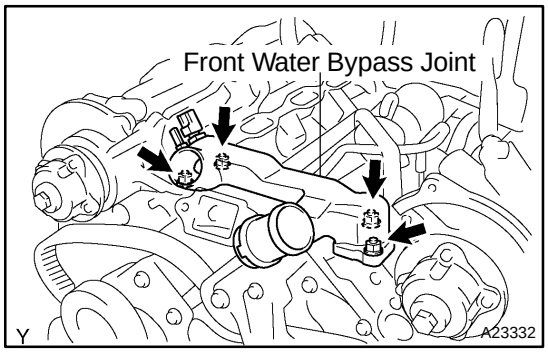
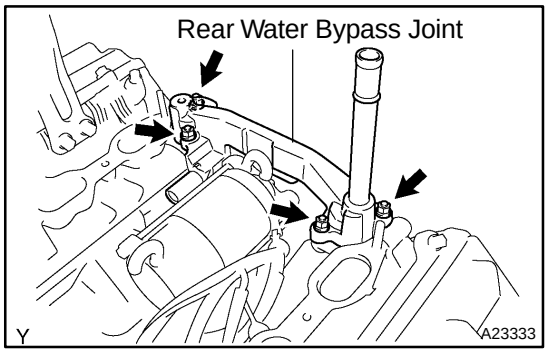
16. **REMOVE WATER INLET AND INLET HOUSING ASSEMBLY (See page CO–6)**
17. **REMOVE AIR PUMP ASSEMBLY (See page EC–22)**
18. **REMOVE NO.2 AIR SWITCHING VALVES (See page EC–22)**



19. **REMOVE FRONT WATER BYPASS JOINT**

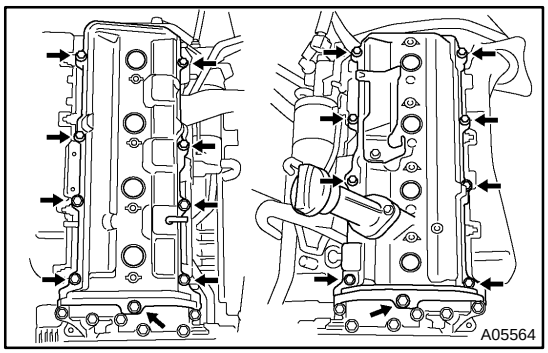
Remove the 4 nuts, water bypass joint and 2 gaskets.



20. **REMOVE REAR WATER BYPASS JOINT**

Remove the 4 nuts, water bypass joint and 2 gaskets.

21. **REMOVE ENGINE HANGERS**



22. **REMOVE CYLINDER HEAD COVERS**

Remove the 18 bolts, seal washers, RH and LH cylinder head covers and 2 gaskets.

23. **IF NECESSARY, REMOVE SEMI–CIRCULAR PLUGS AND CAMSHAFT HOUSING PLUGS**
24. **REMOVE CAMSHAFTS**

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.

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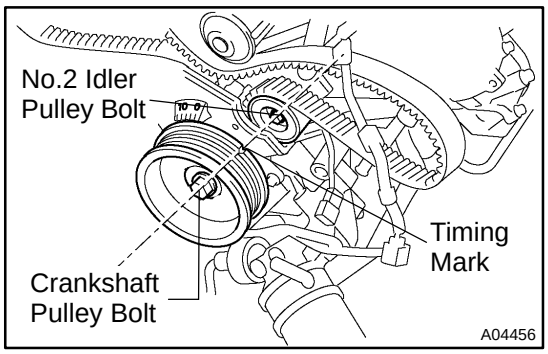
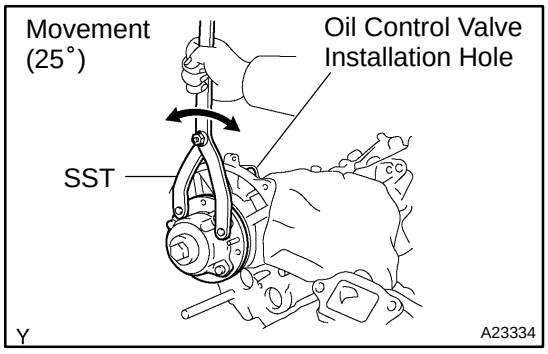


(a) Check the crankshaft pulley position.
Check that the timing mark of the crankshaft pulley is aligned with the centers of the crankshaft pulley bolt and idler pulley bolt.

NOTICE:

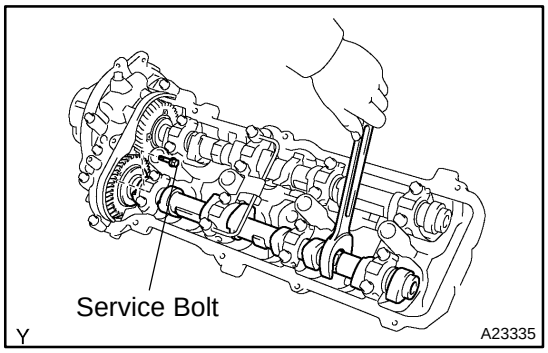
Having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you remove the camshaft, causing damage. So always set the crankshaft pulley at the correct angle.



(b) Release the oil from the front bearing caps.
Using SST, rotate the camshaft timing tube from left to right 2 to 3 times within its VVT–i range (25˚) and use a waste cloth to collect the oil from the camshaft timing oil control valve installation hole.
SST 09960–10010 (09962–01000, 09963–00400)

NOTICE:

Approximately 20 cc (1.2 cu in.) of oil will be ejected. Take care not to spill it.

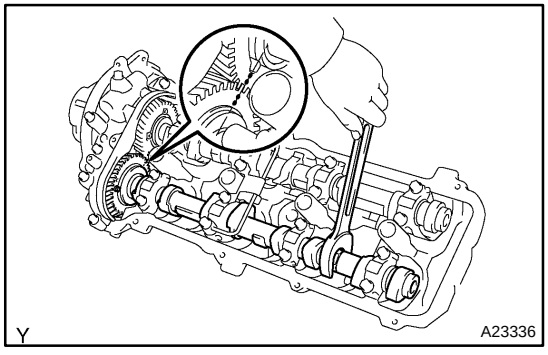


(c) Remove the LH camshafts.
(1) Bring the service bolt hole of the sub–gear upward by turning the hexagon head portion of the exhaust camshaft with a wrench.
(2) Secure the sub–gear to the main gear with a service bolt.

Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 to 20 mm (0.63 to 0.79 in.)

HINT:
When removing the camshaft, make sure that the torsional spring force of the sub–gear has been eliminated by the above operation.



(3) Align the timing mark (2–dot mark) of the camshaft drive gear by turning the hexagon head portion of the exhaust camshaft with a wrench.

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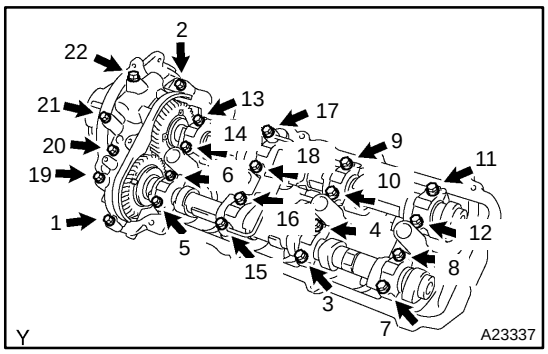
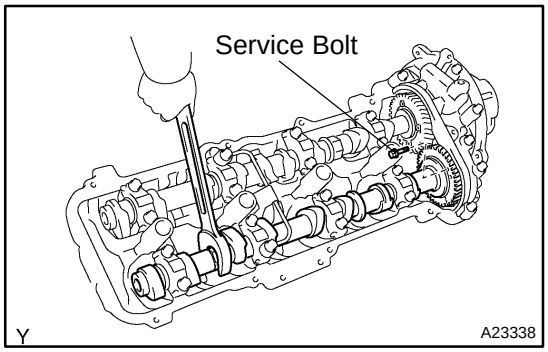


(4) Uniformly loosen the 22 bearing cap bolts in several steps, in the sequence shown.

(5) Remove the 22 bearing cap bolts, 4 seal washers, oil feed pipe, 9 bearing caps, camshaft housing plug, oil control valve filter and 2 camshafts.



(d) Remove the RH camshafts.

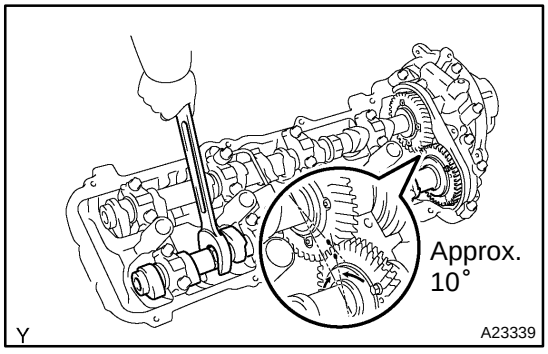
(1) Bring the service bolt hole of the sub–gear upward by turning the hexagon head portion of the exhaust camshaft with a wrench.

(2) Secure the sub–gear to the main gear with a service bolt.

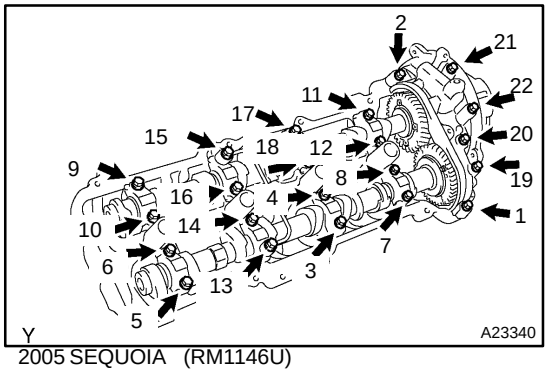
Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 to 20 mm (0.63 to 0.79 in.)

HINT:
When removing the camshafts, make sure that the torsional spring force of the sub–gear has been eliminated by the above operation.



(3) Set the timing mark (1–dot mark) of the camshaft main gear at approx. 10° angle by turning the hexagon head portion of the exhaust camshaft with a wrench.



(4) Uniformly loosen the 22 bearing cap bolts in several steps, in the sequence shown.

(5) Remove the 22 bearing cap bolts, 4 seal washers, oil feed pipe, 9 bearing caps, camshaft housing plug, strainer and 2 camshafts.

HINT:
Arrange the bearing caps for RH and LH sides.

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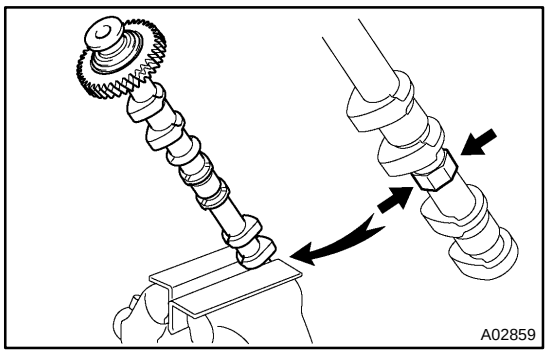
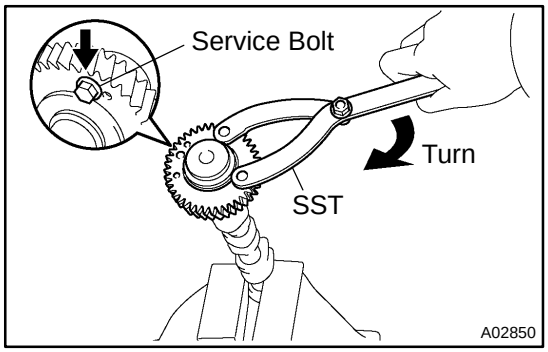


25. DISASSEMBLE EXHAUST CAMSHAFTS

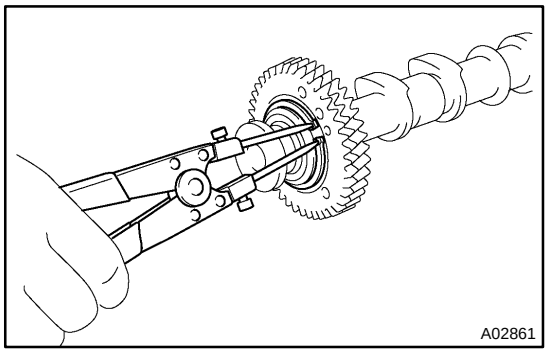
(a) Mount the hexagon head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.



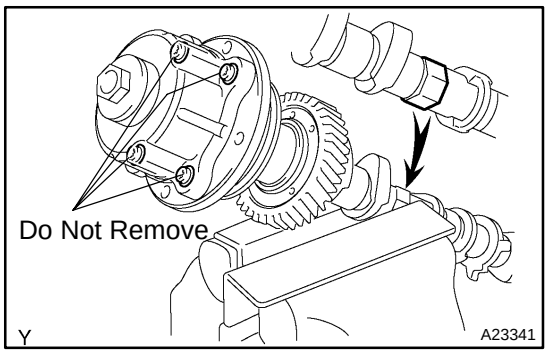
(b) Using SST, turn the sub–gear clockwise, and remove the service bolt.
SST 09960–10010 (09962–01000, 09963–00500)



(c) Using snap ring pliers, remove the snap ring.
(d) Remove the wave washer.
(e) Remove the camshaft sub–gear.
(f) Remove the camshaft gear spring.

NOTICE:

Be careful not to damage the camshaft.

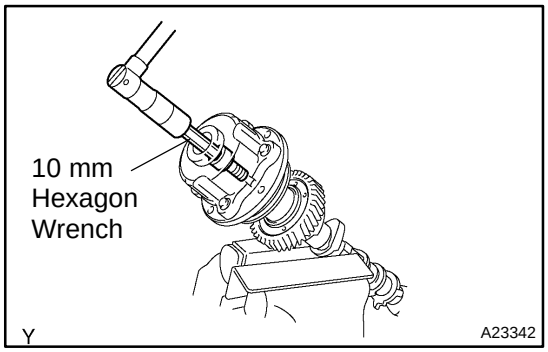


26. REMOVE CAMSHAFT TIMING TUBE FROM INTAKE CAMSHAFT

(a) Mount the hexagon head portion of the intake camshaft in a vise.

NOTICE:

- **Be careful not to damage the camshaft.**
- **The 4 bolts shown in the illustration determine backlash of the gear in the timing tube, so do not remove them. If any of the 4 bolts are removed, install a new timing tube assembly.**



(b) Remove the screw plug and seal washer.
(c) Using a 10 mm hexagon wrench, and remove the bolt.
(d) Pull out the timing tube and drive gear assembly from the camshaft.

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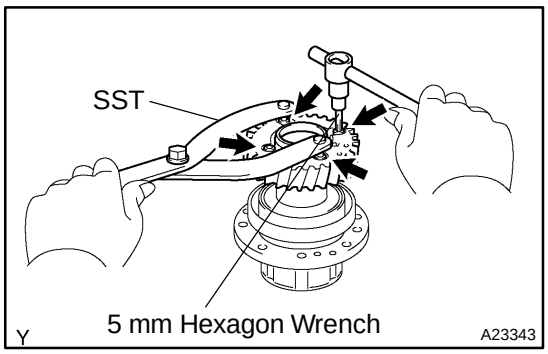
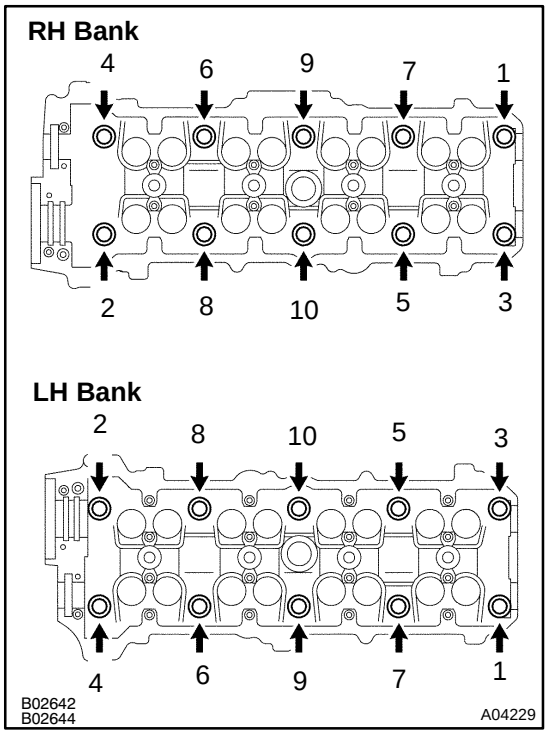


(e) Using SST and a 5 mm hexagon wrench, remove the 4 bolts, drive gear and oil seal.
SST 09960–10010 (09962–01000, 09963–00500)

NOTICE:

Be careful not to damage the timing tube.

27. REMOVE SPARK PLUGS

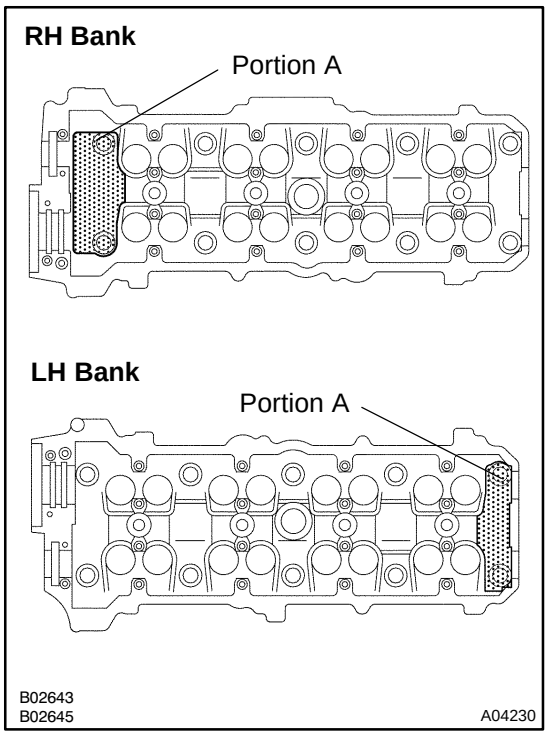


28. REMOVE CYLINDER HEAD AND EXHAUST MANIFOLD ASSEMBLIES

(a) Uniformly loosen the 10 cylinder head bolts on one side of each cylinder head in several steps, in the sequence shown, then perform the same procedure to the other side as shown. Remove the 20 cylinder head bolts and plate washers.

NOTICE:

► **Cylinder head warpage or cracking could result from removing bolts in incorrect order.**



► **Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.**

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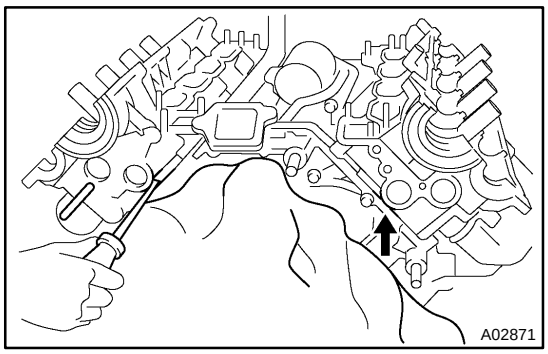


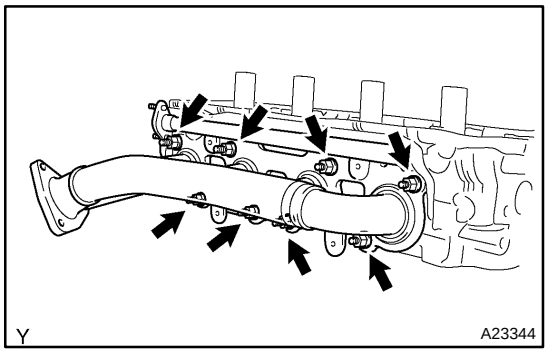
(b) Lift the cylinder head from the dowels on the cylinder block, and place the 2 cylinder heads on wooden blocks on a bench.

HINT:

If the cylinder head is difficult to lift off, pry between the cylinder head and cylinder block with a screwdriver.

NOTICE:

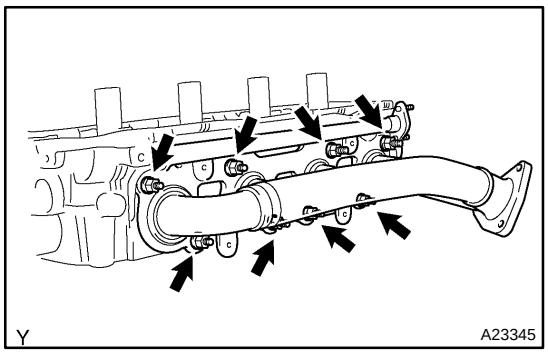
- **Be careful not to damage the contact surfaces of the cylinder head and cylinder block.**
- **The cylinder head should not be tilted so as to secure the valve lifter. If the cylinder head is tilted, remove the valve lifter and check that the adjusting shim is set correctly.**



29. REMOVE RH EXHAUST MANIFOLD FROM CYLINDER HEAD

(a) Remove the 4 bolts and heat insulator.

(b) Remove the 8 nuts, exhaust manifold and gasket.



30. REMOVE LH EXHAUST MANIFOLD FROM CYLINDER HEAD

(a) Remove the 4 bolts and heat insulator.

(b) Remove the 8 nuts, exhaust manifold and gasket.

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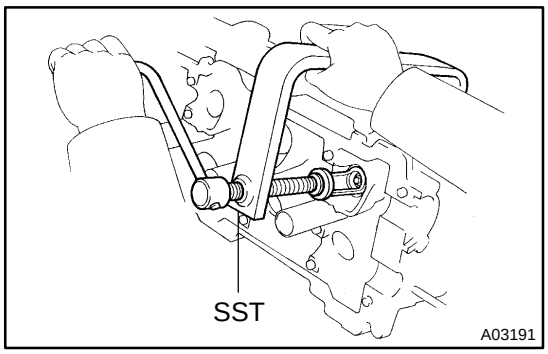
EM0L1–09

DISASSEMBLY



1. REMOVE VALVE LIFTERS AND SHIMS

HINT:

Arrange the valve lifters and shims in correct order.

2. REMOVE VALVES

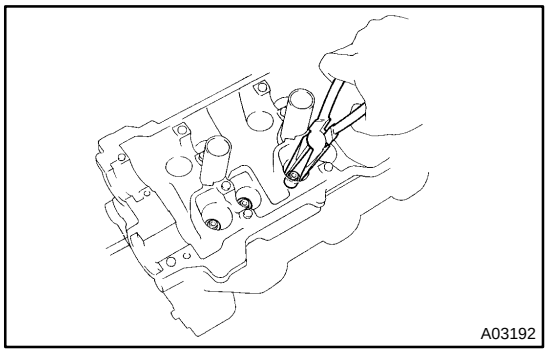
(a) Using SST, compress the valve spring and remove the 2 keepers.

SST 09202–70020 (09202–00010)

(b) Remove the spring retainer, the valve spring, the valve and the spring seat.

HINT:

Arrange the valves, valve springs, spring seats and spring retainers incorrect order.



(c) Using needle–nose pliers, remove the oil seal.

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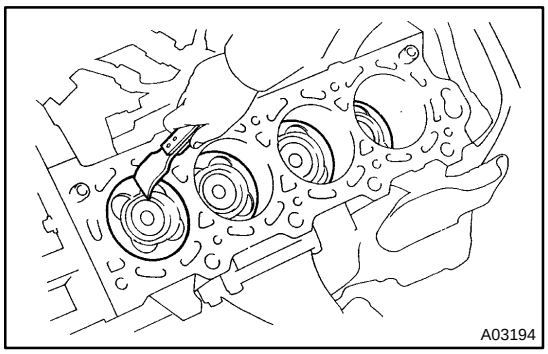
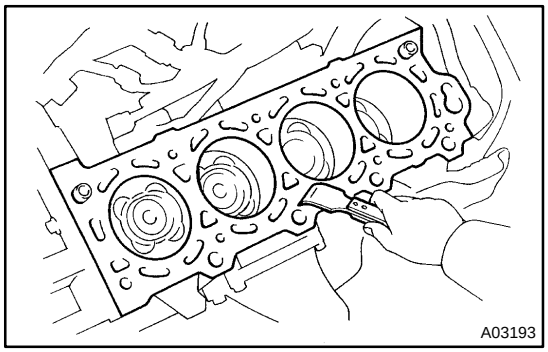
EM1X1–01

INSPECTION



1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

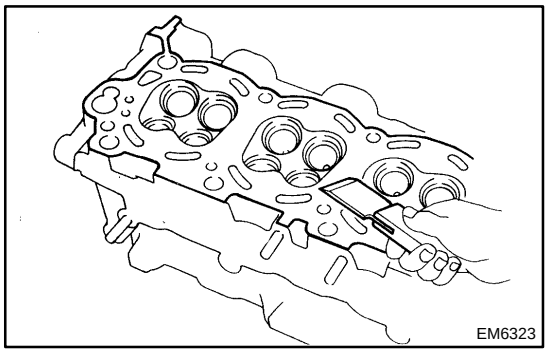
(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



(b) Using a surface contacting gasket scraper, remove all the gasket materials from the cylinder block.

(c) Using compressed air, blow carbon and oil from the bolt holes.

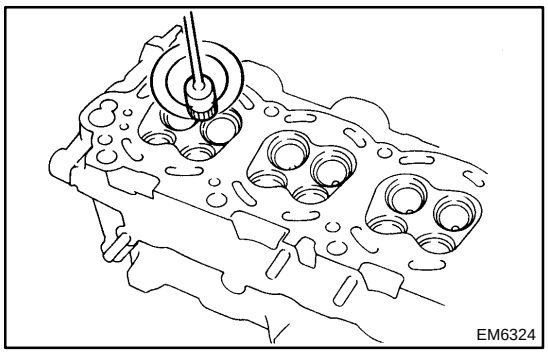
CAUTION:
Protect your eyes when using high pressure compressed air.



2. REMOVE GASKET MATERIAL

Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.

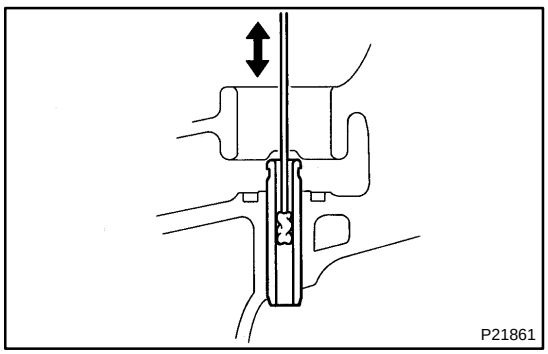
NOTICE:
Be careful not to scratch the surface contacting the cylinder block.



3. CLEAN COMBUSTION CHAMBERS

Using a wire brush, remove all the carbon from the combustion chambers.

NOTICE:
Be careful not to scratch the surface contacting the cylinder block.



4. CLEAN VALVE GUIDE BUSHINGS

Using a valve guide bushing brush and solvent, clean all the guide bushings.

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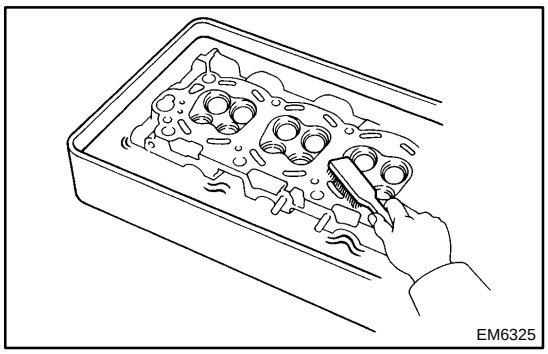
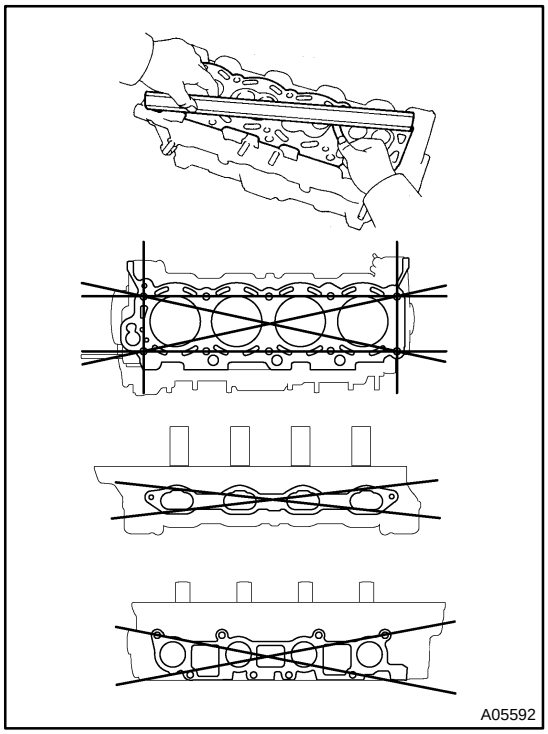


5. CLEAN CYLINDER HEAD

Using a soft brush and solvent, thoroughly clean the cylinder head.

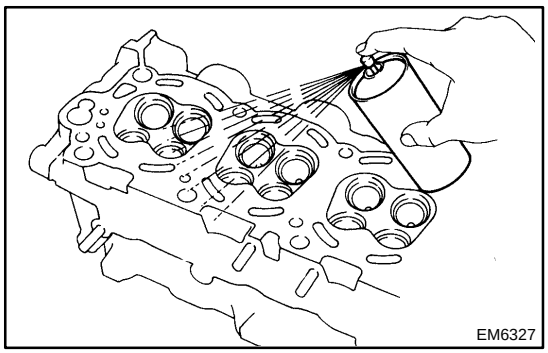


6. INSPECT FOR FLATNESS

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

Maximum warpage: 0.10 mm (0.0039 in.)

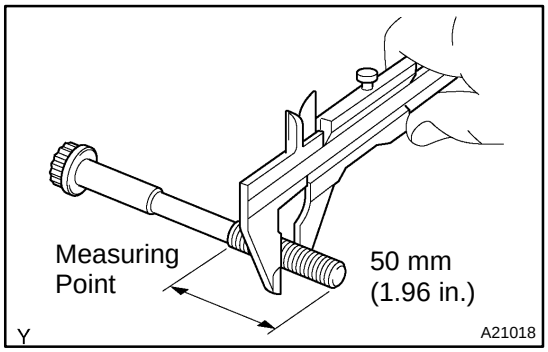
If warpage is greater than maximum, replace the cylinder head.



7. INSPECT FOR CRACKS

Using a dye penetrate, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.

If cracked, replace the cylinder head.



8. INSPECT CYLINDER HEAD BOLT

Using vernier calipers, measure the thread outside diameter of the cylinder head bolt.

Standard outside diameter:
9.810 to 9.960 mm (0.3862 to 0.3921 in.)

Minimum outside diameter: 9.70 mm (0.3819 in.)

If the diameter is less than minimum, replace the bolt.

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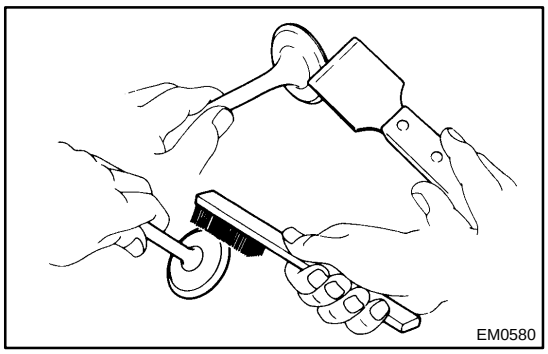
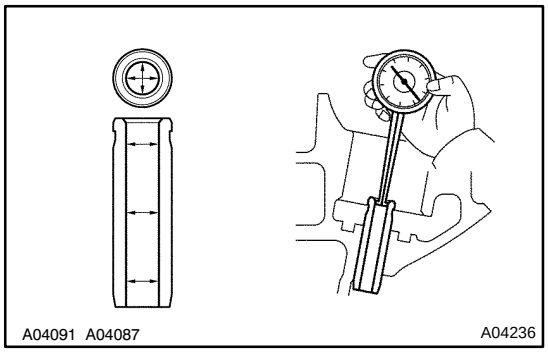


9. CLEAN VALVES

(a) Using a gasket scraper, chip off any carbon from the valve head.

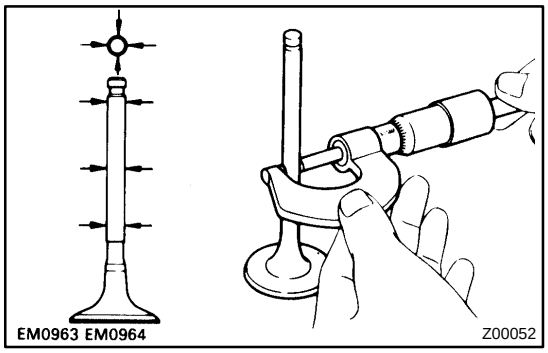
(b) Using a wire brush, thoroughly clean the valve.



10. INSPECT VALVE STEMS AND GUIDE BUSHINGS

(a) Using a caliper gauge, measure the inside diameter of the guide bushing.

Bushing inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)



(b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:

Intake	5.470 to 5.485 mm (0.2154 to 0.2159 in.)
Exhaust	5.465 to 5.480 mm (0.2152 to 0.2157 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

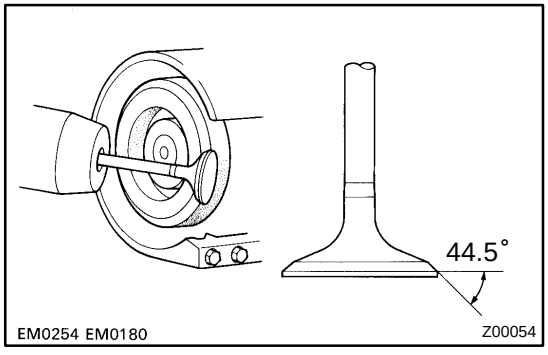
Standard oil clearance:

Intake	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust	0.030 to 0.065 mm (0.0012 to 0.0026 in.)

Maximum oil clearance:

Intake	0.08 mm (0.0031 in.)
Exhaust	0.10 mm (0.0039 in.)

If the clearance is greater than maximum, replace the valve and guide bushing. (See page EM–56)



11. INSPECT AND GRIND VALVES

(a) Grind the valve enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.

Valve face angle: 44.5°

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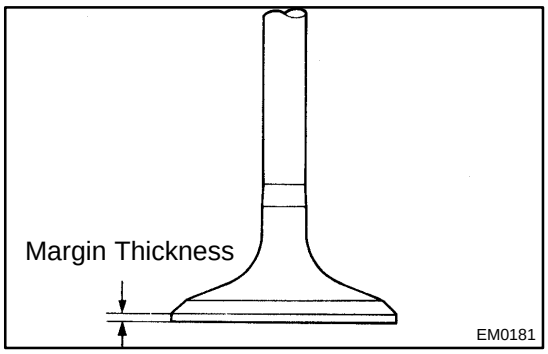
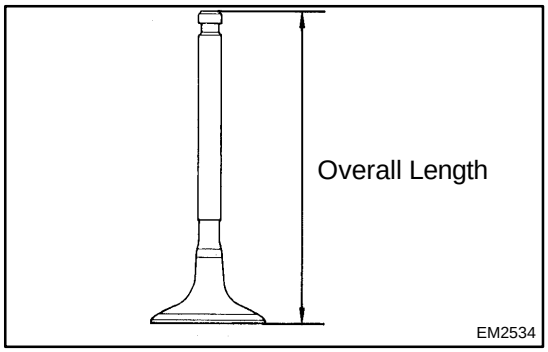


(c) Check the valve head margin thickness.
Standard margin thickness: 1.0 mm (0.039 in.)
Minimum margin thickness: 0.5 mm (0.020 in.)
If the margin thickness is less than minimum, replace the valve.



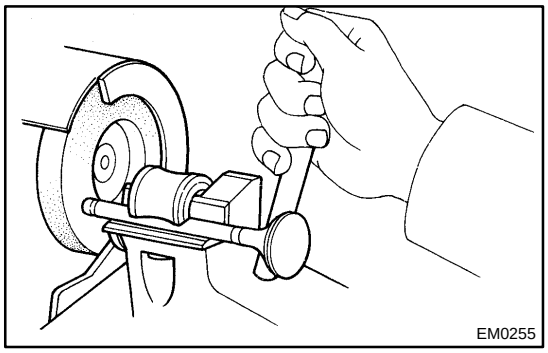
(d) Check the valve overall length.
Standard overall length:

Intake	95.05 mm (3.7421 in.)
Exhaust	95.10 mm (3.7441 in.)

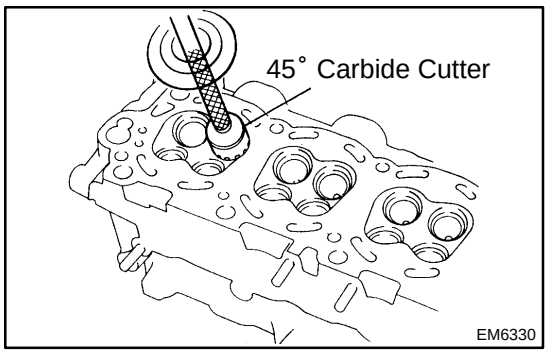
Minimum overall length:

Intake	94.55 mm (3.7224 in.)
Exhaust	94.60 mm (3.7244 in.)

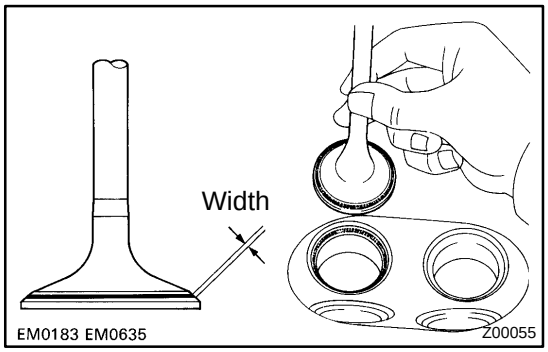
If the overall length is less than minimum, replace the valve.



(e) Check the surface of the valve stem tip for wear.
If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.
NOTICE:
Do not grind off more than minimum.



12. INSPECT AND CLEAN VALVE SEATS
(a) Using a 45° carbide cutter, resurface the valve seats. Remove only metal enough to clean the seats.



(b) Check the valve seating position.
Apply a light coat of Prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate the valve.

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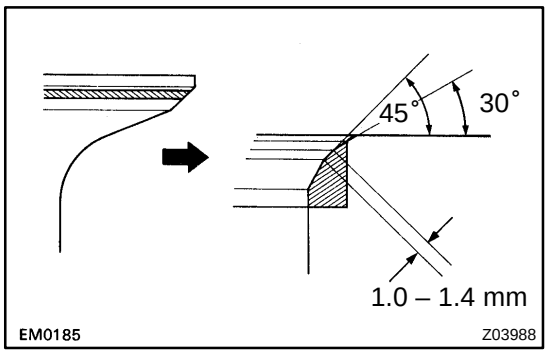
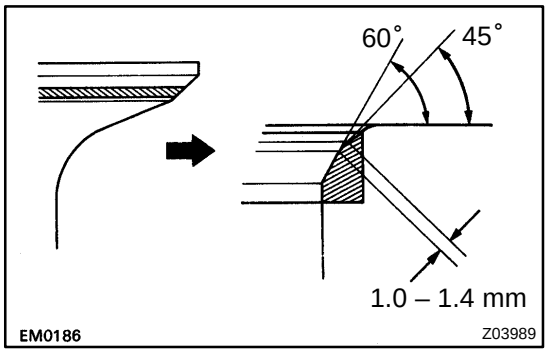


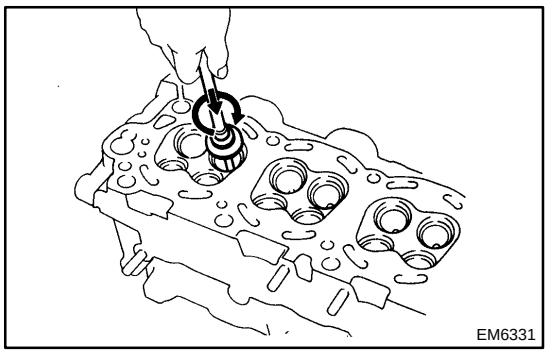
(c) Check the valve face and seat for the following:
- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:

1.0 to 1.4 mm (0.039 to 0.055 in.)

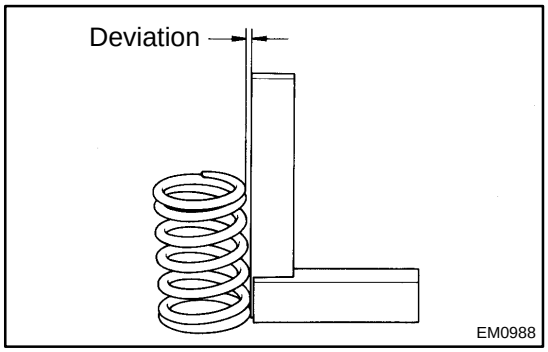
If not, correct the valve seats as follows:
- If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



- If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.



(d) Hand–lap the valve and valve seat with an abrasive compound.
(e) After hand–lapping, clean the valve and valve seat.



13. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation: 2.0 mm (0.079 in.)

If the deviation is greater than maximum, replace the valve spring.

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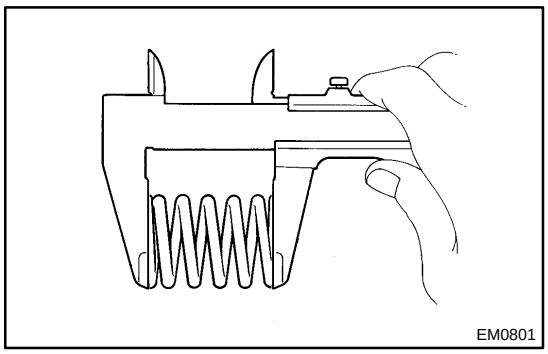
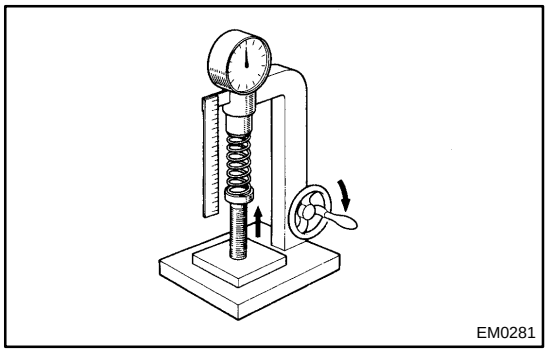

EM0801

(b) Using vernier calipers, measure the free length of the valve spring.

Free length: 54.1 mm (2.130 in.)

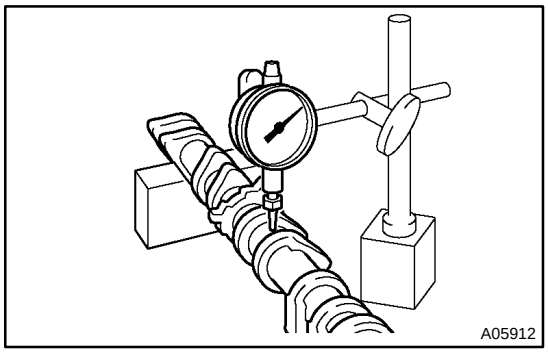
If the free length is not as specified, replace the valve spring.


EM0281

(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:
210 to 226 N (21.4 to 23.0 kgf, 47.2 to 50.7 lbf)
at 35.0 mm (1.378 in.)

If the installed tension is not as specified, replace the valve spring.


A05912

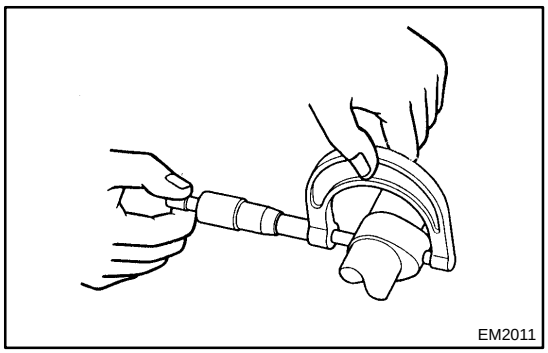
14. INSPECT CAMSHAFT FOR RUNOUT

(a) Place the camshaft on V–blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.03 mm (0.0012 in.)

If the circle runout is greater than maximum, replace the camshaft.


EM2011

15. INSPECT CAM LOBES

Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

Intake	42.61 to 42.71 mm (1.6776 to 1.6815 in.)
Exhaust	42.63 to 42.73 mm (1.6783 to 1.6823 in.)

Minimum cam lobe height:

Intake	42.46 mm (1.6717 in.)
Exhaust	42.48 mm (1.6724 in.)

If the cam lobe height is less than minimum, replace the camshaft.

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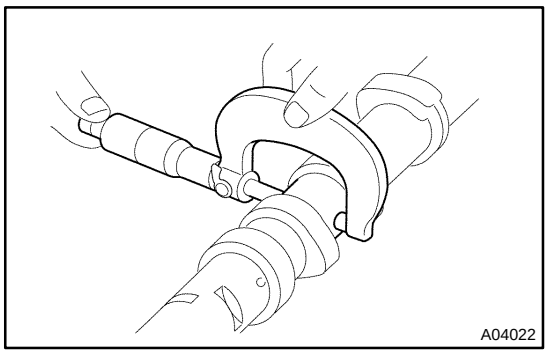


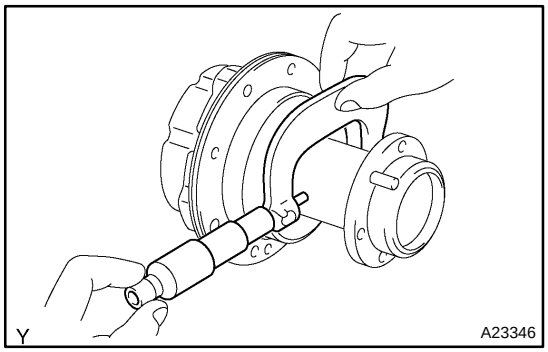
16. INSPECT CAMSHAFT JOURNALS

Using a micrometer, measure the journal diameter.

Journal diameter:

26.954 to 26.970 mm (1.0612 to 1.0618 in.)

If the journal diameter is not as specified, check the oil clearance (see step 20).



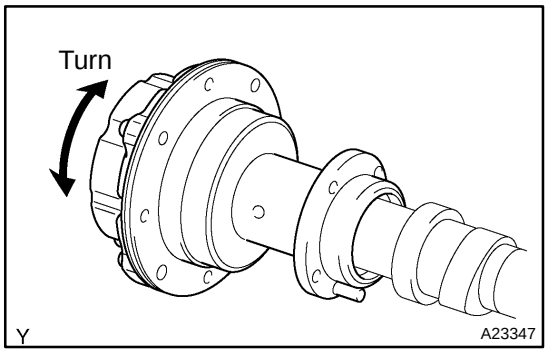
17. INSPECT CAMSHAFT TIMING TUBE

(a) Using a micrometer, measure the journal diameter.

Journal diameter:

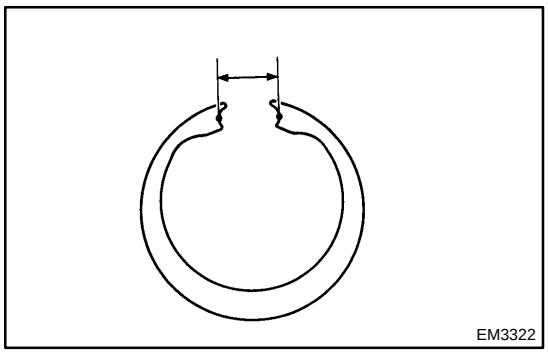
39.955 to 39.964 mm (1.5730 to 1.5734 in.)

If the journal diameter is not as specified, check the oil clearance.



(b) Install the timing tube to the intake camshaft, and check the timing tube turns smoothly.

If necessary, replace the timing tube and intake camshaft.



18. INSPECT CAMSHAFT GEAR SPRING

Using vernier calipers, measure the free distance between the spring ends.

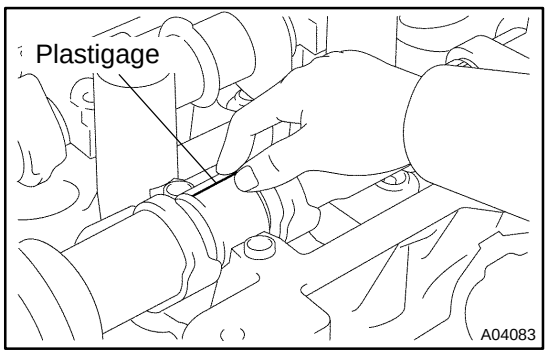
Free distance: 18.2 to 18.8 mm (0.717 to 0.740 in.)

If the free distance is not as specified, replace the gear spring.

19. INSPECT CAMSHAFT BEARINGS

Check the bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.



20. INSPECT CAMSHAFT JOURNAL OIL CLEARANCE

(a) Install the camshaft timing tube to the intake camshaft (see page EM–58).

(b) Clean the bearing caps and camshaft journals.

(c) Place the camshafts on the cylinder head.

(d) Lay a strip of Plastigage across each of the camshaft journals.

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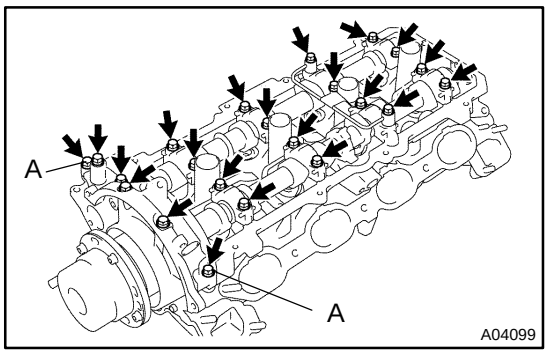
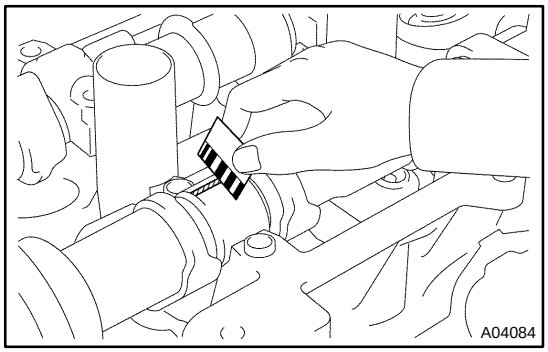


(e) Install the bearing caps (see page EM–60).
Torque:
7.5 N·m (76 kgf·cm, 66 in.·lbf) for bolt A
16 N·m (160 kgf·cm, 12 ft·lbf) for others

NOTICE:
Do not turn the camshaft.

(f) Remove the bearing caps.



(g) Measure the Plastigage at its widest point.
Standard oil clearance:

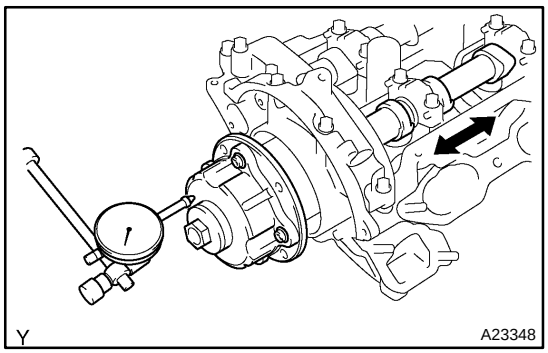
Camshaft journal	0.030 to 0.071 mm (0.0012 to 0.0028 in.)
Camshaft timing tube journal	0.036 to 0.057 mm (0.0014 to 0.0022 in.)

Maximum oil clearance:

Camshaft journal	0.100 mm (0.0039 in.)
Camshaft timing tube journal	0.075 mm (0.0030 in.)

If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(h) Completely remove the Plastigage.
(i) Remove the camshafts.
(j) Remove the camshaft timing tube from the intake camshaft.



21. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshaft timing tube to the intake camshaft (see page EM–58).
(b) Install the camshaft (see page EM–58).
(c) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:

Intake	0 to 0.040 mm (0 to 0.0016 in.)
Exhaust	0.030 to 0.070 mm (0.0012 to 0.0028 in.)

Maximum thrust clearance:

Intake	0.12 mm (0.0047 in.)
Exhaust	0.10 mm (0.0039 in.)

If the thrust clearance is greater than the maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(d) Remove the camshafts.
(e) Remove the camshaft timing tube from the intake camshaft.

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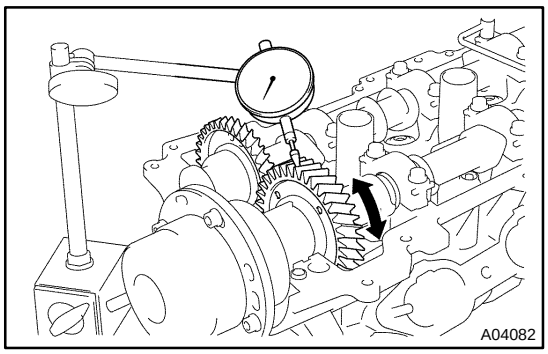


22. INSPECT CAMSHAFT GEAR BACKLASH

(a) Install the drive gear to the camshaft timing tube (See page EM–58).

(b) Install the camshaft timing tube to the intake camshaft (See page EM–58).

(c) Install the camshafts without installing the exhaust camshaft sub–gear and front bearing cap (See page EM–58).

(d) Using a dial indicator, measure the backlash.

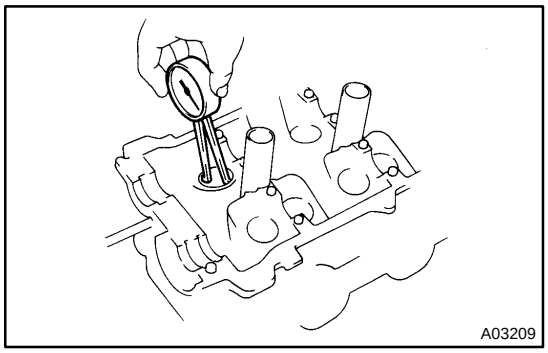
Standard backlash:
0.020 to 0.200 mm (0.0008 to 0.0079 in.)
Maximum backlash: 0.30 mm (0.0118 in.)

If the backlash is greater than the maximum, replace the intake camshaft drive gear and exhaust camshaft.

(e) Remove the camshafts.

(f) Remove the camshaft timing tube from the intake camshaft.

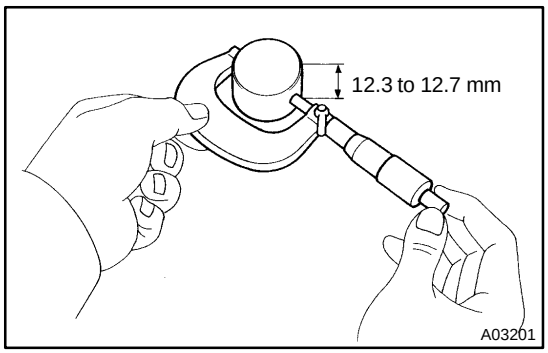
(g) Remove the drive gear from the camshaft timing tube.



23. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

Lifter bore diameter:
31.000 to 31.016 mm (1.2205 to 1.2211 in.)



(b) Using a micrometer, measure the lifter diameter at the valve lifter center line, 12.3 to 12.7 mm (0.484 to 0.500 in.) from the valve lifter head.

Lifter diameter:
30.968 to 30.976 mm (1.2192 to 1.2195 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.

Standard oil clearance:
0.024 to 0.050 mm (0.0009 to 0.0020 in.)
Maximum oil clearance:
0.07 mm (0.0028 in.)

If the oil clearance is greater than the maximum, replace the lifter. If necessary, replace the cylinder head.

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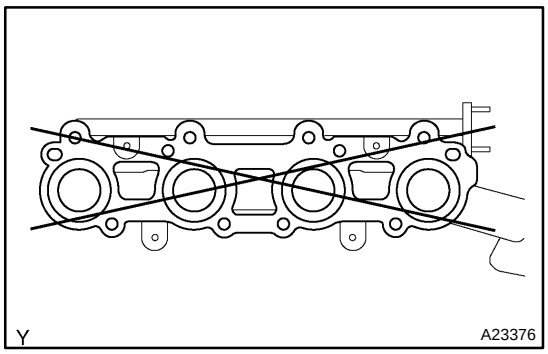

24. INSPECT EXHAUST MANIFOLDS

Using a precision straight edge and feeler gauge, measure the warapage of the surface that is in contact with the cylinder head.

Maximum warpage: 0.10 mm (0.0394 in.)

If warpage is greater than maximum, replace the manifold.

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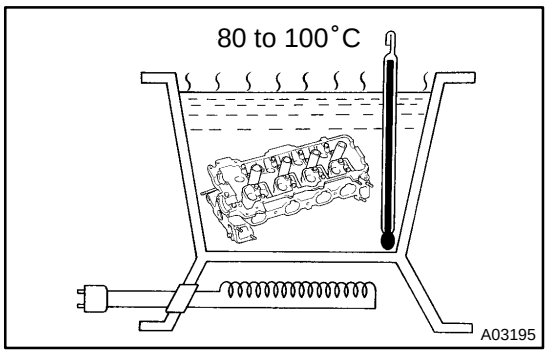
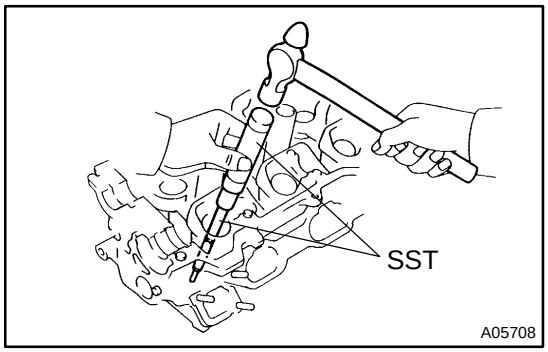
EM0L3–08

REPLACEMENT

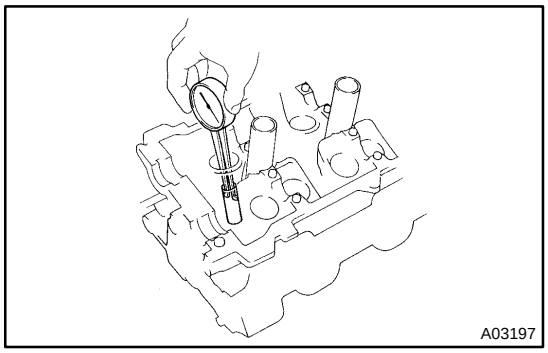


1. REPLACE VALVE GUIDE BUSHINGS

(a) Gradually heat the cylinder head to 80 to 100˚C (176 to 212˚F).



(b) Using SST and a hammer, tap out the guide bushing.
SST 09201–01055, 09950–70010 (09951–07100)



(c) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Both intake and exhaust

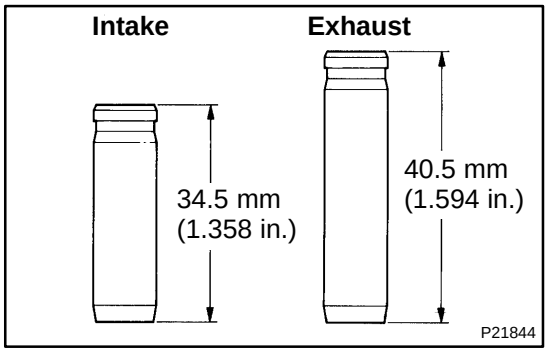
Bushing bore diameter mm (in.)	Bushing size
10.285 to 10.306 (0.4049 to 0.4057)	Use STD
10.335 to 10.356 (0.4069 to 0.4077)	Use O/S STD

(d) Select a new guide bushing (STD or O/S 0.05).

If the bushing bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bushing bore to the following dimension:

10.335 to 10.356 mm (0.4069 to 0.4077 in.)

If the bushing bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.



HINT:

Different the bushings are used for the intake and exhaust.

(e) Gradually heat the cylinder head to 80 to 100˚C (176 to 212˚F).

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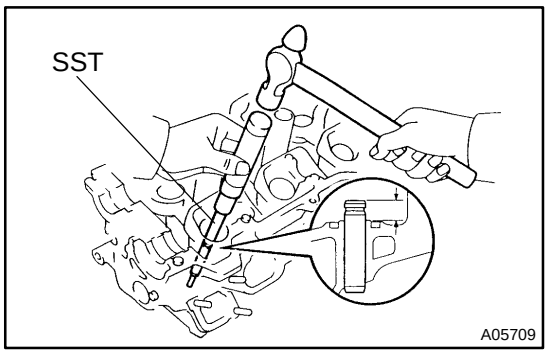
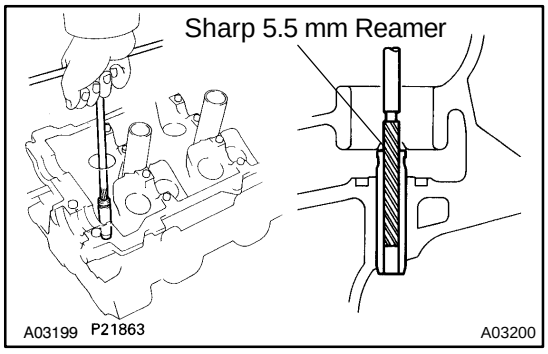


(f) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.

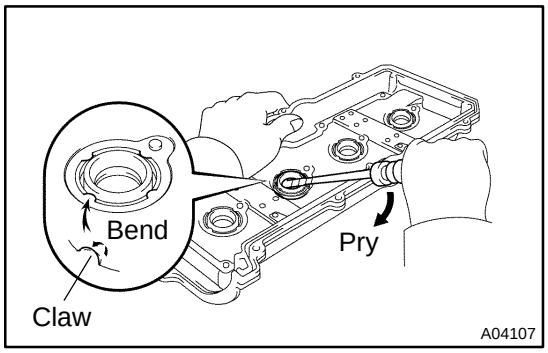
Protrusion height:

Intake	9.2 to 9.8 mm (0.362 to 0.386 in.)
Exhaust	8.2 to 8.8 mm (0.323 to 0.346 in.)

SST 09201–01055, 09950–70010 (09951–07100)



(g) Using a sharp 5.5 mm reamer, ream the guide bushing to obtain the standard specified clearance (see page EM–46) between the guide bushing and valve stem.



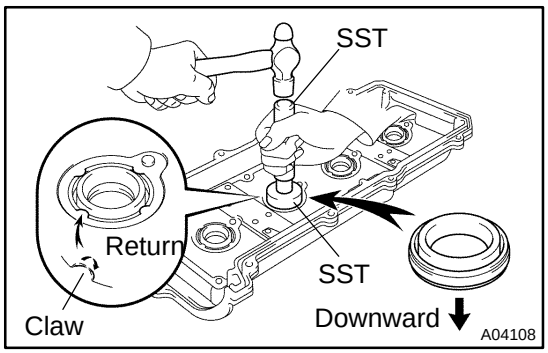
2. REPLACE SPARK PLUG TUBE GASKETS

(a) Bend the 4 ventilation case claws installed on the cylinder head cover to an angle of 90° or more.

(b) Using a screwdriver, pry out the gasket.

NOTICE:

Be careful not to damage the cylinder head cover. Tape the screwdriver tip.



(c) Using SST and a hammer, tap in a new gasket until its surface is flush with the upper edge of the cylinder head cover.

SST 09950–60010 (09951–00240, 09951–00440, 09952–06010), 09950–70010 (09951–07100)

NOTICE:

Be careful of the installation direction.

(d) Apply a light coat of MP grease to the gasket lip.

(e) Return the 4 ventilation case claws to its original position.

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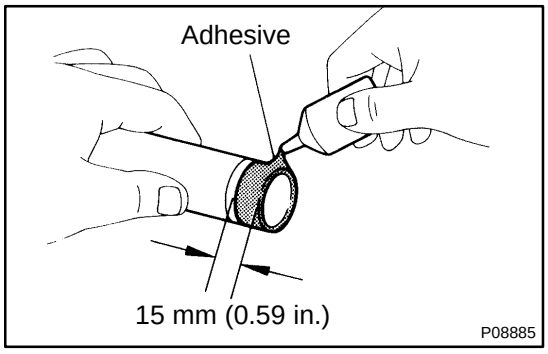
EM0L4–09

REASSEMBLY

HINT:

- ▶ Thoroughly clean all parts to be assembled.
- ▶ Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- ▶ Replace all gaskets and oil seals with new ones.

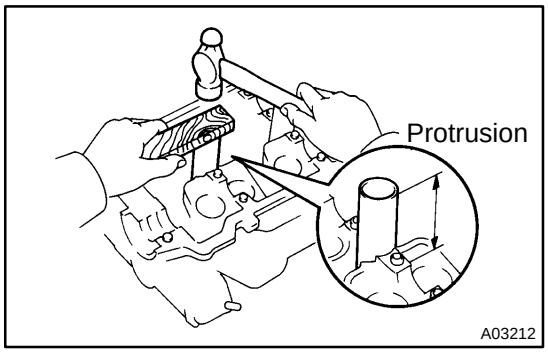


1. INSTALL SPARK PLUG TUBES

HINT:

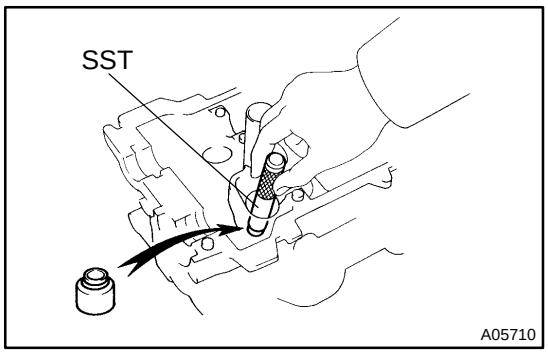
When using a new cylinder head, spark plug tubes must be installed.

(a) Apply adhesive to the end of the spark plug tube.
Adhesive:
Part No. 08833–00070, THREE BOND 1324
or equivalent



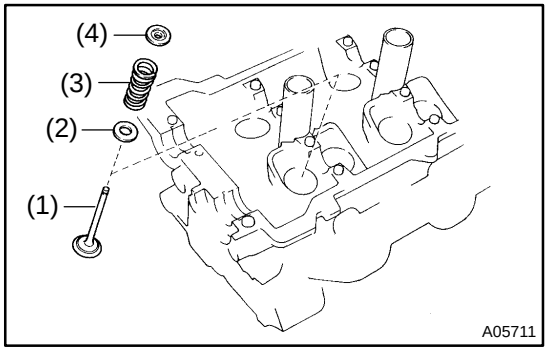
(b) Using a wooden block and hammer, tap in a new spark tube until there is 40.9 – 42.1 mm (1.610 – 1.658 in.) protruding from the camshaft bearing cap installation surface of the cylinder head.

NOTICE:
Avoid tapping a new spark plug tube too far for measuring the amount of the protrusion while tapping.



2. INSTALL VALVES

(a) Using SST, push in a new oil seal.
SST 09201–41020



(b) Install the valve (1), spring seat (2), valve spring (3) and spring retainer (4).

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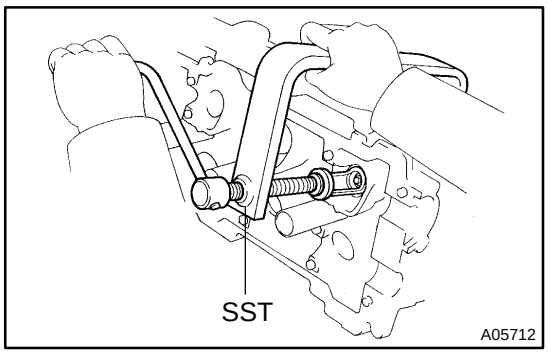
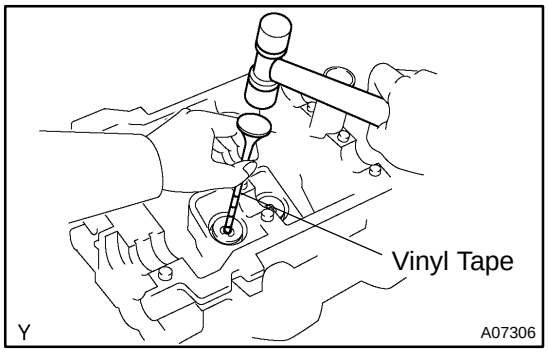


(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202–70020 (09202–00010)



(d) Using a plastic–faced hammer and the valve stem (not in use) tip wound with vinyl tape, lightly tap the valve stem tip to assure proper fit.

NOTICE:

Be careful not to damage the valve stem tip.

3. INSTALL SHIMS AND VALVE LIFTERS

(a) Install the shim and valve lifter.

(b) Check that the valve lifter rotates smoothly by hand.

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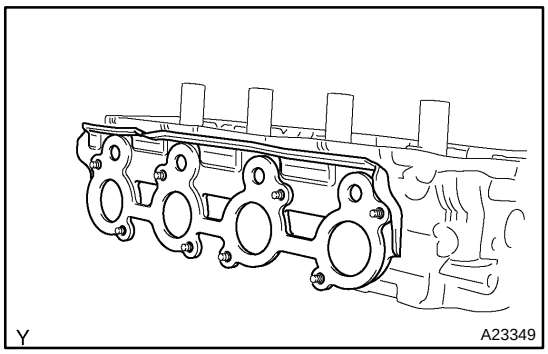
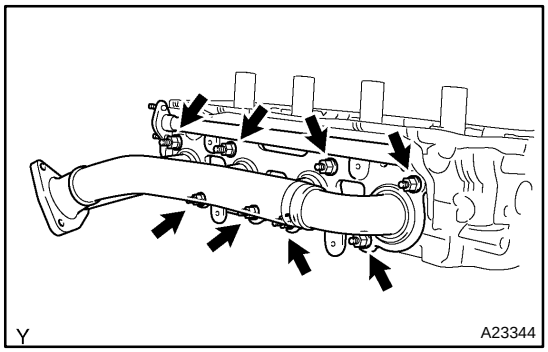
EM1X2–01

INSTALLATION

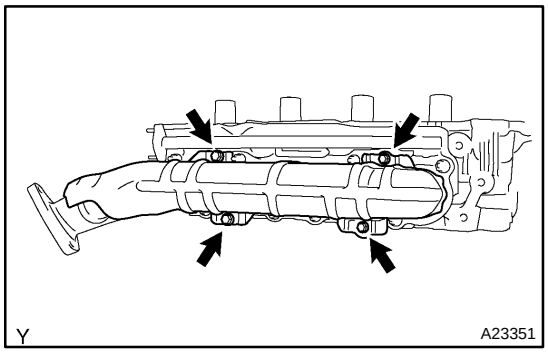


1. INSTALL RH EXHAUST MANIFOLD TO CYLINDER HEAD

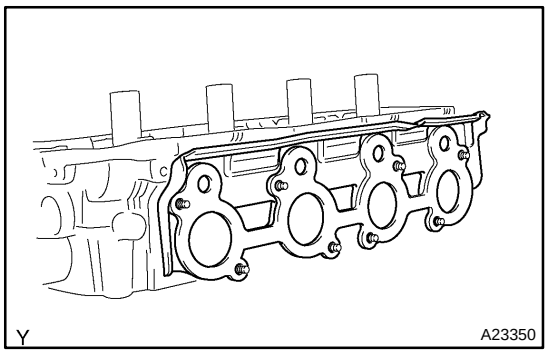
(a) Place a new gasket on the cylinder head.



(b) Install the exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several steps.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

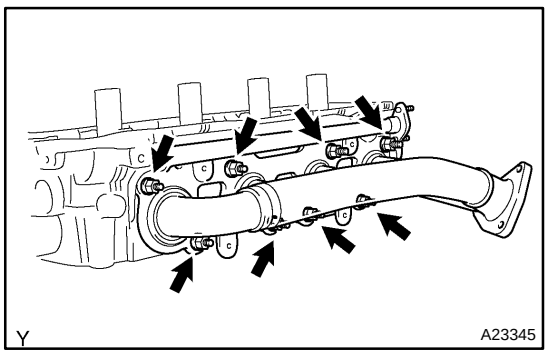


(c) Install the heat insulator with the 4 bolts.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



2. INSTALL LH EXHAUST MANIFOLD TO CYLINDER HEAD

(a) Place a new gasket on the cylinder head.



(b) Install the exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several steps.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

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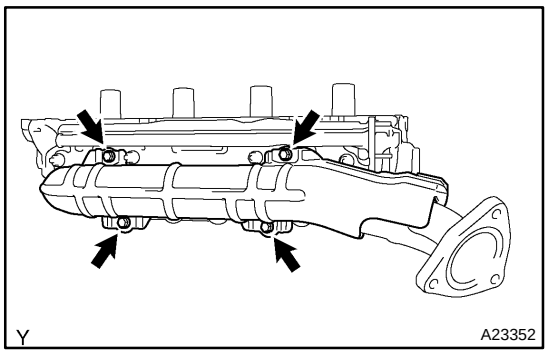
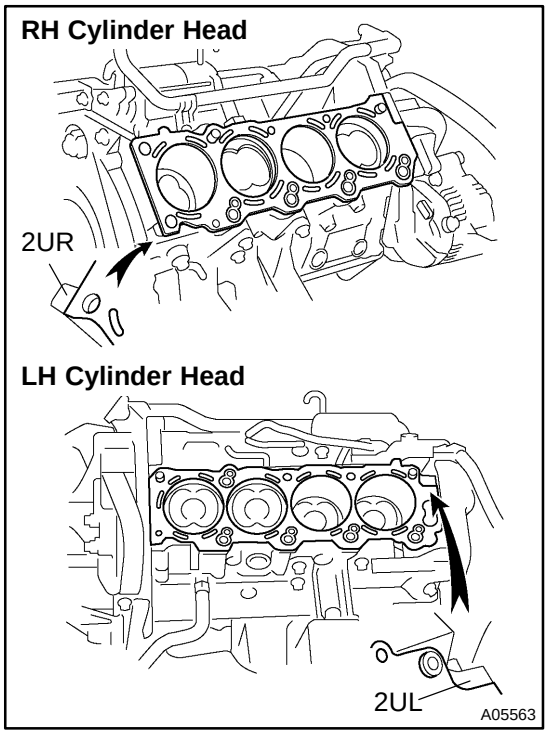


(c) Install the heat insulator with the 4 bolts.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



3. PLACE CYLINDER HEADS ON CYLINDER BLOCK

(a) Place 2 new cylinder head gaskets in the positions on the cylinder block.

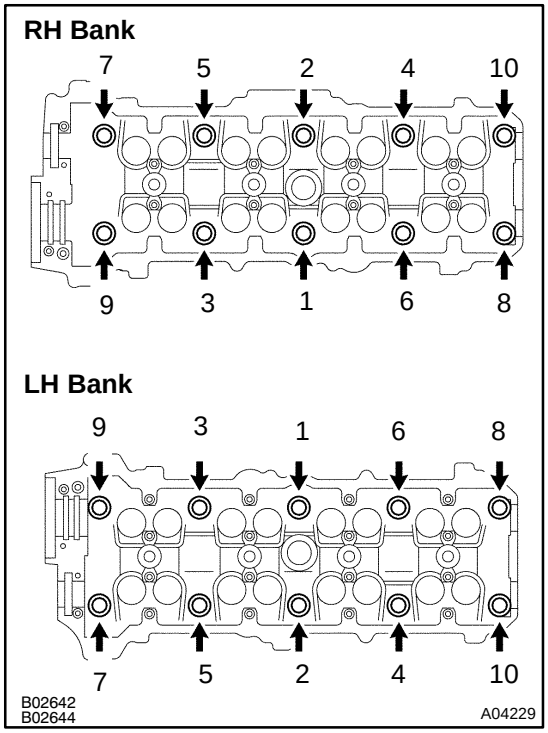
HINT:

On the rear side of the cylinder head gasket are marked to distinguish the LH and RH banks, a ”2UR” mark for the RH bank and a ”2UL” mark for the LH bank.

NOTICE:

Be careful of the installation direction.

(b) Place the 2 cylinder heads in the positions on the cylinder head gaskets.



4. INSTALL CYLINDER HEAD BOLTS

HINT:

- ► The cylinder head bolts are tightened in 2 progressive steps (steps (c) and (e)).
- ► If any cylinder head bolt is broken or deformed, replace it.

(a) Apply a light coat of engine oil to the threads and under the heads of the cylinder head bolts.

(b) Install the plate washer to the cylinder head bolt.

(c) Install and uniformly tighten the 10 cylinder head bolts on one side of the cylinder head in several steps in the sequence shown, then perform the same procedure to the other side as shown.
Torque: 40 N·m (408 kgf·cm, 30 ft·lbf)

If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

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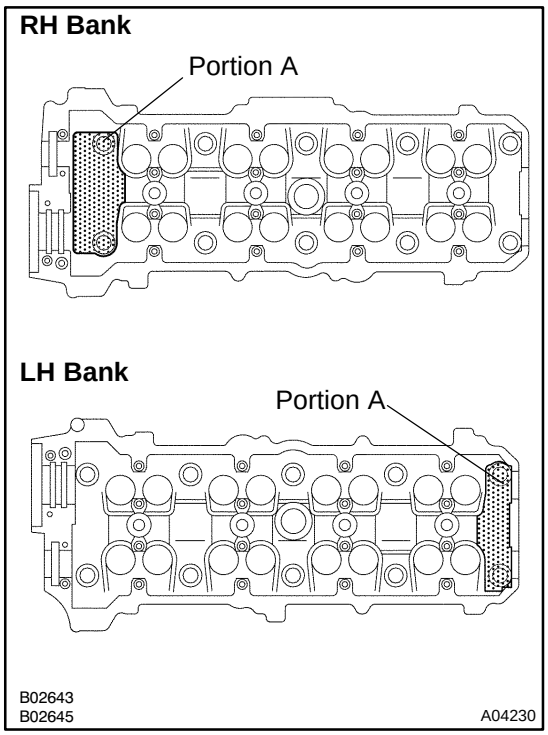
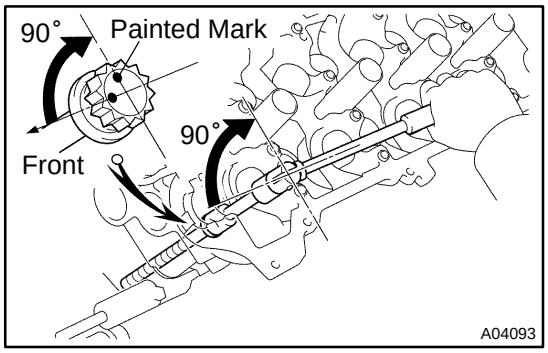
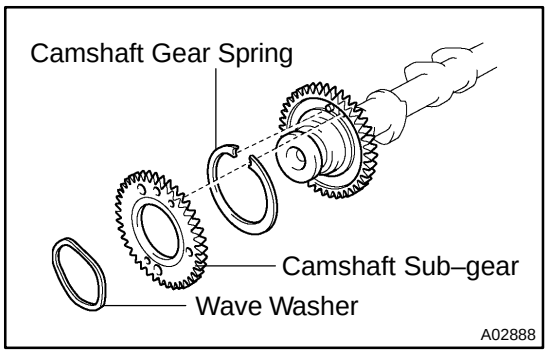


NOTICE:
Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.



(d) Mark the front of the cylinder head bolt with paint.
(e) Retighten the cylinder head bolts by 90° in the numerical order shown.
(f) Check that the painted mark is now at a 90° angle to front.

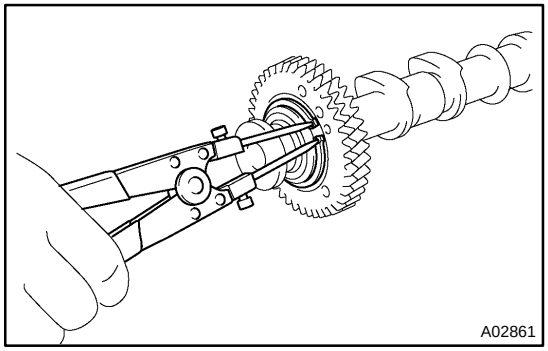
5. INSTALL SPARK PLUGS



6. ASSEMBLE EXHAUST CAMSHAFT

(a) Install the camshaft gear spring, camshaft sub–gear and wave washer.

HINT:
Attach the pin on the gear to the gear spring end.



(b) Using snap ring pliers, install the snap ring.

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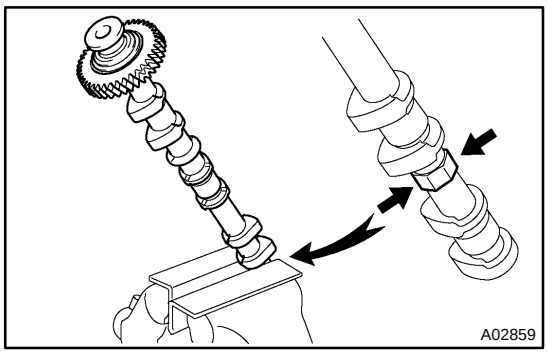
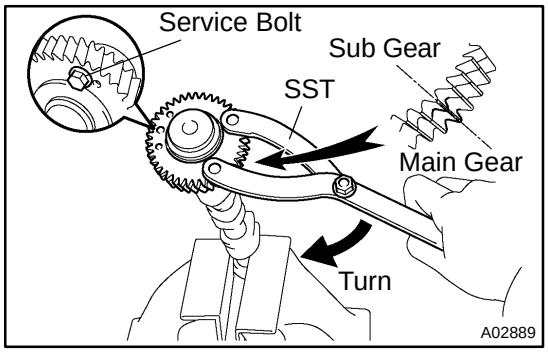


(c) Mount the hexagon wrench head portion of the camshaft in a vise.

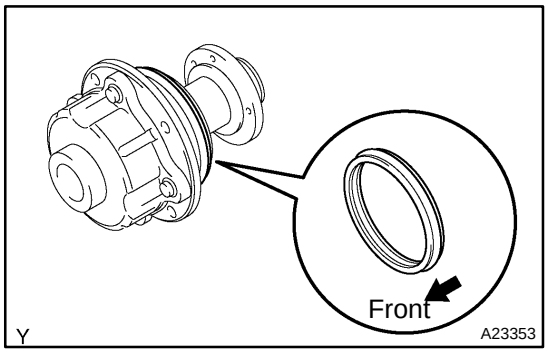
NOTICE:

Be careful not to damage the camshaft.



(d) Using SST, align the holes of the camshaft main gear and sub–gear by turning the camshaft sub–gear counterclockwise, and temporarily install a service bolt.
SST 09960–10010 (09962–01000, 09963–00500)

(e) Align the gear teeth of the main gear and sub–gear, and tighten the service bolt.

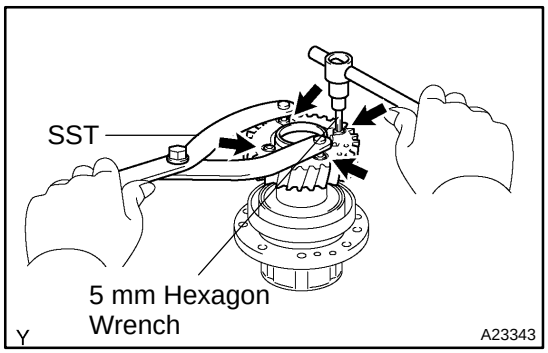


7. INSTALL CAMSHAFT TIMING TUBE TO INTAKE CAMSHAFT

(a) Place a new oil seal to the timing tube.

NOTICE:

Be careful of the installation direction.

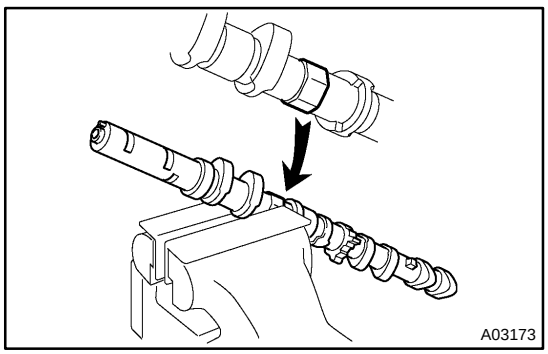


(b) Align the timing tube knock pin with the knock pin groove of the drive gear, and temporarily install the drive gear with the 4 bolts.

(c) Using SST and a 5 mm hexagon wrench, uniformly tighten the 4 bolts in several steps.
SST 09960–10010 (09962–01000, 09963–00500)
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

NOTICE:

Be careful not to damage the timing tube.



(d) Mount the hexagon head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.

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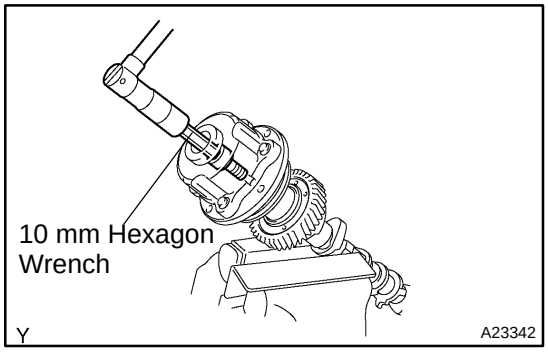


(e) Align the camshaft knock pin with the knock pin groove of the timing tube, and push the timing tube by hand until you it touches the bottom.

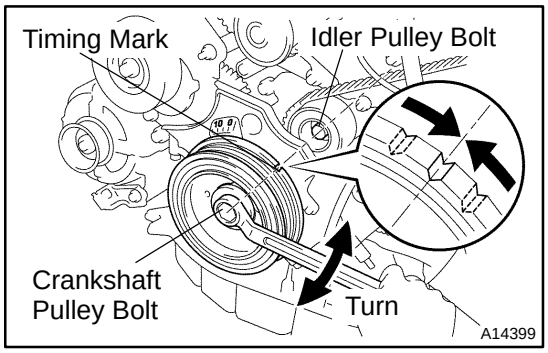
(f) Using a 10 mm hexagon wrench, install the bolt.
Torque: 78 N·m (790 kgf·cm, 58 ft·lbf)

(g) Install the seal washer and screw plug.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

8. INSTALL CAMSHAFTS

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Set the crankshaft pulley position.
Turn the pulley clockwise or counterclockwise, and align the timing mark of the crankshaft pulley with the centers of the crankshaft pulley bolt and idler pulley bolt.

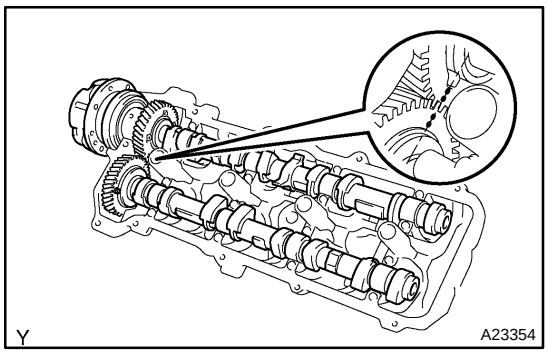
NOTICE:

Having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you install the camshaft, causing damage. So always set the crankshaft pulley at the correct angle.

(b) Install the LH camshafts.

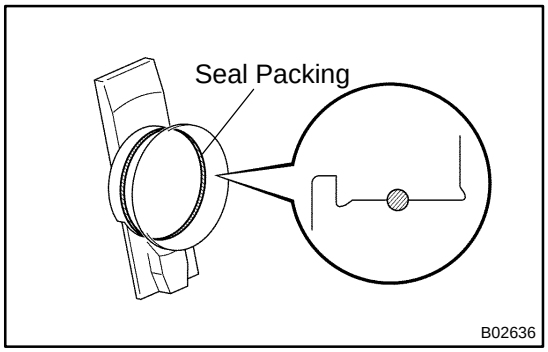
(1) Apply MP grease to the thrust portion of the intake and exhaust camshafts.

(2) Align the timing marks (2–dot mark) of the camshaft drive and driven main gears, and place the intake and exhaust camshafts.



(3) Apply seal packing to the camshaft housing plug.
- ▶ Remove the old packing material (FIPG).
- ▶ Apply seal packing to the housing plug.

Seal packing: Part No. 08826–00080 or equivalent



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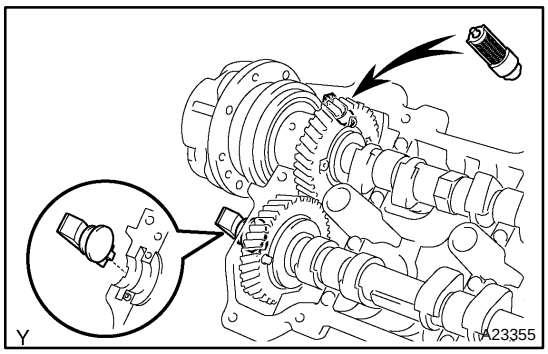
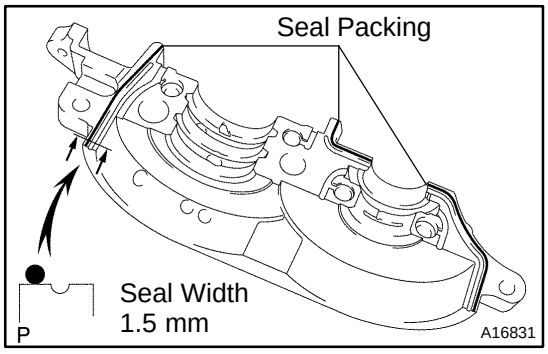


(4) Install the camshaft housing plug to the cylinder head as shown in the illustration.

(5) Install the strainer to the cylinder head.

NOTICE:

Be careful of the installation direction.



(6) Apply seal packing to the front bearing cap.

▶ Remove any old packing material (FIPG) and be careful not to drop any oil on the contact surfaces of the bearing cap and cylinder head.

Using a razor blade and gasket scraper, remove all the old packing material (FIPG) from the gasket surfaces and groove.

Thoroughly clean all components to remove all the loose material.

Using a non–residue solvent, clean both sealing surfaces.

▶ Apply seal packing to the bearing cap as shown in the illustration.

Install a nozzle that has been cut to a 1.5 mm (0.059 in.) opening.

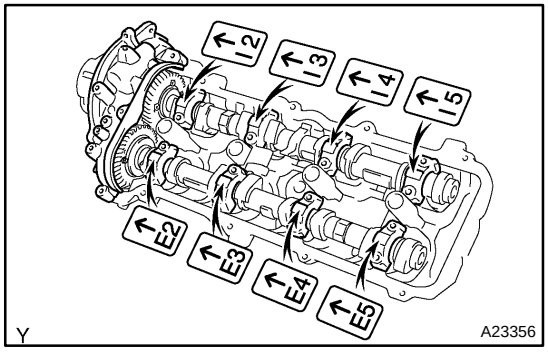
Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

Immediately remove the nozzle from the tube and reinstall cap.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

Do not apply seal packing to the front bearing cap grooves.



(7) Install the front bearing cap.

HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

(8) Install the other bearing caps in the sequence shown with the arrow mark facing forward.

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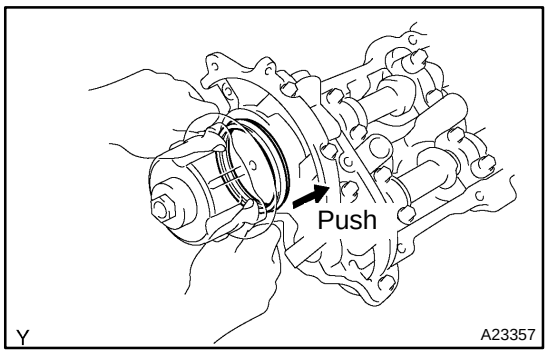
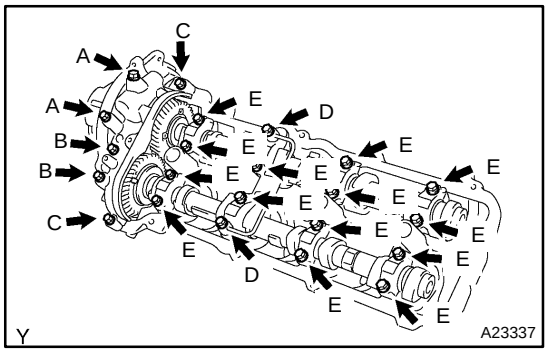


(9) Push in the camshaft oil seal.



(10) Install 4 new seal washers to the bearing cap bolts (A and B).

(11) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts (D and E).

NOTICE:

Do not apply engine oil under the heads of the bearing cap bolts (A), (B) and (C).

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

94 mm (3.70 in.) for A with seal washer

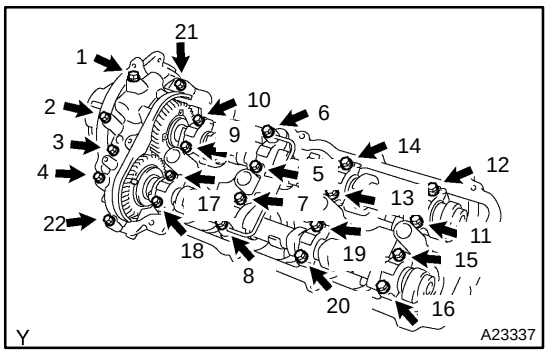
72 mm (2.83 in.) for B with seal washer

25 mm (0.98 in.) for C

52 mm (2.05 in.) for D

38 mm (1.50 in.) for E

(12) Install the oil feed pipe and the 22 bearing cap bolts as shown in the illustration.

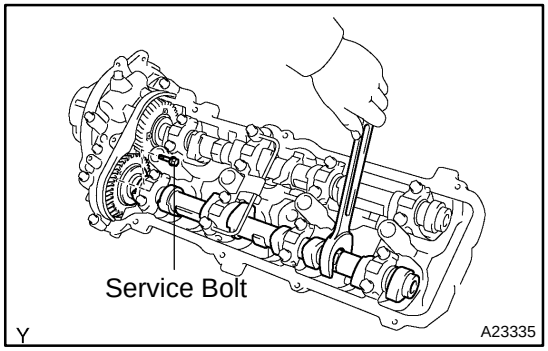


(13) Uniformly tighten the 22 bearing cap bolts in several steps, in the sequence shown.

Torque:

7.5 N·m (76 kgf·cm, 66 in.·lbf) for bolt C

16 N·m (160 kgf·cm, 12 ft·lbf) for others



(14) Remove the service bolt.

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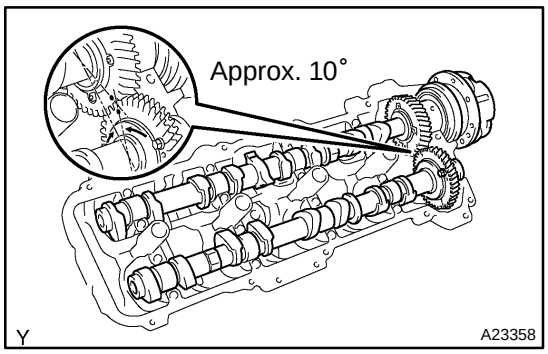
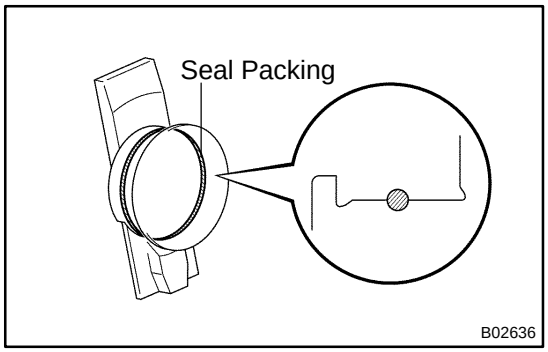
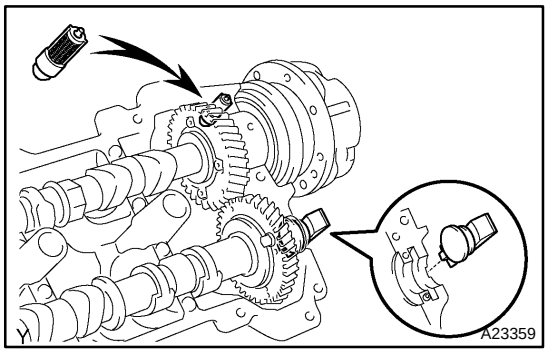


(c) Install the RH camshafts.
(1) Apply MP grease to the thrust portions of the intake and exhaust camshafts.
(2) Align the timing marks (1–dot mark) of the camshaft drive and driven main gears, and place the intake and exhaust camshafts.
(3) Set the timing mark (1–dot mark) of the camshaft drive and driven main gears at approx. 10° angle.



(4) Apply seal packing to the camshaft housing plug.
▶ Remove the old packing material (FIPG).
▶ Apply seal packing to the housing plug.

Seal packing: Part No. 08826–00080 or equivalent



(5) Install the camshaft housing plug to the cylinder head as shown in the illustration.
(6) Install the strainer to the cylinder head.

NOTICE:
Be careful of the installation direction.

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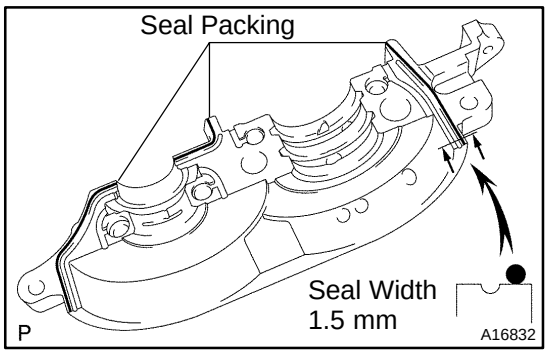


(7) Apply seal packing to the front bearing cap.

▶ Remove any old packing material (FIPG) and be careful not to drop any oil on the contact surfaces of the bearing cap and cylinder head.

Using a razor blade and gasket scraper, remove all the old packing material (FIPG) from the gasket surfaces and groove.

Thoroughly clean all components to remove all the loose material.

Using a non–residue solvent, clean both sealing surfaces.

▶ Apply seal packing to the bearing cap as shown in the illustration.

Install a nozzle that has been cut to a 1.5 mm (0.059 in.) opening.

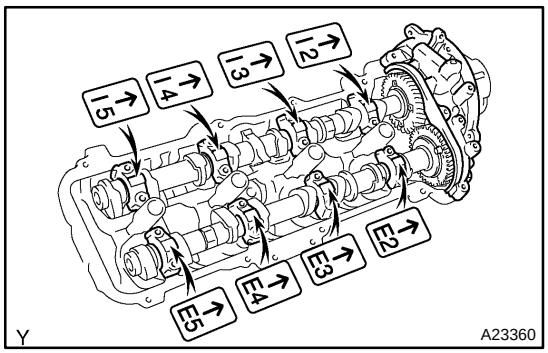
Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

Immediately remove the nozzle from the tube and reinstall cap.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

Do not apply seal packing to the front bearing cap grooves.

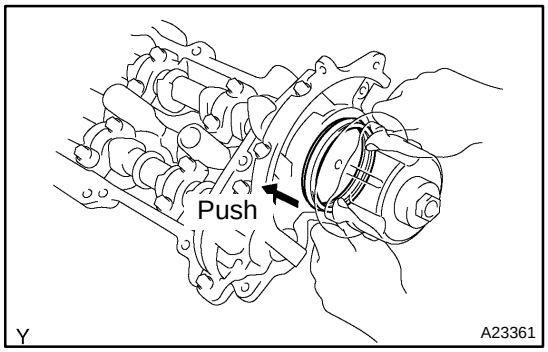


(8) Install the front bearing cap.

HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

(9) Install the other bearing caps in the sequence shown with the arrow mark facing forward.



(10) Push in the camshaft oil seal.

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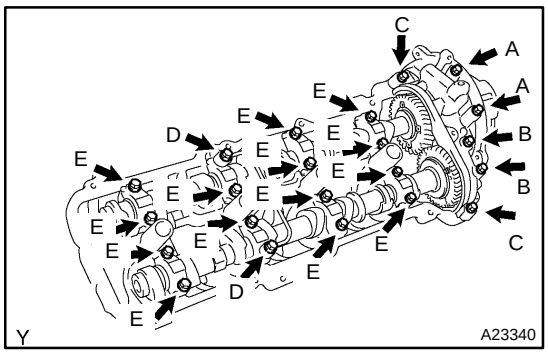


(11) Install 4 new seal washers to the bearing cap bolts (A and B).

(12) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts (D and E).

NOTICE:

Do not apply engine oil under the heads of the bearing cap bolts (A), (B) and (C).

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

94 mm (3.70 in.) for A with seal washer

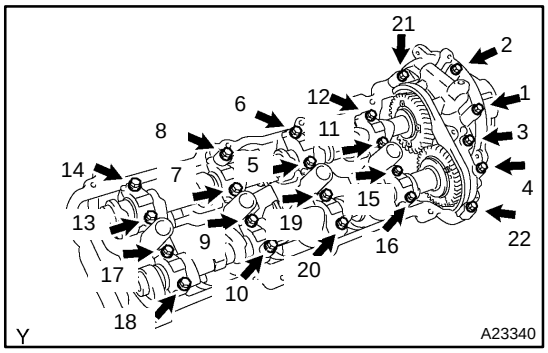
72 mm (2.83 in.) for B with seal washer

25 mm (0.98 in.) for C

52 mm (2.05 in.) for D

38 mm (1.50 in.) for E

(13) Install the oil feed pipe and the 22 bearing cap bolts as shown in the illustration.

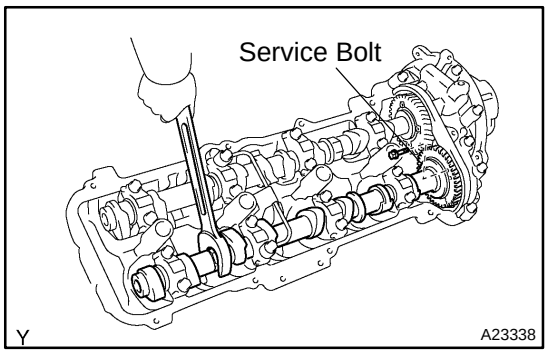


(14) Uniformly tighten the 22 bearing cap bolts in several steps, in the sequence shown.

Torque:

7.5 N·m (76 kgf·cm, 66 in.·lbf) for bolt C

16 N·m (160 kgf·cm, 12 ft·lbf) for others



(15) Remove the service bolt.

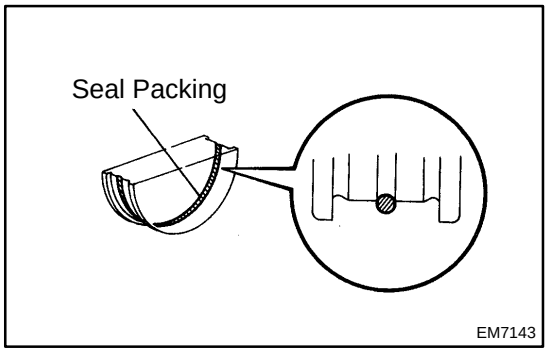
9. CHECK AND ADJUST VALVE CLEARANCE

(See page EM–4)

Turn the camshaft so that the cam lobe faces upward, and check and adjust the valve clearance.

10. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE

(See page SF–48)



11. INSTALL SEMI–CIRCULAR PLUGS

(a) Remove any old packing material (FIPG).

(b) Apply seal packing to the semi–circular plug grooves.

Seal packing:

Part No. 08826–00080 or equivalent

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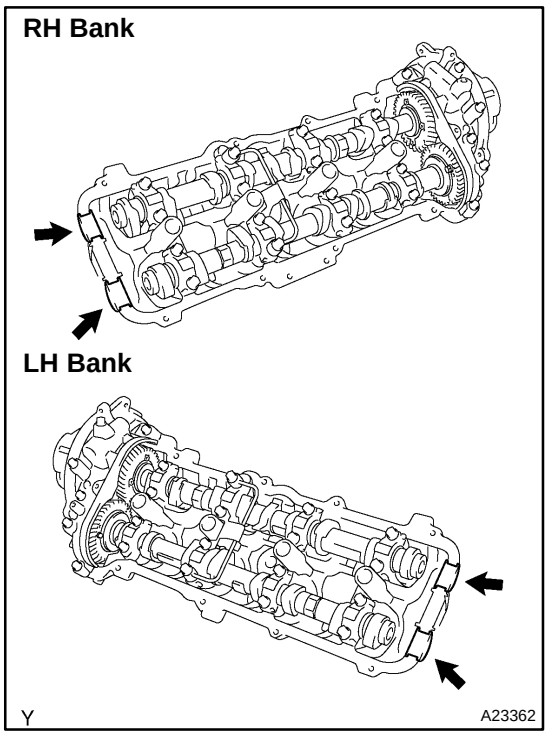
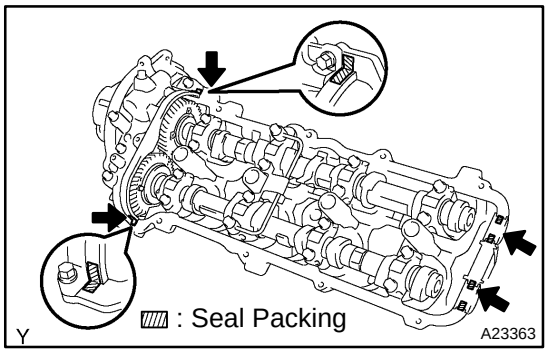


(c) Install the 4 semi–circular plugs to the cylinder heads as shown in the illustration.

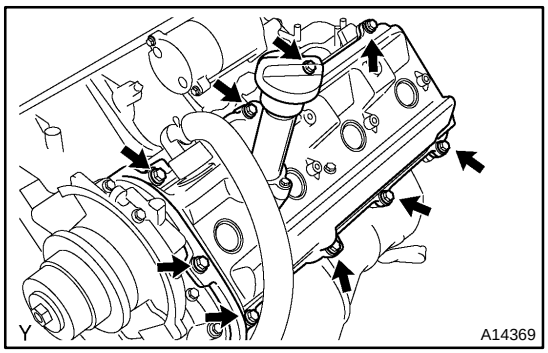


12. INSTALL LH CYLINDER HEAD COVER

(a) Remove any old packing material (FIPG).

(b) Apply seal packing to the cylinder heads as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

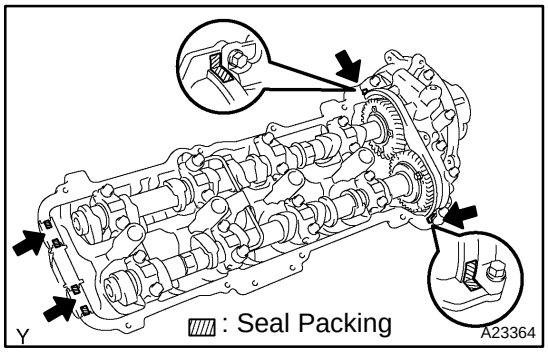


(c) Install the gasket to the cylinder head cover.

(d) Install the seal washer to the bolt.

(e) Install the cylinder head cover with the 9 bolts. Uniformly tighten the bolts in several steps.

Torque: 6.0 N·m (60 kgf·cm, 53 in.·lbf)



13. INSTALL RH CYLINDER HEAD COVER

(a) Remove any old packing material (FIPG).

(b) Apply seal packing to the cylinder heads as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

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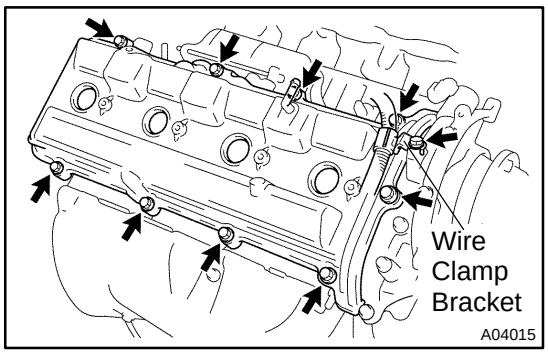
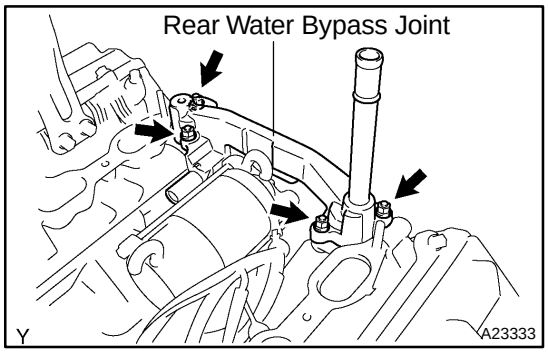


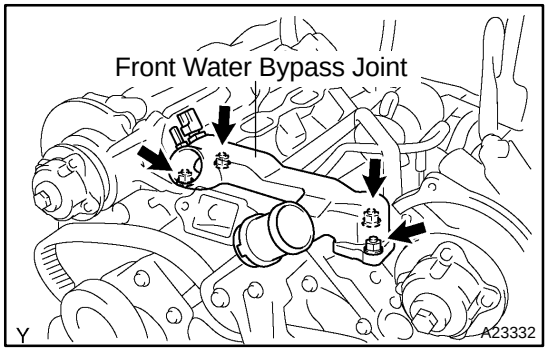
(c) Install the gasket to the cylinder head cover.
(d) Install the seal washer to the bolt.
(e) Install the cylinder head cover with the 9 bolts. Uniformly tighten the bolts in several steps. Install the 2 cylinder head covers.
Torque: 6.0 N·m (60 kgf·cm, 53 in.·lbf)
(f) Install the wire clamp bracket on the engine wire to the camshaft bearing cap.

14. INSTALL ENGINE HANGERS
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)
15. INSTALL VVT SENSORS (See page SF–77)
16. INSTALL OIL DIPSTICK AND GUIDE FOR ENGINE
17. INSTALL OIL DIPSTICK AND GUIDE FOR A/T
18. INSTALL IGNITION COILS (See page IG–6)



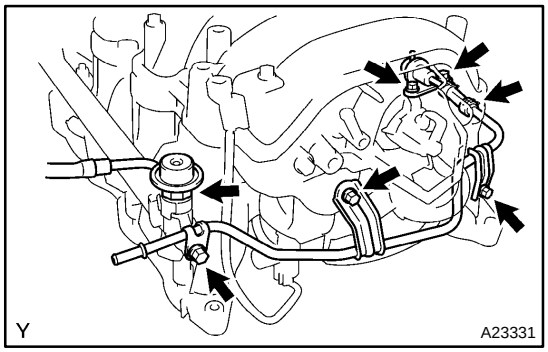
19. INSTALL REAR WATER BYPASS JOINT
(a) Install 2 new gaskets to the cylinder head.
(b) Install the the water bypass joint with the 4 nuts to the cylinder heads. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

20. INSTALL NO.2 AIR SWITCHING VALVES (See page EC–26)
21. INSTALL AIR PUMP ASSEMBLY (See page EC–26)



22. INSTALL FRONT WATER BYPASS JOINT
Install 2 new gaskets and the water bypass joint with the 4 nuts. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

23. INSTALL WATER INLET AND INLET HOUSING ASSEMBLY (See page CO–8)



24. ASSEMBLE INTAKE MANIFOLDS
(a) Install the 2 delivery pipes and 8 injectors (see page SF–31).
(b) Install 2 new gaskets and fuel pulsation damper.
(c) Install a new O–ing and fuel pressure regulator with the 2 bolts.
(d) Install the fuel return pipe to the intake manifold with the 3 bolts.
(e) Connect the fuel return hose to the fuel pressure regulator.

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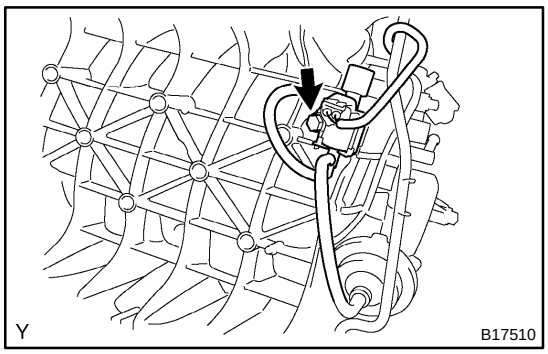
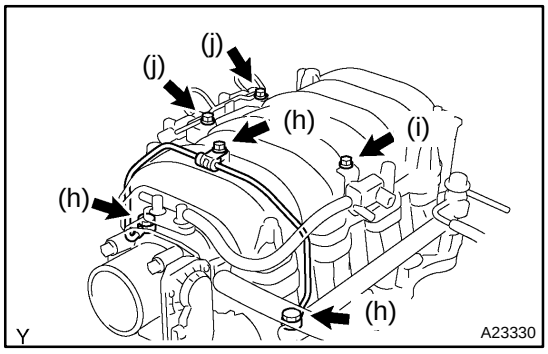


(f) Install the VSV for ACIS with the bolt.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

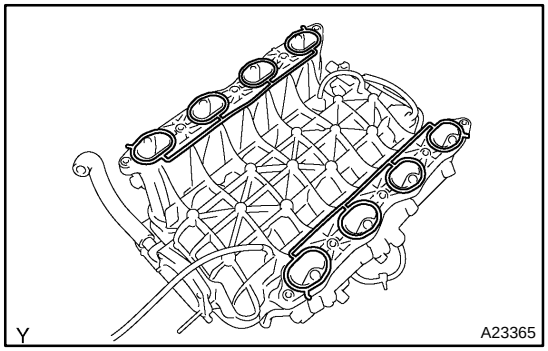
(g) Install the throttle body (See page SF–43).



(h) Install 4 new gaskets and front fuel pipe with the bolt and 2 unions to the intake manifold.
Torque:
39 N·m (400 kgf·cm, 29 ft·lbf) for union bolts
7.5 N·m (80 kgf·cm, 66 in.·lbf) for bolt

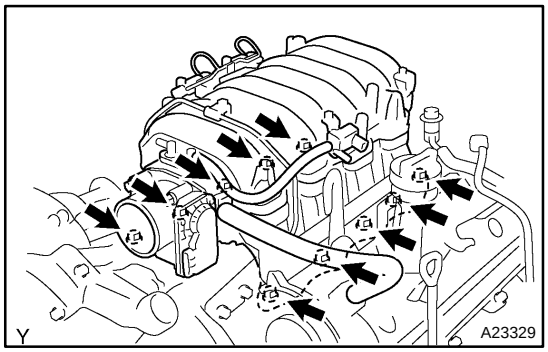
(i) Install the VSV for EVAP with the bolt to the intake manifold and connect the EVAP hose.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(j) Install the 2 VSVs for air injection system with the 2 bolts.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



25. INSTALL INTAKE MANIFOLD ASSEMBLY

(a) Place 2 new gaskets on the intake manifold.



(b) Place the intake manifold assembly on the cylinder heads.

(c) Install and uniformly tighten the 6 bolts and 4 nuts in several steps.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

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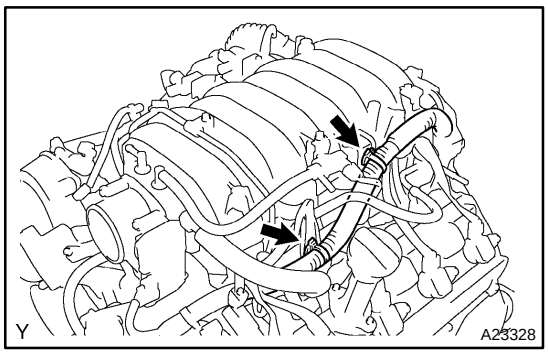
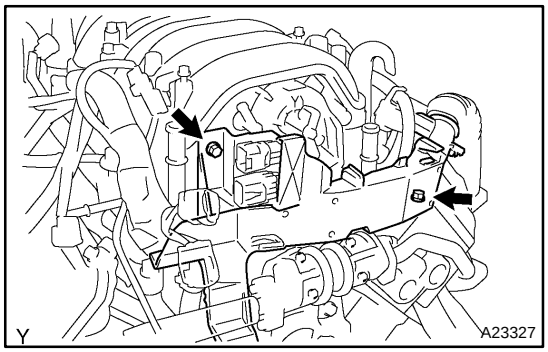


(d) Install the throttle body cover bracket to the intake manifold.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(e) Install the wire bracket to the intake manifold with the bolt.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

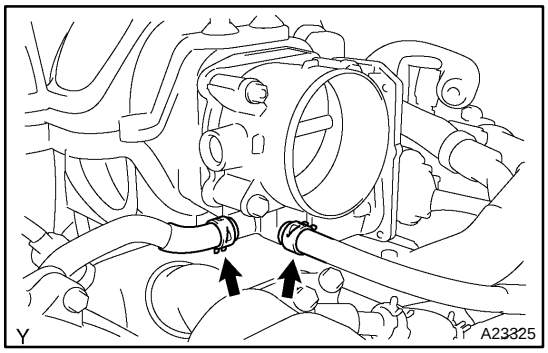
(f) Connect the engine wire to the engine hanger and wire bracket.

(g) Install the engine wire to the LH No.1 timing belt rear plate.

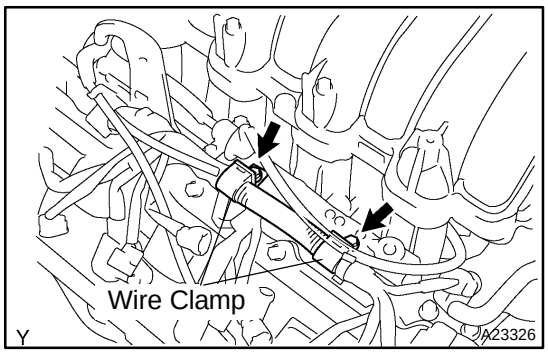


(h) Connect the wire protector to the intake manifold and cylinder heads with the 2 bolts.

(i) Install the 2 ground cables with the 2 bolts to the RH and LH cylinder heads.



(j) Connect the 2 water bypass hoses to the throttle body.



(k) Connect the 2 wire clamps to the wire clamp bracket on the RH delivery pipe.

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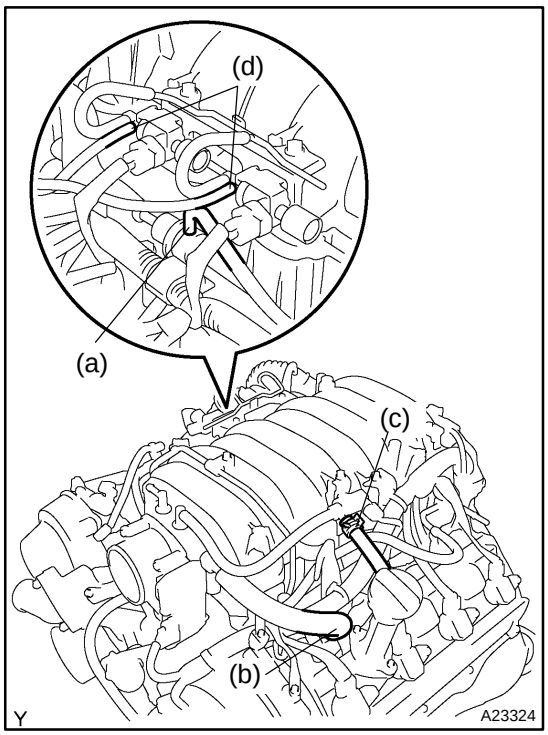

26. CONNECT HOSES TO INTAKE MANIFOLD

(a) Connect the vacuum hose to the fuel pressure regulator.

(b) Connect the PCV hose to the PCV valve on the LH the cylinder head.

(c) Connect the EVAP hose (from charcoal canister) to the VSV for EVAP.

(d) Connect the 2 vacuum hoses to the VSV for the air injection system.

(e) Connect the brake booster tube.

27. CONNECT CONNECTORS TO INTAKE MANIFOLD

(a) Connect the throttle control connector.

(b) Connect the 2 VSV connectors for the air injection system.

(c) Connect the VSV connector for the EVAP.

(d) Connect the 8 injector connectors.

(e) Connect the ECT sensor connector.

(f) Connect the 2 air fuel ratio sensor connectors.

28. CONNECT FUEL INLET HOSE (See page SF–31) AND FUEL RETURN HOSE

29. INSTALL TIMING BELT REAR PLATES

(a) Install the RH No.1 timing belt rear plates.

Install the RH No.1 timing belt rear plates to the cylinder head with the 3 bolts and stud bolt.

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(b) Install the LH No.1 timing belt rear plates.

(1) Connect the wire clamp to the No.1 timing belt rear plate.

(2) Install the LH No.1 timing belt rear plates to the cylinder head with the 3 bolts and stud bolt.

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

30. INSTALL THROTTLE BODY COVER

31. INSTALL IGNITION COILS (See page IG–6)

32. INSTALL OIL DIPSTICK AND GUIDE FOR A/T

33. INSTALL FRONT EXHAUST PIPE (See page EM–126)

34. INSTALL PS PUMP (See page EM–83)

35. INSTALL CAMSHAFT POSITION SENSOR (See page IG–9)

36. INSTALL CAMSHAFT TIMING PULLEYS (See page EM–23)

37. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS (See page EM–23)

38. CHECK ENGINE OIL LEVEL

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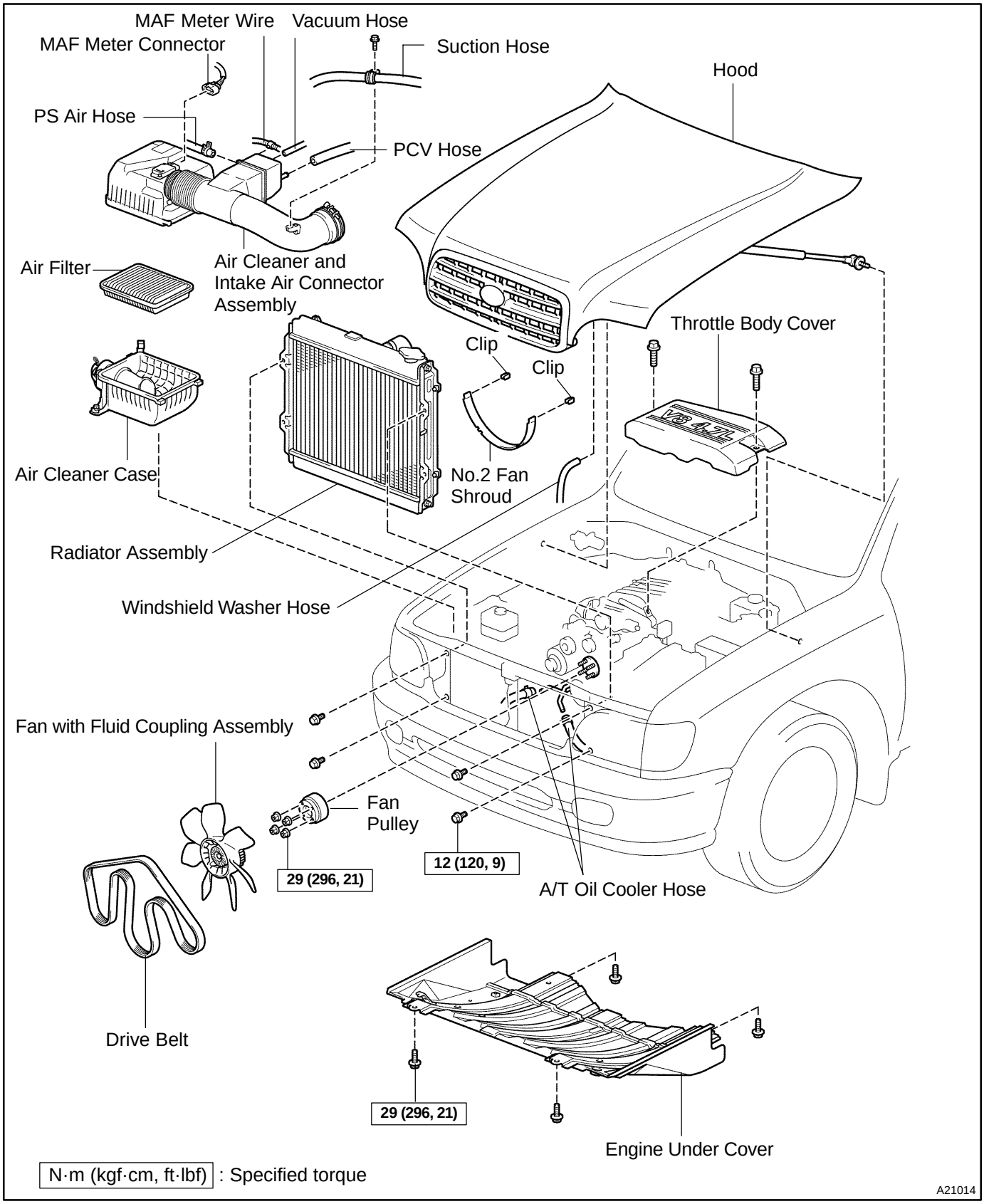
ENGINE UNIT (2WD)

COMPONENTS

EM11Z–07



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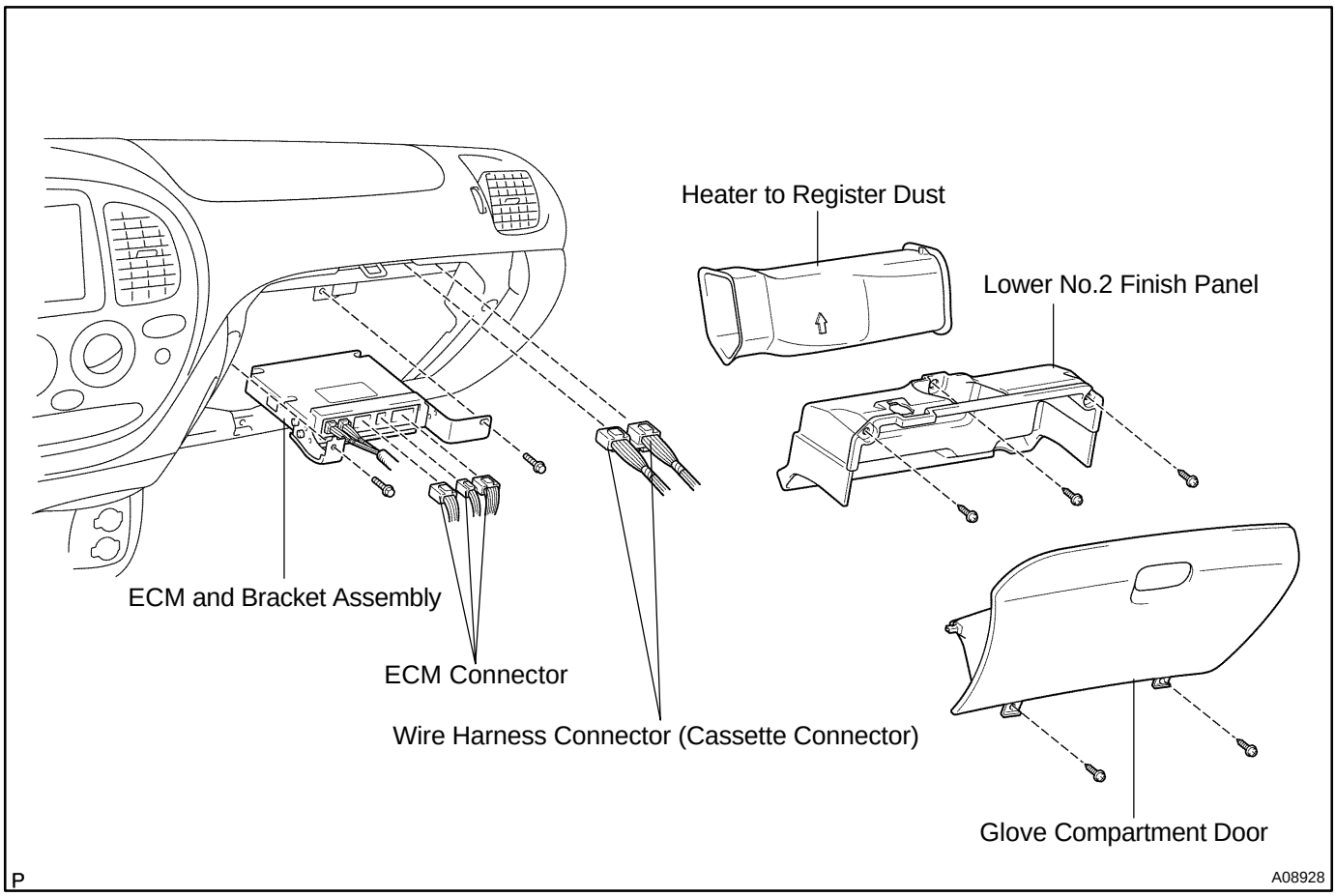
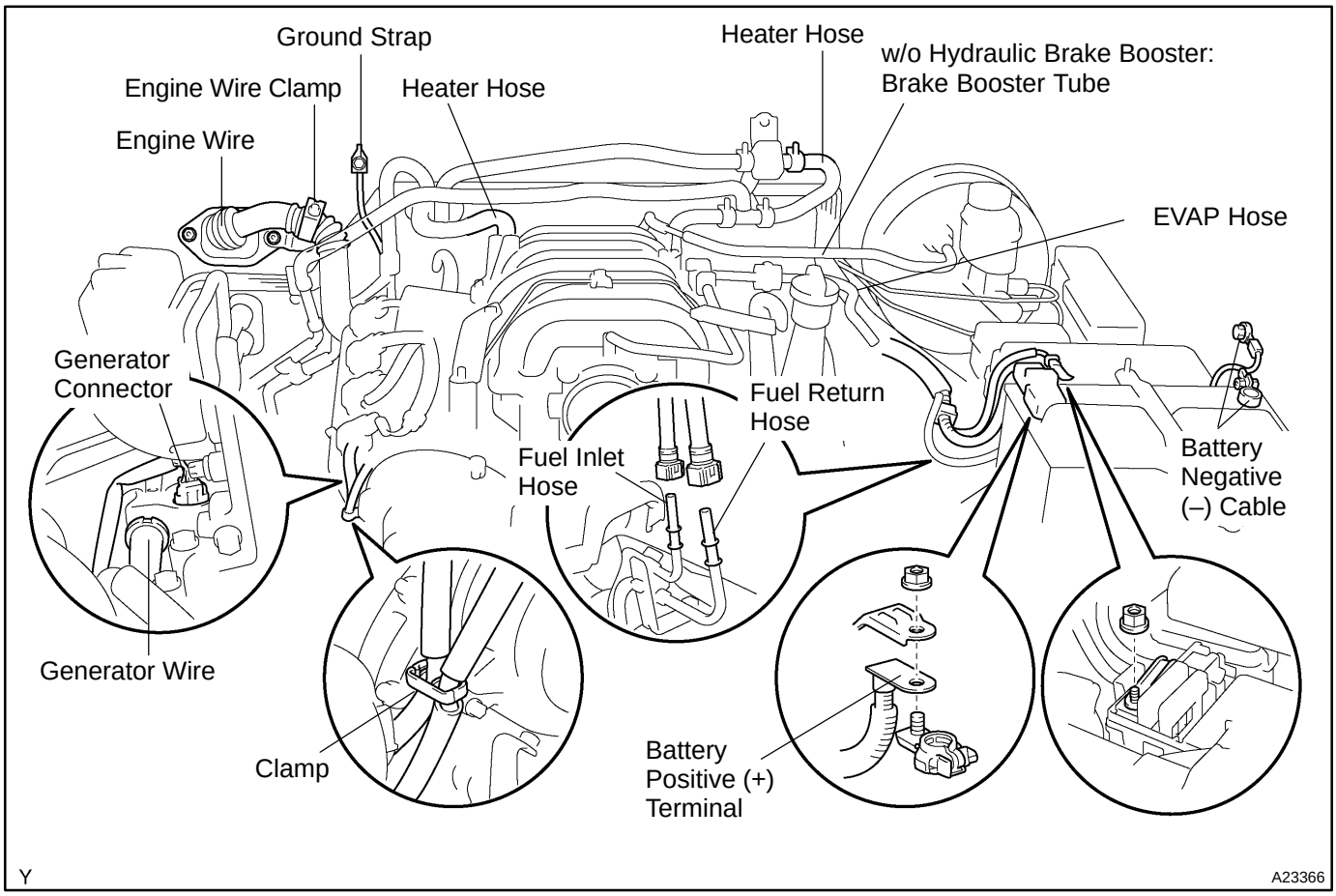
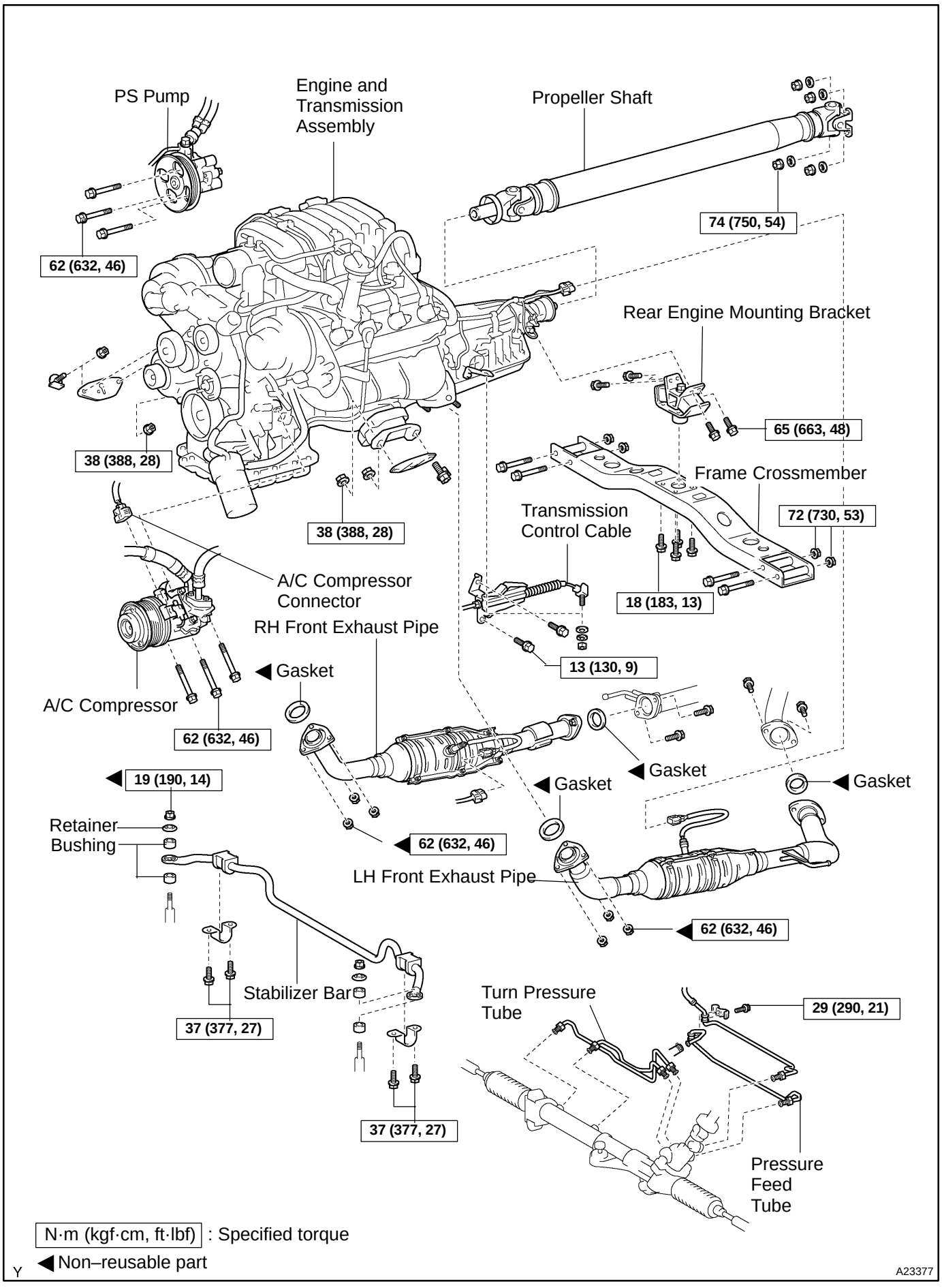
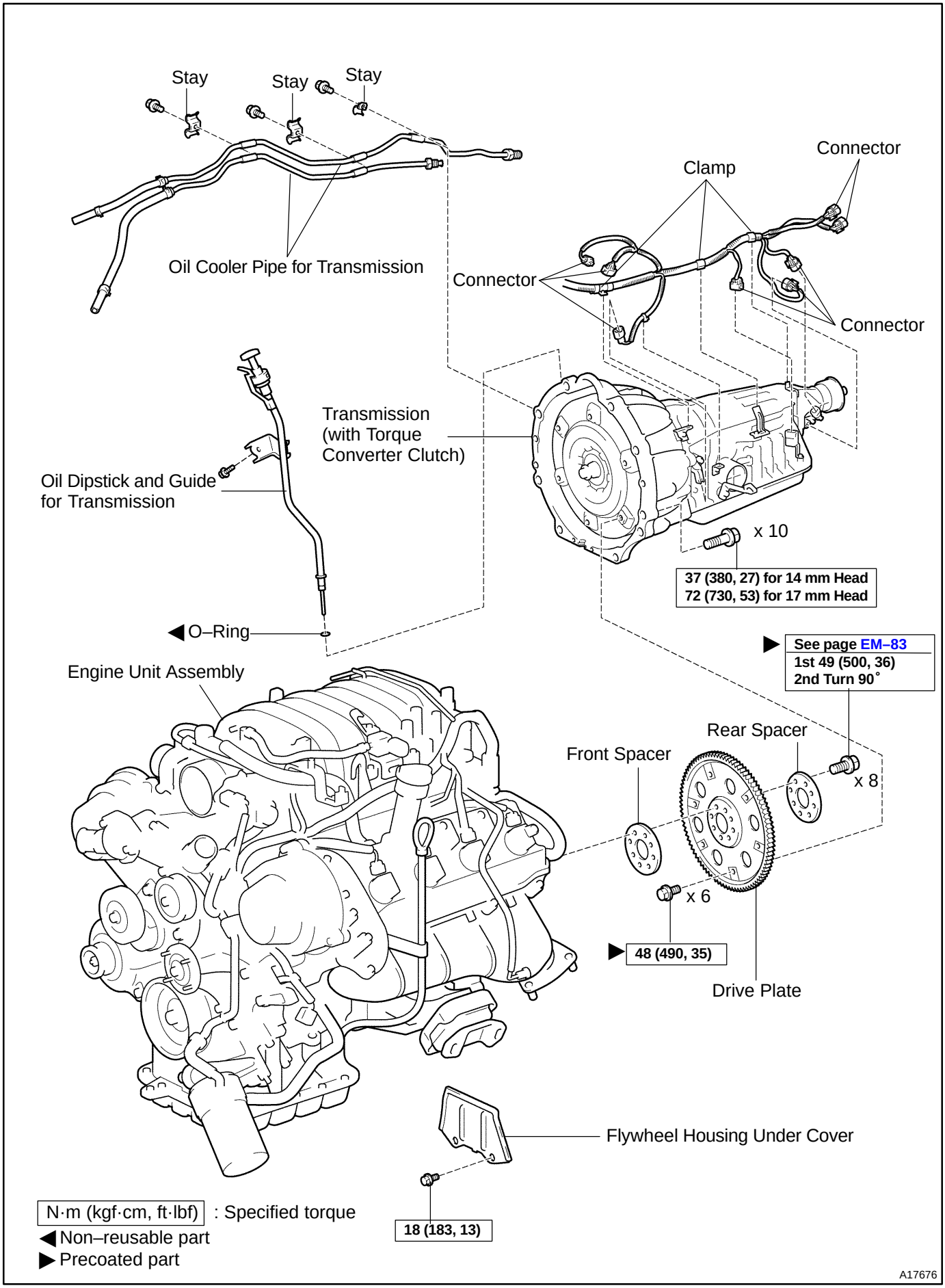

Heater to Register Dust
Lower No.2 Finish Panel
ECM and Bracket Assembly
ECM Connector
Wire Harness Connector (Cassette Connector)
Glove Compartment Door
P
A08928


Ground Strap
Engine Wire Clamp
Heater Hose
Engine Wire
Heater Hose
w/o Hydraulic Brake Booster:
Brake Booster Tube
EVAP Hose
Generator
Connector
Fuel Return
Hose
Fuel Inlet
Hose
Battery
Negative
(–) Cable
Generator Wire
Clamp
Battery
Positive (+)
Terminal
Y
A23366

Dardoor.com


PS Pump
Engine and Transmission Assembly
Propeller Shaft
62 (632, 46)
74 (750, 54)
Rear Engine Mounting Bracket
65 (663, 48)
38 (388, 28)
38 (388, 28)
Frame Crossmember
72 (730, 53)
Transmission Control Cable
18 (183, 13)
13 (130, 9)
A/C Compressor Connector
RH Front Exhaust Pipe
Gasket
A/C Compressor
62 (632, 46)
Gasket
Gasket
Gasket
19 (190, 14)
Retainer
Bushing
62 (632, 46)
LH Front Exhaust Pipe
62 (632, 46)
Stabilizer Bar
37 (377, 27)
Turn Pressure Tube
29 (290, 21)
37 (377, 27)
Pressure Feed Tube
N·m (kgf·cm, ft·lbf) : Specified torque
◀ Non–reusable part
Y
A23377

Dardoor.com


Stay
Stay
Stay
Oil Cooler Pipe for Transmission
Clamp
Connector
Connector
Connector
Transmission
(with Torque
Converter Clutch)
Oil Dipstick and Guide
for Transmission
x 10
37 (380, 27) for 14 mm Head
72 (730, 53) for 17 mm Head
◀ O–Ring
▶ See page EM–83
1st 49 (500, 36)
2nd Turn 90°
Engine Unit Assembly
Rear Spacer
Front Spacer
x 8
x 6
▶ 48 (490, 35)
Drive Plate
Flywheel Housing Under Cover
18 (183, 13)
N·m (kgf·cm, ft·lbf) : Specified torque
◀ Non–reusable part
▶ Precoated part
A17676

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EM120–07

REMOVAL

1. REMOVE ENGINE HOOD

2. REMOVE ENGINE UNDER COVER

3. DISCONNECT BATTERY CABLES

(a) Disconnect the clamp on battery negative (–) cable from the No.2 relay box.

(b) Disconnect the battery positive (+) terminal cable.

(c) Disconnect battery negative (–) cable from the left fender apron.

4. DRAIN ENGINE COOLANT

5. REMOVE RADIATOR ASSEMBLY (See page CO–17)

6. REMOVE THROTTLE BODY COVER

7. REMOVE AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

(a) Disconnect the MAF meter connector.

(b) Loosen the 3 bolts, and remove the air cleaner case.

(c) Remove the suction hose from the intake air connector.

(d) Disconnect the PS air hose, air inlet hose for EVAP, PCV hose and MAF meter wire from the air intake connector.

(e) Disconnect the intake air connector from the throttle body.

8. REMOVE DRIVE BELT, FAN, FLUID COUPLING AND FAN PULLEY

(a) Loosen the 4 nuts holding the fluid coupling to the fan bracket.

(b) Remove the drive belt. (See page CH–7)

(c) Remove the 4 nuts, the fan, fluid coupling assembly and fan pulley.

9. DISCONNECT ENGINE WIRE FROM CABIN

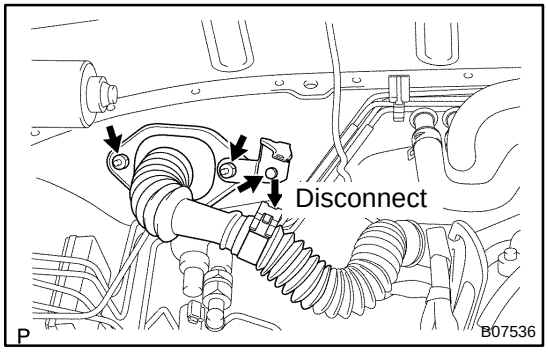
(a) Remove the glove compartment door.

(b) Remove the lower No.2 panel.

(c) Remove the 3 screws, and disconnect the ECM from the body bracket.

(d) Disconnect the 3 wire harness connectors from the ECM.

(e) Disconnect the 2 wire harness connectors (cassette connector).



(f) Disconnect the engine wire from the engine wire bracket and remove the bolt, 2 nuts and bracket.

(g) Pull out the engine wire from the cowl panel.

10. DISCONNECT HOSES, WIRES, CONNECTORS, CLAMPS, GROMMET AND CABLES

(a) Disconnect the 2 PS air hoses from hose clamp on the No.3 RH timing belt cover.

(b) Disconnect the generator wire.

(c) Disconnect the generator connector.

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(d) Disconnect the hose clamp for the PS air hose.
(e) Disconnect the PS air hose from the upper intake manifold.
(f) Disconnect the 2 heater hoses.
(g) Disconnect the ground strap from the cowl panel.
(h) Disconnect the fuel inlet hose and clamps.
(i) Disconnect the fuel return hose and clamp.
(j) Disconnect the air inlet hose from the charcoal canister.
(k) Disconnect the EVAP hose from the charcoal canister.
(l) w/o Hydraulic brake booster:
Disconnect the brake booster tube.

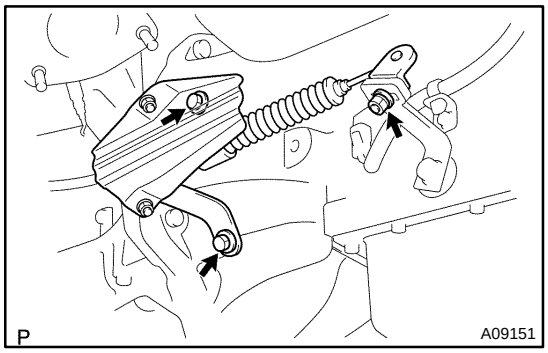
11. REMOVE FRONT EXHAUST PIPES
(See page EM–126)

12. REMOVE PROPELLER SHAFT (See page PR–3)

13. REMOVE FRONT STABILIZER BAR
(See page SA–91)

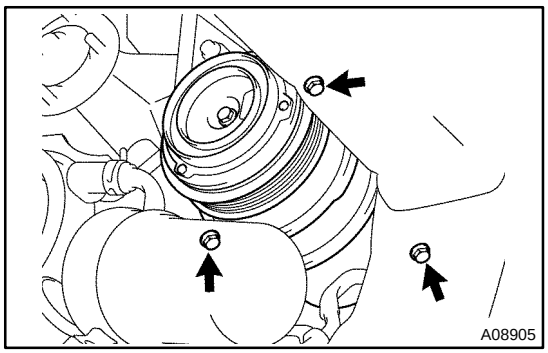
14. DISCONNECT POWER STEERING GEAR PIPES

Disconnect the pressure feed tube, turn tube and pressure tubes from the PS gear assembly.
(See page SR–40, SR–41)



15. REMOVE TRANSMISSION CONTROL CABLE

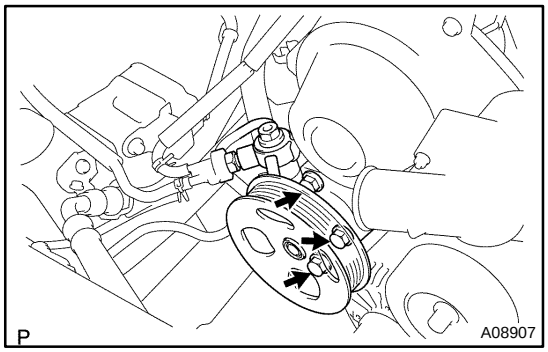
(a) Remove the 2 bolts and control cable bracket from the transmission.
(b) Remove the control cable from the control shift lever.



16. DISCONNECT A/C COMPRESSOR FROM ENGINE

(a) Disconnect the A/C compressor connector.
(b) Remove the 3 bolts, and disconnect the A/C compressor from the engine.

HINT:
Suspend the A/C compressor securely.



17. DISCONNECT PS PUMP FROM ENGINE

Remove the 3 bolts, and disconnect the PS pump from the engine.
HINT:
Suspend the PS pump securely.

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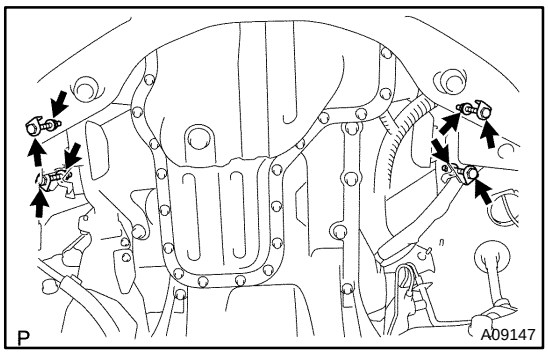
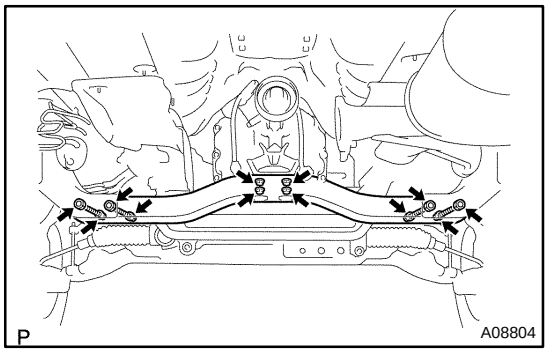


18. REMOVE ENGINE MOUNTING BRACKETS

(a) Attach the engine chain hoist to the engine hangers.

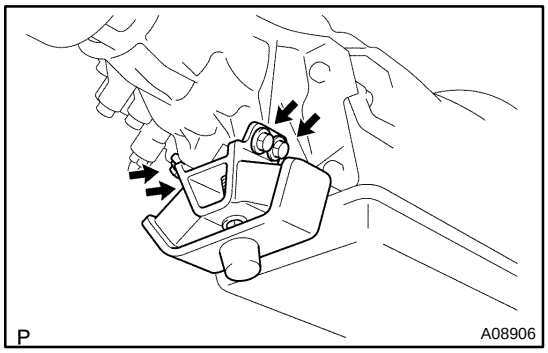
(b) Remove the 4 nuts and 4 bolts holding the engine mounting brackets to the frame brackets.

19. PLACE JACK UNDER TRANSMISSION

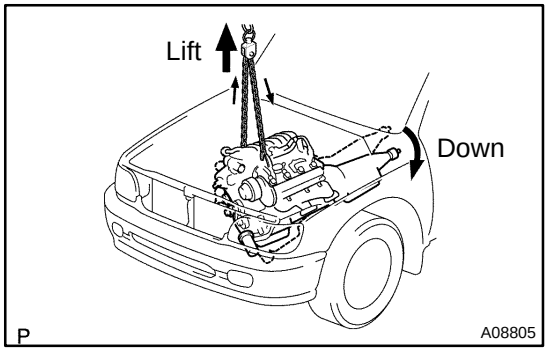


20. REMOVE ENGINE REAR MOUNTING BRACKET

(a) Remove the 8 bolts, 2 nuts and frame crossmember.



(b) Remove the 4 bolts and engine rear mounting bracket from the transmission.



21. REMOVE ENGINE AND TRANSMISSION ASSEMBLY FROM VEHICLE

(a) Lift the engine out of the vehicle slowly and carefully.

HINT:

Make sure the engine is clear of all wiring, hoses and cables.

(b) Place the engine and transmission assembly onto the stand.

22. DISCONNECT ENGINE WIRE FROM TRANSMISSION

(a) Disconnect the 5 connectors.

(b) Disconnect the 2 wire clamps.

23. REMOVE OIL DIPSTICK GUIDE AND DIPSTICK FOR TRANSMISSION

(a) Disconnect the 2 breather hoses from the dipstick guide.

(b) Remove the 2 bolts.

(c) Pull out the dipstick guide and dipstick from the dipstick tube of transmission.

(d) Remove the O–ring from the dipstick guide.

24. REMOVE OIL COOLER PIPES FOR TRANSMISSION

(a) Remove the 3 bolts and 3 stays.

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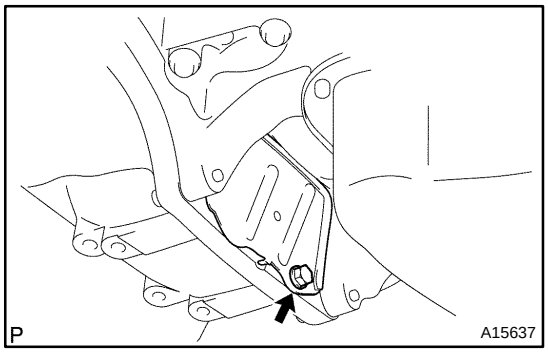
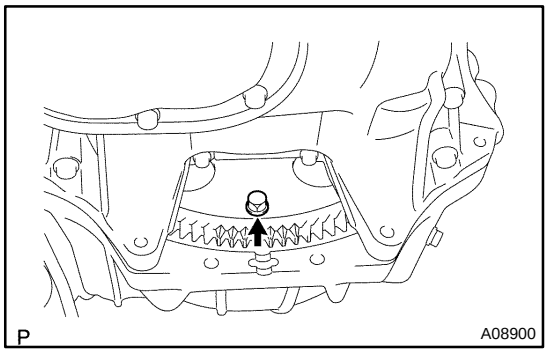
(b) Loosen the 2 union nuts, and remove the 2 oil cooler pipes.



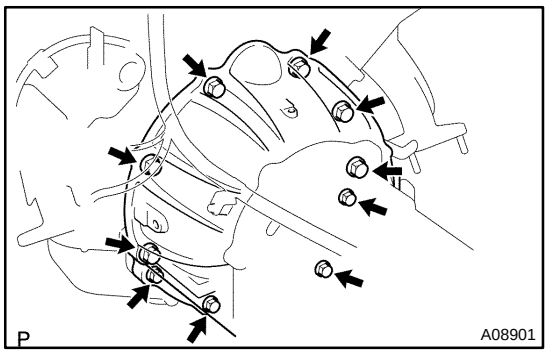
25. REMOVE TORQUE CONVERTER CLUTCH BOLTS

(a) Remove the bolt and flywheel housing under cover.



(b) Turn the crankshaft pulley bolt to gain access to each bolt.

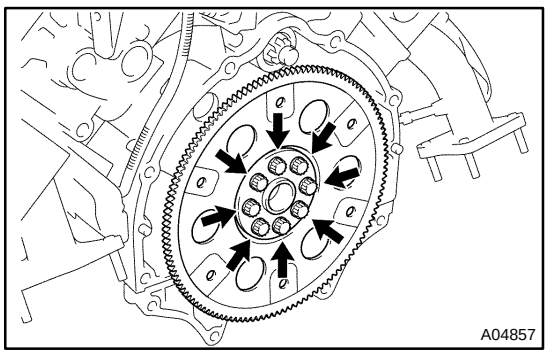
(c) Hold the crankshaft pulley bolt with a wrench, and remove the 6 bolts.



26. REMOVE TRANSMISSION

(a) Remove the 10 bolts.

(b) Remove the transmission together with the torque converter clutch from the engine.



27. REMOVE DRIVE PLATE

Remove the 8 bolts, front spacer, drive plate and rear spacer.

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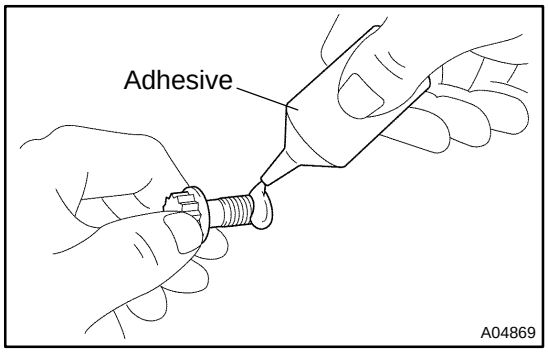
EM121–07

INSTALLATION

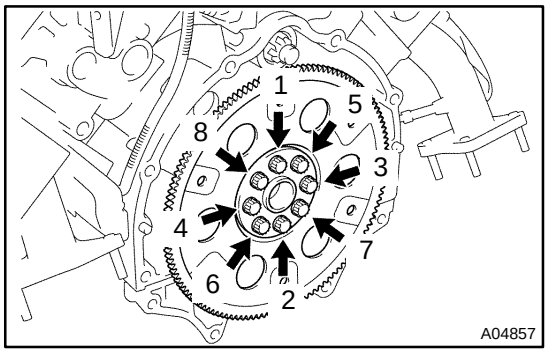
1. INSTALL DRIVE PLATE

HINT:

- ▶ The mounting bolts are tightened in 2 progressive steps (steps (c) and (e)).
- ▶ If any one of the mounting bolts is broken or deformed, replace it.

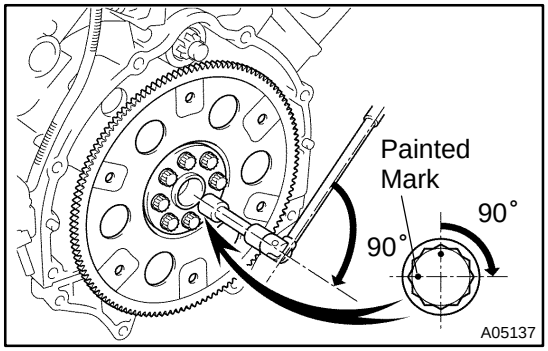


(a) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent



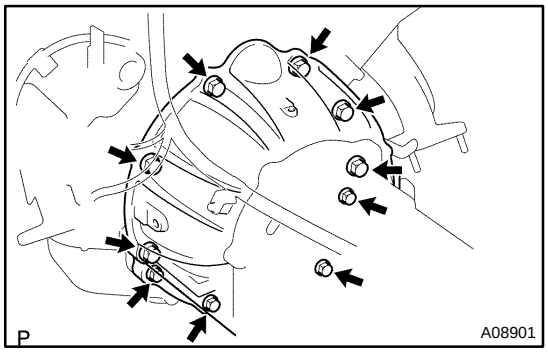
(b) Install the front spacer, drive plate and rear spacer on the crankshaft.
(c) Install and uniformly tighten the 8 mounting bolts in several passes, in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

If any one of the mounting bolts does not meet the torque specification, replace the mounting bolt.



(d) Mark the mounting bolt with paint.
(e) Retighten the mounting bolts by 90° in the numerical order shown.
(f) Check that the painted mark is now at a 90° angle to (e).

2. INSTALL TRANSMISSION TO ENGINE



(a) Check the torque converter clutch installation.
(See page AT–29)
(b) Attach the transmission to the engine.
(c) Install the 10 bolts.
Torque:
37 N·m (380 kgf·cm, 27 ft·lbf) for 14 mm head
72 N·m (730 kgf·cm, 53 ft·lbf) for 17 mm head

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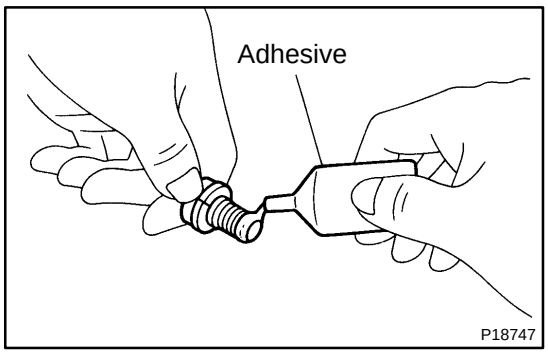
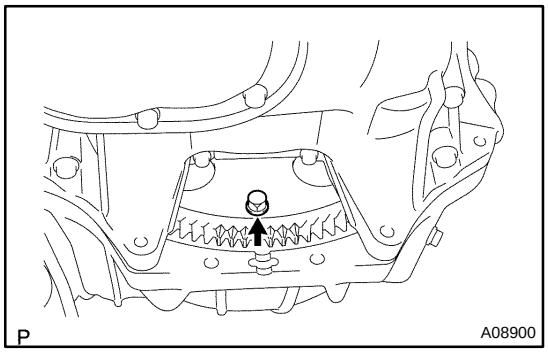


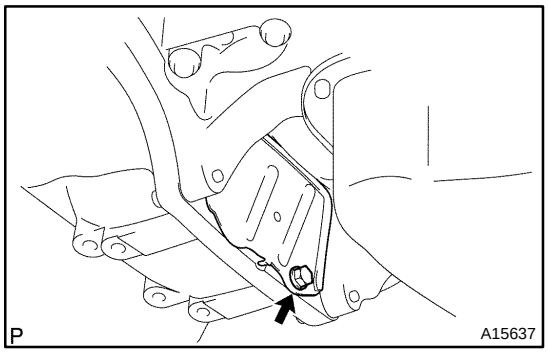
3. INSTALL TORQUE CONVERTER CLUTCH BOLTS

(a) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Hold the crankshaft pulley bolt with a wrench, and install the 6 bolts evenly.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

HINT:
First install the black colored bolt, install the other bolts.



(c) Install the flywheel housing under cover with the bolt.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

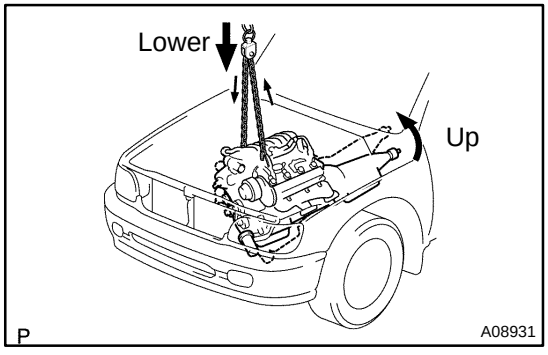
4. INSTALL OIL COOLER PIPE FOR TRANSMISSION

5. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK FOR TRANSMISSION

(a) Install a new O–ring to the dipstick guide.
(b) Apply soapy water to the O–ring.
(c) Connect the dipstick guide end to the dipstick tube of the oil pan.
(d) Install the dipstick guide with the bolt.
(e) Install the dipstick.
(f) Connect the 2 breather hoses to the dipstick guide.

6. CONNECT ENGINE WIRE TO TRANSMISSION

(a) Connect the 5 connectors.
(b) Connect the 2 wire clamps.



7. INSTALL ENGINE AND TRANSMISSION ASSEMBLY IN VEHICLE

(a) Attach the engine chain hoist to the engine hangers.
(b) Slowly lower the engine and transmission assembly into the engine compartment.
(c) Attach the engine mounting brackets to the frame brackets.

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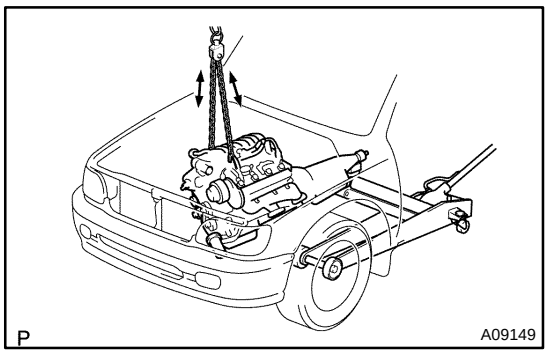
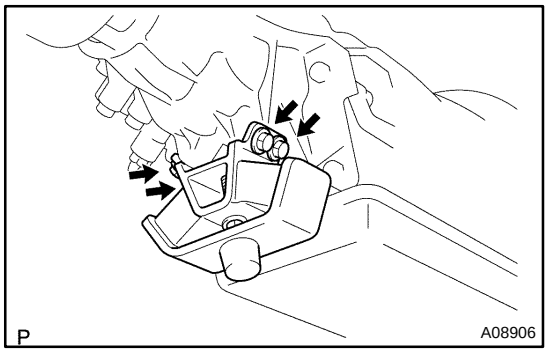
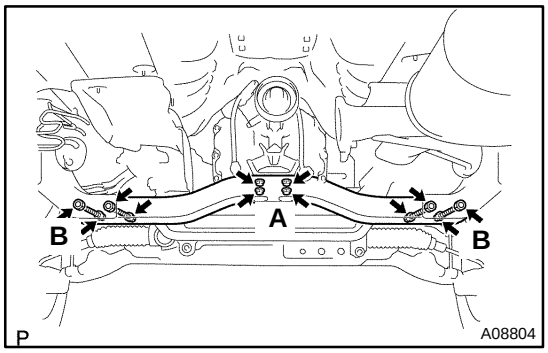


(d) Keep the engine level with a jack.

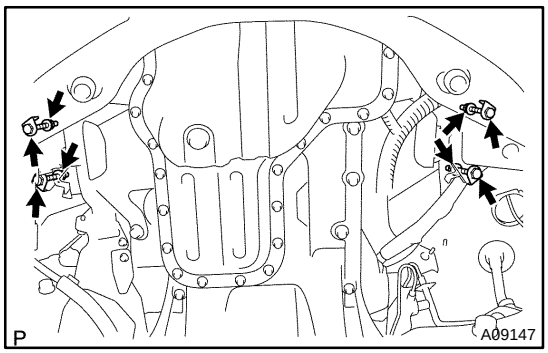


8. INSTALL ENGINE REAR MOUNTING BRACKET

(a) Install the engine rear mounting bracket to the transmission with the 4 bolts.
Torque: 65 N·m (663 kgf·cm, 48 ft·lbf)



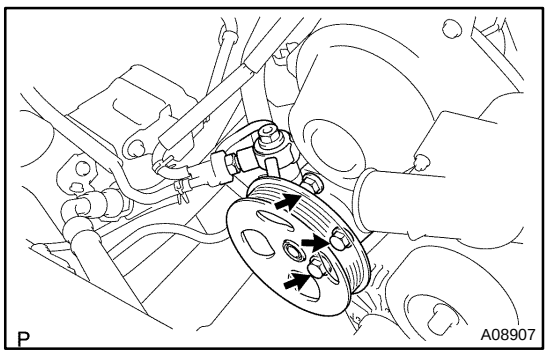
(b) Install the frame crossmember with the 8 bolts and 4 nuts.
Torque:
A: 18 N·m (183 kgf·cm, 13 ft·lbf) for bolts
B: 72 N·m (730 kgf·cm, 53 ft·lbf) for nuts



9. INSTALL ENGINE MOUNTING BRACKETS

(a) Install the engine mounting brackets to the frame brackets with the 2 nuts and 4 bolts.
Torque: 38 N·m (388 kgf·cm, 28 ft·lbf)

(b) Remove the engine chain hoist.



10. INSTALL PS PUMP

Install the PS pump with the 3 bolts.
Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)

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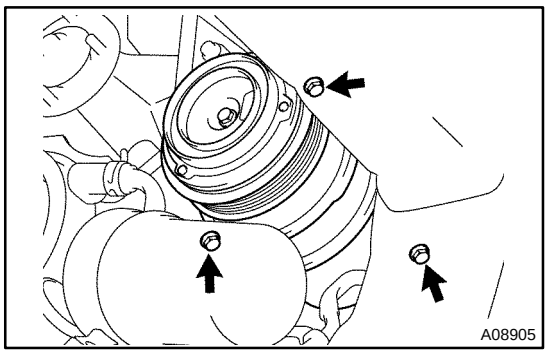
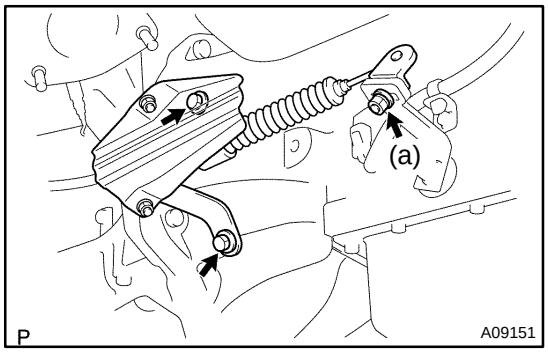


11. INSTALL A/C COMPRESSOR

(a) Install the A/C compressor with the 3 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Connect the A/C compressor connector.



12. INSTALL TRANSMISSION CONTROL CABLE

(a) Install the control cable to the control shift lever.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Install the control cable bracket to the transmission with the 2 bolts.

13. CONNECT POWER STEERING GEAR PIPES

Connect the pressure feed tube, turn tube and turn pressure tubes to the PS gear assembly. (See page SR–40, SR–41)

14. INSTALL FRONT STABILIZER BAR
(See page SA–93)

15. INSTALL PROPELLER SHAFT (See page PR–5)

16. INSTALL FRONT EXHAUST PIPES
(See page EM–126)

17. CONNECT HOSES, WIRES, CONNECTORS, CLAMPS, GROMMET AND CABLES

(a) Connect the 2 PS air hoses to hose clamp on the No.3 RH timing belt cover.
(b) Connect the generator wire.
(c) Connect the generator connector.
(d) Connect the hose clamp for the PS air hose.
(e) Connect the PS air hose to the upper intake manifold.
(f) Connect the 2 heater hoses.
(g) Connect the ground strap connector.
(h) Connect the fuel inlet hose and clamps.
(i) Connect the fuel return hose and clamp.
(j) Connect the air inlet hose to the charcoal canister.
(k) Connect the EVAP hose to the charcoal canister.
(l) Connect the brake booster tube.

18. CONNECT ENGINE WIRE TO CABIN

(a) Push into the engine wire through the cowl panel.

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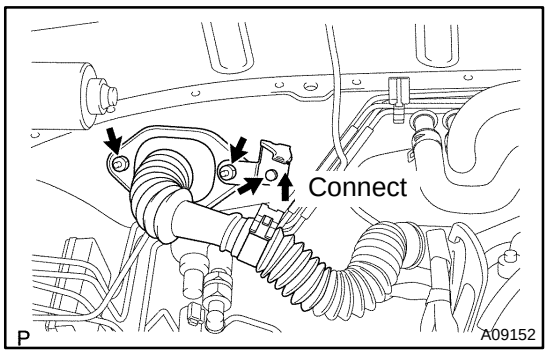

(b) Install the engine wire bracket with the 2 nuts and bolt and connect the engine wire to the bracket.
(c) Connect the 2 wire harness connectors (cassette connector).
(d) Connect the 3 connectors to the ECM.
(e) Install the ECM with the 3 screws.
(f) Install the lower No.2 panel.
(g) Install the glove compartment door.

19. INSTALL FAN PULLEY, FAN, FLUID COUPLING AND DRIVE BELT

(a) Temporarily install the fan pulley, the fan and fluid coupling assembly with the 4 nuts.
(b) Install the drive belt. (See page CH–16)
(c) Tighten the 4 nuts holding the fluid coupling to the fan bracket.

20. INSTALL AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

(a) Install the air cleaner with the 3 bolt.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)
(b) Connect the intake air connector to the throttle body.
(c) Connect the MAF meter connector.
(d) Install the suction hose to the intake air connector.
(e) Connect the PS air hose, air inlet hose for EVAP, PCV hose and MAF meter wire to the air intake connector.

21. INSTALL THROTTLE BODY COVER

22. INSTALL RADIATOR ASSEMBLY (See page CO–18)

23. INSTALL BATTERY CABLES

(a) Connect the clamp on battery negative (–) cable to No.2 relay box.
(b) Connect the battery positive (+) terminal cable.
(c) Connect the battery negative cable to the left fender apron.

24. PERFORM INITIALIZATION

Some system need initialzation when disconnecting the cable from the battery terminal.

25. FILL WITH ENGINE COOLANT (See page CO–2)

26. FILL WITH ENGINE OIL (See page LU–2)

27. START ENGINE AND CHECK FOR LEAKS

28. INSTALL ENGINE UNDER COVER

29. INSTALL HOOD

30. PERFORM ROAD TEST

Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

31. RECHECK ENGINE COOLANT AND OIL LEVELS

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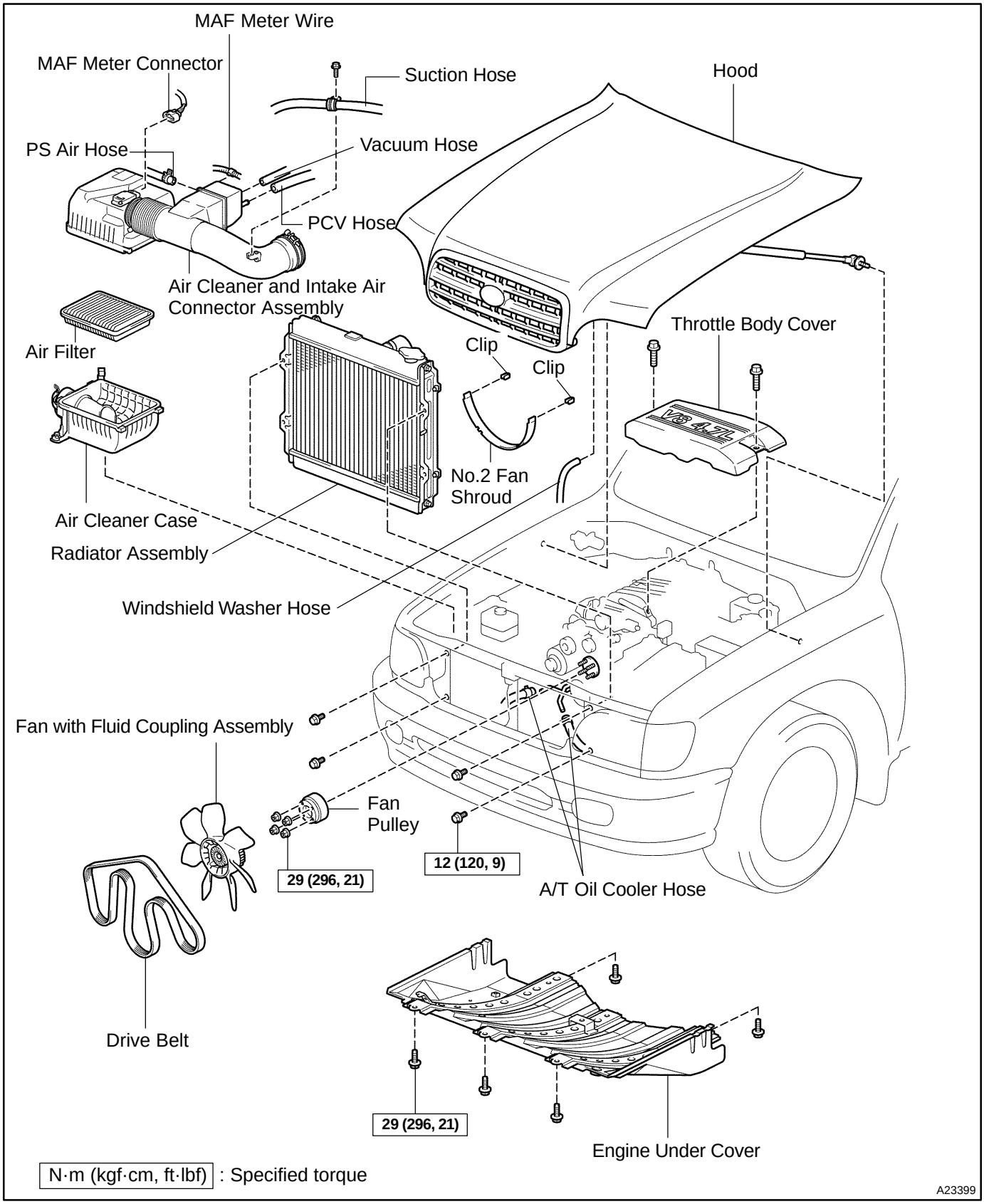
ENGINE UNIT (4WD)

COMPONENTS

EM1O7–04



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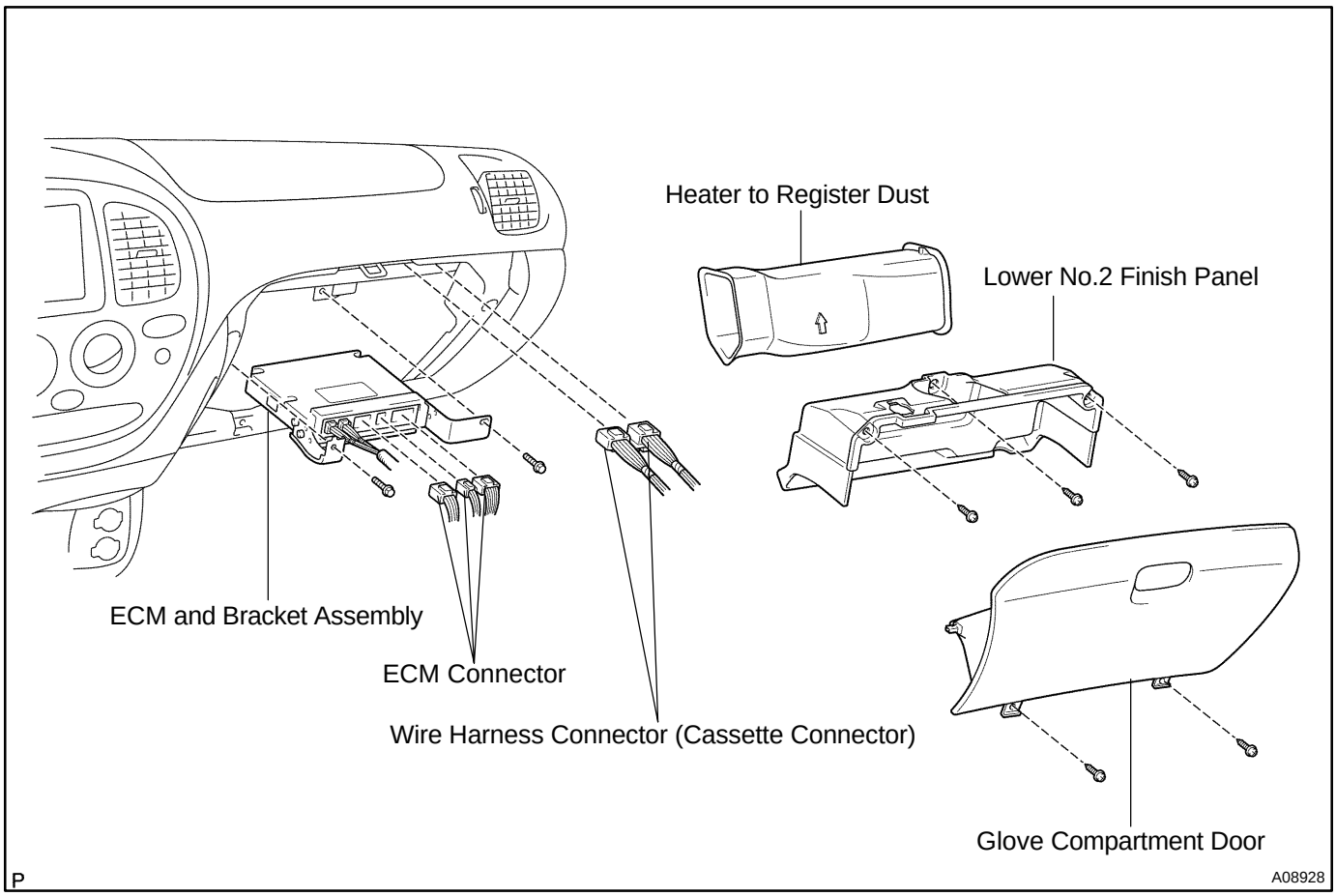
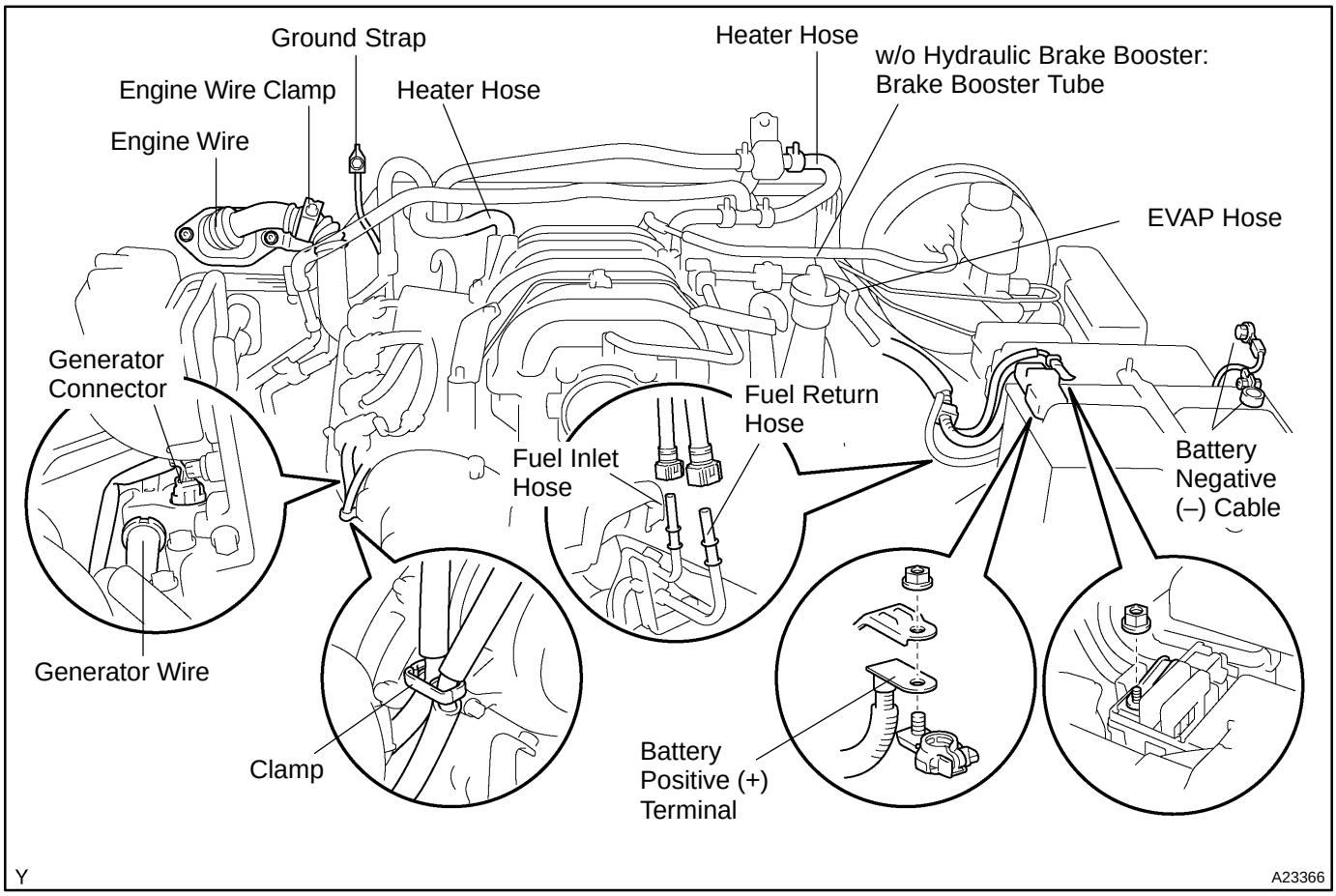

Heater to Register Dust
Lower No.2 Finish Panel
ECM and Bracket Assembly
ECM Connector
Wire Harness Connector (Cassette Connector)
Glove Compartment Door
P
A08928


Ground Strap
Heater Hose
Engine Wire Clamp
Engine Wire
Heater Hose
w/o Hydraulic Brake Booster:
Brake Booster Tube
EVAP Hose
Generator
Connector
Fuel Return
Hose
Fuel Inlet
Hose
Battery
Negative
(–) Cable
Generator Wire
Clamp
Battery
Positive (+)
Terminal
Y
A23366

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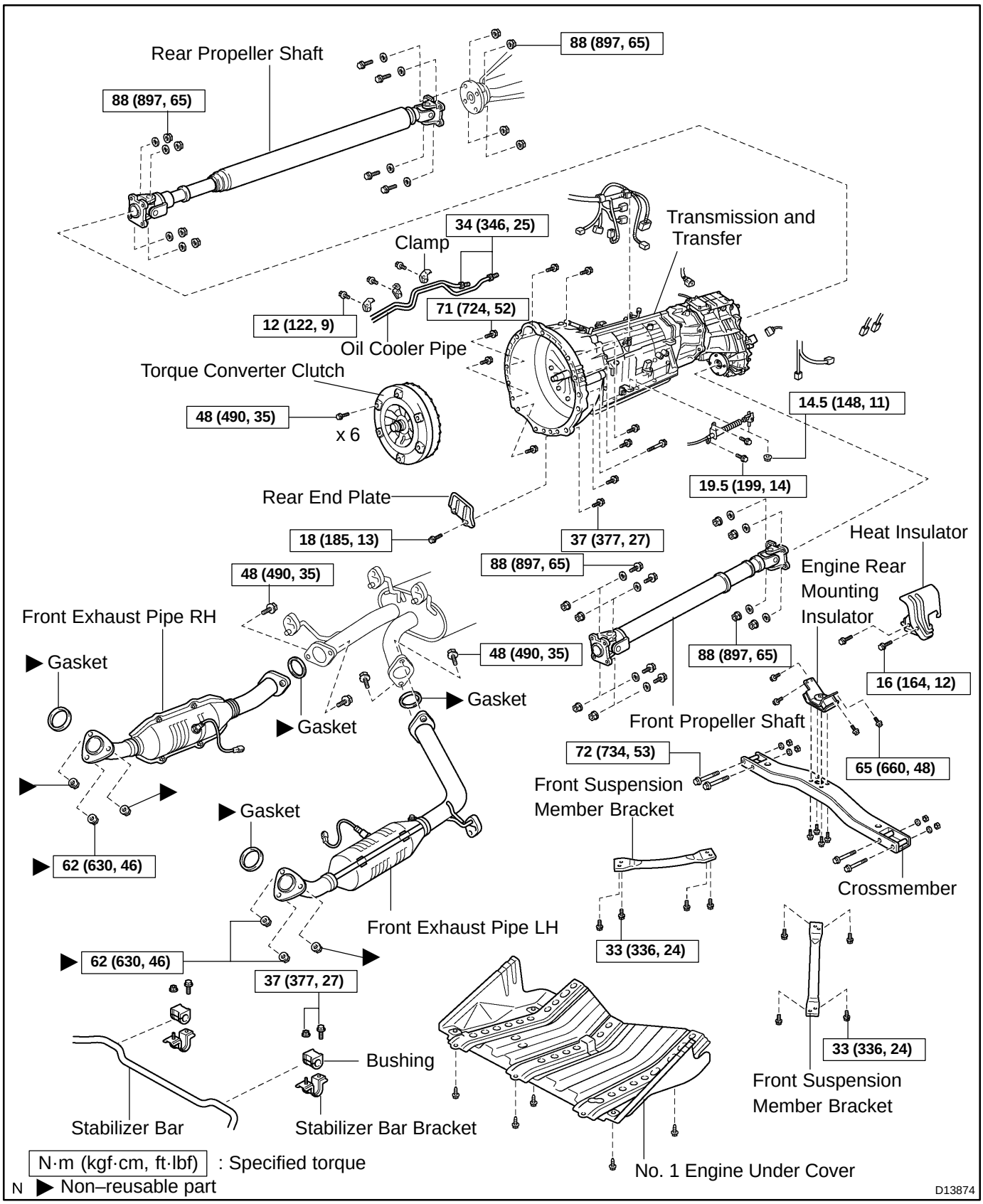
Rear Propeller Shaft
88 (897, 65)
88 (897, 65)
34 (346, 25)
Clamp
Transmission and Transfer
12 (122, 9)
71 (724, 52)
Oil Cooler Pipe
Torque Converter Clutch
48 (490, 35)
x 6
14.5 (148, 11)
19.5 (199, 14)
Rear End Plate
18 (185, 13)
37 (377, 27)
88 (897, 65)
Heat Insulator
Engine Rear Mounting Insulator
48 (490, 35)
Front Exhaust Pipe RH
▶ Gasket
48 (490, 35)
88 (897, 65)
16 (164, 12)
▶ Gasket
▶ Gasket
Front Propeller Shaft
72 (734, 53)
65 (660, 48)
Front Suspension Member Bracket
▶ Gasket
▶ 62 (630, 46)
Crossmember
Front Exhaust Pipe LH
33 (336, 24)
▶ 62 (630, 46)
37 (377, 27)
Bushing
33 (336, 24)
Front Suspension Member Bracket
Stabilizer Bar
Stabilizer Bar Bracket
No. 1 Engine Under Cover
N·m (kgf·cm, ft·lbf) : Specified torque
N ▶ Non–reusable part
D13874

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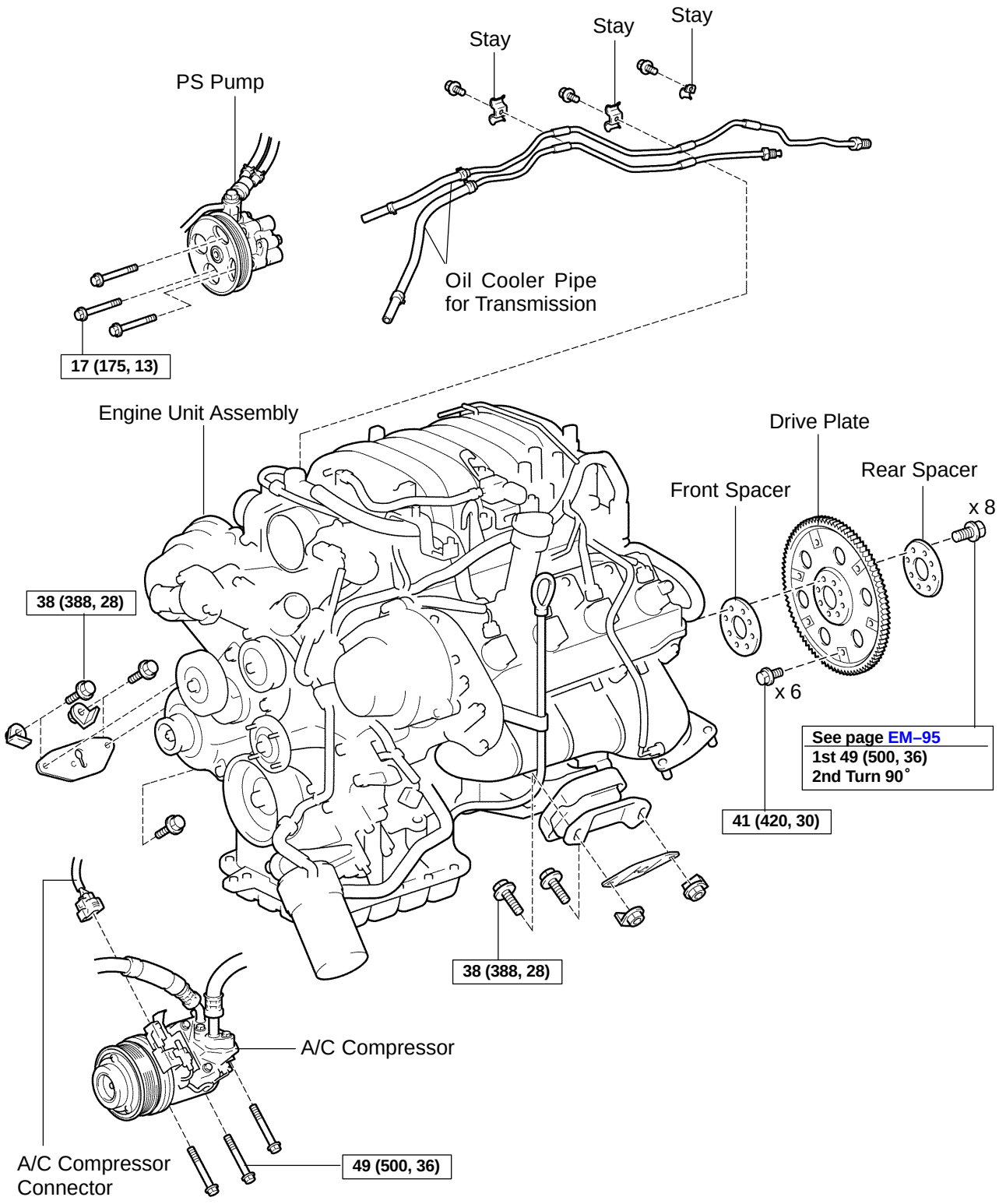

N·m (kgf·cm, ft·lbf) : Specified torque

B17615

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EM11X–07

REMOVAL

1. REMOVE FRONT EXHAUST PIPES
(See page EM–126)

2. REMOVE FRONT AND REAR PROPELLER SHAFTS
(See page PR–7)

3. REMOVE FRONT STABILIZER BAR
(See page SA–91)

4. REMOVE TRANSMISSION (See page AT–25)

5. REMOVE ENGINE HOOD

6. REMOVE ENGINE UNDER COVER

7. DISCONNECT BATTERY CABLES

(a) Disconnect the clamp on battery negative (–) cable from the No.2 relay box.

(b) Disconnect the battery positive (+) terminal cable.

(c) Disconnect the battery negative (–) cable from the left fender apron.

8. DRAIN ENGINE COOLANT

9. REMOVE RADIATOR ASSEMBLY (See page CO–17)

10. REMOVE THROTTLE BODY COVER

11. REMOVE AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

(a) Disconnect the MAF meter connector.

(b) Loosen the 3 bolts, and remove the air cleaner case.

(c) Remove the suction hose from the intake air connector.

(d) Disconnect the PS air hose, air inlet hose for EVAP, PCV hose and MAF meter wire from the air intake connector.

(e) Disconnect the intake air connector from the throttle body.

12. REMOVE DRIVE BELT, FAN, FLUID COUPLING AND FAN PULLEY

(a) Loosen the 4 nuts holding the fluid coupling to the fan bracket.

(b) Remove the drive belt. (See page CH–16)

(c) Remove the 4 nuts, the fan, fluid coupling assembly and fan pulley.

13. DISCONNECT ENGINE WIRE FROM CABIN

(a) Remove the glove compartment door.

(b) Remove the lower No.2 panel.

(c) Remove the 3 screws, and disconnect the ECM from the body bracket.

(d) Disconnect the 3 wire harness connectors from the ECM.

(e) Disconnect the 2 wire harness connectors (cassette connector).

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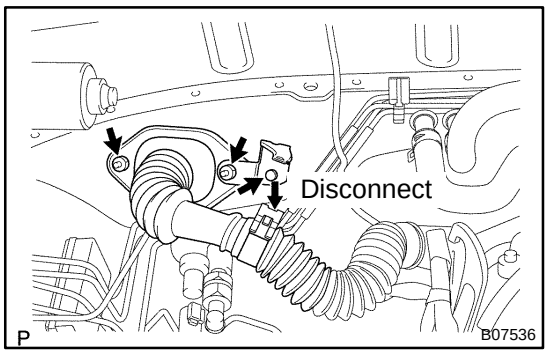
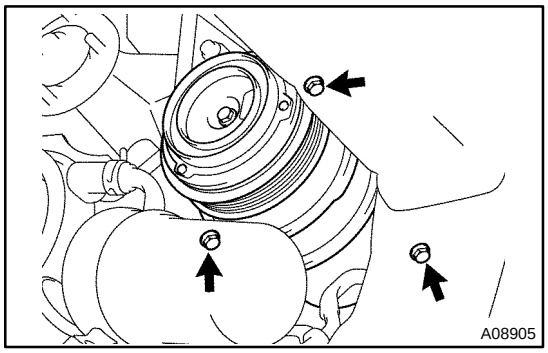


(f) Disconnect the engine wire from the engine wire bracket and remove the 2 nuts, bolt and bracket.
(g) Pull out the engine wire from the cowl panel.

14. DISCONNECT HOSES, WIRES, CONNECTORS, CLAMPS, GROMMET AND CABLES

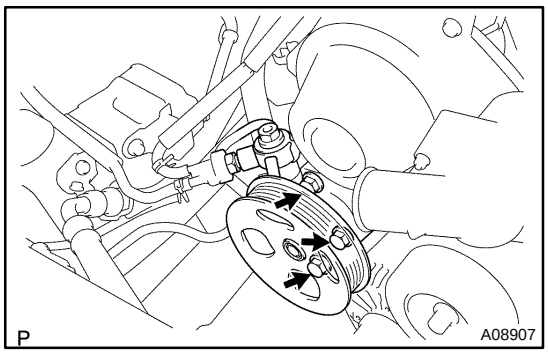
(a) Disconnect the 2 PS air hoses from hose clamp on the No.3 RH timing belt cover.
(b) Disconnect the generator wire.
(c) Disconnect the generator connector.
(d) Disconnect the hose clamp for the PS air hose.
(e) Disconnect the PS air hose from the upper intake manifold.
(f) Disconnect the 2 heater hoses.
(g) Disconnect the ground strap from the cowl panel.
(h) Disconnect the fuel inlet hose and clamps.
(i) Disconnect the fuel return hose and clamp.
(j) Disconnect the air inlet hose from the charcoal canister.
(k) Disconnect the EVAP hose from the charcoal canister.
(l) Disconnect the brake booster tube.



15. DISCONNECT A/C COMPRESSOR FROM ENGINE

(a) Disconnect the A/C compressor connector.
(b) Remove the 3 bolts, and disconnect the A/C compressor from the engine.

HINT:
Suspend the A/C compressor securely.



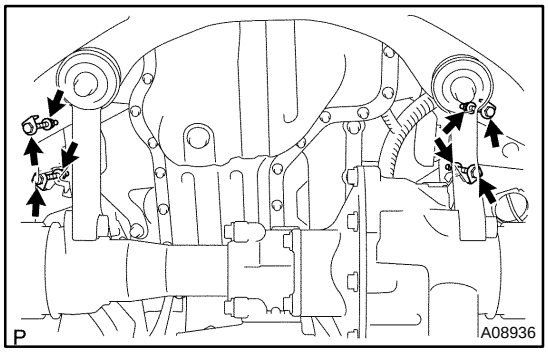
16. DISCONNECT PS PUMP FROM ENGINE

Remove the 3 bolts, and disconnect the PS pump from the engine.

HINT:
Suspend the PS pump securely.

17. REMOVE OIL COOLER PIPES FOR TRANSMISSION

(a) Remove the 3 bolts and 3 stays.
(b) Loosen the 2 union nuts, and remove the 2 oil cooler pipes.



18. REMOVE ENGINE ASSEMBLY FROM VEHICLE

(a) Attach the engine chain hoist to the engine hangers.
(b) Remove the 4 bolts holding the engine mounting brackets to the frame brackets.

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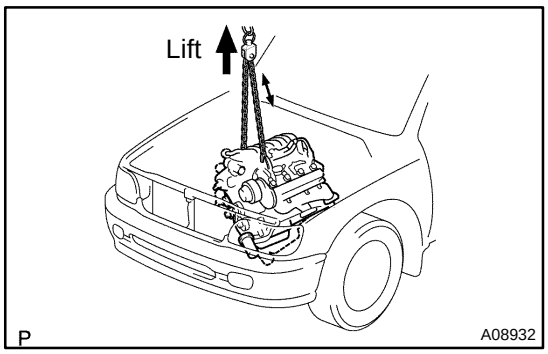
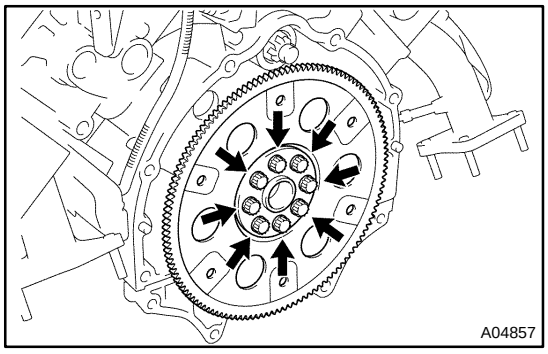


(c) Lift the engine out of the vehicle slowly and carefully.

HINT:

Make sure the engine is clear of all wiring, hoses and cables.

(d) Place the engine and transmission assembly onto the stand.



19. REMOVE DRIVE PLATE

Remove the 8 bolts, front spacer, drive plate and rear spacer.

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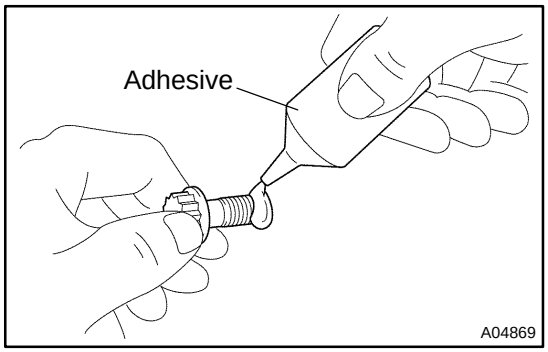
EM11Y–07

INSTALLATION

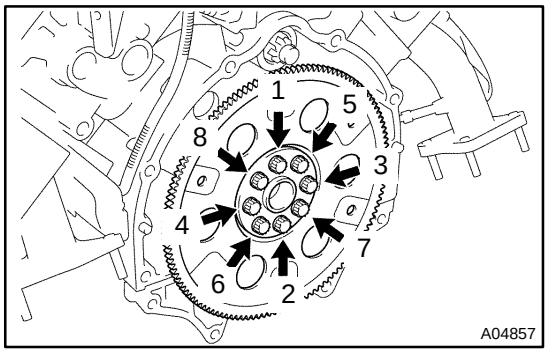
1. INSTALL DRIVE PLATE

HINT:

- ▶ The mounting bolts are tightened in 2 progressive steps (steps (c) and (e)).
- ▶ If any one of the mounting bolts is broken or deformed, replace it.

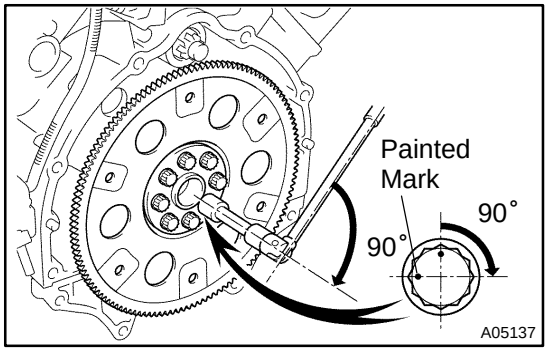


(a) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent



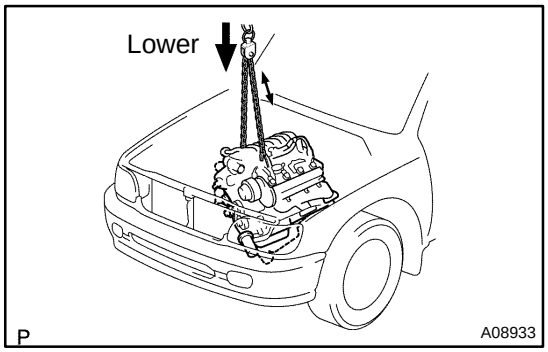
(b) Install the front spacer, drive plate and rear spacer on the crankshaft.
(c) Install and uniformly tighten the 8 mounting bolts in several passes, in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

If any one of the mounting bolts does not meet the torque specification, replace the mounting bolt.



(d) Mark the mounting bolt with paint.
(e) Retighten the mounting bolts by 90° in the numerical order shown.
(f) Check that the painted mark is now at a 90° angle to (e).

2. INSTALL ENGINE ASSEMBLY IN VEHICLE



(a) Attach the engine chain hoist to the engine hangers.
(b) Slowly lower the engine assembly into the engine compartment.
(c) Attach the engine mounting brackets to the frame brackets.

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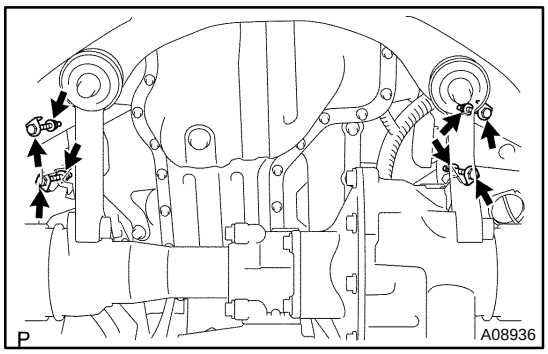
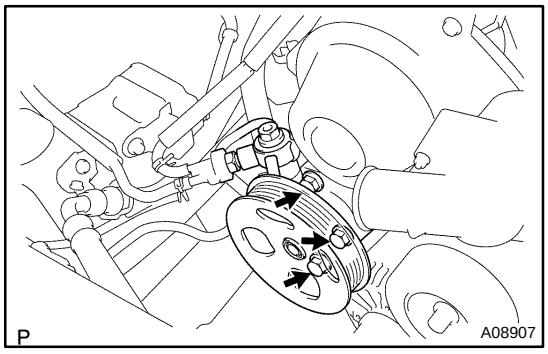
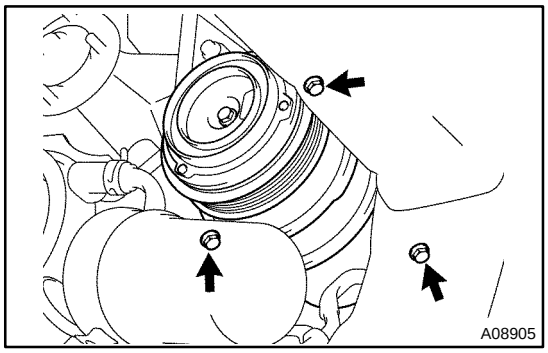


(d) Install the engine mounting brackets to the frame brackets with the 2 nuts and 4 bolts.
Torque: 38 N·m (388 kgf·cm, 28 ft·lbf)
(e) Remove the engine chain hoist.



3. INSTALL PS PUMP
Install the PS pump with the 3 bolts.
Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)



4. INSTALL A/C COMPRESSOR
(a) Install the A/C compressor with the 3 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
(b) Connect the A/C compressor connector.
5. CONNECT HOSES, WIRES, CONNECTORS, CLAMPS, GROMMET AND CABLES
(a) Connect the 2 PS air hoses to hose clamp on the No.3 RH timing belt cover.
(b) Connect the generator wire.
(c) Connect the generator connector.
(d) Connect the hose clamp for the PS air hose.
(e) Connect the PS air hose to the upper intake manifold.
(f) Connect the 2 heater hoses.
(g) Connect the ground strap to the cowl panel.
(h) Connect the fuel inlet hose and clamps.
(i) Connect the fuel return hose and clamp.
(j) Connect the air inlet hose to the charcoal canister.
(k) Connect the EVAP hose to the charcoal canister.
(l) Connect the brake booster tube.
6. CONNECT ENGINE WIRE TO CABIN
(a) Push into the engine wire through the cowl panel.

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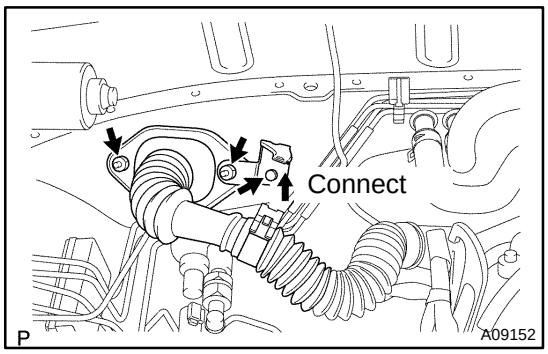

(b) Install the engine wire bracket with the 2 nuts and bolt and connect the engine wire to the bracket.
(c) Connect the 3 connectors to the ECM.
(d) Connect the 2 wire harness connectors (cassette connector).
(e) Install the ECM with the 3 screws.
(f) Install the lower No.2 panel.
(g) Install the glove compartment door.

7. INSTALL FAN PULLEY, FAN, FLUID COUPLING AND DRIVE BELT

(a) Temporarily install the fan pulley, the fan and fluid coupling assembly with the 4 nuts.
(b) Install the drive belt. (See page CH–16)
(c) Tighten the 4 nuts holding the fluid coupling to the fan bracket.

8. INSTALL AIR CLEANER AND INTAKE AIR CONNECTOR PIPE ASSEMBLY

(a) Install the air cleaner case with the 3 bolts.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)
(b) Connect the intake air connector to the throttle body.
(c) Connect the MAF meter connector.
(d) Install the suction hose to the intake air connector.
(e) Connect the PS air hose, air inlet hose for EVAP, PCV hose and MAF meter connector to the intake air connector.

9. INSTALL THROTTLE BODY COVER
10. INSTALL TRANSMISSION (See page AT–29)
11. INSTALL RADIATOR ASSEMBLY (See page CO–18)
12. INSTALL FRONT STABILIZER BAR (See page SA–93)
13. INSTALL FRONT AND REAR PROPELLER SHAFTS (See page PR–9)
14. INSTALL FRONT EXHAUST PIPES (See page EM–126)
15. INSTALL BATTERY CABLES

(a) Connect the battery positive (+) terminal cable.
(b) Connect the battery negative (–) cable to the battery and left fender apron.
(c) Connect the clamp on battery negative (–) cable to No.2 relay box.

16. PERFORM INITIALIZATION

Some system need initialzation when disconnecting the cable from the battery terminal.

17. FILL WITH ENGINE COOLANT (See page CO–2)
18. FILL WITH ENGINE OIL (See page LU–2)
19. START ENGINE AND CHECK FOR LEAKS
20. INSTALL ENGINE UNDER COVERS
21. INSTALL HOOD

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22. PERFORM ROAD TEST

Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

23. RECHECK ENGINE COOLANT AND OIL LEVELS

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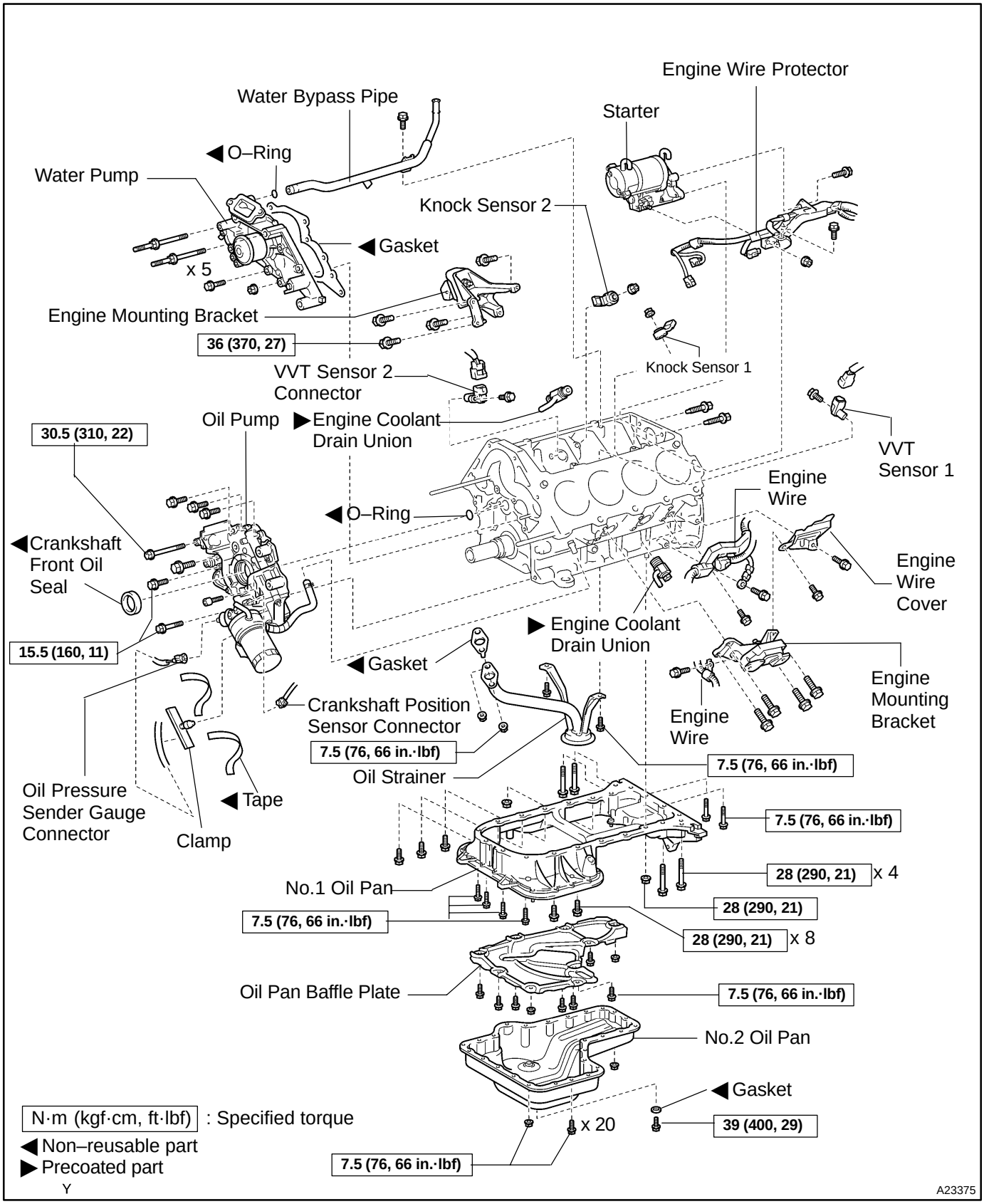
CYLINDER BLOCK

COMPONENTS

EM0E9–17



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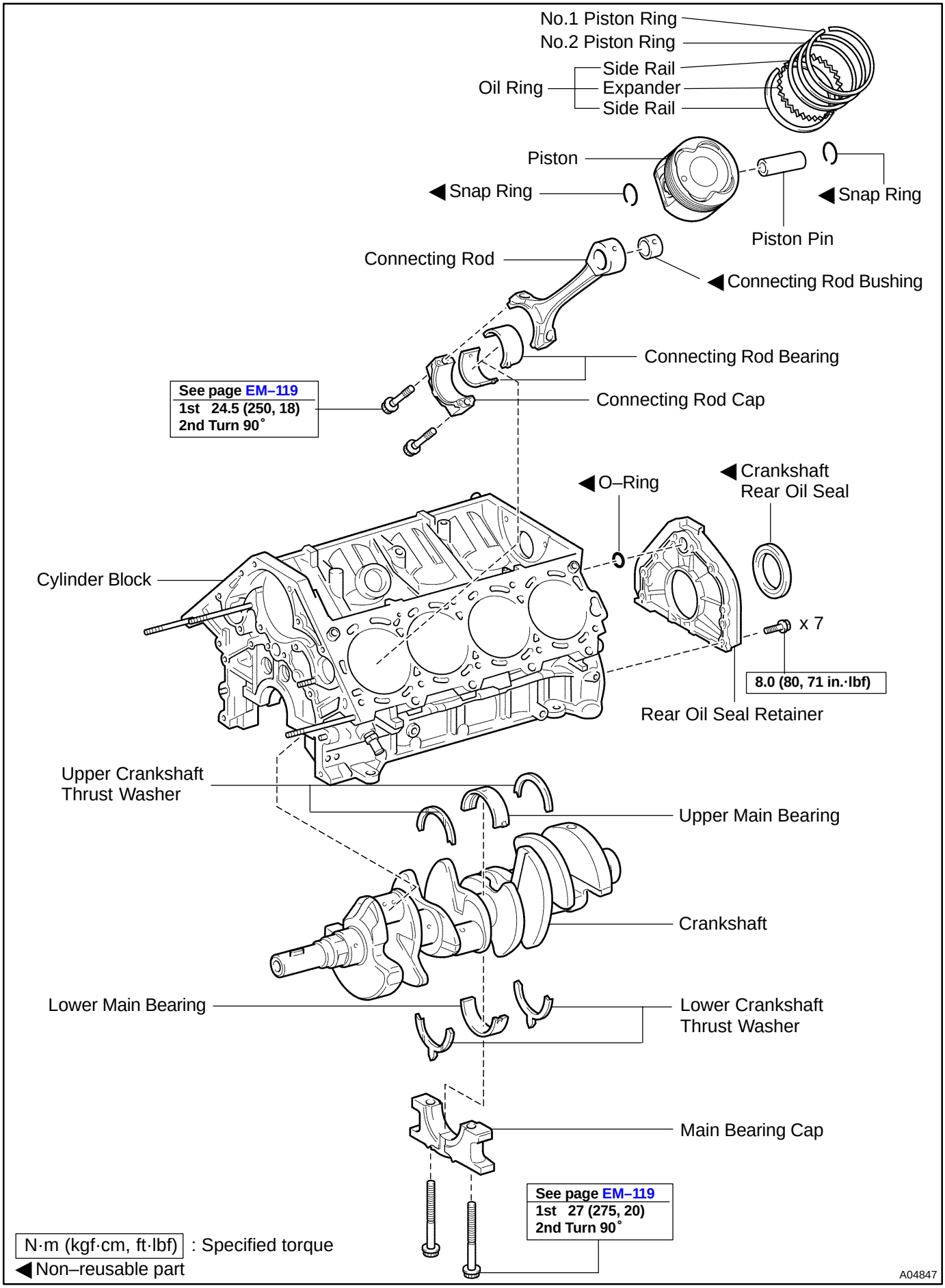
No.1 Piston Ring
No.2 Piston Ring
Oil Ring
Side Rail
Expander
Side Rail
Piston
◀ Snap Ring
◀ Snap Ring
Piston Pin
Connecting Rod
◀ Connecting Rod Bushing
Connecting Rod Bearing
See page EM–119
1st 24.5 (250, 18)
2nd Turn 90°
Connecting Rod Cap
◀ O–Ring
◀ Crankshaft
Rear Oil Seal
Cylinder Block
x 7
8.0 (80, 71 in.·lbf)
Rear Oil Seal Retainer
Upper Crankshaft
Thrust Washer
Upper Main Bearing
Crankshaft
Lower Main Bearing
Lower Crankshaft
Thrust Washer
Main Bearing Cap
See page EM–119
1st 27 (275, 20)
2nd Turn 90°
N·m (kgf·cm, ft·lbf) : Specified torque
◀ Non–reusable part
A04847

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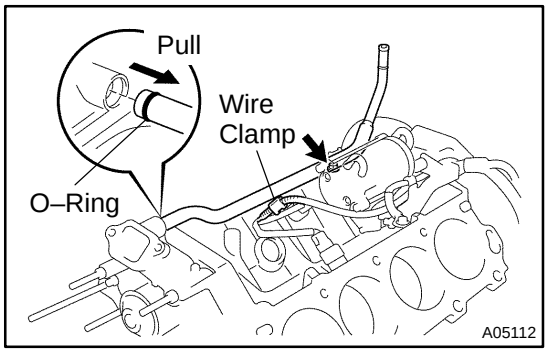
EM122–05

DISASSEMBLY

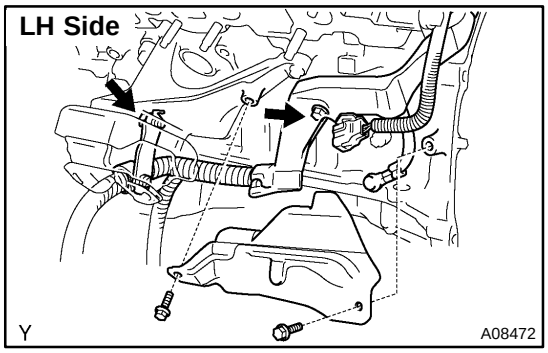
1. **INSTALL ENGINE TO ENGINE STAND**
2. **REMOVE TIMING BELT AND PULLEYS (See page EM–16)**
3. **REMOVE CYLINDER HEAD (See page EM–36)**



4. **REMOVE WATER BYPASS PIPE**

(a) Disconnect the wire clamp (for knock sensor 1, 2) from bracket of the water bypass pipe.
(b) Remove the bolt.
(c) Pull out the water bypass pipe from the water pump.
(d) Remove the O–ring from the water bypass pipe.

5. **REMOVE STARTER (See page ST–5)**
6. **REMOVE KNOCK SENSORS (See page SF–66)**
7. **REMOVE VVT SENSORS (See page SF–77)**



8. **DISCONNECT ENGINE WIRE FROM LH SIDE OF CYLINDER BLOCK**

(a) Remove the 2 bolts and engine wire cover from the LH side of the cylinder block.
(b) Remove the 2 bolts, disconnect the brackets on the engine wire from the cylinder block and engine mounting bracket.

9. **REMOVE OIL COOLER PIPE BRACKET FOR A/T**

Remove the bolt and bracket.

10. **REMOVE ENGINE MOUNTING BRACKETS**

Remove the 4 bolts and mounting bracket. Remove the 2 mounting brackets.

11. **REMOVE WATER PUMP (See page CO–6)**
12. **REMOVE NO.2 OIL PAN (See page LU–8)**
13. **REMOVE OIL PAN BAFFLE PLATE**
14. **REMOVE NO.1 OIL PAN (See page LU–8)**
15. **REMOVE OIL STRAINER**
16. **REMOVE OIL PUMP (See page LU–8)**
17. **REMOVE ENGINE COOLANT DRAIN UNIONS**

Remove the 2 drain unions.

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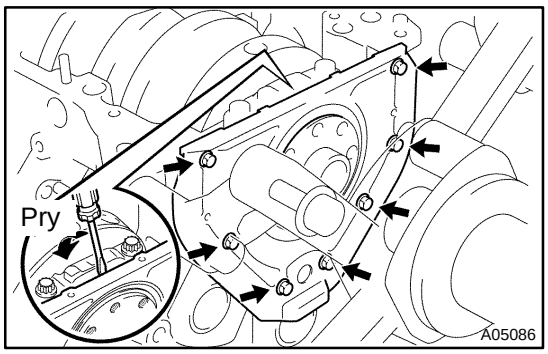
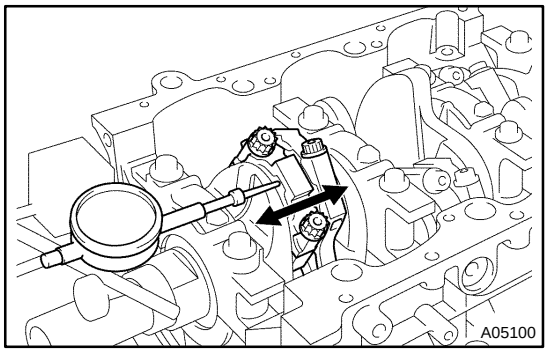


18. REMOVE REAR OIL SEAL RETAINER

(a) Remove the 7 bolts.

(b) Using a screwdriver, remove the oil seal retainer by prying the portion between the oil seal retainer and main bearing cap.

(c) Remove the O–ring.



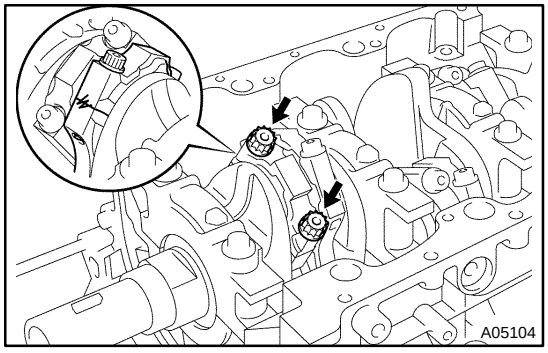
19. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back an forth.

Standard thrust clearance:
0.160 to 0.290 mm (0.0063 to 0.0114 in.)
Maximum thrust clearance: 0.35 mm (0.0138 in.)

If the thrust clearance is greater than maximum, replace the connecting rod assembly(s). If necessary, replace the crankshaft.

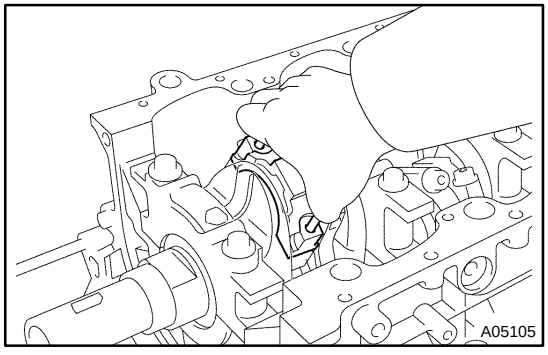
Connecting rod thickness:
22.880 to 22.920 mm (0.9008 to 0.9024 in.)



20. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

(a) Check the matchmarks on the connecting rod and see it cap to ensure correct reassembly.

(b) Remove the 2 connecting rod cap bolts.



(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

HINT:

Keep the lower bearing inserted with the connecting rod cap.

(d) Clean the crank pin and bearing.

(e) Check the crank pin and bearing for peeling and scratches.

If the crank pin or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.

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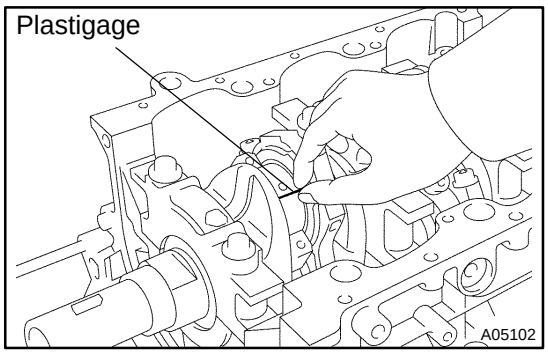
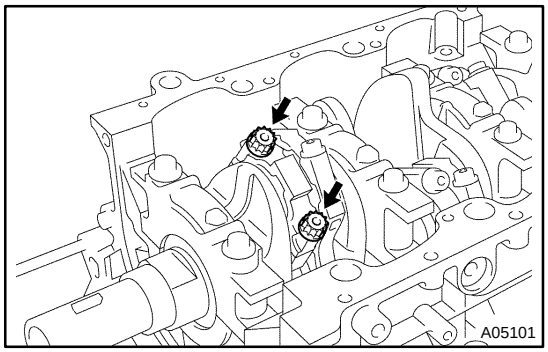


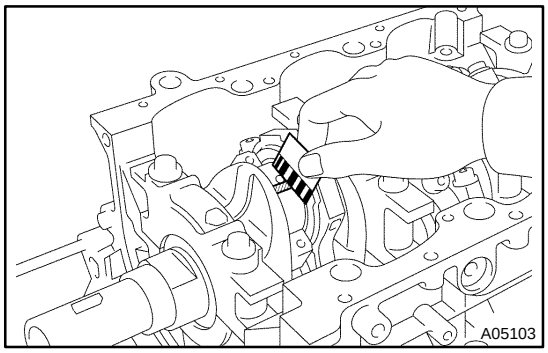
(f) Lay a strip of Plastigage across the crank pin.



(g) Install the connecting rod cap with the 2 bolts.
(see page EM–119)

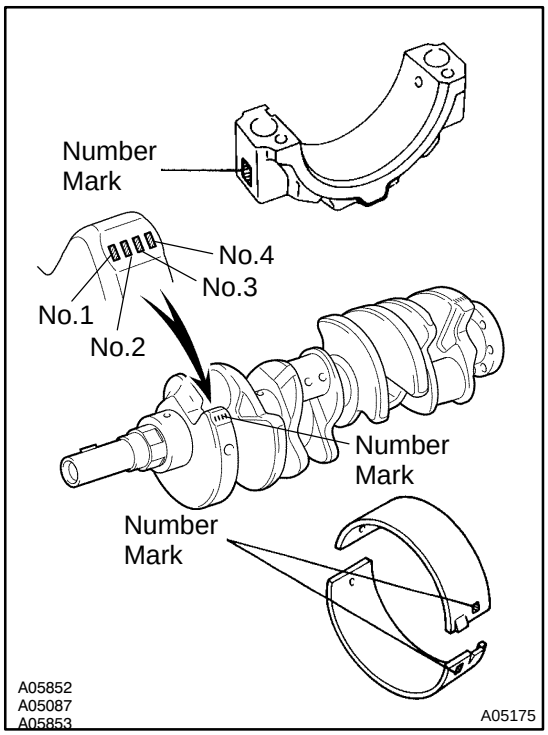
NOTICE:
Do not turn the crankshaft.

(h) Remove the 2 bolts, connecting rod cap and lower bearing. (See procedure (b) and (c) above)



(i) Measure the Plastigage at its widest point.
Standard oil clearance:
0.021 to 0.047 mm (0.0008 to 0.0019 in.)
Maximum oil clearance: 0.059 mm (0.0023 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, replace the crankshaft.



HINT:
If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the connecting rod cap and crankshaft, then selecting the bearing with the same number as the total. There are 6 sizes of standard bearings, marked ”2”, ”3”, ”4”, ”5”, ”6” and ”7”.

	Number mark											
Connecting rod cap	1	1	2	1	2	3	2	3	4	3	4	4
Crankshaft	1	2	1	3	2	1	3	2	1	3	2	3
Use bearing	2	3		4			5			6		7

EXAMPLE:
Connecting rod cap ”3” + Crankshaft ”1”
= Total number 4 (Use bearing ”4”)

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Reference

Connecting rod big end inside diameter:

Mark "1"	55.000 to 55.006 mm (2.1654 to 2.1656 in.)
Mark "2"	55.006 to 55.012 mm (2.1656 to 2.1658 in.)
Mark "3"	55.012 to 55.018 mm (2.1658 to 2.1661 in.)
Mark "4"	55.018 to 55.024 mm (2.1661 to 2.1663 in.)

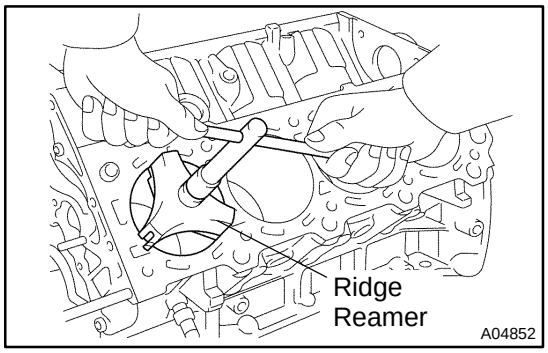
Crankshaft crank pin diameter:

Mark "1"	51.994 to 52.000 mm (2.0470 to 2.0472 in.)
Mark "2"	51.988 to 51.994 mm (2.0468 to 2.0470 in.)
Mark "3"	51.982 to 51.988 mm (2.0465 to 2.0468 in.)

Standard sized bearing center wall thickness:

Mark "2"	1.487 to 1.490 mm (0.0585 to 0.0587 in.)
Mark "3"	1.490 to 1.493 mm (0.0587 to 0.0588 in.)
Mark "4"	1.493 to 1.496 mm (0.0588 to 0.0589 in.)
Mark "5"	1.496 to 1.499 mm (0.0589 to 0.0590 in.)
Mark "6"	1.499 to 1.502 mm (0.0590 to 0.0591 in.)
Mark "7"	1.502 to 1.505 mm (0.0591 to 0.0593 in.)

(j) Completely remove the Plastigage.



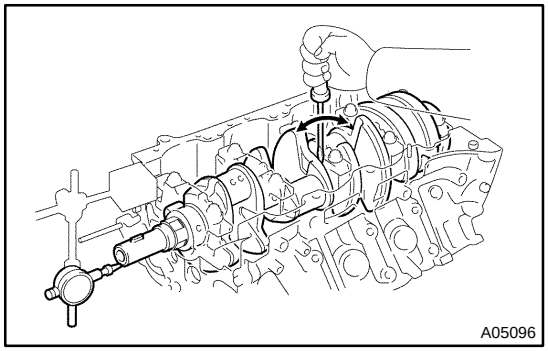
21. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

(b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

- ▶ Keep the bearings, connecting rod and cap together.
- ▶ Arrange the piston and connecting rod assemblies in correct order.



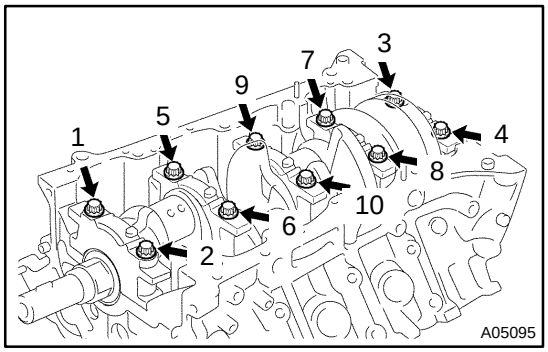
22. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.020 to 0.220 mm (0.0008 to 0.0087 in.)
Maximum thrust clearance: 0.30 mm (0.0118 in.)

If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness:
2.440 to 2.490 mm (0.0961 to 0.0980 in.)



23. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the 10 main bearing cap bolts in several passes, in the sequence shown.

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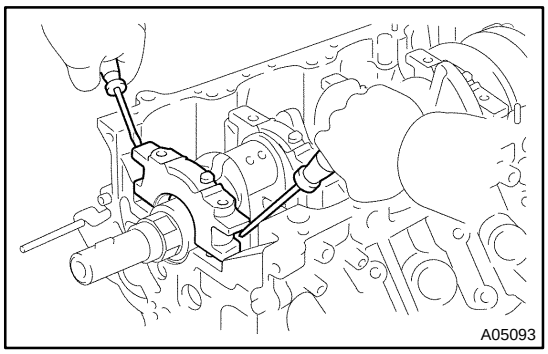


(b) Using 2 screwdrivers, pry out the main bearing cap, and remove the 5 main bearing caps, 5 lower bearings and 2 lower thrust washers (No.3 main bearing cap only).

NOTICE:

Be careful not to damage the cylinder block.

HINT:

- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.

(c) Lift out the crankshaft.

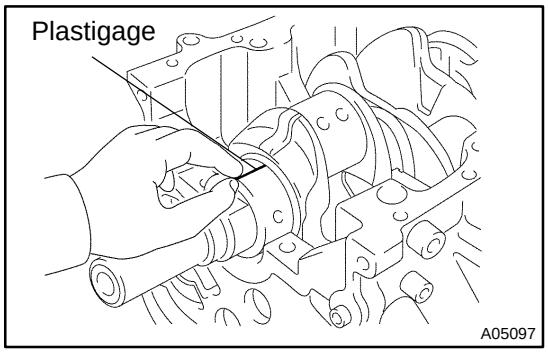
HINT:

Keep the upper bearings and upper thrust washers together with the cylinder block.

(d) Clean each main journal and bearing.

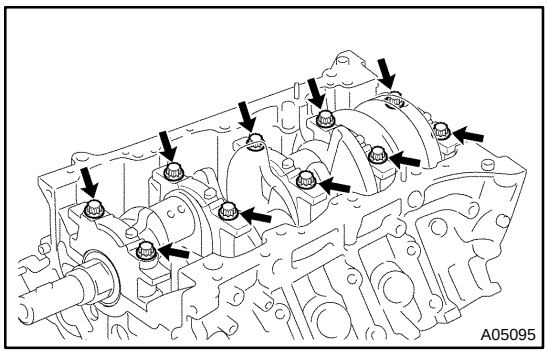
(e) Check each main journal and bearing for peelings and scratches.

If the journal or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



(f) Place the crankshaft on the cylinder block.

(g) Lay a strip of Plastigage across each journal.

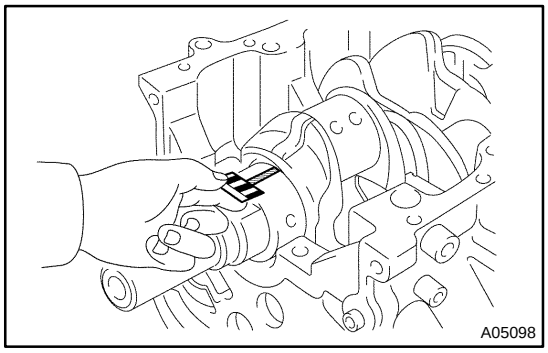


(h) Install the main bearing caps. (See page EM–119)

NOTICE:

Do not turn the crankshaft.

(i) Remove the main bearing caps.
(See procedure (a) and (b) above)



(j) Measure the Plastigage at its widest point.

Standard clearance:
No.1, No.5
0.028 to 0.046 mm (0.0011 to 0.0018 in.)
Others
0.040 to 0.058 mm (0.0016 to 0.0023 in.)
Maximum clearance: 0.065 mm (0.0026 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, replace the crankshaft.

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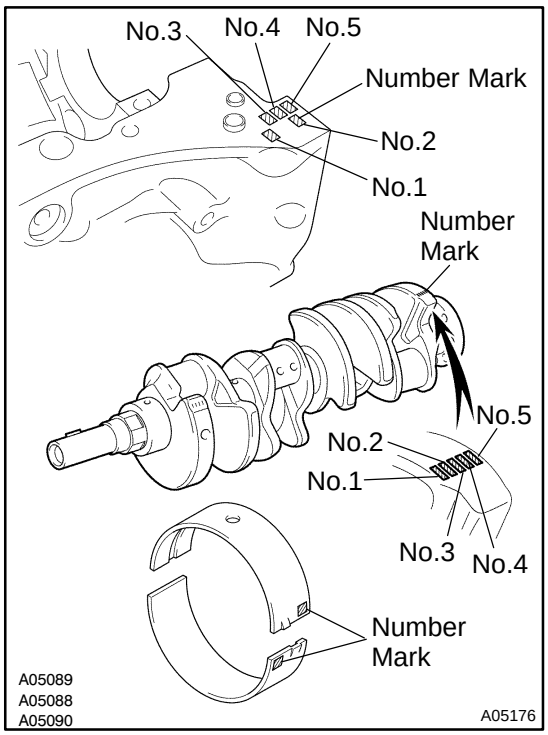

HINT:
If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. There are 5 sizes of the standard bearings. For No.1 and No.5 position bearings, use bearings marked ”3”, ”4”, ”5”, ”6” and ”7”. For others position bearings, use bearings marked ”1”, ”2”, ”3”, ”4” and ”5”.

No.1, No.5

	Mark	Use bearing
Cylinder block (A) + Crankshaft (B)	0 to 5	3
	6 to 11	4
	12 to 17	5
	18 to 23	6
	24 to 28	7

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06”
= Total number 14 (Use bearing ”5”)

Others

	Mark	Use bearing
Cylinder block (A) + Crankshaft (B)	0 to 5	1
	6 to 11	2
	12 to 17	3
	18 to 23	4
	24 to 28	5

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06”
= Total number 14 (Use bearing ”3”)

Reference
Cylinder block main journal bore diameter (A):

Mark ”00”	72.000 mm (2.8346 in.)
Mark ”01”	72.001 mm (2.8347 in.)
Mark ”02”	72.002 mm (2.8347 in.)
Mark ”03”	72.003 mm (2.8348 in.)
Mark ”04”	72.004 mm (2.8348 in.)
Mark ”05”	72.005 mm (2.8348 in.)
Mark ”06”	72.006 mm (2.8349 in.)
Mark ”07”	72.007 mm (2.8349 in.)
Mark ”08”	72.008 mm (2.8350 in.)
Mark ”09”	72.009 mm (2.8350 in.)
Mark ”10”	72.010 mm (2.8350 in.)
Mark ”11”	72.011 mm (2.8351 in.)
Mark ”12”	72.012 mm (2.8351 in.)
Mark ”13”	72.013 mm (2.8352 in.)
Mark ”14”	72.014 mm (2.8352 in.)

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Mark ”15”	72.015 mm (2.8352 in.)
Mark ”16”	72.016 mm (2.8353 in.)

Crankshaft main journal diameter (B):

Mark ”00”	67.000 mm (2.6378 in.)
Mark ”01”	66.999 mm (2.6378 in.)
Mark ”02”	66.998 mm (2.6377 in.)
Mark ”03”	66.997 mm (2.6377 in.)
Mark ”04”	66.996 mm (2.6376 in.)
Mark ”05”	66.995 mm (2.6376 in.)
Mark ”06”	66.994 mm (2.6376 in.)
Mark ”07”	66.993 mm (2.6375 in.)
Mark ”08”	66.992 mm (2.6375 in.)
Mark ”09”	66.991 mm (2.6374 in.)
Mark ”10”	66.990 mm (2.6374 in.)
Mark ”11”	66.989 mm (2.6374 in.)
Mark ”12”	66.988 mm (2.6373 in.)

Standard bearing center wall thickness:
No.1 and No.5

Mark ”3”	2.487 to 2.490 mm (0.0979 – 0.0980 in.)
Mark ”4”	2.490 to 2.493 mm (0.0980 – 0.0981 in.)
Mark ”5”	2.493 to 2.496 mm (0.0981 – 0.0983 in.)
Mark ”6”	2.496 to 2.499 mm (0.0983 – 0.0984 in.)
Mark ”7”	2.499 to 2.502 mm (0.0984 – 0.0985 in.)

Others

Mark ”1”	2.481 to 2.484 mm (0.0977 – 0.0978 in.)
Mark ”2”	2.484 to 2.487 mm (0.0978 – 0.0979 in.)
Mark ”3”	2.487 to 2.490 mm (0.0979 – 0.0980 in.)
Mark ”4”	2.490 to 2.493 mm (0.0980 – 0.0981 in.)
Mark ”5”	2.493 to 2.496 mm (0.0981 – 0.0983 in.)

(k) Completely remove the Plastigage.

24. REMOVE CRANKSHAFT

(a) Lift up the crankshaft.

(b) Remove the 5 upper main bearings and 2 upper thrust washers from the cylinder block.

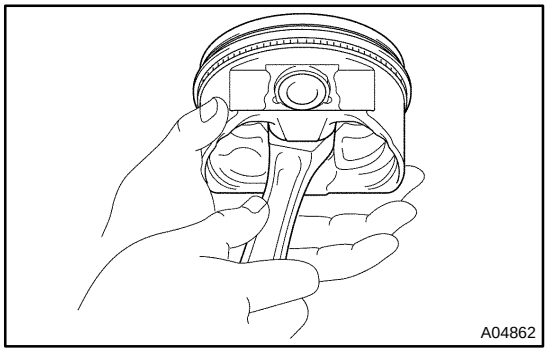
HINT:

Arrange the main bearing caps, bearings and thrust washers in correct order.

25. CHECK FIT BETWEEN PISTON AND PISTON PIN

Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.



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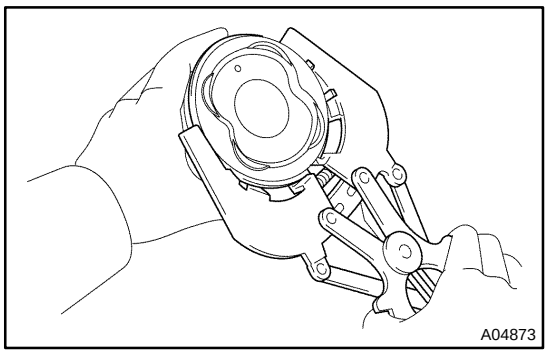


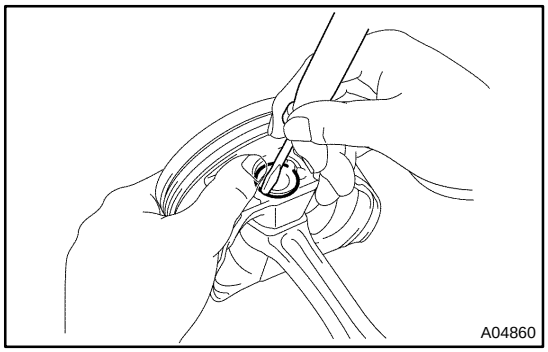
26. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the 2 compression rings.

(b) Remove the 2 side rails and oil ring by hand.

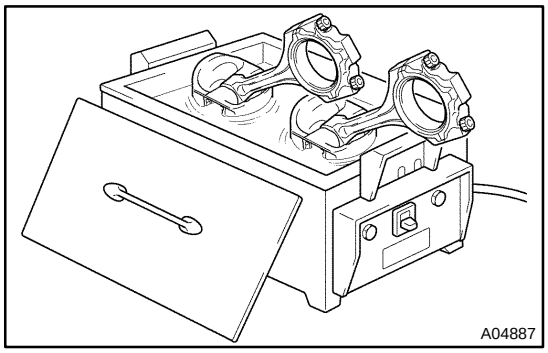
HINT:

Arrange the piston rings in correct order only.

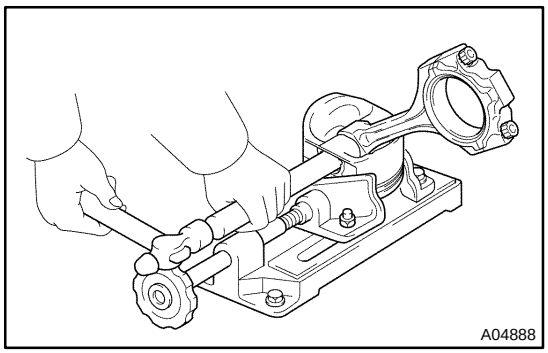


27. DISCONNECT CONNECTING ROD FROM PISTON

(a) Using a small screwdriver, pry out the 2 snap rings.



(b) Gradually heat the piston to approx. 60°C (140°F).



(c) Using a plastic–faced hammer and brass bar, lightly tap out the piston pin and pin and remove the connecting rod.

HINT:

- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in correct order.

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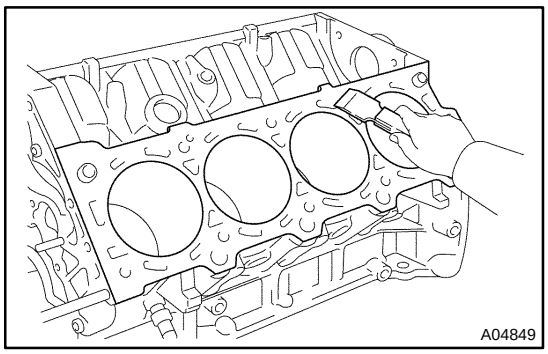
EM0EB–17

INSPECTION

1. CLEAN CYLINDER BLOCK

(a) Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

(b) Using a soft brush and solvent, thoroughly clean the cylinder block.



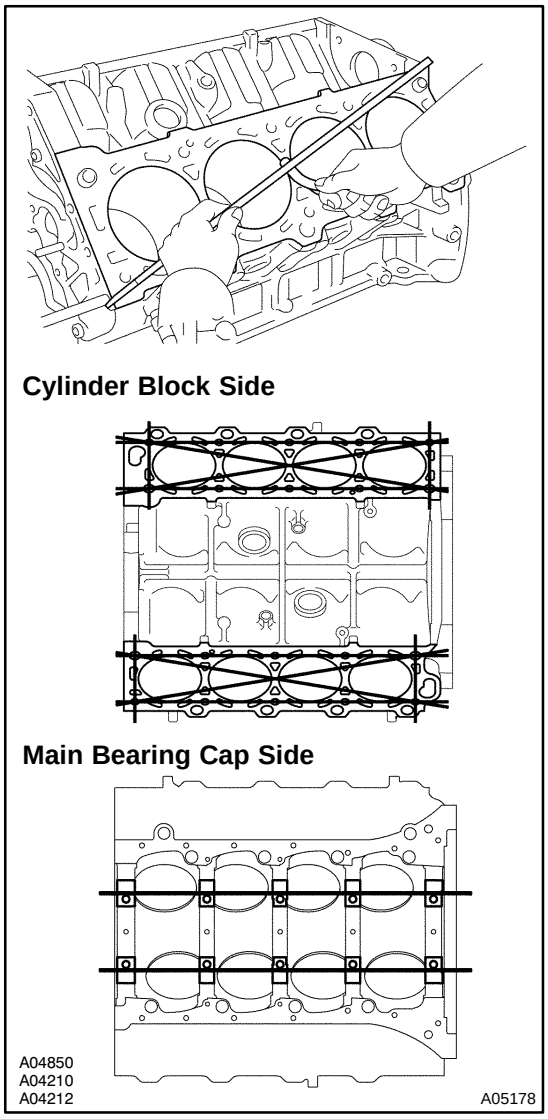
2. INSPECT CYLINDER BLOCK

(a) Inspect for flatness.

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head and main bearing cap for warpage.

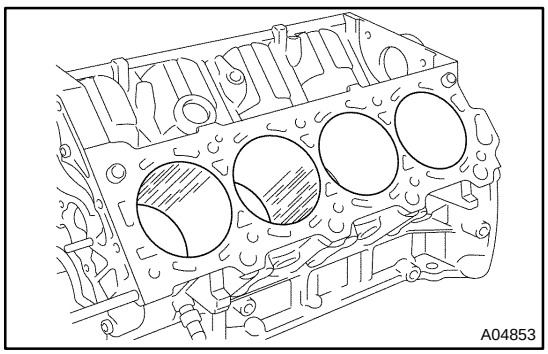
Maximum warpage: 0.07 mm (0.0028 in.)

If warpage is greater than maximum, replace the cylinder block.



(b) Visually check the cylinder for vertical scratches.

If deep scratches are present, rebore all the 8 cylinders and replace all the 8 pistons. (See page EM–116) If necessary, replace the cylinder block.



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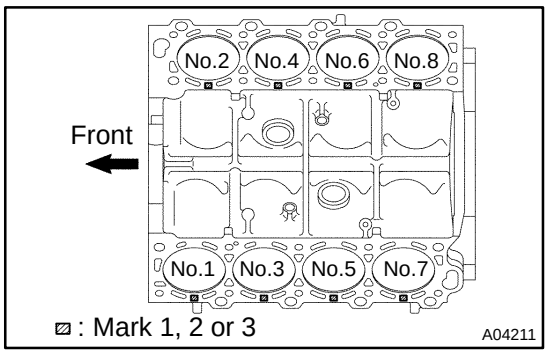
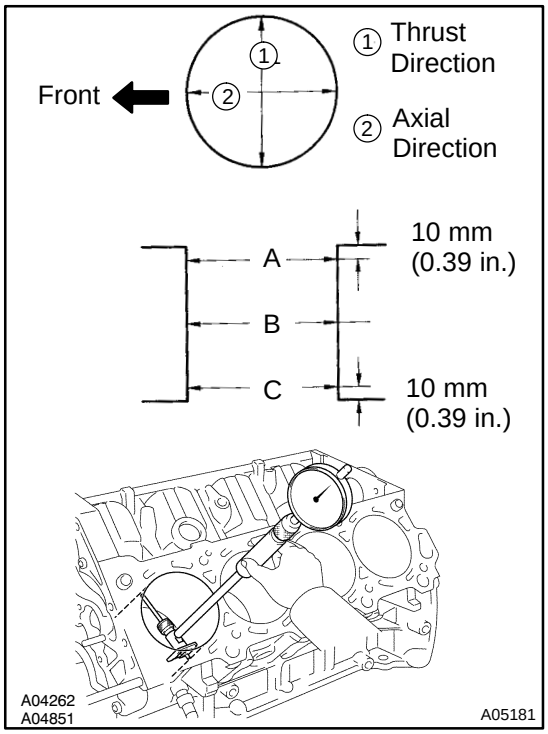


(c) Inspect the cylinder bore diameter.

HINT:

There are 3 sizes of the standard cylinder bore diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the top of the cylinder block.



Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

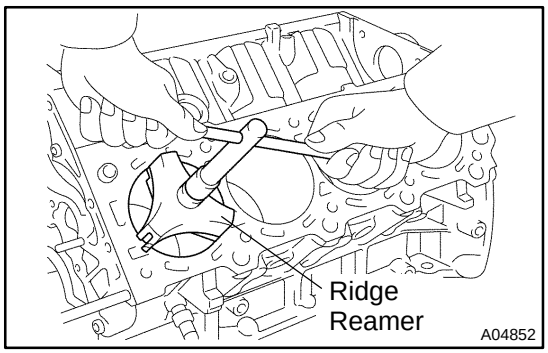
Standard diameter:

STD	Mark "1"	94.002 to 94.010 mm (3.7009 to 3.7012 in.)
	Mark "2"	94.010 to 94.023 mm (3.7012 to 3.7017 in.)
	Mark "3"	94.023 to 94.031 mm (3.7017 to 3.7020 in.)

Maximum diameter:

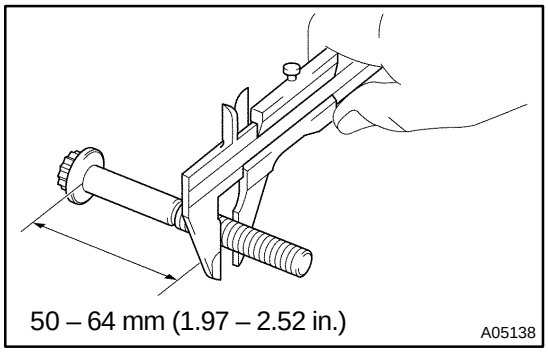
STD	94.231 mm (3.7099 in.)
O/S 0.50	94.731 mm (3.7296 in.)

If the diameter is greater than maximum, rebore all the 8 cylinders and replace all the 8 pistons. (See page EM–116) If necessary, replace the cylinder block.



(d) Remove the cylinder ridge.

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.



(e) Using vernier calipers, measure the thread outside diameter of the main bearing cap bolt.

Standard diameter:

10.760 to 10.970 mm (0.4236 to 0.4319 in.)

Minimum diameter: 10.40 mm (0.4094 in.)

If the diameter is less than minimum, replace the cap bolt.

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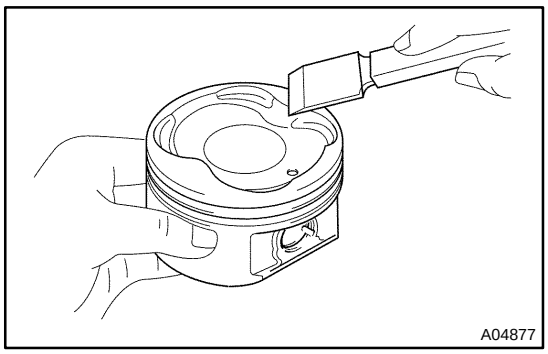
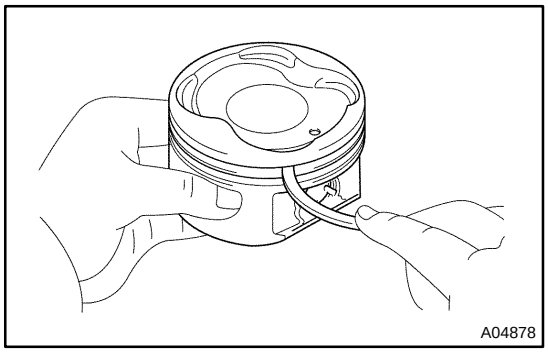
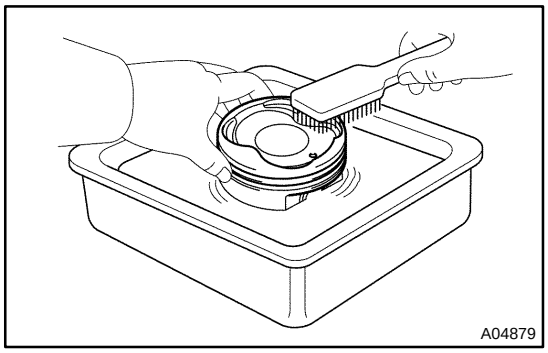


3. CLEAN PISTON

(a) Using a gasket scraper, remove the carbon from the piston top.



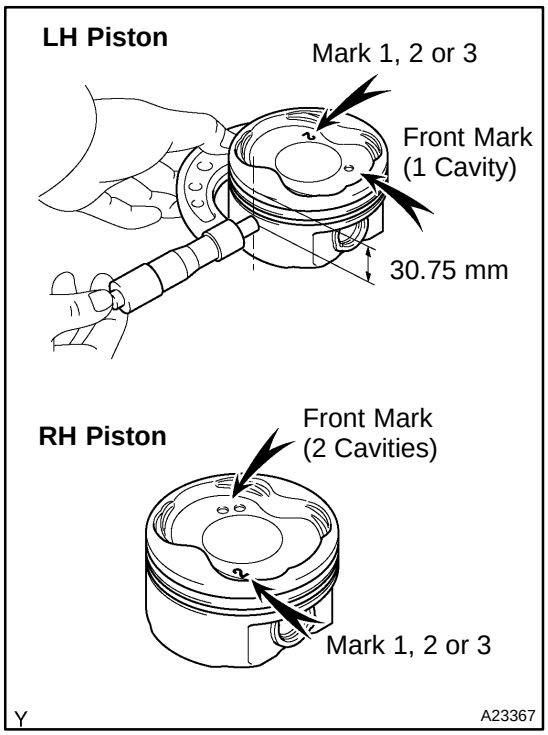
(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE:

Do not use a wire brush.



4. INSPECT PISTON AND CONNECTING ROD

(a) Inspect the piston oil clearance.

HINT:

There are 3 sizes of the standard piston diameter, marked ”1”, ”2” and ”3” accordingly. The mark is stamped on the piston top.

(1) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 30.75 mm (1.2106 in.) from the piston head.

Piston diameter:

STD	Mark ”1”	93.902 to 93.935 mm (3.6969 to 3.6982 in.)
	Mark ”2”	93.912 to 93.940 mm (3.6973 to 3.6984 in.)
	Mark ”3”	93.920 to 93.950 mm (3.6976 to 3.6988 in.)
O/S 0.50		94.402 to 94.450 mm (3.7166 to 3.7185 in.)

(2) Measure the cylinder bore diameter in the thrust directions (see step 2 above).

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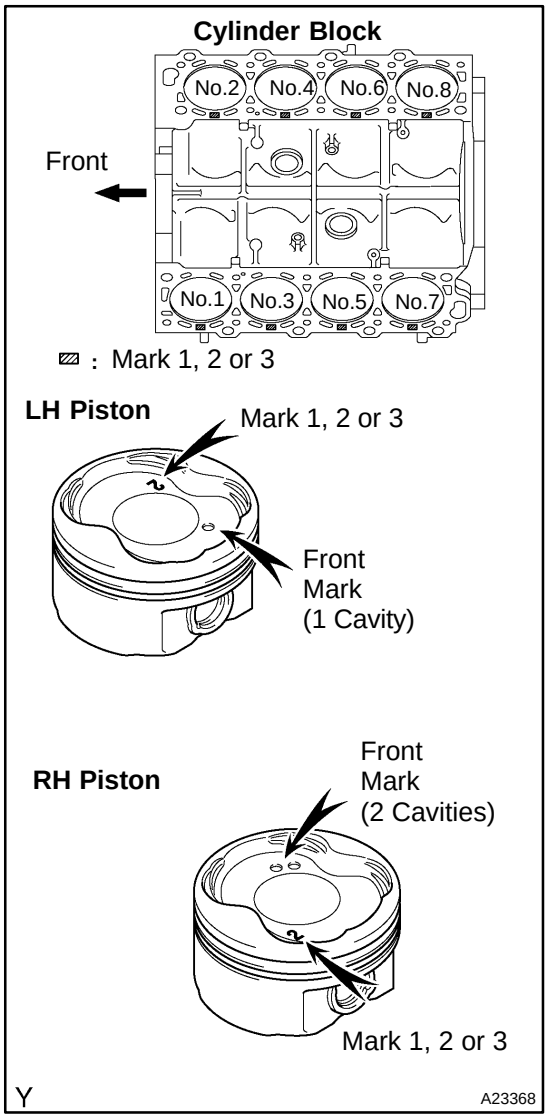
(3) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:
0.030 to 0.071 mm (0.0012 to 0.0028 in.)
Maximum oil clearance: 0.13 mm (0.0051 in.)

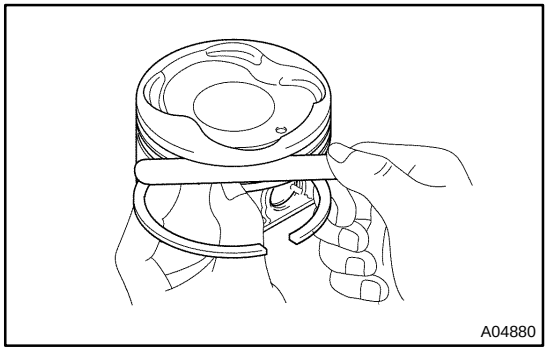
If the oil clearance is greater than maximum, replace all the 8 pistons and rebore all the 8 cylinders. (See page EM–116) If necessary, replace the cylinder block.



HINT

Use a new cylinder block:

- ▶ Use a piston with the same number mark as the cylinder diameter number marked on the cylinder block.
- ▶ The shape of the piston differs for the LH and RH banks. The LH piston is marked with 1 cavity and ”2”, the RH piston with 2 cavities and ”2”.



(b) Inspect the piston ring groove clearance.

Using a feeler gauge, measure the clearance between the new piston ring and the wall of the ring groove.

Ring groove clearance:

No.1	0.030 to 0.080 mm (0.0012 to 0.0031 in.)
No.2	0.020 to 0.060 mm (0.0008 to 0.0024 in.)

If the clearance is not as specified, replace the piston.

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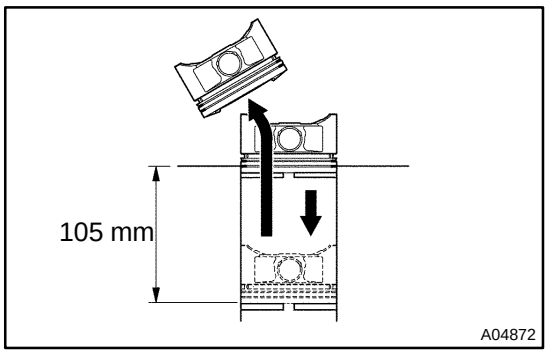
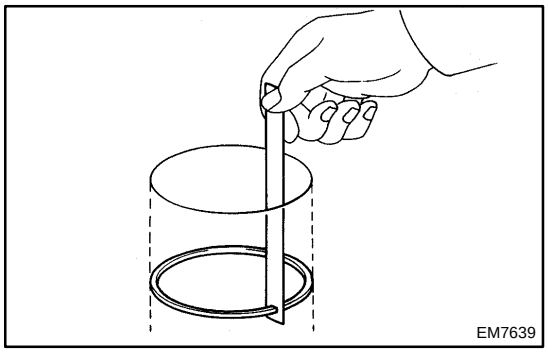


(c) Inspect the piston ring end gap.
(1) Insert the piston ring into the cylinder bore.
(2) Using a piston, push the piston ring a little to the bottom of the ring travel, 105 mm (4.13 in.) from the top of the cylinder block.



(3) Using a feeler gauge, measure the end gap.

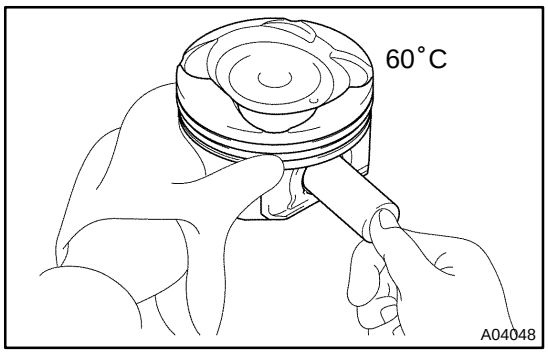
Standard end gap:

No.1	0.300 to 0.400 mm (0.0118 to 0.0157 in.)
No.2	0.400 to 0.550 mm (0.0157 to 0.0217 in.)
Oil (Side rail)	0.130 to 0.380 mm (0.0051 to 0.0150 in.)

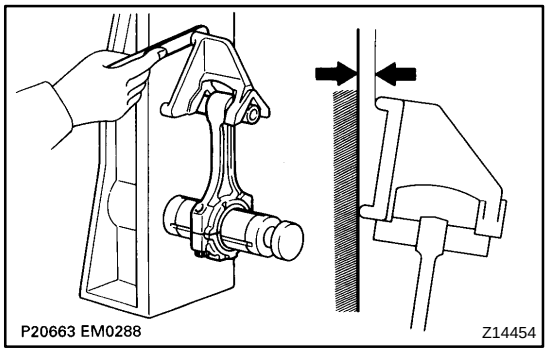
Maximum end gap:

No.1	1.10 mm (0.0433 in.)
No.2	1.30 mm (0.0512 in.)
Oil (Side rail)	0.90 mm (0.0354 in.)

If the end gap is greater than maximum, replace the piston ring.
If the end gap is greater than maximum, even with a new piston ring, rebore all the 8 cylinders (See page EM–116) or replace the cylinder block.



(d) Inspect the piston pin fit.
At 60˚C (140˚F), you should be able to push the piston pin into the piston pin hole with your thumb.



(e) Using a rod aligner and feeler gauge, check the connecting rod alignment.
(1) Check for bend.

Maximum bend:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If bend is greater than maximum, replace the connecting rod assembly.

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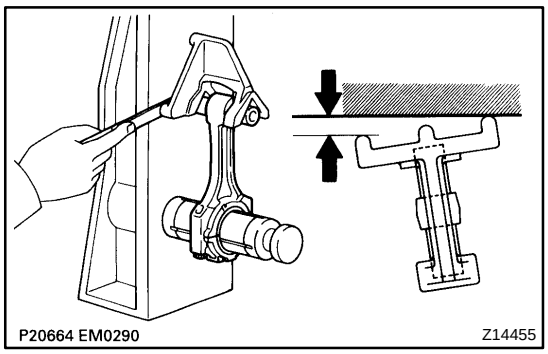
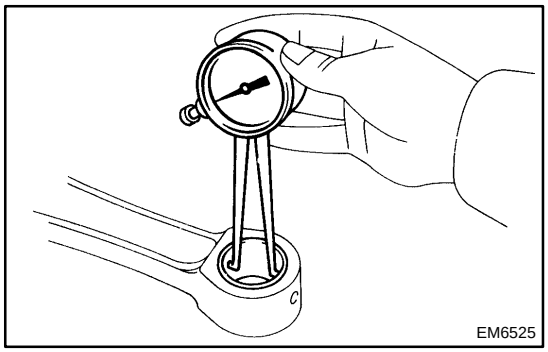


(2) Check for twist.

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If twist is greater than maximum, replace the connecting rod assembly.

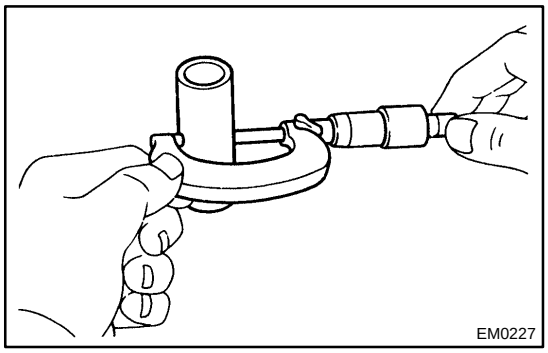


(f) Inspect the piston pin oil clearance.

(1) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter:

22.005 to 22.014 mm (0.8663 to 0.8667 in.)



(2) Using a micrometer, measure the piston pin diameter.

Piston pin diameter:

21.997 to 22.009 mm (0.8660 to 0.8664 in.)

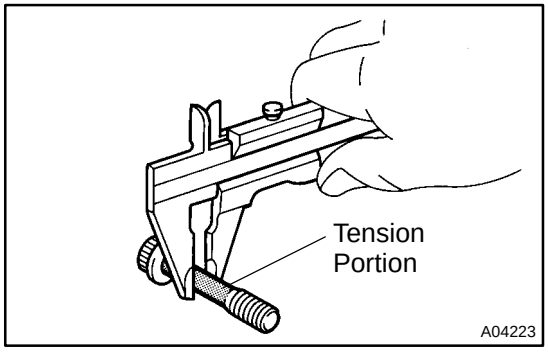
(3) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

Standard oil clearance:

0.005 to 0.011 mm (0.0002 to 0.0004 in.)

Maximum oil clearance: 0.05 mm (0.0020 in.)

If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.



(g) Using vernier calipers, measure the tension portion of the connecting rod bolt.

Standard diameter:

7.200 to 7.300 mm (0.2835 to 0.2874 in.)

Minimum diameter: 7.00 mm (0.2756 in.)

If the diameter is less than the minimum, replace the bolt.

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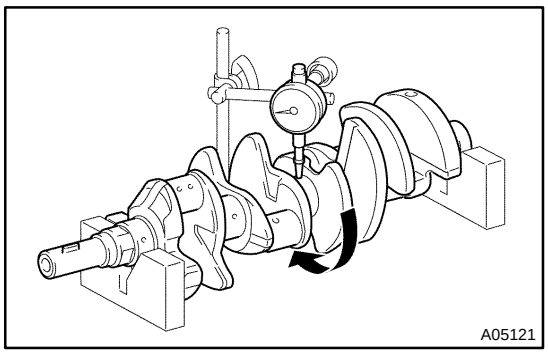

A05121

5. INSPECT CRANKSHAFT

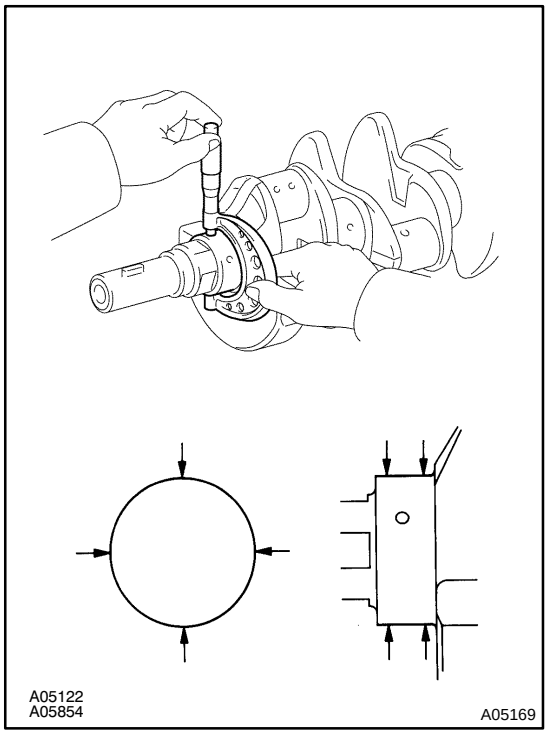
(a) Inspect for circle runout.

(1) Place the crankshaft on V–blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.04 mm (0.0016 in.)

If the circle runout is greater than maximum, replace the crankshaft.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A05169

(b) Inspect the main journals and crank pins.

(1) Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:
66.988 to 67.000 mm (2.6373 to 2.6378 in.)
Crank pin diameter:
51.982 to 52.000 mm (2.0465 to 2.0472 in.)

If the diameter is not as specified, check the oil clearance (See page EM–101). If necessary, replace the crankshaft.

(2) Check each main journal and crank pin for taper and out–of–round as shown.

Maximum taper and out–of–round:
0.02 mm (0.0008 in.)

If the taper and out–of–round is greater than maximum, replace the crankshaft.

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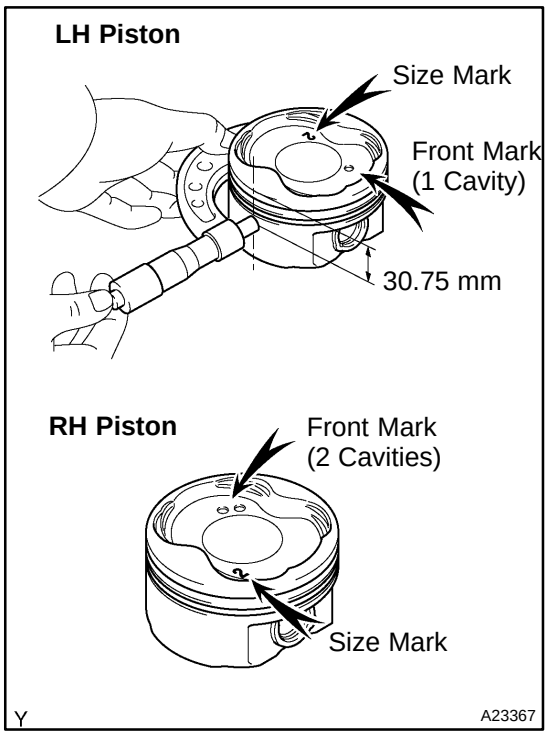
EM123–04

REPLACEMENT



1. REPLACE OVERSIZED (O/S) PISTONS FOR CYLINDER BORING

HINT:

- ▶ Bore all the 8 cylinders to match the oversized piston outside diameter.
- ▶ Replace all the piston rings with ones to match the oversized pistons.

(a) Keep 8 new oversized pistons.
O/S 0.50 piston diameter:
94.402 to 94.430 mm (3.7166 to 3.7177 in.)

HINT:

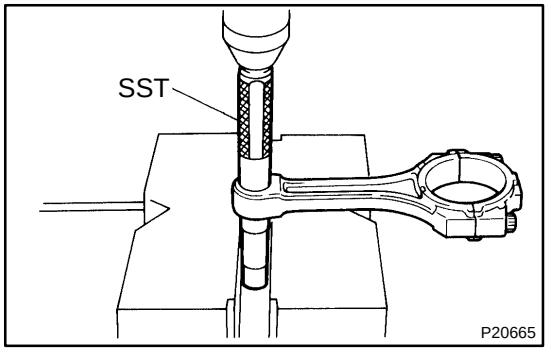
The shape of the piston differs for the LH and RH banks. The LH piston is marked with 1 cavity and ”2”, the RH piston with 2 cavities and ”2”.

(b) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 30.75 mm (1.2106 in.) from the piston head.

(c) Calculate the size to be rebored for each cylinder as follows:
Size to be rebored = P + C – H
P = Piston diameter
C = Piston clearance:
0.030 to 0.071 mm (0.0012 to 0.0028 in.)
H = Allowance for honing: 0.02 mm (0.0008 in.) or less

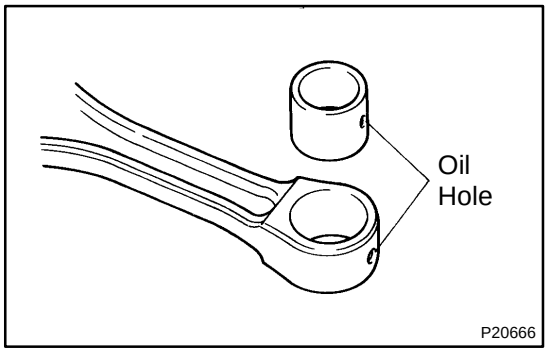
(d) Bore and hone the cylinders to calculated dimensions.
Maximum honing: 0.02 mm (0.0008 in.)

NOTICE:
Excess honing will destroy the finished roundness.



2. REPLACE CONNECTING ROD BUSHINGS

(a) Using SST and a press, press out the bushing.
SST 09222–30010



(b) Align the oil holes of a new bushing and the connecting rod.

(c) Using SST and a press, press in the bushing.
SST 09222–30010

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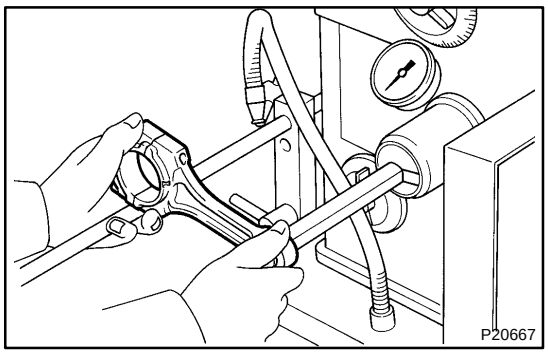
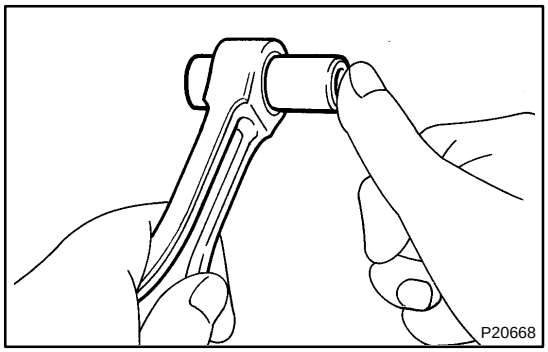
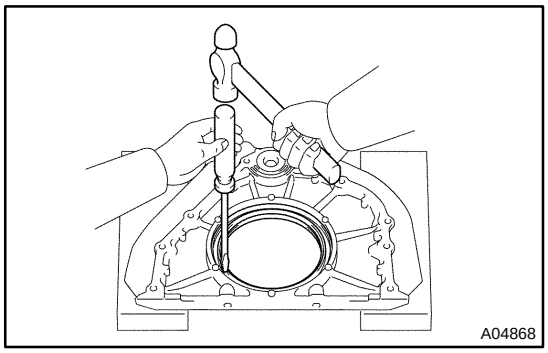


(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (See page EM–101) between the bushing and piston pin.



(e) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.

3. REPLACE CRANKSHAFT FRONT OIL SEAL (See page LU–13)



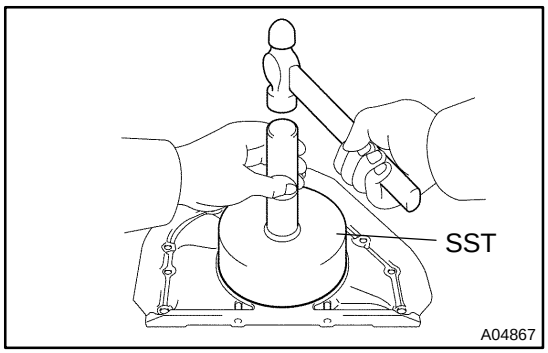
4. REPLACE CRANKSHAFT REAR OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to replace the oil seal.

(a) If the rear oil seal retainer is removed from the cylinder block:

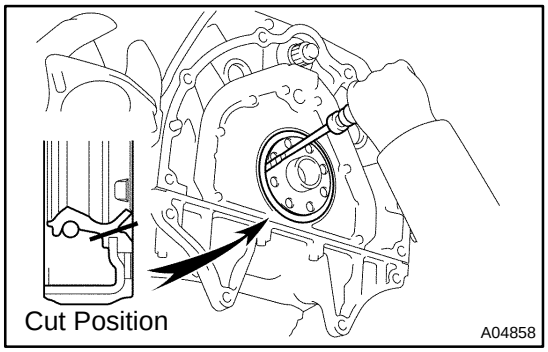
(1) Using a screwdriver and hammer, tap out the oil seal.



(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223–56010

(3) Apply MP grease to the oil seal lip.



(b) If the rear oil seal retainer is installed to the cylinder block:

(1) Using a knife, cut off the oil seal lip.

(2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip.

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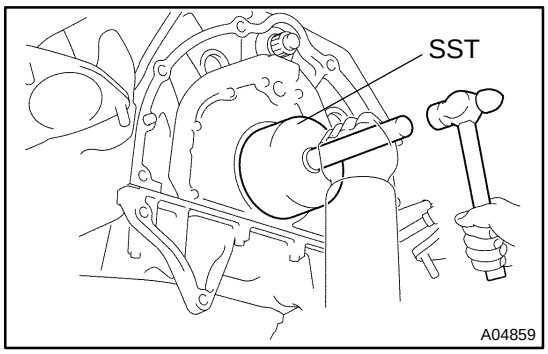

(3) Apply MP grease to a new oil seal lip.
(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223–56010

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EM124–07

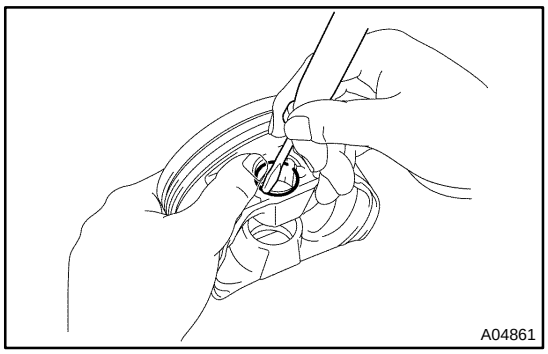
REASSEMBLY

HINT:

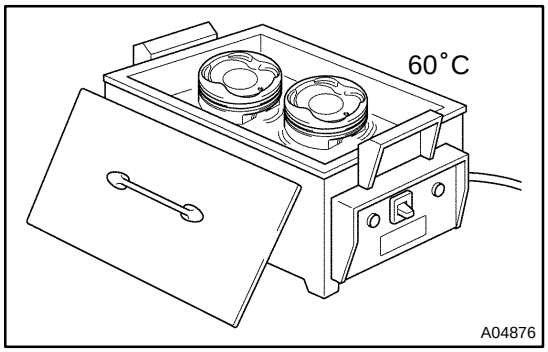
- ▶ Thoroughly clean all parts to be assembled.
- ▶ Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- ▶ Replace all gaskets, O–rings and oil seals with new ones.

1. ASSEMBLE PISTON AND CONNECTING ROD

(a) Using a screwdriver, install a new snap ring on one side of the piston pin hole.



(b) Gradually heat the piston to about 60˚C (140˚F).



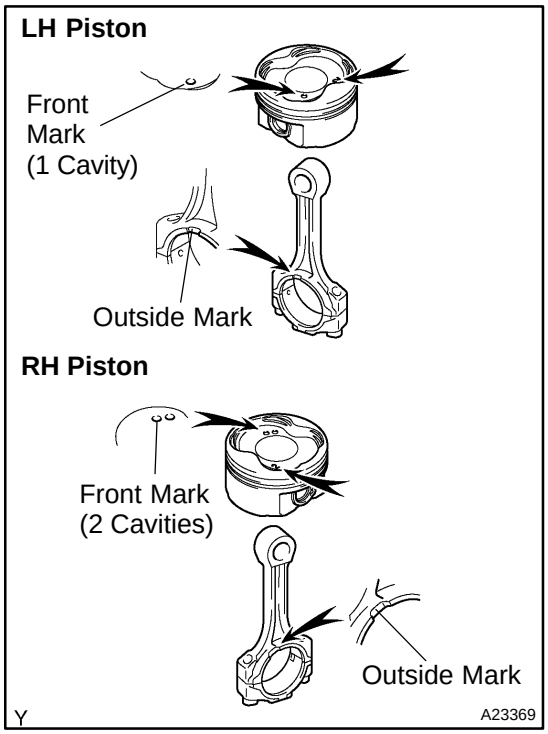
(c) Coat the piston pin with engine oil.

(d) Position the piston so that the front mark and to the outside mark on the connecting rod face in the same direction as shown in the illustration.

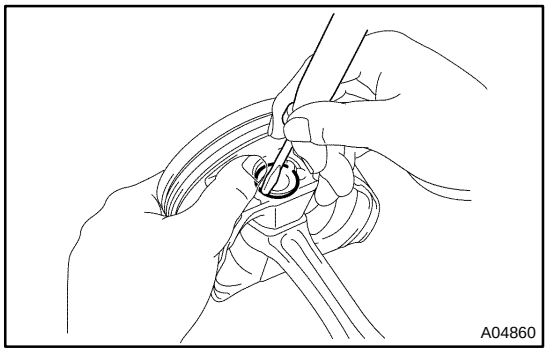
NOTICE:

The installation directions of the piston and connecting rod are different for the LH and RH banks. The LH piston is marked with 1 cavity and ”2”, the RH piston with 2 cavities and ”2”.

(e) Align the piston pin holes of the piston and connecting rod, and push in the piston pin with your thumb.



(f) Using a screwdriver, install a new snap ring on the other side of the piston pin hole.



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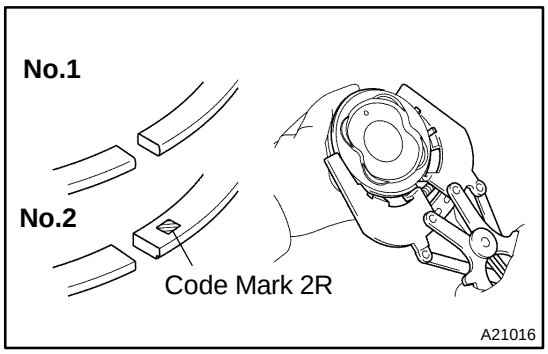


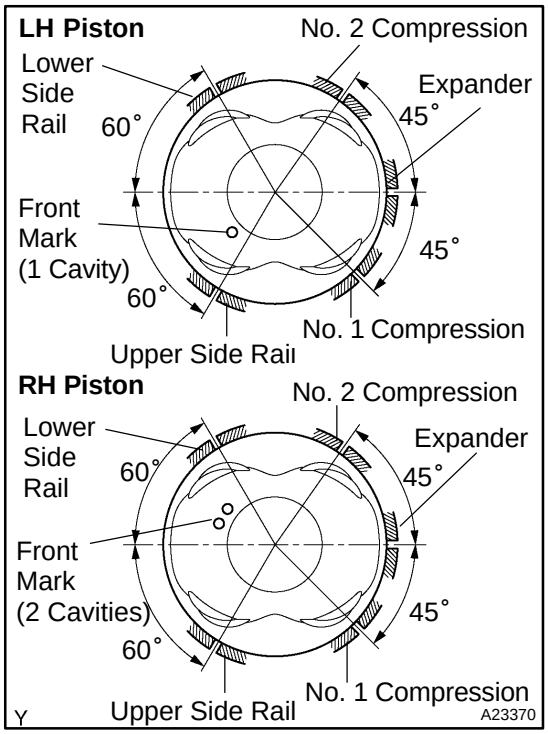
2. INSTALL PISTON RINGS

(a) Install the oil ring expander and 2 side rails by hand.

(b) Using a piston ring expander, install the 2 compression rings.

Code mark:

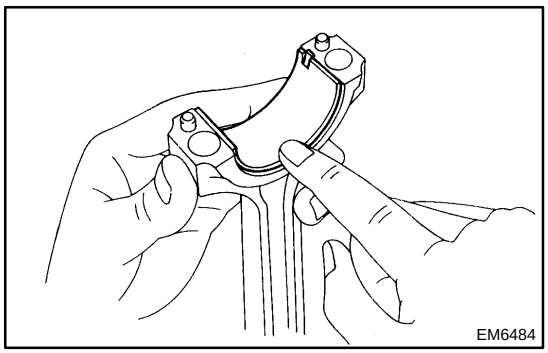
No.1	None
No.2	2R



(c) Position the piston rings so that the ring ends are as shown.

NOTICE:

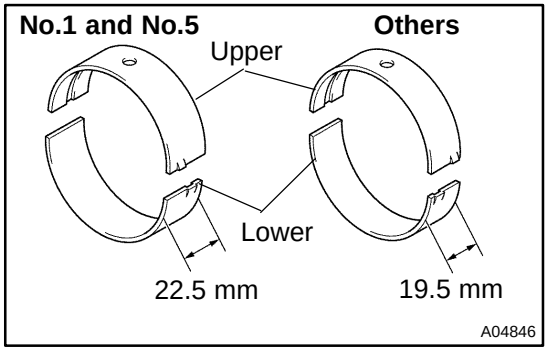
Do not align the ring ends.



3. INSTALL BEARINGS

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.

(b) Install the bearings in the connecting rod and connecting rod cap.



4. INSTALL MAIN BEARINGS

HINT:

▶ Main bearings are of 19.5 mm (0.768 in.) and 22.5 mm (0.886 in.) in width. Install the 22.5 mm (0.886 in.) bearings in the No.1 and No.5 cylinder block journal positions with the main bearing cap. Install the 19.5 mm (0.768 in.) bearings in the other positions.

▶ Upper bearings have an oil groove and oil holes, but lower bearings do not.

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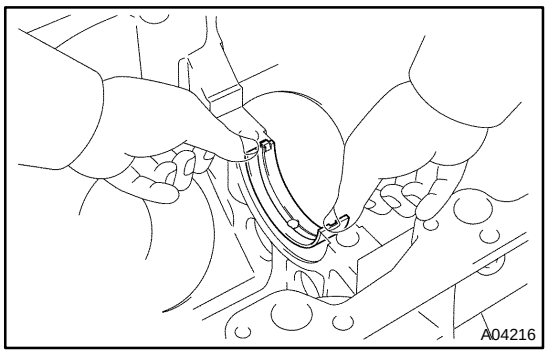
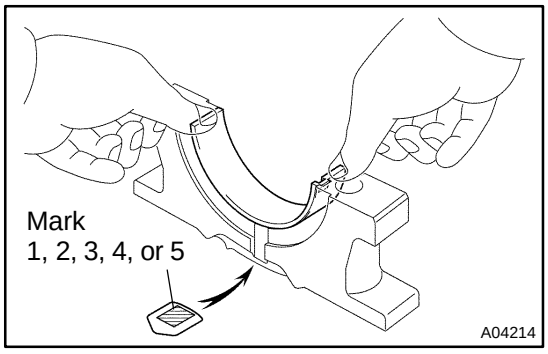


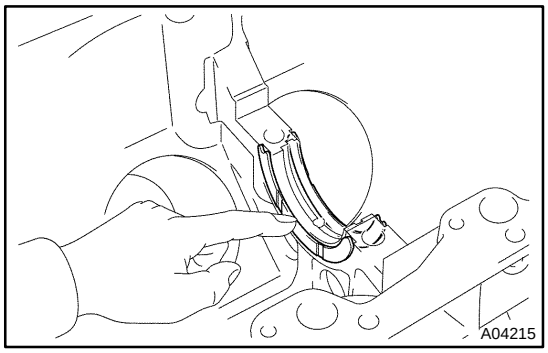
(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 5 upper bearings.



(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 5 lower bearings.

HINT:

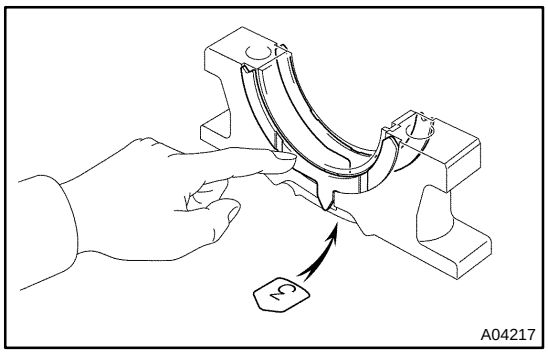
A number is marked on each main bearing cap to indicate the installation position.



5. INSTALL UPPER THRUST WASHERS

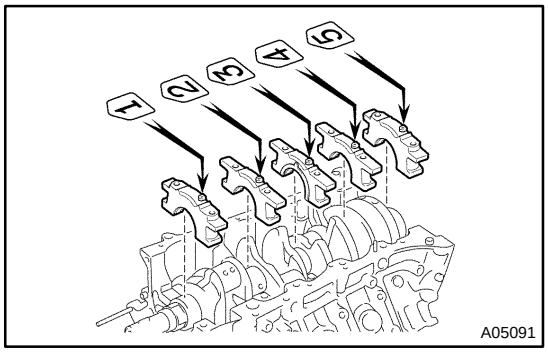
Install the 2 thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.

6. PLACE CRANKSHAFT ON CYLINDER BLOCK



7. PLACE MAIN BEARING CAPS AND LOWER THRUST WASHERS ON CYLINDER BLOCK

(a) Install the 2 thrust washers on the No.3 bearing cap with the grooves facing outward.



(b) Install the 5 main bearing caps in their proper locations.

8. INSTALL MAIN BEARING CAP BOLTS

HINT:

- ▶ The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- ▶ If any one of the main bearing cap bolts is broken or deformed, replace it.

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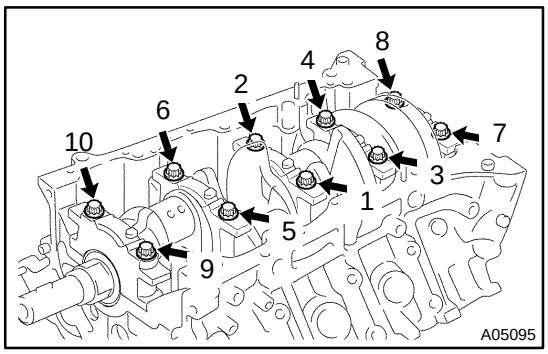
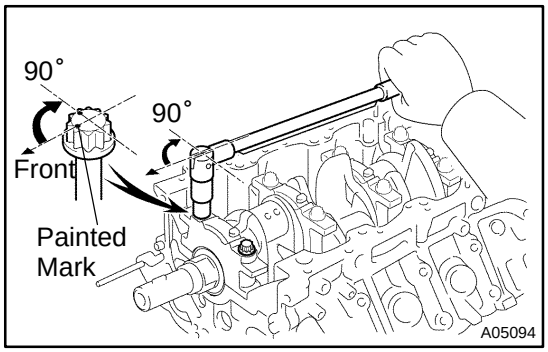


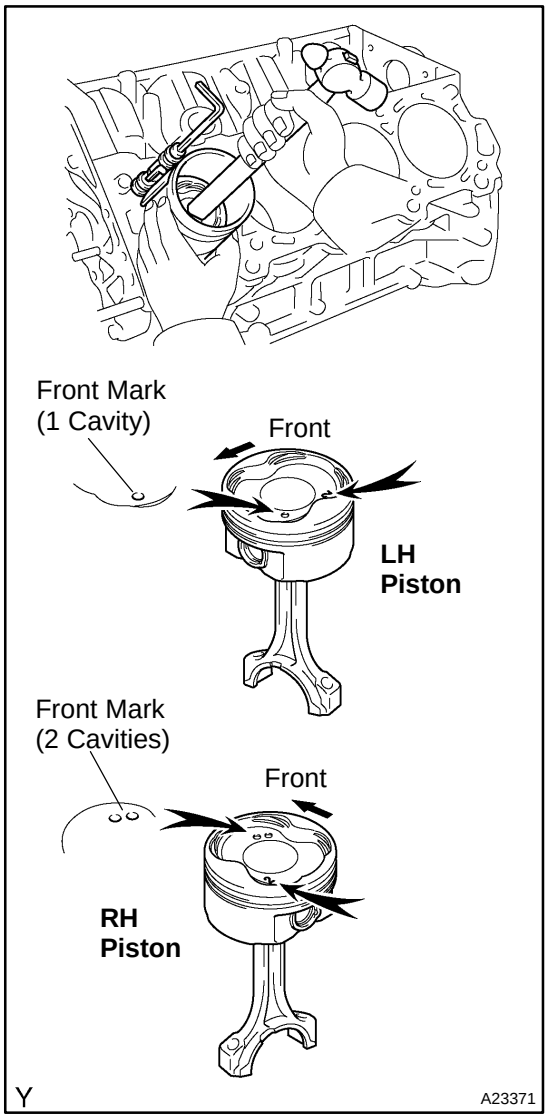
(a) Apply a light coat of engine oil to the threads and under the main bearing cap bolts.
(b) Install and uniformly tighten the 10 main bearing cap bolts in several steps, in the sequence shown.
Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)

If any of the main bearing cap bolts does not meet the torque specification, replace the main bearing cap bolt.



(c) Mark the front of the main bearing cap bolt with paint.
(d) Retighten the main bearing cap bolts by 90° in the numerical order shown.
(e) Check that the painted mark is now at a 90° angle to the front.
(f) Check that the crankshaft turns smoothly.

9. CHECK CRANKSHAFT THRUST CLEARANCE
(See page EM–101)



10. INSTALL PISTON AND CONNECTING ROD ASSEMBLIES

Using a piston ring compressor, push correctly the numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.

NOTICE:
The shape of the piston differs for the LH and RH banks. The LH piston is marked with 1 cavity and ”2”, the RH piston with 2 cavities and ”2”.

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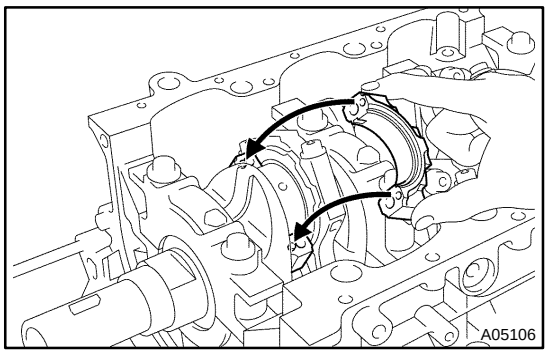
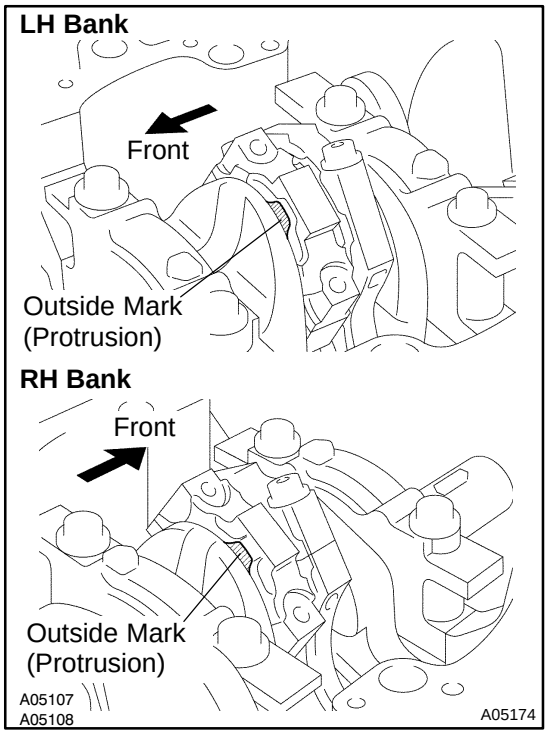


11. PLACE CONNECTING ROD CAP ON CONNECTING ROD

(a) Match the numbered connecting rod cap with the connecting rod.

(b) Align the pin groove of the connecting rod cap with the pins of the connecting rod, and install the connecting rod cap.

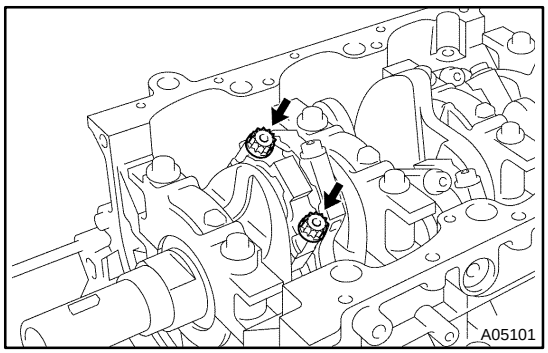


(c) Check that the outside mark of the connecting rod cap is facing in correct direction.

12. INSTALL CONNECTING ROD CAP BOLTS

HINT:

- ▶ The connecting rod cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- ▶ If any one of the connecting rod cap bolts is broken or deformed, replace it.

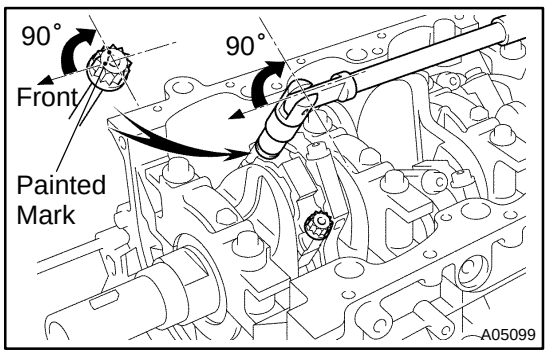


(a) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.

(b) Install and alternately tighten the 2 connecting rod cap bolts in several passes.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

If any one of the connecting rod cap bolts does not meet the torque specification, replace the connecting rod cap bolts.



(c) Mark the front of the connecting cap bolt with paint.

(d) Retighten the cap bolts by 90° as shown.

(e) Check that the painted mark is now at a 90° angle to the front.

(f) Check that the crankshaft turns smoothly.

13. CHECK CONNECTING ROD THRUST CLEARANCE (See page EM–101)

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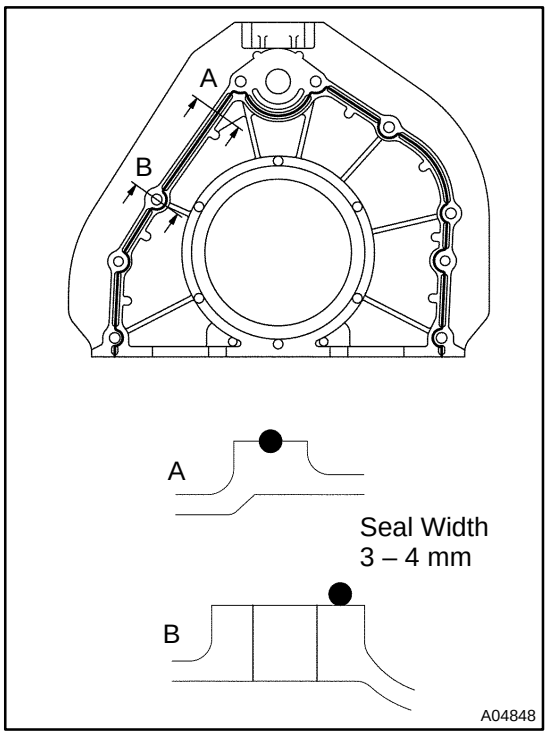


14. INSTALL REAR OIL SEAL RETAINER

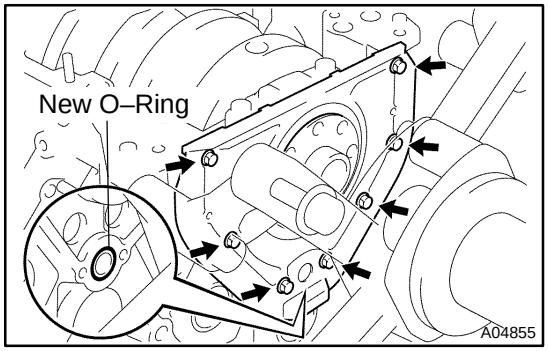
(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contacting surfaces of the oil seal retainer and cylinder block.

- ▶ Using a razor blade and gasket scraper, remove all the old packing (FIPG) materials from the gasket surfaces and sealing grooves.
- ▶ Thoroughly clean all components to remove all the loose material.
- ▶ Using a non–residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the oil seal retainer as shown in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

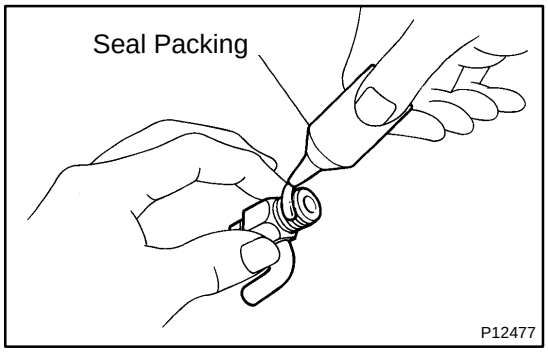
- ▶ Install a nozzle that has been cut to a 3 – 4 mm (0.12 – 0.16 in.) opening.
- ▶ Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- ▶ Immediately remove nozzle from the tube and reinstall cap.



(c) Install a new O–ring to the cylinder block.

(d) Install the oil seal retainer with the 7 bolts.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)



15. INSTALL ENGINE COOLANT DRAIN UNIONS

(a) Apply seal packing to 2 or 3 threads.

Seal packing: Part No. 08826–00100 or equivalent

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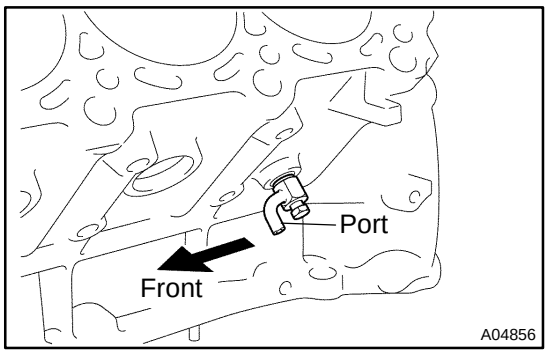
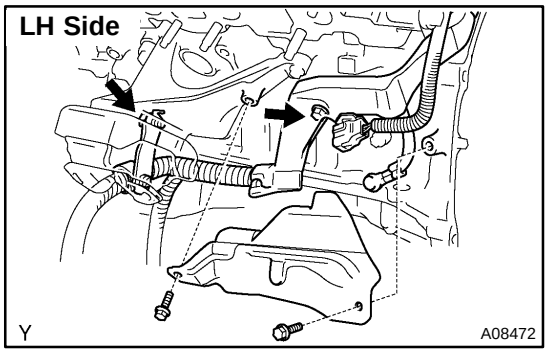


(b) Install the 2 drain unions.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

HINT:
After applying the specified torque, rotate the drain union clockwise until its drain port is facing forward.

16. INSTALL OIL PUMP (See page LU–15)
17. INSTALL OIL STRAINER (See page LU–15)
18. INSTALL NO.1 OIL PAN (See page LU–15)
19. INSTALL OIL PAN BAFFLE PLATE (See page LU–15)
20. INSTALL NO.2 OIL PAN (See page LU–15)
21. INSTALL WATER PUMP (See page CO–8)
22. INSTALL ENGINE MOUNTING BRACKETS

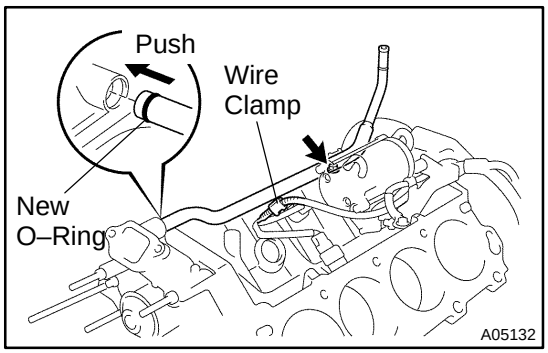
Install the mounting bracket with the 4 bolts. Install the 2 mounting brackets.
Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)



23. INSTALL ENGINE WIRE TO LH SIDE OF CYLINDER BLOCK
(a) Install the brackets on the engine wire with the 2 bolts.
(b) Install the engine wire cover with the 2 bolts.
24. INSTALL OIL COOLER PIPE BRACKET FOR A/T

Install the bracket with the bolt.

25. INSTALL VVT SENSORS (See page SF–77)
26. INSTALL KNOCK SENSORS (See page SF–66)
27. INSTALL STARTER (See page ST–16)



28. INSTALL WATER BYPASS PIPE
(a) Install a new O–ring to the water bypass pipe.
(b) Apply soapy water to the O–ring.
(c) Push in the water bypass pipe end into the pipe hole of the water pump.
(d) Install the water bypass pipe with the bolt.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
(e) Install the wire clamp to the bracket of the water bypass pipe.

29. INSTALL CYLINDER HEADS (See page EM–60)
30. INSTALL TIMING BELT AND PULLEYS (See page EM–23)
31. DISCONNECT ENGINE FROM ENGINE STAND

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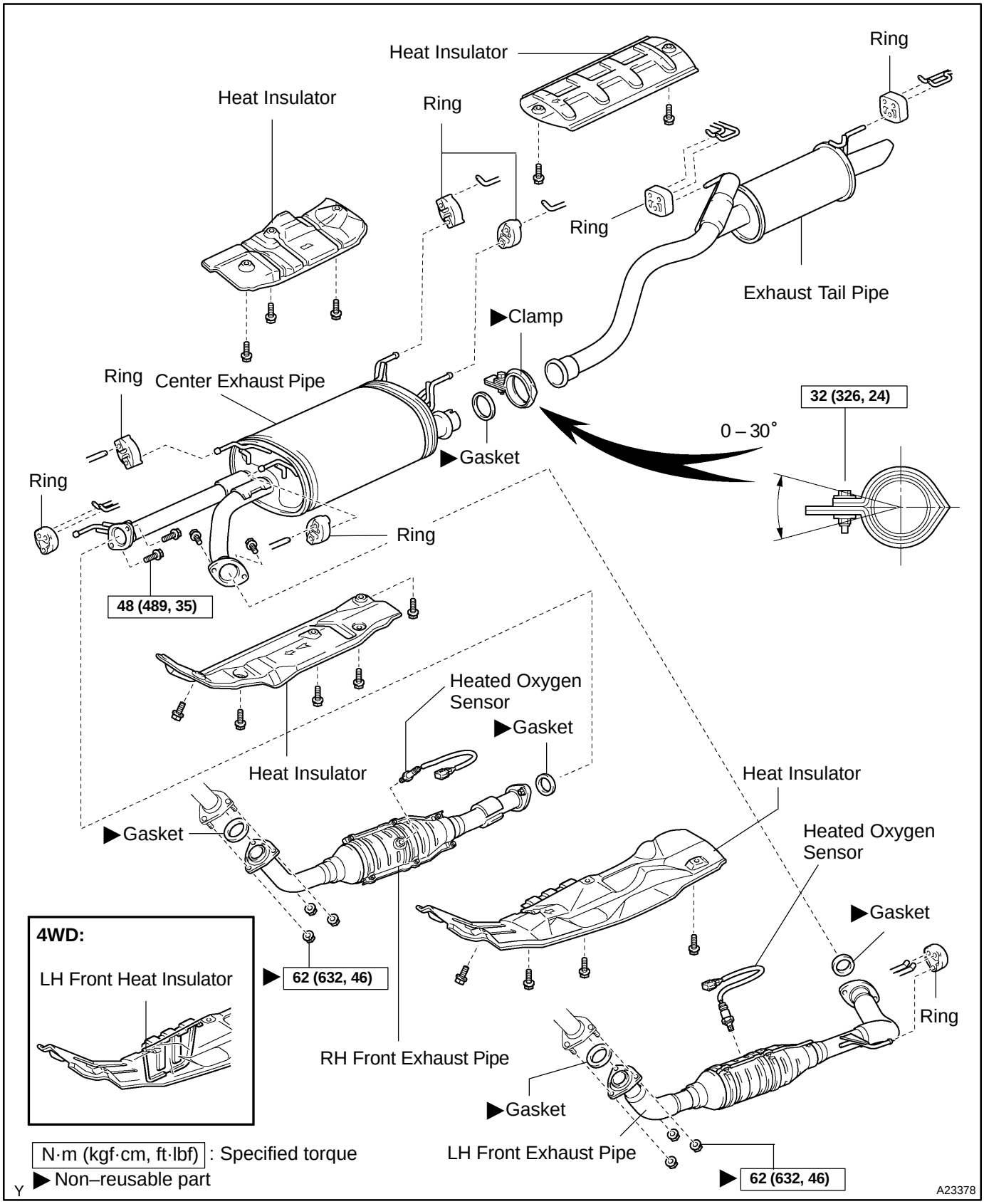
EXHAUST SYSTEM

EM0EE–20

COMPONENTS



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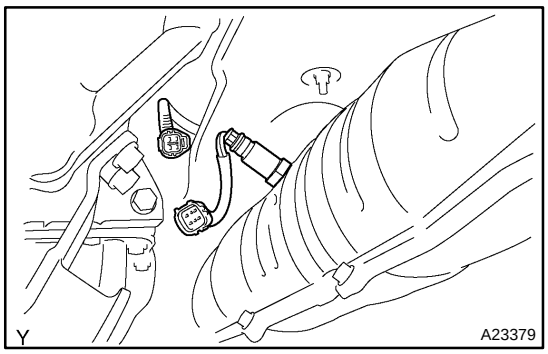
EM1X4–01

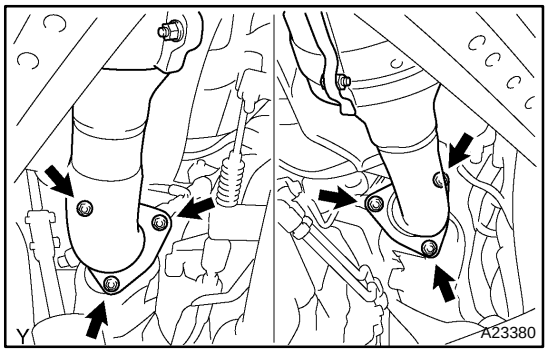
REMOVAL



1. REMOVE HEATED OXYGEN SENSORS

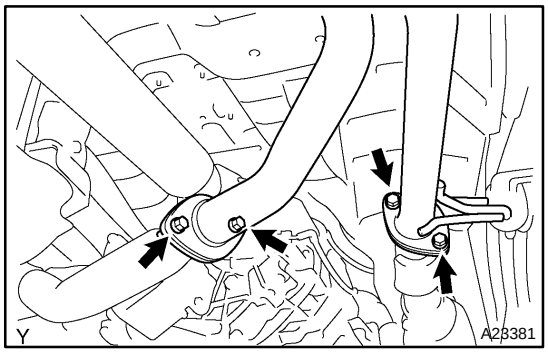
(a) Disconnect the heated oxygen sensor.

(b) Remove the heated oxygen sensor.

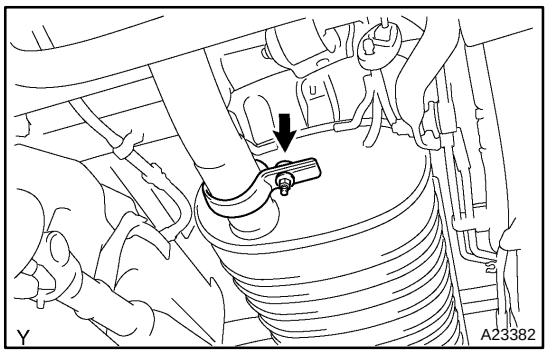


2. REMOVE RH AND LH FRONT EXHAUST PIPES

(a) Remove the 6 nuts and 2 gaskets, and disconnect the front exhaust pipes from the exhaust manifold.



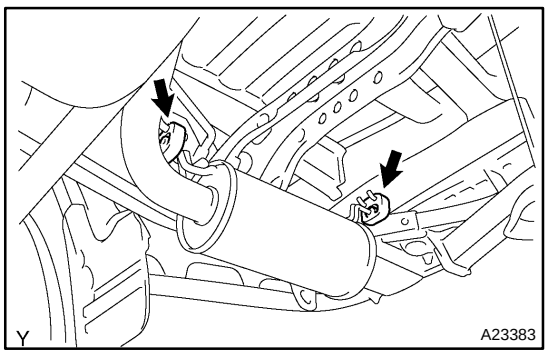
(b) Remove the 4 bolts, 2 gaskets and 2 front exhaust pipes from the center exhaust pipe.



3. REMOVE CENTER EXHAUST PIPE

(a) Loosen the clamp bolt, disconnect the center exhaust pipe and remove the gasket from the exhaust tail pipe.

(b) Remove the 5 rings and center exhaust pipe.



4. REMOVE EXHAUST TAIL PIPE

Remove the 2 rings and exhaust tail pipe.

5. REMOVE HEAT INSULATOR

(a) Remove the 5 bolts and No.1 heat insulator.

(b) Remove the 4 bolts and No.2 heat insulator.

(c) Remove the 3 bolts and No.3 heat insulator.

(d) Remove the 2 bolts and No.4 heat insulator.

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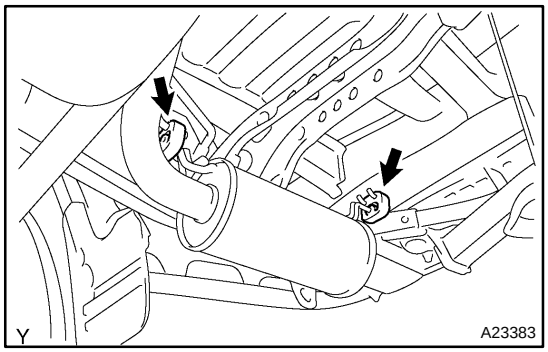
EM1X5–01

INSTALLATION

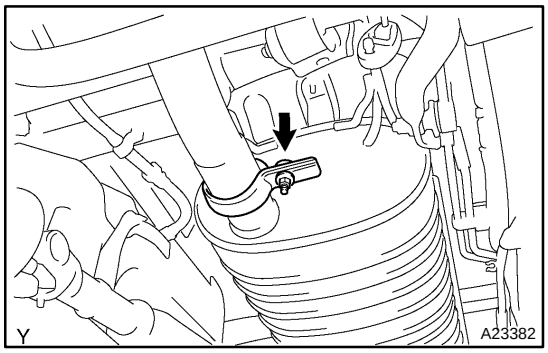
1. INSTALL HEAT INSULATOR

(a) Install the No.1 heat insulator with the 5 bolts.
(b) Install the No.2 heat insulator with the 4 bolts.
(c) Install the No.3 heat insulator with the 3 bolts.
(d) Install the No.4 heat insulator with the 2 bolts.



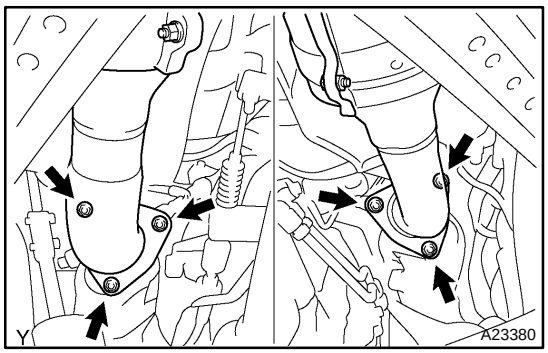
2. INSTALL EXHAUST TAIL PIPE

(a) Install the 2 rings and exhaust tail pipe.



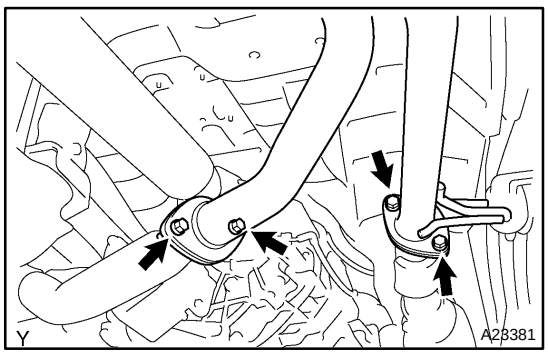
3. INSTALL CENTER EXHAUST PIPE

(a) Install the 5 rings and center exhaust pipe.
(b) Install a new gasket and connect the center exhaust pipe to the exhaust tail pipe with a new clamp.
Torque: 32 N·m (326 kgf·cm, 24 ft·lbf)



4. INSTALL RH AND LH FRONT EXHAUST PIPES

(a) Install 2 new gaskets and connect the 2 front exhaust pipes with the 6 nuts to the exhaust manifold.
Torque: 62 N·m (632 kgf·cm, 46 ft·lbf)



(b) Install 2 new gaskets and connect the 2 front exhaust pipe with the 4 bolts to the center exhaust pipe.
Torque: 48 N·m (489 kgf·cm, 35 ft·lbf)

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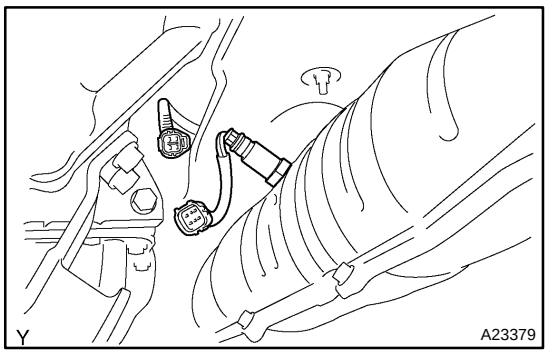

5. INSTALL HEATED OXYGEN SENSORS

(a) Install the heated oxygen sensor.
Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)

(b) Connect the heated oxygen sensor connector.

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EMISSION CONTROL SYSTEM

EC087–03

PURPOSE

The emission control systems are installed to reduce the amount of HC, CO and NOx exhausted from the engine ((3) and (4)), to prevent the atmospheric release of blow–by gas–containing HC (1) and evaporated fuel containing HC being released from the fuel tank (2).
The function of each system is shown in these table:

System	Abbreviation	Function
(1) Positive Crankcase Ventilation	PCV	Reduces HC
(2) Evaporative Emission Control	EVAP	Reduces evaporated HC
(3) Three–Way Catalytic Converter	TWC	Reduces HC, CO and NOx
(4) Sequential Multiport Fuel Injection*	SFI	Injects a precisely timed, optimum amount of fuel for reduced exhaust emissions

Remark: * For inspection and repair of the SFI system, refer to the SF section in this manual.

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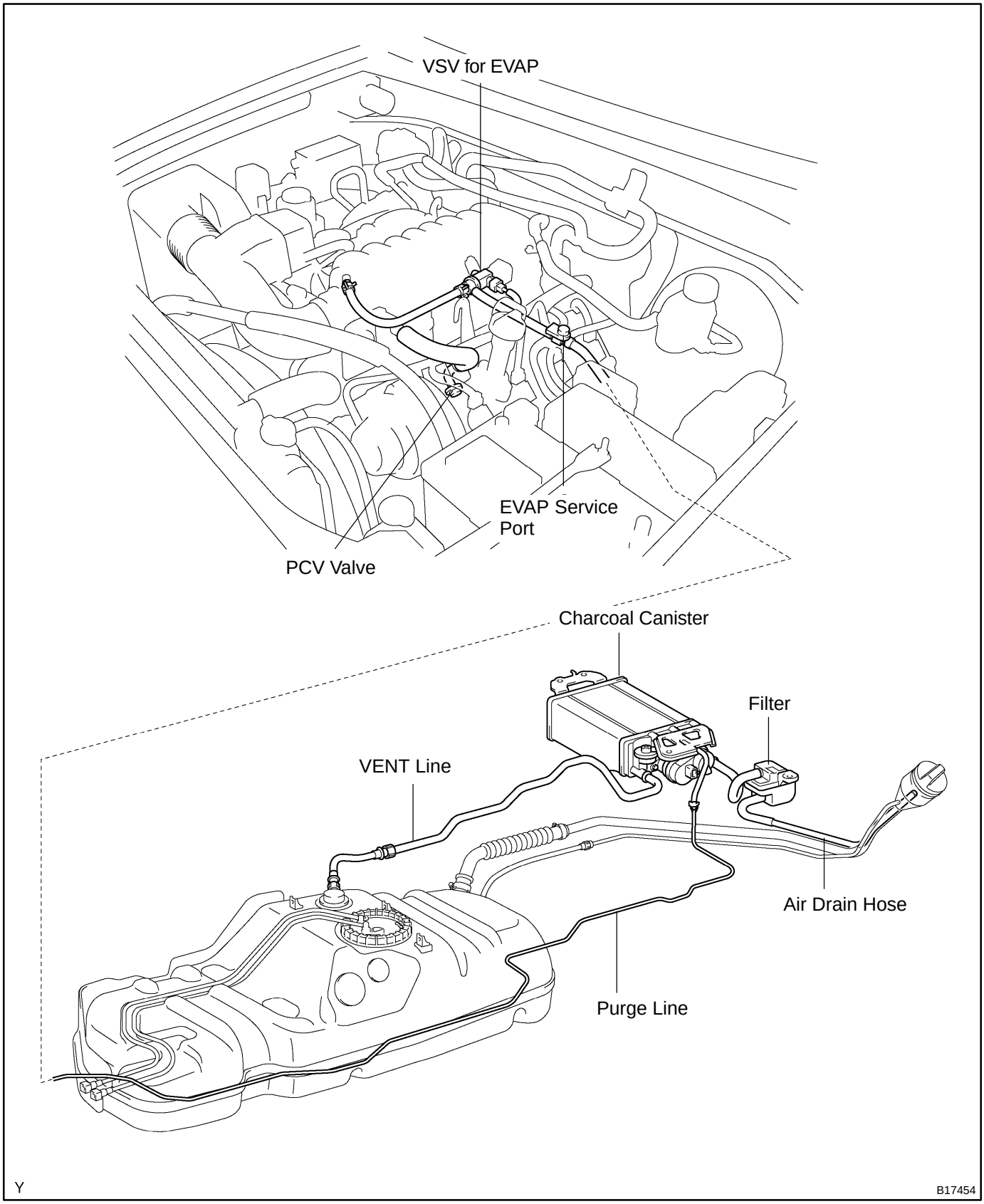
PARTS LAYOUT AND SCHEMATIC DRAWING

LOCATION

EC0NO–01



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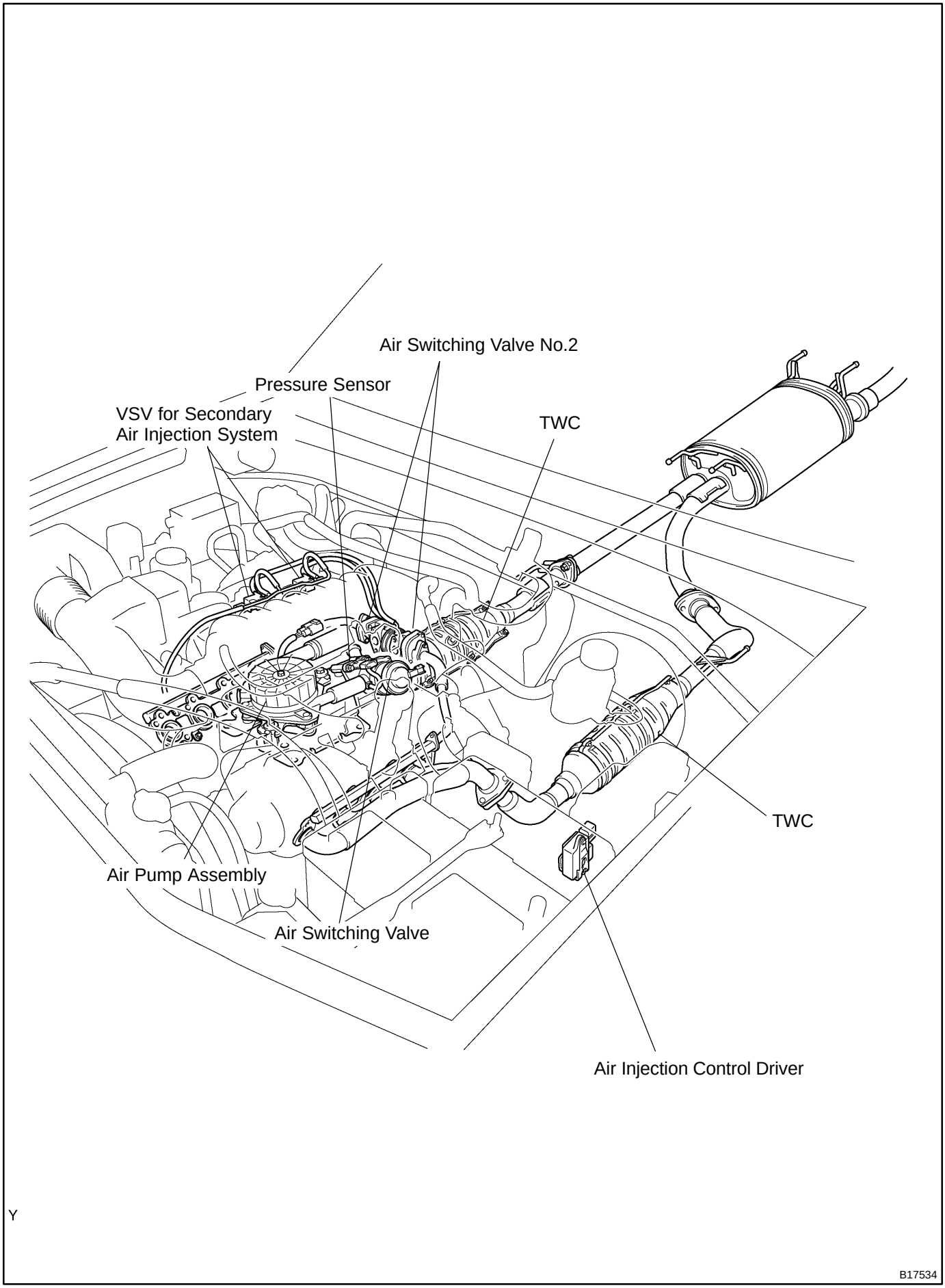
Air Switching Valve No.2
Pressure Sensor
VSV for Secondary
Air Injection System
TWC
TWC
Air Pump Assembly
Air Switching Valve
Air Injection Control Driver
Y
B17534

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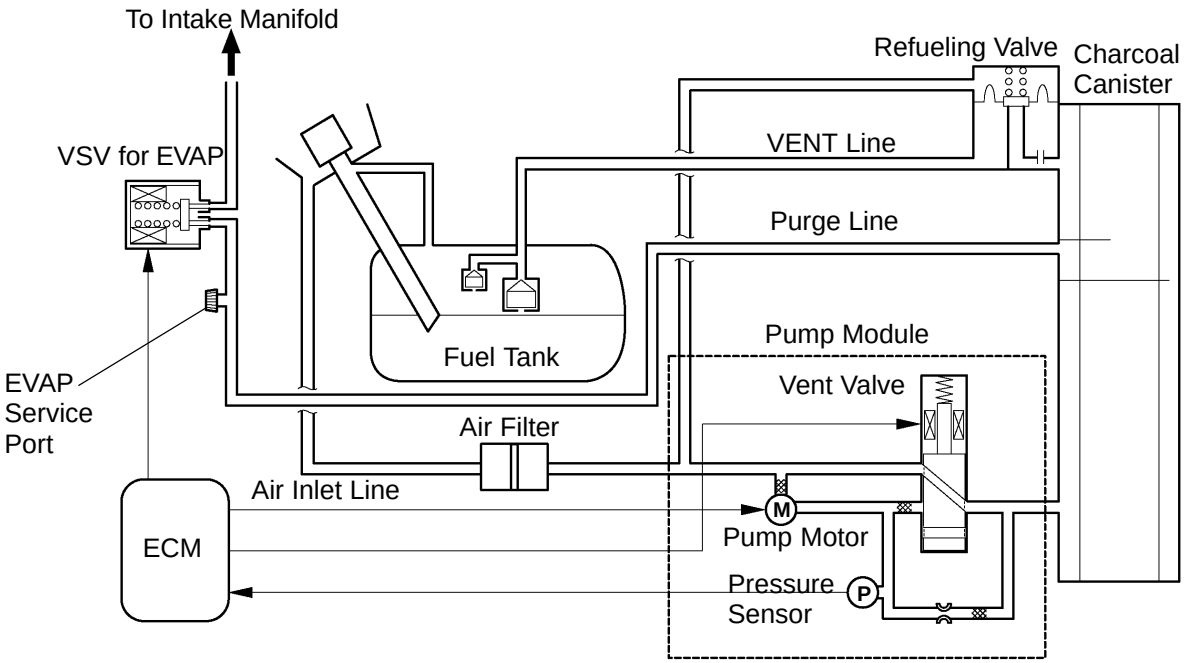
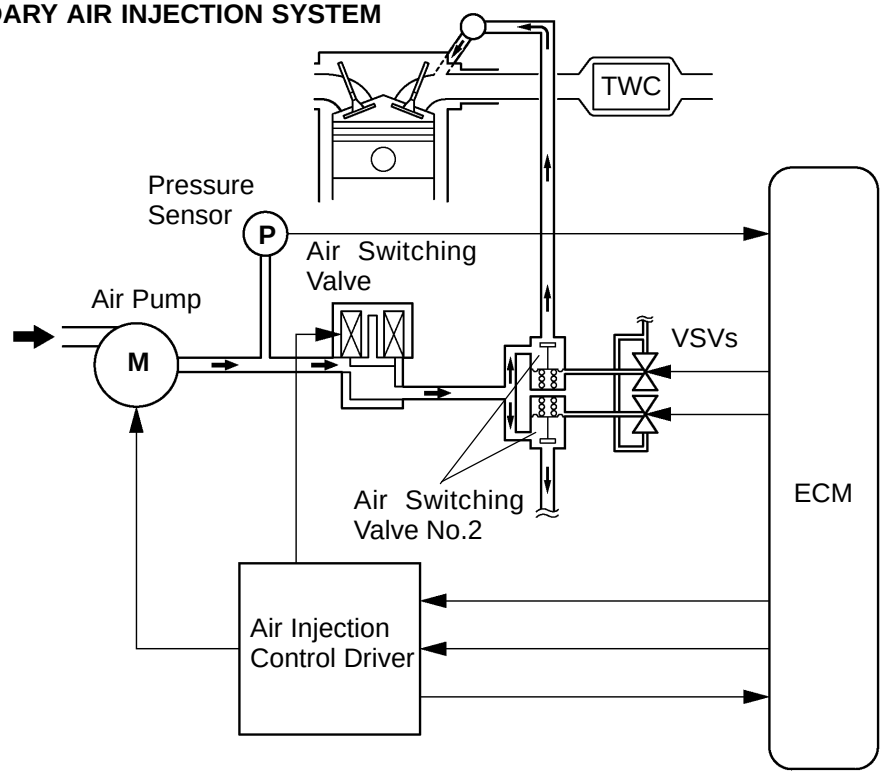
EC089–06

DRAWING

EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM



SECONDARY AIR INJECTION SYSTEM



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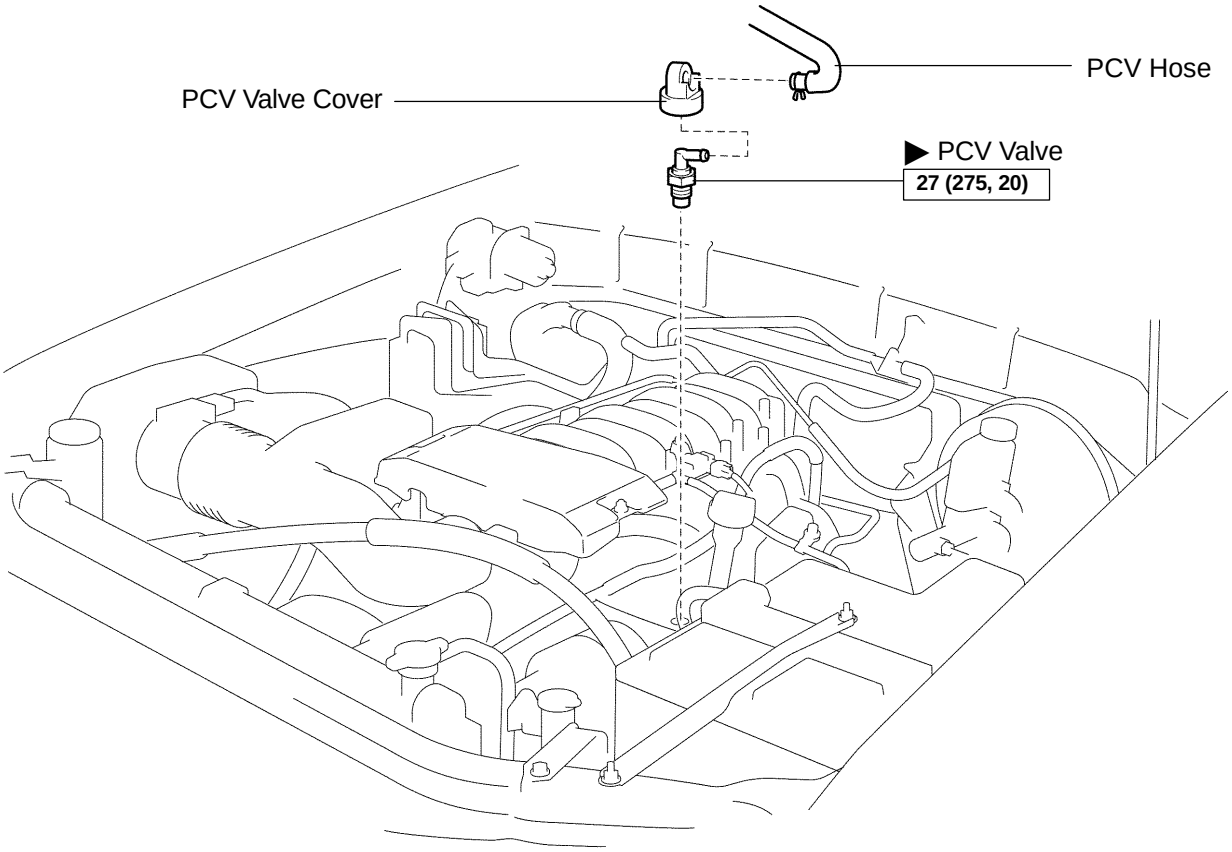
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

COMPONENTS

EC0MB–01



N·m (kgf·cm, ft·lbf) : Specified torque
P ▶ Precoated part

B16483

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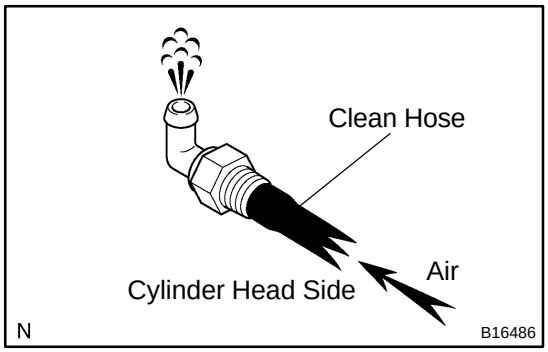
EC0NP–01

INSPECTION

1. REMOVE V–BANK COVER

2. INSPECT PCV VALVE

(a) Remove the PCV valve.



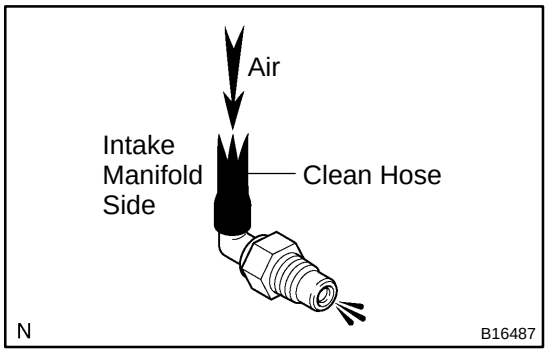
(b) Install a clean hose to the PCV valve.

(c) Inspect the PCV valve operation.

(1) Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:

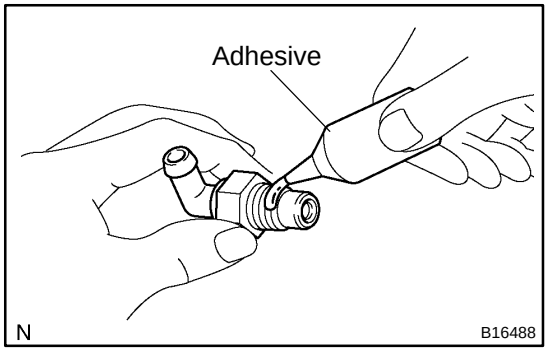
Do not suck air through the valve. Petroleum substances inside the valve are harmful.



(2) Blow air into the intake manifold side, and check that air passes through with difficulty.

If operation is not as specified, replace the PCV valve.

(d) Remove the clean hose from the PCV valve.

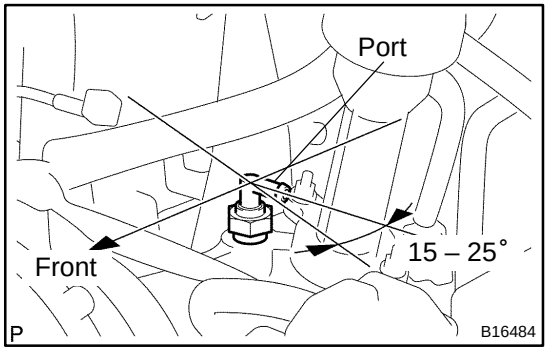


(e) Reinstall the PCV valve.

(1) Apply adhesive to 2 or 3 threads.

Adhesive:

Part No. 08833–00070, THREE BOND 1324 or equivalent



(2) Reinstall the PCV valve.

Torque: 27 N·m (275 kgf·cm,20 ft·lbf)

HINT:

After applying the specified torque, rotate the PCV valve clockwise with the port faced in the direction indicated in the illustration.

(3) Install the PCV valve cover to the PCV valve.

(4) Connect the PCV hose to the PCV valve.

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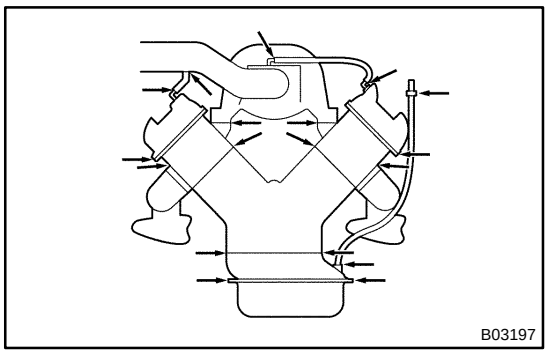

3. INSPECT HOSES, CONNECTIONS AND GASKETS

Visually for cracks, leaks or damage.

4. REINSTALL V–BANK COVER

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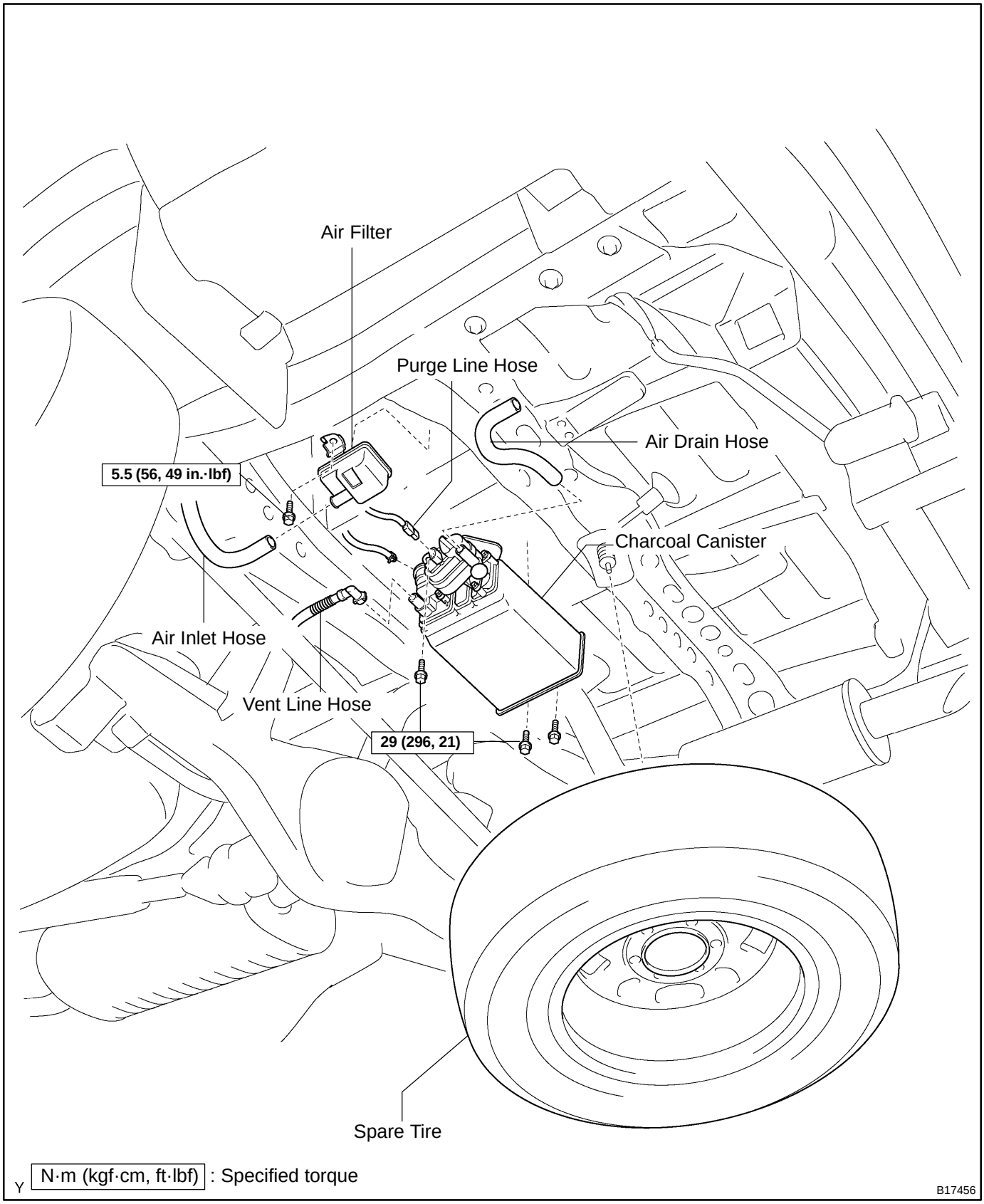
EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM

COMPONENTS

EC0JK–03



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EC0JL–03

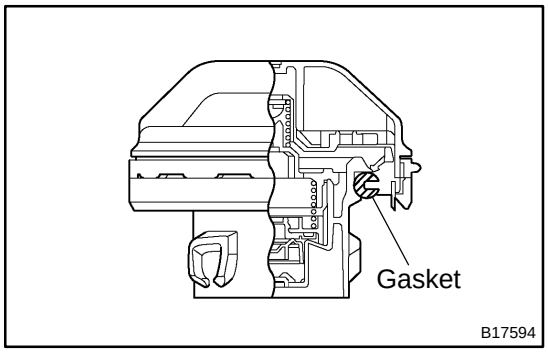
INSPECTION

1. INSPECT LINES AND CONNECTIONS

Visually check for loose connections, sharp bends or damage.

2. INSPECT FUEL TANK

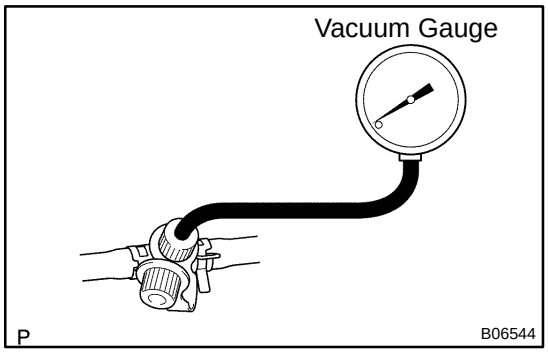
Visually check for deformation, cracks or fuel leakage.



3. INSPECT FUEL TANK CAP

Visually check if the cap and/or gasket are deformed or damaged.

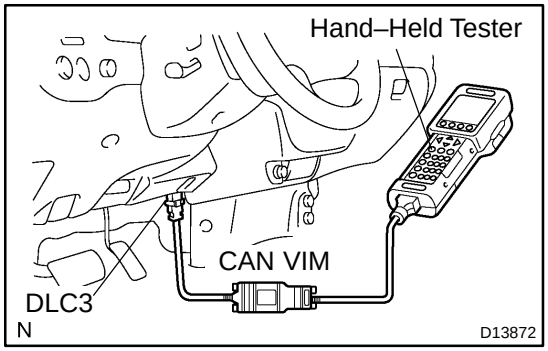
If necessary, repair or replace the cap.



4. INSPECT EVAP SYSTEM LINE

(a) Warm up the engine to normal operating temperature and stop the engine.

(b) Install a vacuum gauge (EVAP control system test equipment vacuum gauge) into the EVAP service port on the purge line.



(c) When using a hand–held tester:
Operation of the VSV for EVAP.
(1) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).
(2) Start the engine.
(3) Turn the hand–held tester ON.
(4) Enter the following menus: DIAGNOSIS / ENHANCED OBDII/ ACTIVE TEST / EVAP VAV (ALONE)

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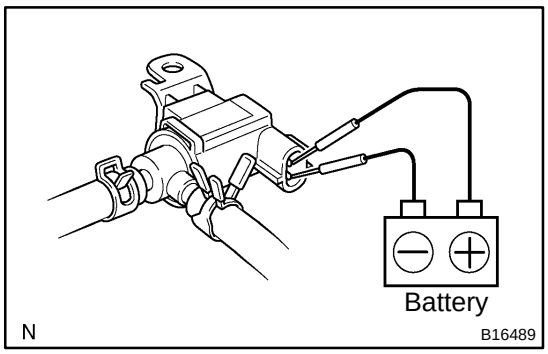
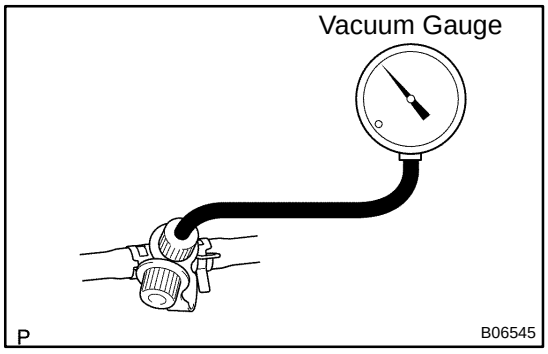


(d) When not using a hand–held tester:
Operation of the VSV for the EVAP.
(1) Disconnect the VSV for the EVAP connector.
(2) Connect leads from the positive (+) and negative (–) battery terminals to the VSV for EVAP terminals.
(3) Start the engine.



(e) Check the vacuum when the engine idles.
Vacuum:
Maintain between 0.368 and 19.713 in.Hg (5 to 268 in.Aq) for over 5 seconds

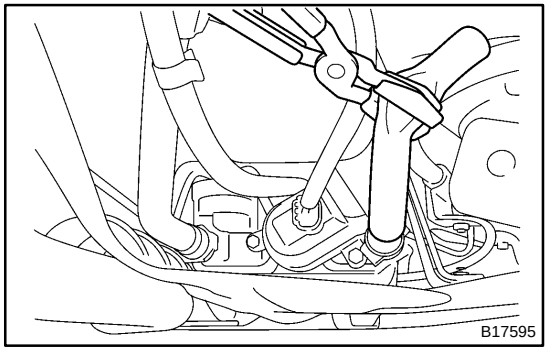
HINT:
If the vacuum does not change, the hose connecting the VSV and the service port is loose or blocked, or the VSV is malfunctioning.

(f) When using a hand–held tester:
Conclude operation of the VSV for EVAP.
(1) Stop the engine.
(2) Disconnect the hand–held tester from the DLC3.

(g) When not using a hand–held tester:
Conclude operation of the VSV for EVAP.
(1) Stop the engine.
(2) Disconnect the positive (+) and negative (–) leads of the battery from the VSV for EVAP terminals.
(3) Connect the VSV for EVAP connector.

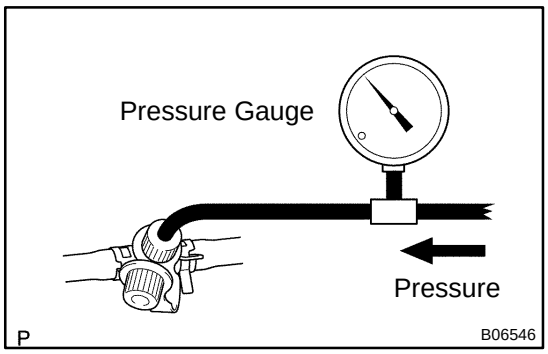
(h) Disconnect the vacuum gauge from the EVAP service port on the purge line.

(i) Connect a pressure gauge to the EVAP service port on the purge line.



(j) Check the pressure.
(1) Prepare a rubber hose that has an inside diameter of 15 to 18.5 mm.
(2) Disconnect the atmospheric side hose of the pump module.
(3) Connect the prepared rubber hose to the pump module, and pinch the rubber hose with the clip to prevent air from entering into the canister passage.

Dardoor.com



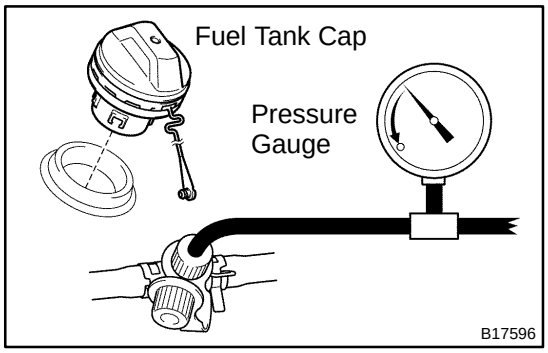
(4) Apply pressure (13.5 to 15.5 in.Aq, 0.99 to 1.14 in.Hq) from the EVAP service port.

Pressure:

The gauge should still read over 7.7 to 8.8 in.Aq (0.57 to 0.65 in.Hq) for 2 minutes after the pressure is applied.

HINT:

If you cannot apply pressure, the hose connecting the VSV, charcoal canister and fuel tank has slipped off or the VSV is open.

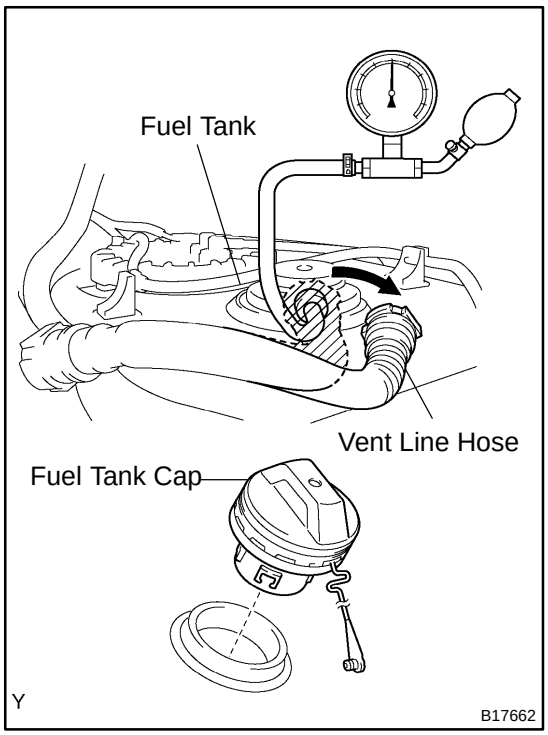


(5) Check if the pressure decreases when the fuel tank cap is removed while applying pressure.

HINT:

If the pressure does not decrease when the filler cap is removed, the hose connecting the service port and the fuel tank may be blocked.

(k) Disconnect the pressure gauge from the EVAP service port on the purge line.



5. INSPECT FUEL CUTOFF VALVE AND FILL CHECK VALVE

(a) Disconnect the vent line hose from the fuel tank.

(b) Connect the pressure gauge to the fuel tank.

(c) Fill the fuel tank with fuel.

(d) Apply pressure of 4 kPa (41 gf/cm^2,0.58 psi) to the vent port of the fuel tank.

HINT:

It is necessary to check the amount of fuel in the fuel tank. When the fuel tank is full, the float valve of the fill check valve is closed and no air can pass through.

(e) Remove the fuel tank cap, and check that the pressure drops.

If the pressure does not drop, replace the fuel tank assembly.

(f) Reconnect the vent line hose to the fuel tank.

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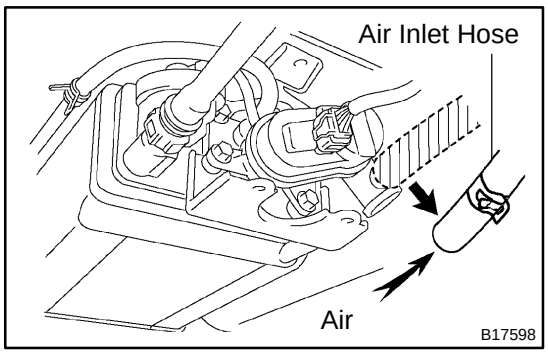


6. CHECK AIR INLET LINE

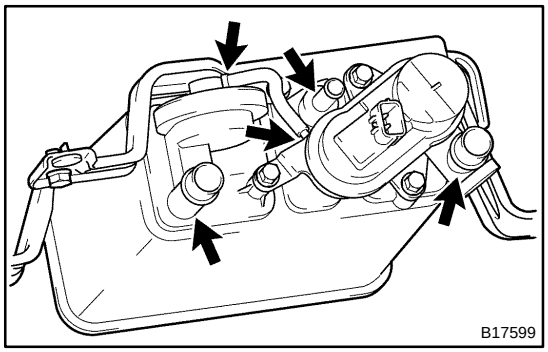
(a) Disconnect the air inlet line hose from the charcoal canister.

(b) Check that air can flow freely into the air inlet line.

If air cannot flow freely into the air inlet line, repair or replace it.

(c) Reconnect the air inlet line hose to the charcoal canister.

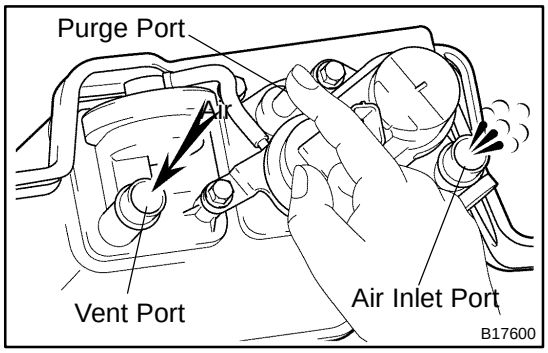
7. REMOVE CHARCOAL CANISTER ASSEMBLY



8. INSPECT CHARCOAL CANISTER ASSEMBLY

(a) Visually check the charcoal canister for cracks or damage.

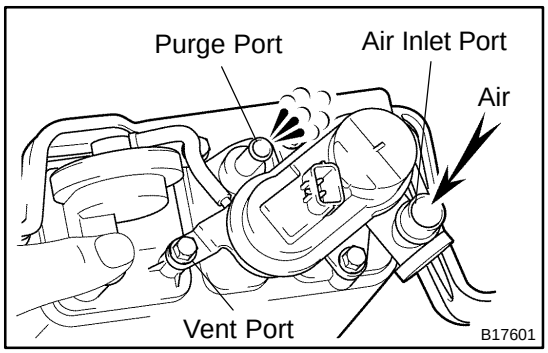
If cracks or damage are found, replace the charcoal canister assembly.



(b) Check charcoal canister operation.

(1) With the purge port closed, blow 1.67 kPa (17.0 gf/cm^2, 0.24 psi) of air into the vent port, and check that air flows from the air inlet port.

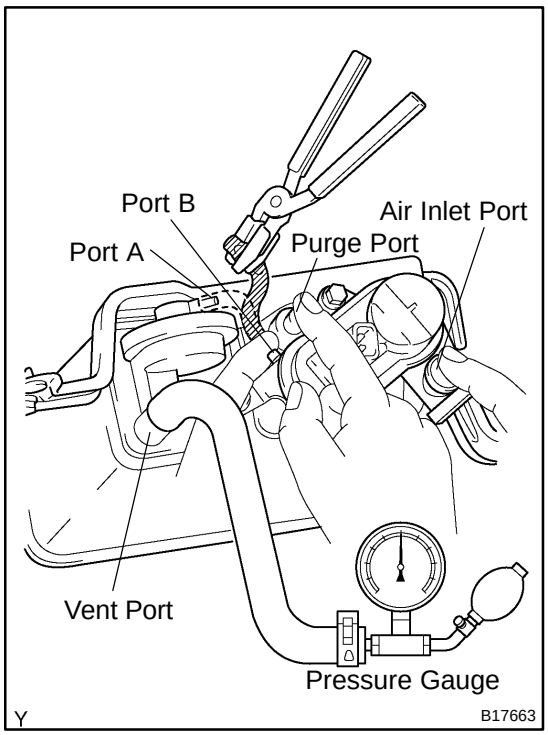
If the result is not as specified, replace the charcoal canister assembly.



(2) With the vent port closed, blow 1.10 kPa (11.2 gf/cm^2, 0.16 psi) air to the air inlet port, and check that air flows from the purge port.

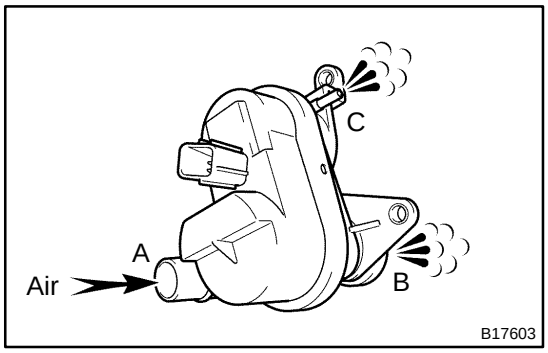
If the result is not as specified, replace the charcoal canister assembly.

Dardoor.com



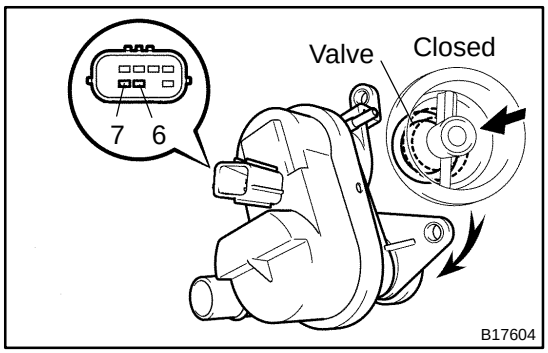
(c) Check for air leakage.
(1) Remove the air hose between ports A and B.
(2) Connect the pressure gauge to the vent port of the charcoal canister.
(3) While holding port B, with the purge port and the air inlet port closed and port A open, apply pressurized air 19.6 kPa (0.2 kgf/cm^2, 2.81 psi) of pressurized air into the vent port, then confirm that the pressure is retained for 1 minute.

If the result is not as specified, replace the charcoal canister assembly.



(d) Check leak detection pump.
(1) Remove the detection pump from the charcoal canister.
(2) Check that air flows from port A to B and then C.

If the result is not as specified, replace the charcoal canister assembly.



(3) Connect the positive (+) lead to terminal 7 and the negative (–) lead to terminal 6.
(4) Check that the valve is closed.

If the result is not as specified, replace the charcoal canister assembly.

(5) Install the detection pump.

9. INSPECT VSV FOR EVAP (See page SF–63)

10. REINSTALL CHARCOAL CANISTER ASSEMBLY

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THREE–WAY CATALYTIC CONVERTER (TWC) SYSTEM

EC0JM–02

ON–VEHICLE INSPECTION

1. CHECK EXHAUST PIPE ASSEMBLY

(a) Check the connections for looseness or damage.

(b) Check the clamps for weakness, cracks or damage.

2. INSPECT TWC

Check for dents or damage.

If any part of protector is damaged or dented to the extent that it contacts the TWC, repair or replace it.

3. INSPECT HEAT INSULATOR

(a) Check the heat insulator for damage.

(b) Check for adequate clearance between the TWC and heat insulator.

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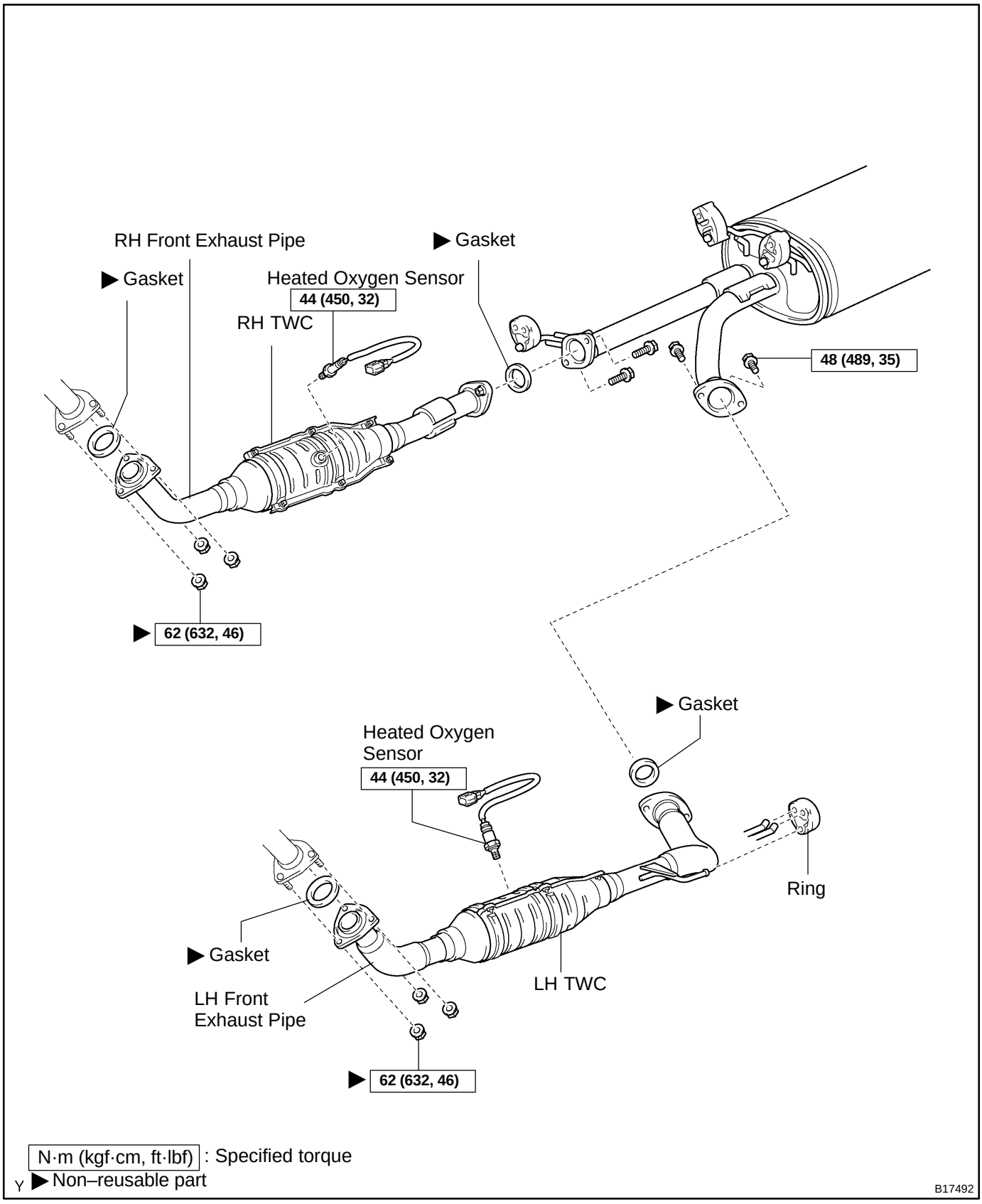
EC08C–05

COMPONENTS



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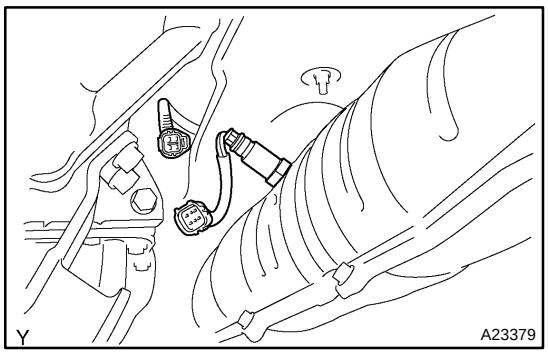
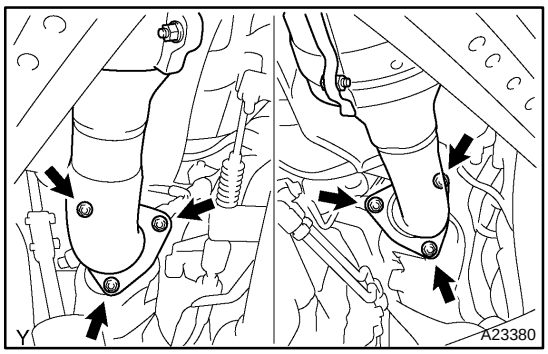
EC0NQ–01

REPLACEMENT



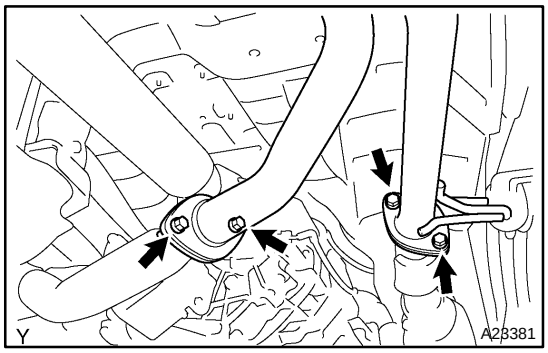
1. DISCONNECT HEATED OXYGEN SENSORS

Remove the 2 heated oxygen sensors from the front exhaust pipes.



2. REMOVE RH AND LH FRONT EXHAUST PIPES

(a) Remove the 6 nuts from the front side of the RH and LH front exhaust pipes.



(b) Remove the 4 bolts from the rear side of the RH and LH front exhaust pipes.

(c) Remove the RH and LH front exhaust pipes and 4 gaskets.

3. INSTALL RH AND LH FRONT EXHAUST PIPES

(a) Install 4 new gaskets to the RH and LH front exhaust pipes.

(b) Install the 4 bolts.

Torque: 48 N·m (489 kgf·cm, 35 ft·lbf)

(c) Install 6 new nuts to the front side of the RH and LH front exhaust pipes.

Torque: 62 N·m (632 kgf·cm, 46 ft·lbf)

4. INSTALL HEATED OXYGEN SENSOR

Install the 2 heated oxygen sensors to the RH and LH front exhaust pipes.

Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

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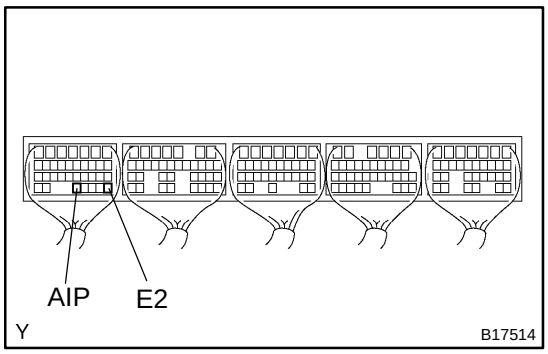


SECONDARY AIR INJECTION SYSTEM

EC0NY–01

ON–VEHICLE INSPECTION

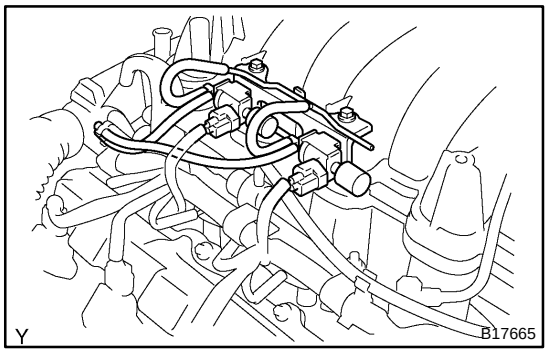
1. INSPECT PRESSURE SENSOR

(a) Turn the ignition switch to the ON position.

(b) Measure the voltage between terminals AIP and E2 of the ECM connector.

Voltage: 1.0 to 2.2 V

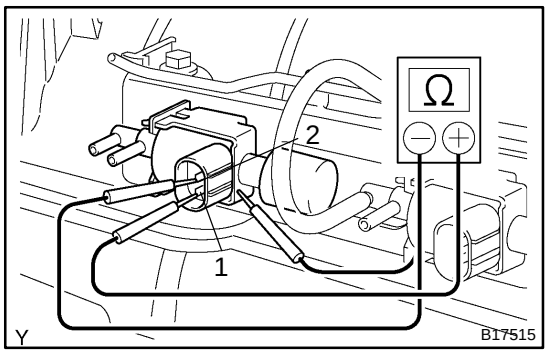
If the voltage is not as specified, replace the pressure sensor.



2. INSPECT VSV FOR AIR INJECTION SYSTEM

(a) Disconnect the connector from the VSV.

(b) Disconnect the 2 vacuum hoses from the VSV.

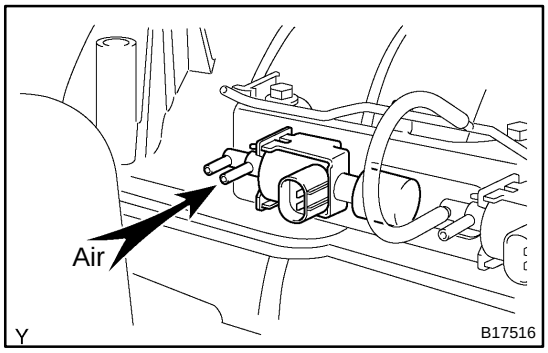


(c) Using an ohmmeter, measure the resistance between the terminals.

Standard:

Tester Connection	Specified Condition
1 – 2	33 to 39 Ω at 20°C (68°F)
1 – Body ground	10 MΩ or higher
2 – Body ground	10 MΩ or higher

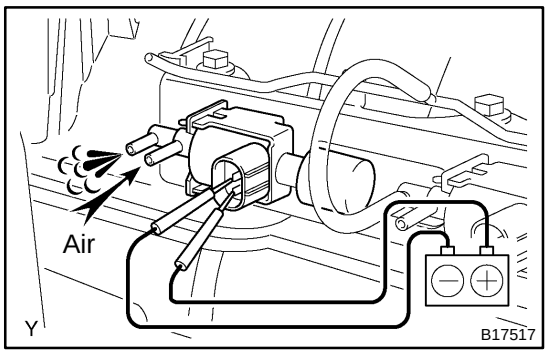
If the resistance is not as specified, replace the VSV.



(d) Check that air does not flow from the port as shown in the illustration.

If the result is not as specified, replace the VSV.

Dardoor.com



(e) Apply positive battery between the terminals, check that air flows from the ports.

If the result is not as specified, replace the VSV.

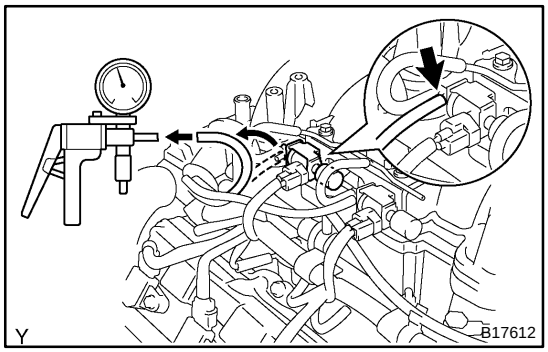
(f) Connect the 2 vacuum hoses to the VSV.

NOTICE:

Be sure to connect the vacuum hoses correctly.

(g) Connect the connector to the VSV.

(h) Perform procedures (a) to (g) to the other VSV.

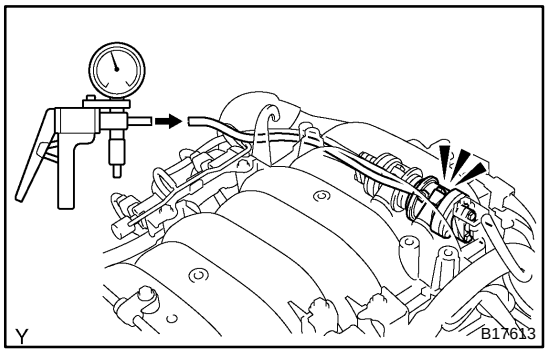


3. INSPECT NO. 2 AIR SWITCHING VALVE

(a) Disconnect the vacuum hose from the VSV for the air injection system.

(b) Apply vacuum (30 kPa (306 gf/cm^2, 4.35 psi) to vacuum hose, check that the vacuum does not decrease.

If operation is not as specified, replace the No.2 air switching valve.



(c) Release the vacuum, and check that the operation sound is emited from the No.2 air switching valve.

If operation is not as specified, replace the No.2 air switching valve.

(d) Perform procedures (a) to (c) to the other No.2 air seitching valve.

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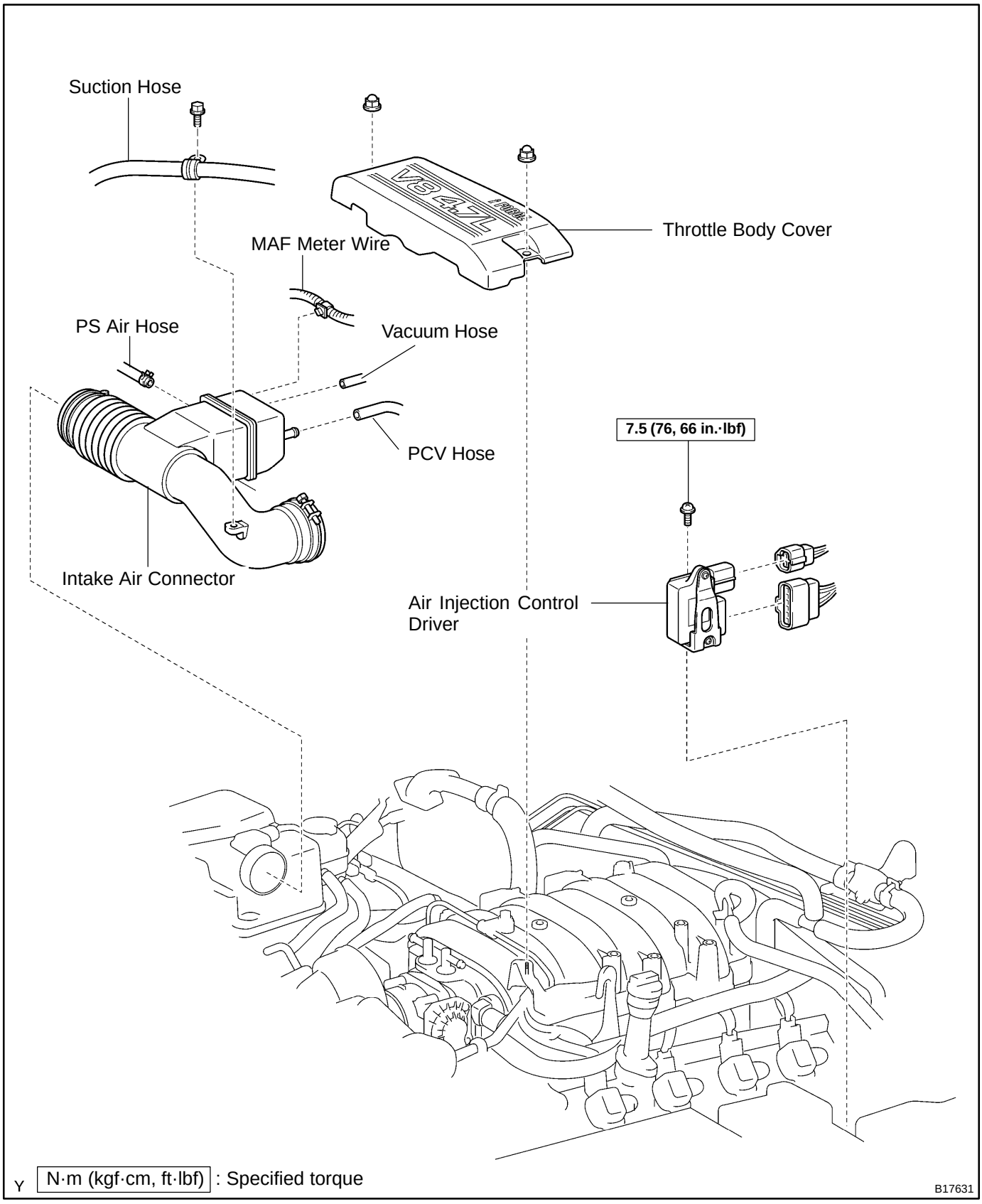
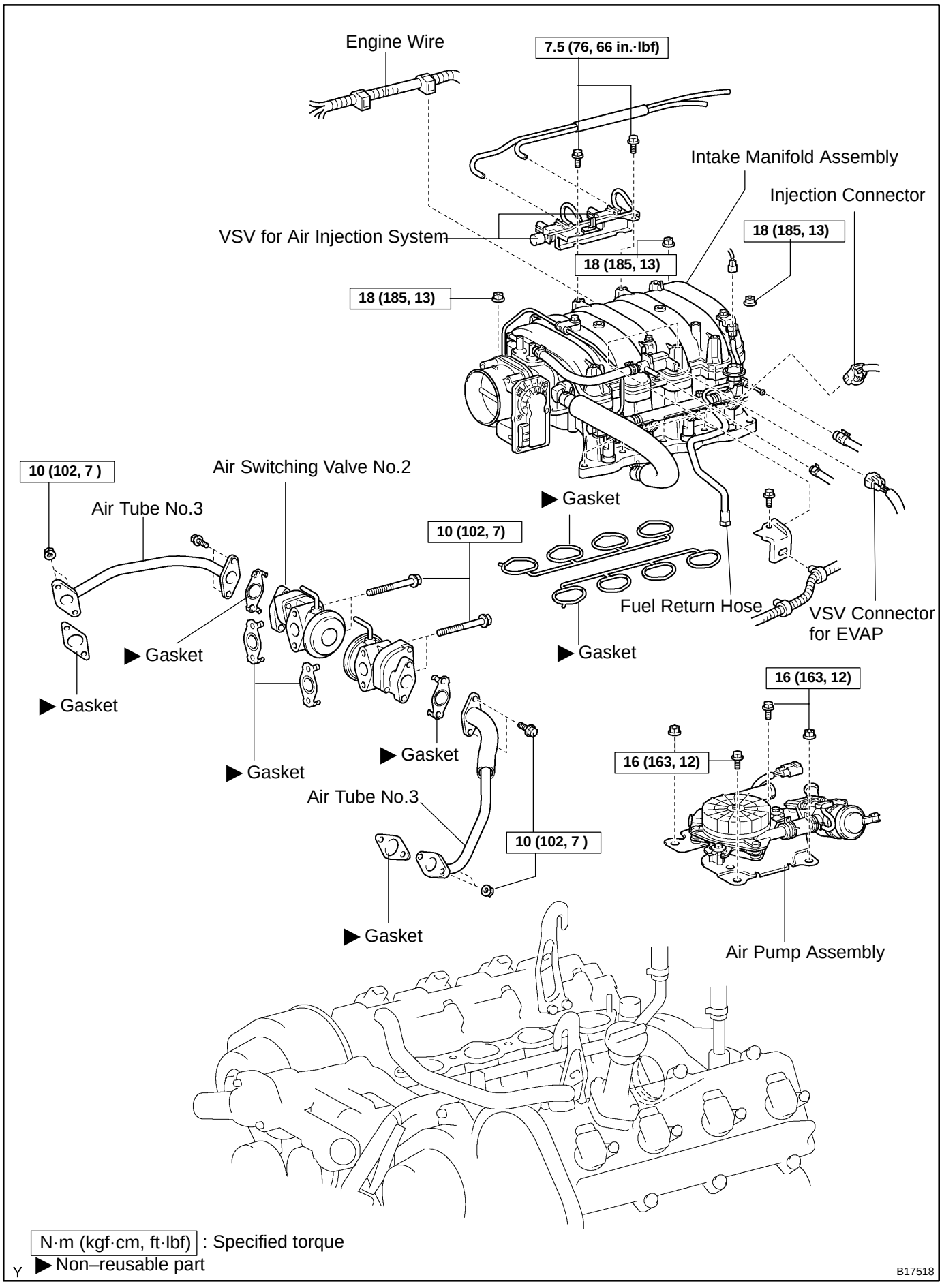
EC0NZ–01

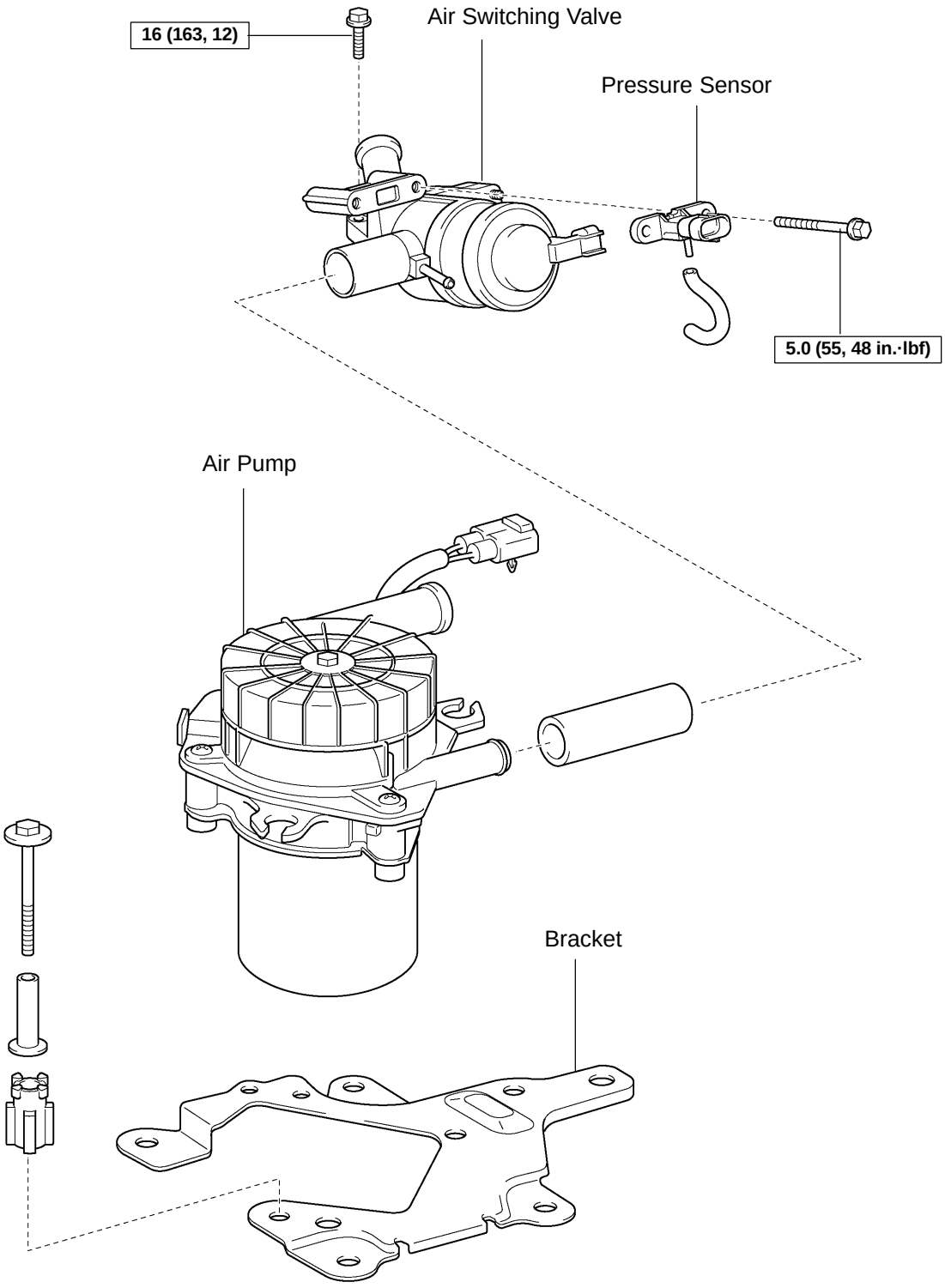
COMPONENTS



Dardoor.com


Engine Wire
7.5 (76, 66 in.·lbf)
Intake Manifold Assembly
Injection Connector
VSV for Air Injection System
18 (185, 13)
18 (185, 13)
18 (185, 13)
10 (102, 7)
Air Switching Valve No.2
Air Tube No.3
▶ Gasket
10 (102, 7)
▶ Gasket
Fuel Return Hose
VSV Connector for EVAP
▶ Gasket
▶ Gasket
▶ Gasket
▶ Gasket
16 (163, 12)
16 (163, 12)
Air Tube No.3
10 (102, 7)
▶ Gasket
Air Pump Assembly
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
B17518

Dardoor.com



Y N·m (kgf·cm, ft·lbf) : Specified torque

B17519

Dardoor.com

EC0O0–01

REMOVAL

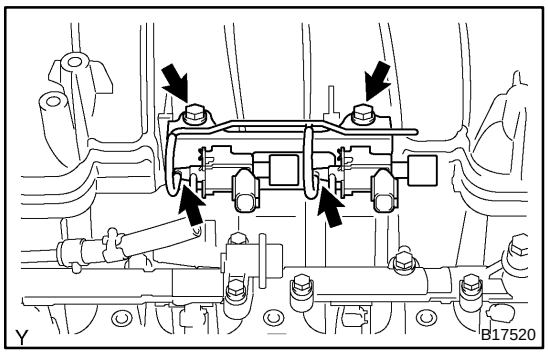
1. REMOVE THROTTLE BODY COVER

2. REMOVE INTAKE MANIFOLD (See page EM–36)

3. REMOVE VSV FOR AIR INJECTION SYSTEM

(a) Remove the 2 bolts and 2 VSVs from the intake manifold.

(b) Remove the 2 vacuum hoses from the 2 VSVs.



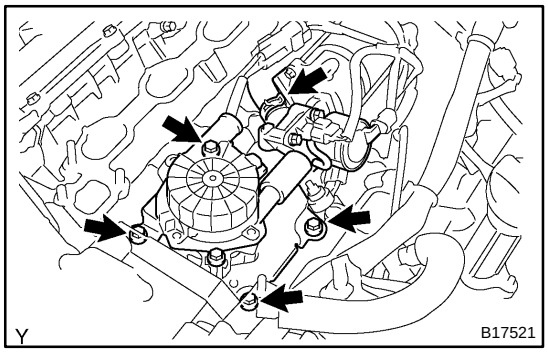
4. REMOVE AIR PUMP ASSEMBLY

(a) Disconnect the air hose No.2 from the air switching valve.

(b) Disconnect the air switching valve connector.

(c) Disconnect the pressure sensor connector for the air injection system.

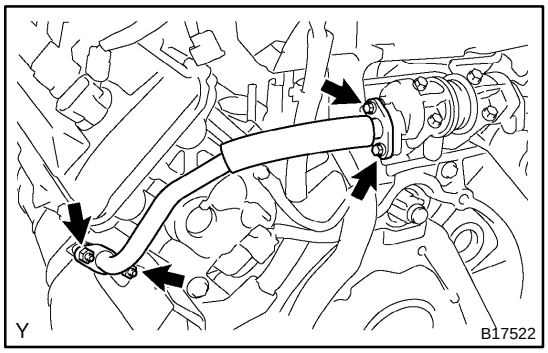
(d) Remove the 4 bolts and air pump assembly.



5. REMOVE NO. 2 AIR SWITCHING VALVE

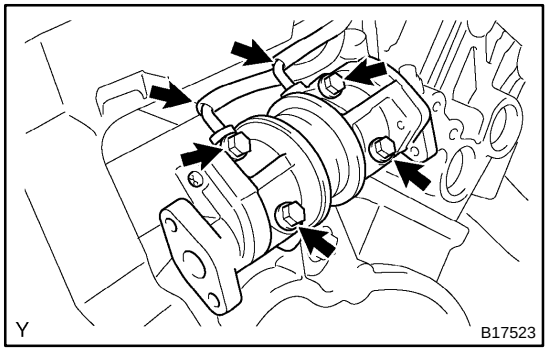
(a) Remove the 4 nuts and 2 gaskets, and disconnect the 2 No.3 air tubes from the exhaust manifolds.

(b) Remove the 4 bolts, 2 gaskets and the 2 No.3 air tubes from the 2 No.2 air switching valves.



(c) Remove the 4 bolts, 2 gaskets and the 2 No.2 air switching valves from the rear water by–pass joint.

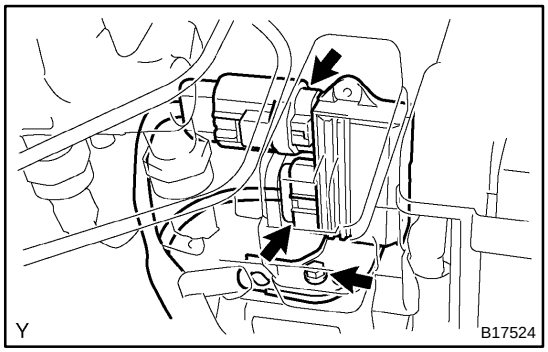
(d) Remove the 2 vacuum hoses from the No.2 air switching valves.



6. REMOVE AIR INJECTION CONTROL DRIVER

(a) Disconnect the 2 connectors from the air injection control driver.

(b) Remove the 2 bolts and air injection control driver from the body.



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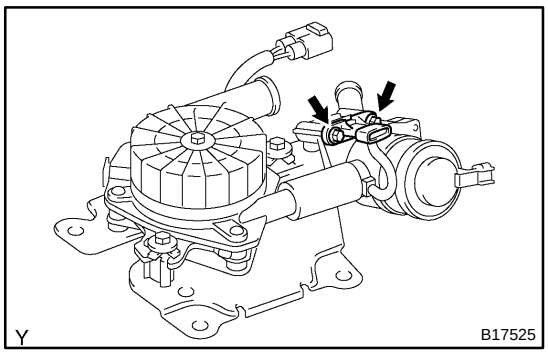
EC0O1–01

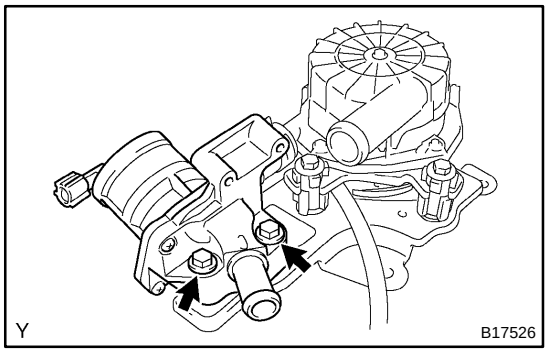
DISASSEMBLY



1. REMOVE PRESSURE SENSOR

(a) Remove the vacuum hose from the pressure sensor and air switching valve.

(b) Remove the 2 bolts and pressure sensor from the air switching valve.



2. REMOVE AIR SWITCHING VALVE

(a) Remove the 2 bolts and air switching valve from the air pump bracket.

(b) Remove the No.1 air hose from the air switching valve and air pump.

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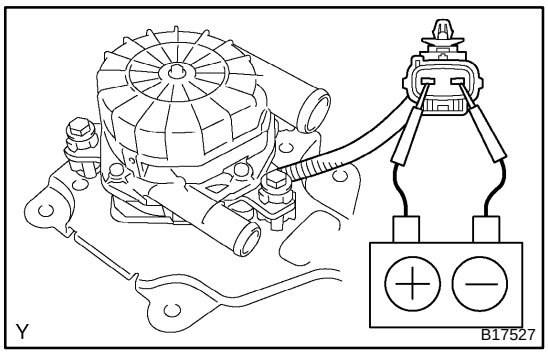
EC0O2–01

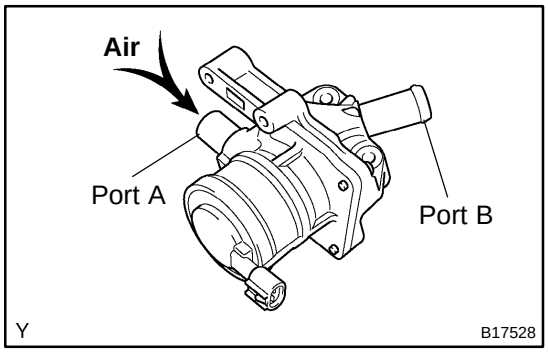
INSPECTION



1. INSPECT AIR PUMP

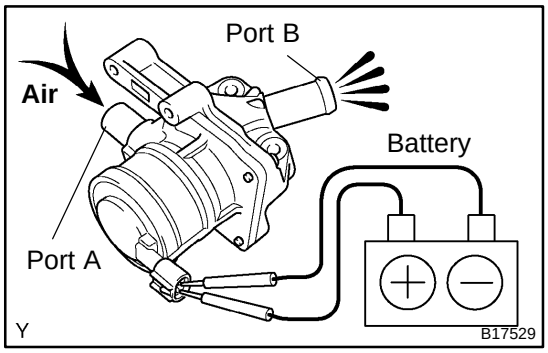
(a) Connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to terminal 2, and check that air flows.

If operation is not as specified, replace the air pump.



2. INSPECT AIR SWITCHING VALVE

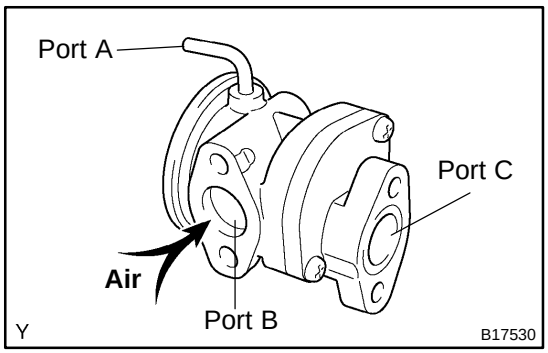
(a) Blow air into port A and check that air is not discharged from port B.



(b) Apply positive battery between the terminals.

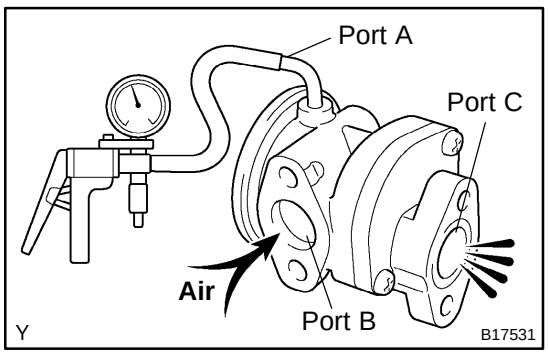
(c) Blow air into port A and check that air is discharged from port B.

If operation is not as specified, replace the air switching valve.



3. INSPECT NO. 2 AIR SWITCHING VALVE

(a) Blow air into port B and check that air is not discharged from port C.



(b) Apply vacuum (30 kPa (306 gf/cm^2, 4.35 psi) to port A, blow air into port B and check that air is discharged from port C.

If operation is not as specified, replace the No.2 air switching valve.

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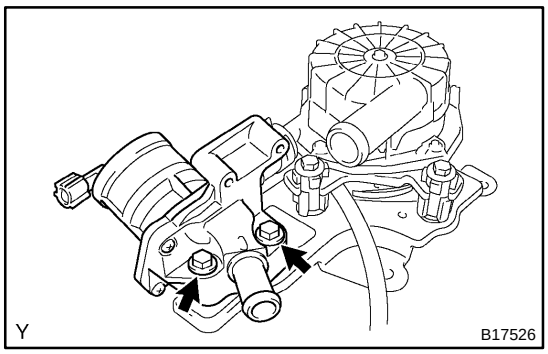
EC0O3–01

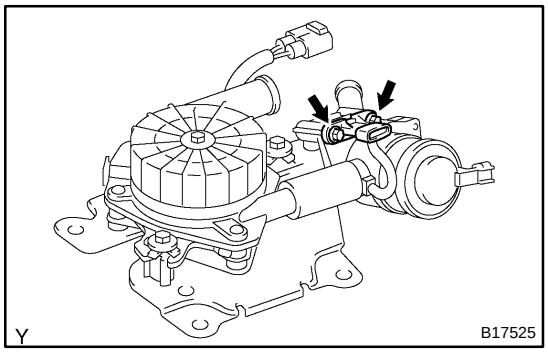
REASSEMBLY



1. INSTALL AIR SWITCHING VALVE

(a) Install the No.1 air hose to the air switching valve and air pump.

(b) Install the air switching valve with the 2 bolts to the air pump bracket.
Torque: 16 N·m (163 kgf·cm, 12 ft·lbf)



2. INSTALL PRESSURE SENSOR

(a) Install the pressure sensor with the 2 bolts to the air switching valve.
Torque: 5.0 N·m (55 kgf·cm, 48 in.·lbf)

(b) Install the vacuum hose to the pressure sensor and air switching valve.

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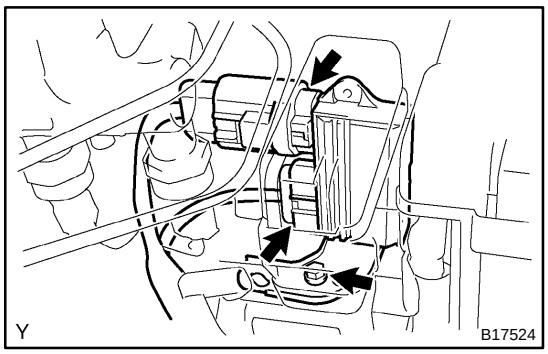
EC0O4–01

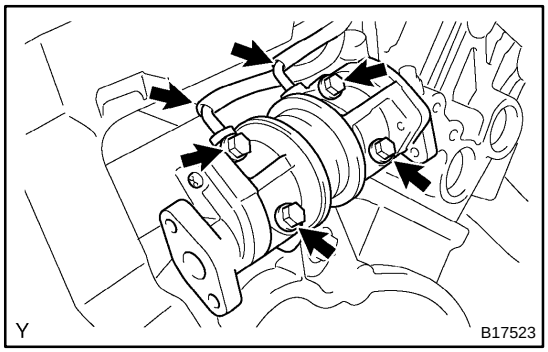
INSTALLATION



1. INSTALL AIR INJECTION CONTROL DRIVER

(a) Install the air injection control driver with the 2 bolts to the body.
Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

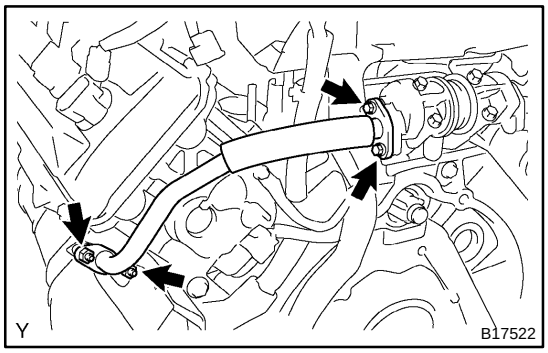
(b) Connect the 2 connectors to the air injection control driver.



2. INSTALL NO. 2 AIR SWITCHING VALVE

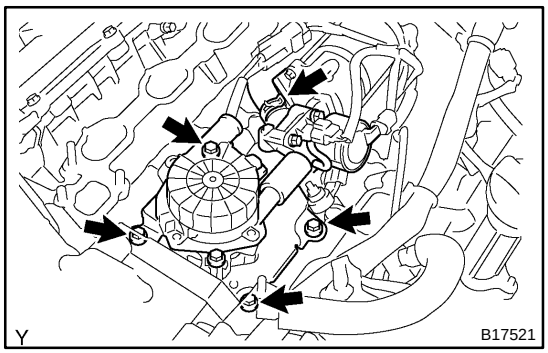
(a) Connect the 2 vacuum hoses to the No.2 air switching valves.

(b) Install 2 new gaskets and 2 No.2 air switching valves with the 4 bolts to the rear water by–pass joint.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)



(c) Install 2 new gaskets, and connect the 2 No.3 air tubes with the 4 bolts to the No.2 air switching valve.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

(d) Install the 2 new gaskets, and connect the 2 No.3 air tubes with the 4 nuts to the exhaust manifold.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)



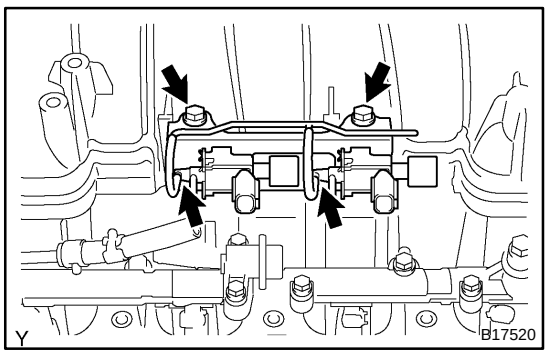
3. INSTALL AIR PUMP ASSEMBLY

(a) Install the air pump assembly with the 4 bolts.
Torque: 16 N·m (163 kgf·cm, 12 ft·lbf)

(b) Connect the pressure sensor connector for the air injection system.

(c) Connect the air switching valve connector.

(d) Connect the air hose No.2 to the air switching valve.



4. INSTALL VSV FOR AIR INJECTION SYSTEM

(a) Install the 2 VSVs with the 2 bolts to the intake manifold.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(b) Connect the 2 vacuum hoses to the 2 VSVs.

5. INSTALL INTAKE MANIFOLD (See page EM–60)

6. INSTALL THROTTLE BODY COVER

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SFI SYSTEM

PRECAUTION

SF1XD–01

HINT:

All DTCs retained in the ECM will be erased when the negative (–) terminal cable is removed from the battery.

If necessary, read the DTC before removing the negative (–) terminal cable from the battery.

1. BEFORE WORKING ON FUEL SYSTEM, DISCONNECT CABLE FROM NEGATIVE (–) BATTERY TERMINAL

2. DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON FUEL SYSTEM

3. KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS

4. MAINTENANCE PRECAUTIONS

(a) To prevent engine misfire, these precautions should be taken.

(1) Check the battery terminals are proper connected.

(2) After repair, check that the ignition coil terminals and all other ignition system lines are reconnected securely.

(3) When cleaning the engine compartment, be especially careful to protect the electrical system from water.

(b) Observe the following when handling the air fuel ratio sensors and oxygen sensor.

(1) Do not drop the sensor or hit it against another object.

(2) The sensor should be free from any contact with water.

5. IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC.)

If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

6. AIR INDUCTION SYSTEM

(a) Removal of the engine oil dipstick, oil filler cap, PCV hose, may break the engine.

(b) Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head may result in air suction and break the engine.

7. ELECTRONIC CONTROL SYSTEM

(a) Before removing SFI wiring connectors, terminals, first disconnect the power by turning the ignition switch off or disconnecting the negative (–) terminal cable from the battery.

HINT:

Be sure to check DTCs before disconnecting the negative (–) terminal cable from the battery.

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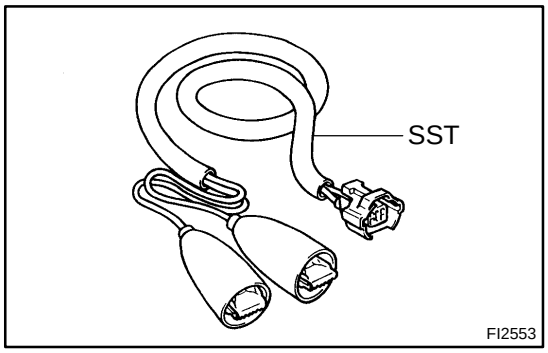
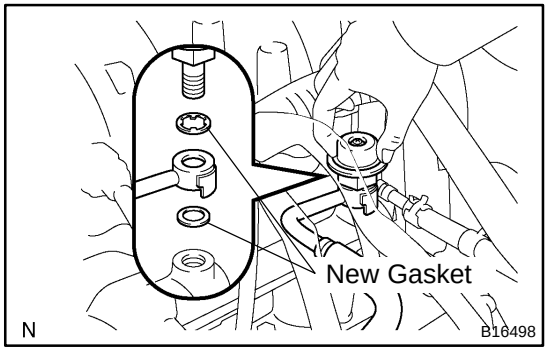
(b) When installing the battery, be especially careful to correctly connect the positive (+) and negative (–) cables.
(c) Do not give a severe impact to the SFI parts during removal or installation. Handle all SFI parts carefully, especially the ECM.
(d) Be careful during troubleshooting. Numerous transistor circuits are used and even slight terminal contact can cause further trouble.
(e) Do not open the ECM cover.
(f) When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting into the SFI parts and wiring connectors.
(g) Parts should be replaced as an assembly.
(h) Care should be taken when pulling out and inserting wiring connectors.
    (1) Release the lock and pull out the connector, pulling on the connectors.
    (2) Fully insert the connector and check that it is locked.



(i) Use SST for inspection or test of the injector or its wiring connector.
SST 09842–30070

8. FUEL SYSTEM

(a) When disconnecting the high fuel pressure line, a large amount of gasoline will spill out. Observe the following procedures:
    (1) Disconnect the circuit opening relay.
    (2) Start the engine. After the engine has stopped on its own, turn the ignition switch off.
    (3) Put a container under the connecting part of the pressure line.
    (4) Slowly loosen the connection.
    (5) Disconnect the high fuel pressure line.
    (6) Reconnect the fuel pump connector.



(b) When connecting the union bolt (fuel pressure pulsation damper) on the high pressure pipe union, observe the following procedures:
    (1) Always use 2 new gaskets.
    (2) Tighten the union bolt by hand.

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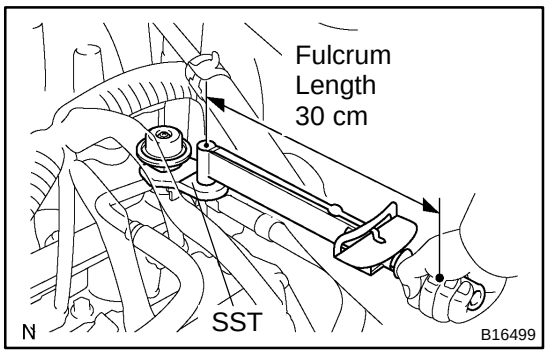


(3) Using SST, tighten the union bolt to the specified torque.

SST 09612–24014 (09617–24011)

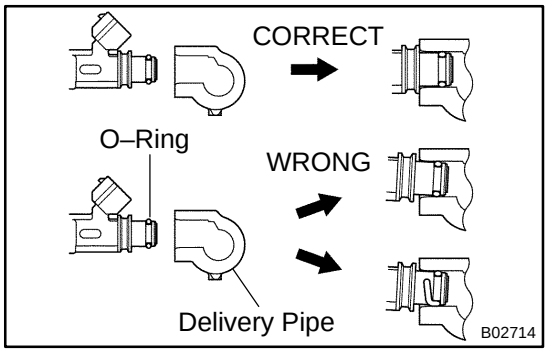
Torque:

33 N·m (340 kgf·cm, 24 ft·lbf) for use with SST

39 N·m (400 kgf·cm, 29 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

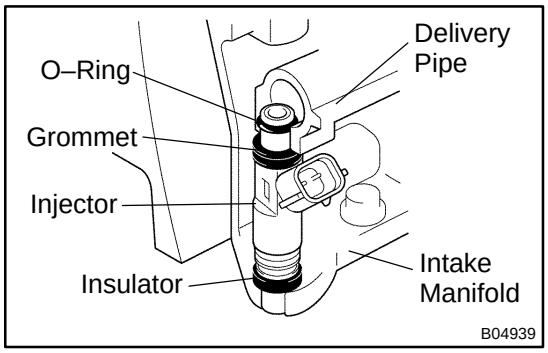


(c) Observe the following precautions when removing or installing the injectors.

(1) Never reuse the O–ring.

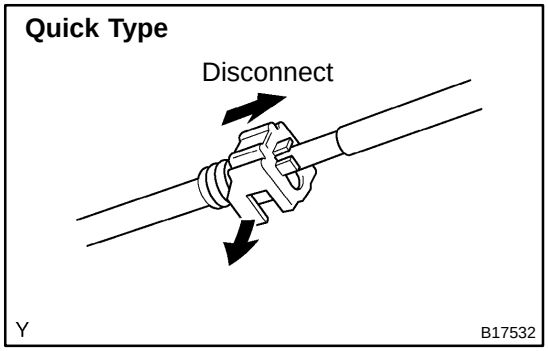
(2) When placing a new O–ring on the injector, take care not to damage it in any way.

(3) Coat a new O–ring with spindle oil or gasoline before installing. Never use engine, gear or brake oil.



(d) Install the injector to the delivery pipe and intake manifold as shown in the illustration.

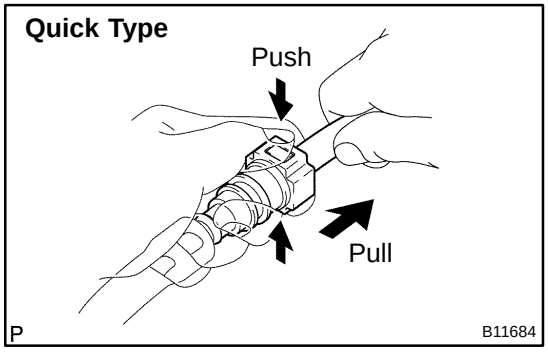
Before installing the injector, apply spindle oil or gasoline on the place where the delivery pipe or the intake manifold touches the O–ring of the injector.



(e) Observe the following when disconnecting the fuel tube connector (quick type):

(1) Check if there is any dirt in the pipe and around the connector before disconnecting the fuel tube connector. If necessary, clean the dirt away.

(2) Disconnect the fuel pipe clamp from the connector.



(3) Be sure to disconnect them by hand.

(4) When the connector and the pipe are stuck, push and pull the connector. Then disconnect and pull it out. Do not use any tools at this time.

(5) Check if there is any dirt or other foreign matter on the seal surface of the disconnected pipe. If necessary, clean the dirt away.

(6) Do not damage the disconnected pipe and connector and prevent intrusion of foreign objects by covering them with a plastic bag.

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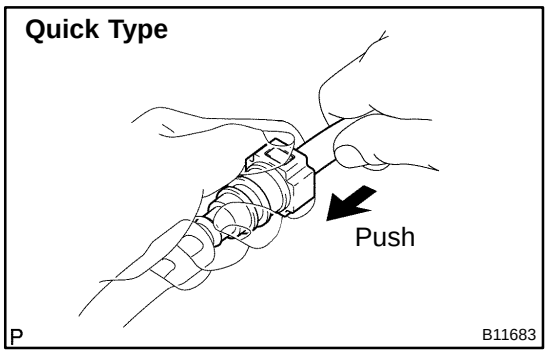
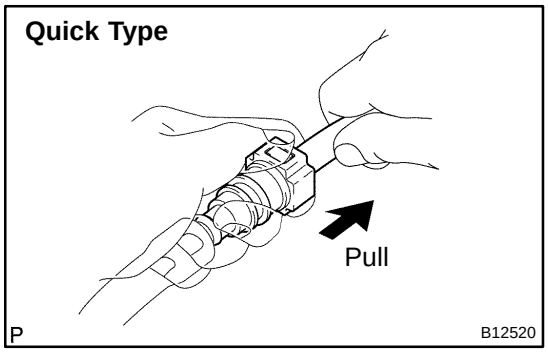


(f) Observe the following when connecting the fuel tube connector (quick type):

(1) Check if there is any damage or foreign objects in the connected part of the pipe.

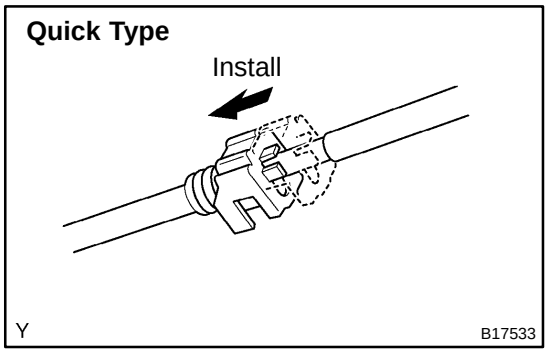
(2) Match the axis of the connector with the axis of the pipe, and push into the connector until a ”click” sound is heard. If the connection is tight, apply a small amount of fresh engine oil on the tip of the pipe.



(3) After finishing the connection, pull the pipe and the connector to ensure it is secure.

(4) Check to make sure no fuel leak is present.

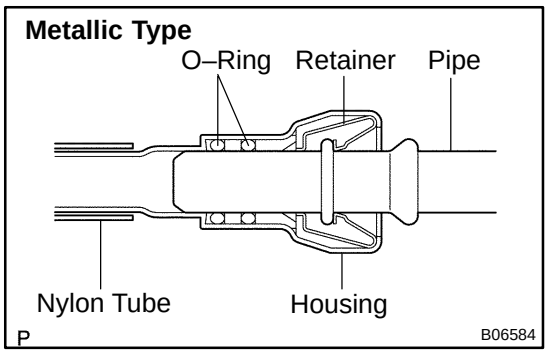
If the result is not specified, repair or replace.



(5) Install the fuel pipe clamp to the connector.

(6) Check to make sure no fuel leak is present.

If the result is not specified, repair or replace.

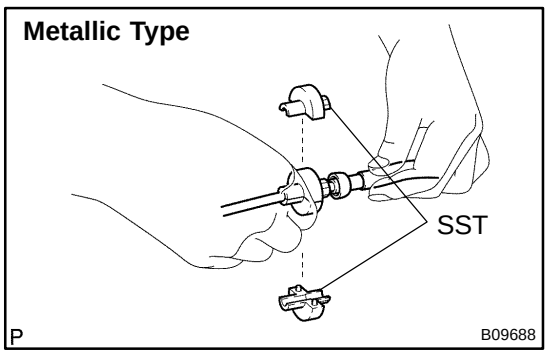


(g) Observe the following when disconnecting the fuel tube connector (metallic type):

HINT:

The structure of the metallic connector is shown on the left.

(1) Check if there is any dirt in the pipe and around the connector before disconnecting the fuel tube connector. If necessary, clean the dirt away.



(2) Assemble SST to the connecting part, as shown in the illustration.

SST 09268–21010

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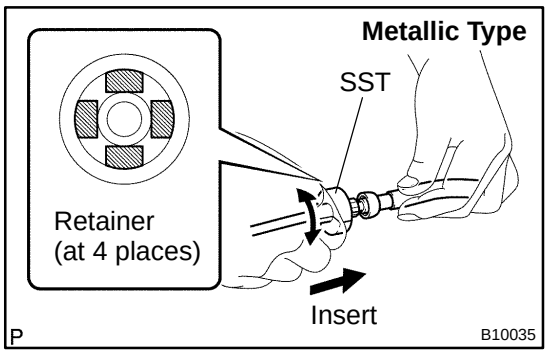
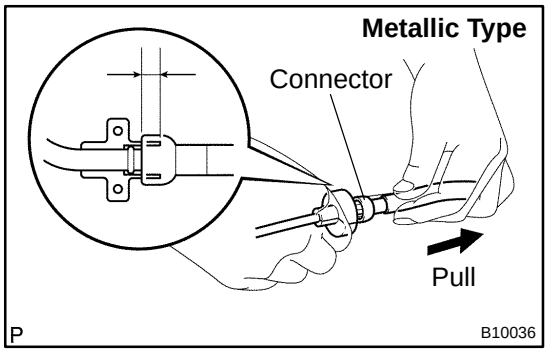
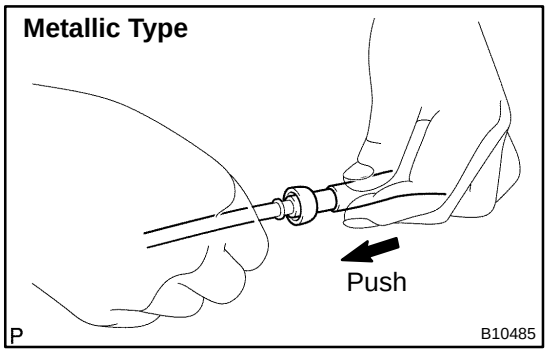


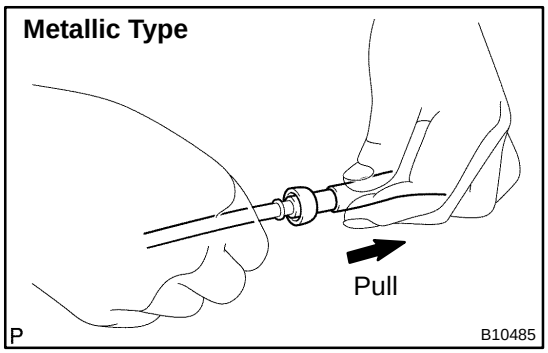
(3) Turn the SST, align the retainers inside the connector with the SST chamfered parts and insert the SST into the connector.



(4) While holding the SST, pull the connector towards the SST to put the retainers on the SST chamfered parts.
(5) Slide the SST and connector together towards the fuel tube assembly.



(h) Observe the following when connecting the fuel tube connector (metallic type):
(1) Check if there is any damage or foreign objects in the connected part of the pipe.
(2) Match the axis of the connector with the axis of the pipe, and push into the connector until a ”click” sound is heard. If the connection is tight, apply a small amount of fresh engine oil on the tip of the pipe.



(3) After finishing the connection, pull the pipe and the connector to ensure it is secure.
(4) Check to make sure no fuel leak is present.

If the result is not specified, repair or replace.

(i) Observer the following when handling the nylon tube:
(1) Pay attention not to turn the connected part of the nylon tube and the quick connector with tube when connecting them.
(2) Pay attention not to kink the nylon tube.
(3) Do not remove the nylon tube.
(4) Do not close the piping with the nylon tube by bending it.

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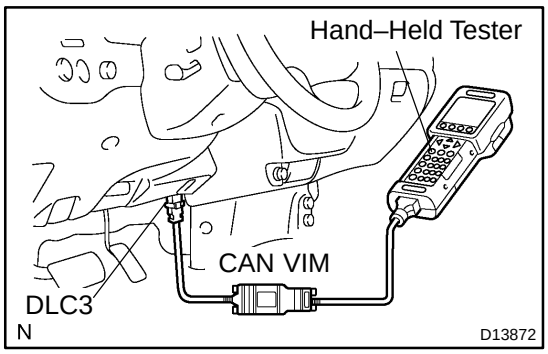


(j) Check that there is any fuel leak after maintenance anywhere on the fuel system.

(1) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).

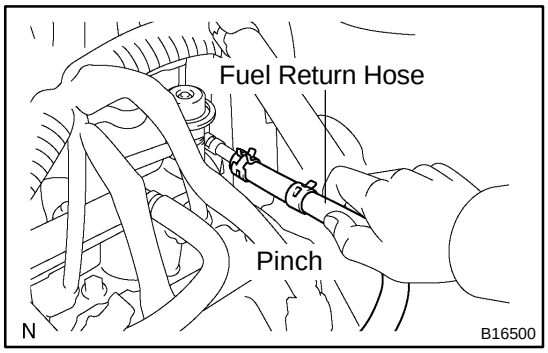
(2) Turn the ignition switch ON and push the hand–held tester main switch ON.

NOTICE:

Do not start the engine.

(3) Enter the following menus: DIAGNOSIS / ENHANCED OBDII / ACTIVE TEST / FUEL PUMP / SPD.

(4) Please refer to the hand–held tester operator's manual for further details.



(5) Pinch the fuel return hose.

The pressure in the high pressure line will rise to approx. 392 kPa (4 kgf/cm^2, 57 psi). In this state, check to see that there are no leaks from any part of the fuel system.

NOTICE:

Always pinch the hose. Avoid bending as it may cause the hose to crack.

(6) Turn the ignition switch OFF.

(7) Disconnect the hand–held tester and CAN VIM from the DLC3.

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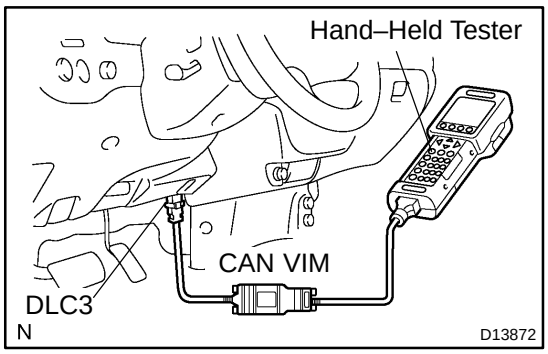


FUEL PUMP

SF12Y–05

ON–VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

(a) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).

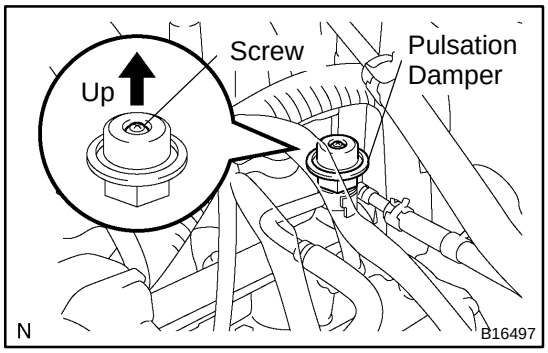
(b) Turn the ignition switch ON, and push the hand–held tester main switch ON.

NOTICE:

Do not start the engine.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBDII / ACTIVE TEST / FUEL PUMP / SPD

(d) Please refer to the hand–held tester operator's manual for further details.



(e) Check that the pulsation damper screw rises when the fuel pump operates.

If operation is not as specified, check the fusible link, fuses, EFI main relay, fuel pump, ECM and wiring connections.

(f) Turn the ignition switch off.

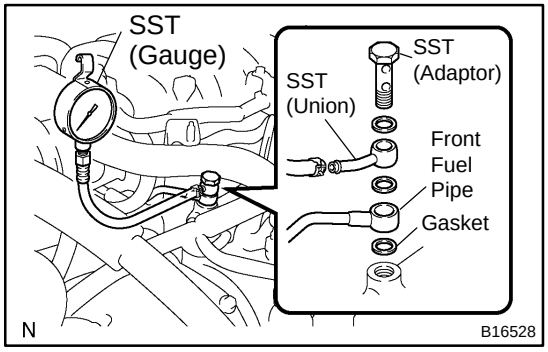
(g) Disconnect the hand–held tester and CAN VIM from the DLC3.

2. CHECK FUEL PRESSURE

(a) Check the battery positive voltage is 12 V or more.

(b) Disconnect the negative (–) terminal cable from the battery.

(c) Remove the front fuel pipe from the LH delivery pipe. (See page SF–27)



(d) Install the front fuel pipe and SST (pressure gauge) to the delivery pipe with the 3 lower gaskets and SST (adaptor).
SST 09268–45014 (09268–41190, 90405–06167)
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(e) Wipe off any splattered gasoline.

(f) Reconnect the negative (–) terminal cable to the battery.

(g) Connect a hand–held tester to the DLC3. (See step 1 in check fuel pump operation (a) to (e))

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(h) Measure the fuel pressure.

Fuel pressure:

265 to 304 kPa (2.7 to 3.1 kgf/cm^2, 38 to 44 psi)

If pressure is high, replace the fuel pressure regulator.

If pressure is low, check the fuel hoses and connections, fuel pump, fuel filter and fuel pressure regulator.

(i) Disconnect the hand–held tester and CAN VIM from the DLC3.

(j) Start the engine.

(k) Measure the fuel pressure at idle.

Fuel pressure:

265 to 304 kPa (2.7 to 3.1 kgf/cm^2, 38 to 44 psi)

(l) Stop the engine.

(m) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.

Fuel pressure: 147 kPa (1.5 kgf/cm^2, 21 psi) or more

If pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

(n) After checking fuel pressure, disconnect the negative (–) terminal cable from the battery and carefully remove the SST to prevent gasoline from splashing.

SST 09268–45014

(o) Reinstall the front fuel pipe to the LH delivery pipe. (See page SF–31)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION (See page IN–20)

Some systems need initialization when disconnecting the cable from the negative battery terminal.

5. CHECK FOR FUEL LEAKS (See page SF–1)

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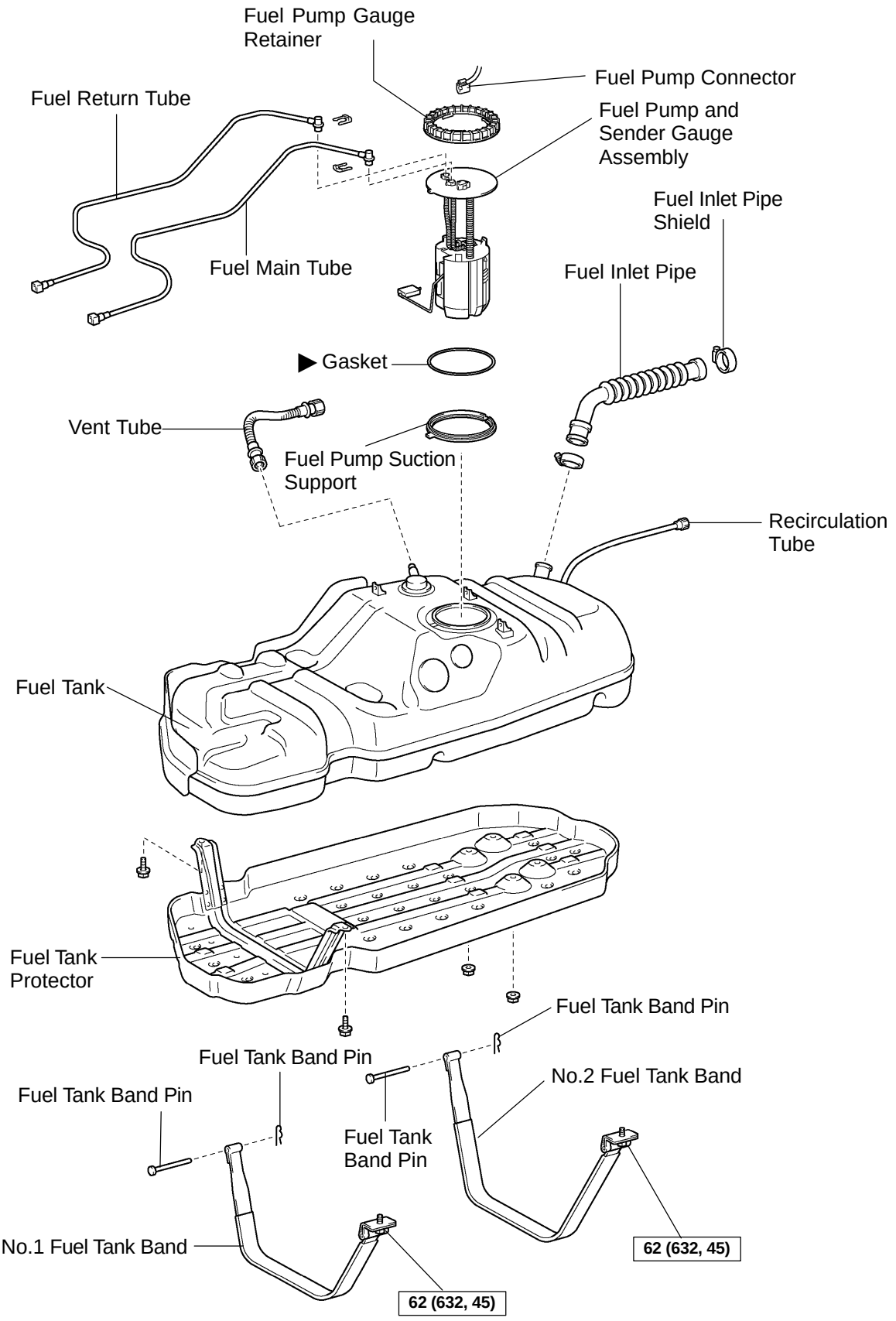
SF12Z–05

COMPONENTS



Y N·m (kgf·cm, ft·lbf) : Specified torque

▶ Non–reusable part

B17462

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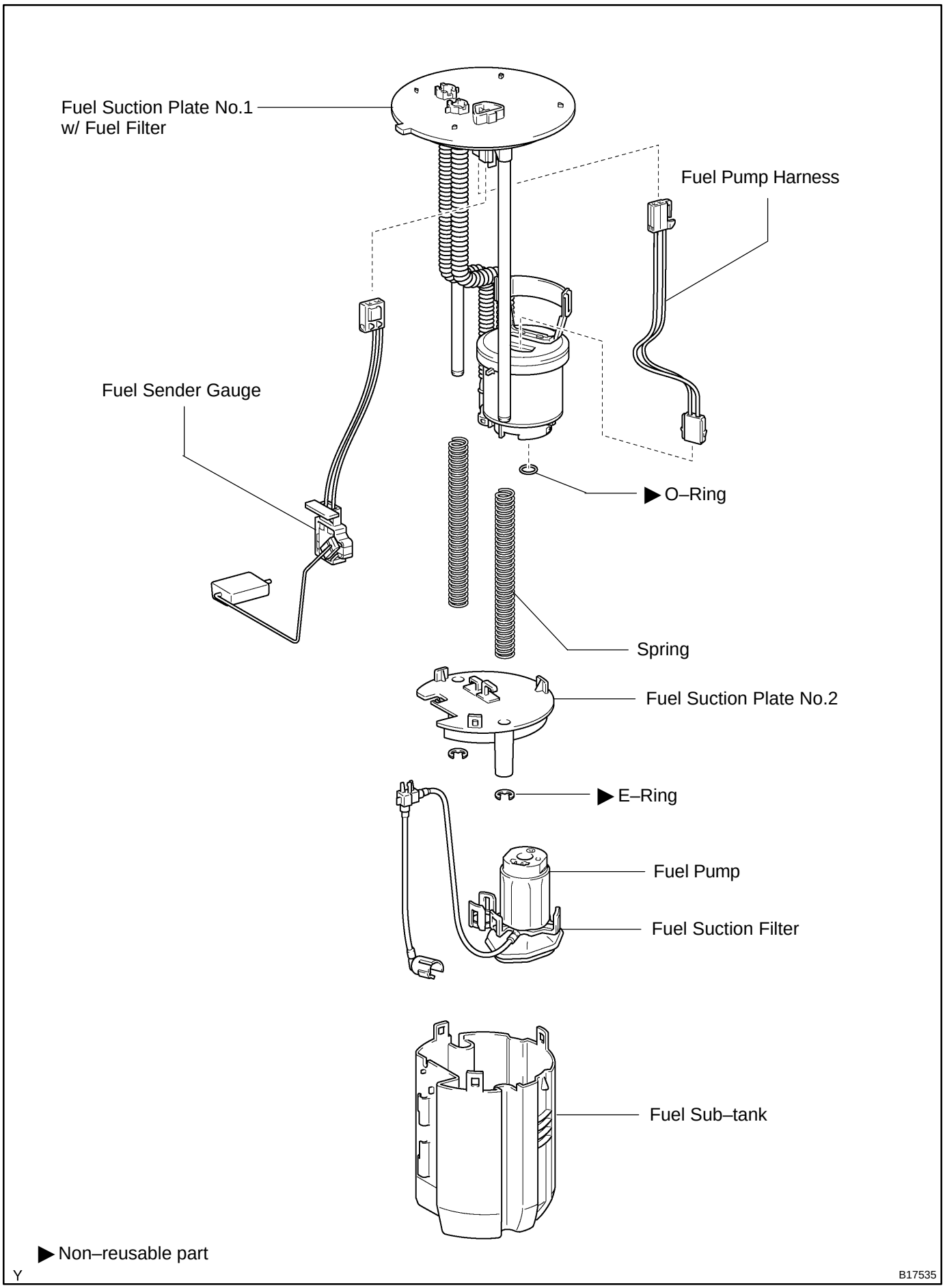
Fuel Suction Plate No.1
w/ Fuel Filter
Fuel Pump Harness
Fuel Sender Gauge
▶ O–Ring
Spring
Fuel Suction Plate No.2
▶ E–Ring
Fuel Pump
Fuel Suction Filter
Fuel Sub–tank
▶ Non–reusable part
Y
B17535

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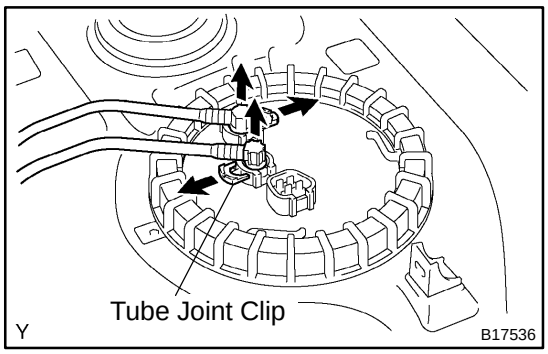
SF130–04

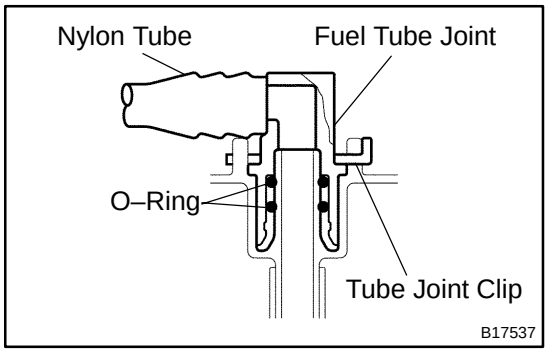
REMOVAL

1. REMOVE FUEL TANK ASSEMBLY (See page SF–34)

2. DISCONNECT FUEL SUCTION TUBE

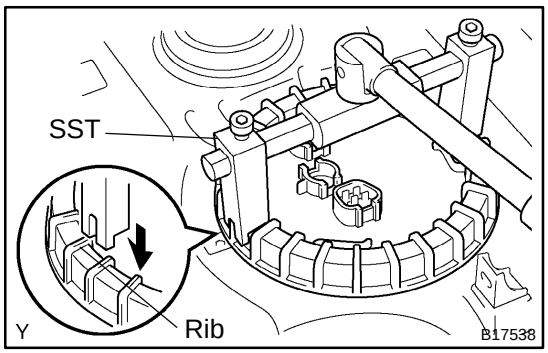
Remove the 2 tube clips, and pull out the 2 fuel tubes.





NOTICE:

- **Before this operation, check the connector for dirt, mud or other contamination. Clean if necessary.**
- **Be careful of mud. The connector's O–ring, which seals the pipe and connector, is easily contaminated.**
- **Do not use any tool in this operation.**
- **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**
- **When the pipe and connector are stuck, push and pull the connector to release and pull the connector out carefully.**



3. REMOVE FUEL PUMP ASSEMBLY

(a) Using SST, loosen the fuel pump gauge retainer.

SST 09808–14020 (09808–01410, 09808–01420, 09808–01430)

HINT:

A rib on the fuel pump gauge retainer fits into a tip of the SST.

(b) Remove the fuel pump gauge retainer.

(c) Remove the fuel suction tube.

NOTICE:

Be careful not to bend the arm of the fuel sender gauge.

(d) Remove the gasket from the fuel tank.

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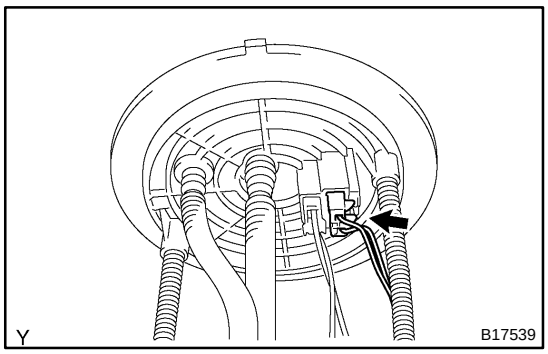
SF1XE–01

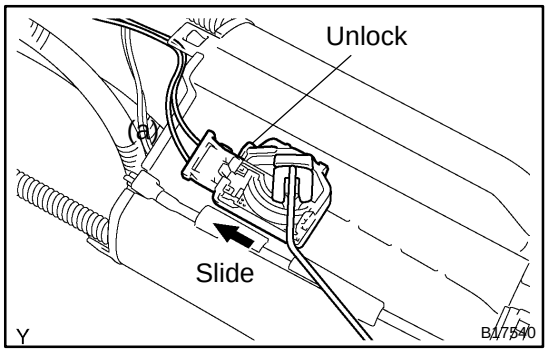
DISASSEMBLY

1. REMOVE FUEL SENDER GAUGE

(a) Disconnect the sender gauge connector from the fuel suction plate No.1.

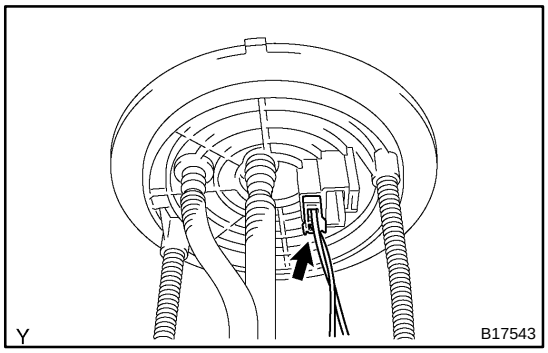


(b) Unlock the fuel sender gauge and slide to remove.

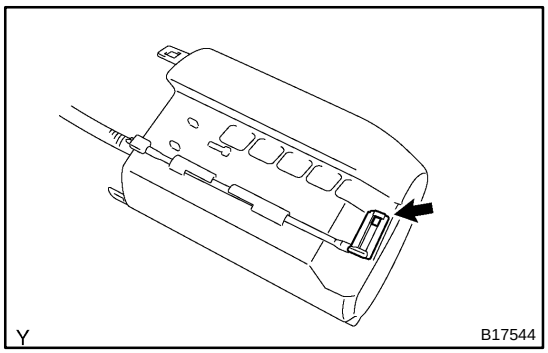


2. REMOVE FUEL SUB–TANK

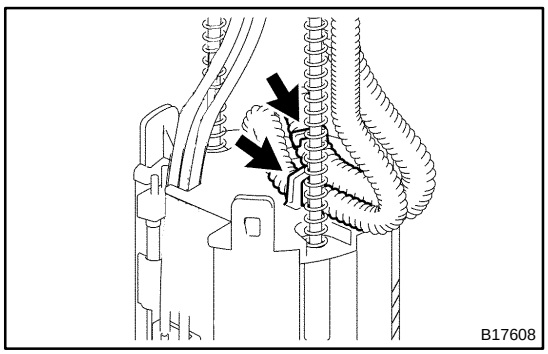
(a) Disconnect the fuel pump harness connector from the fuel suction plate No.1.



(b) Disconnect the suction filter hose from the fuel sub–tank.



(c) Disconnect the 2 tubes from the tube clamps.



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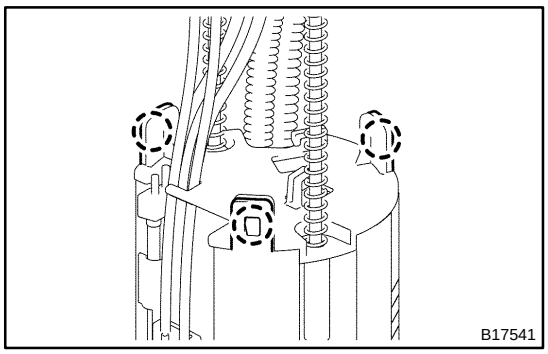
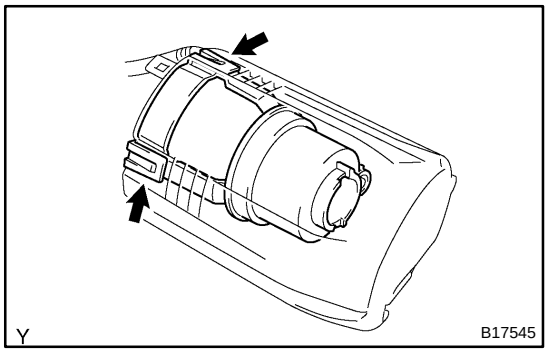


(d) Using a screwdriver with the tip wrapped in tape, disconnect the 3 snap–claws from the fuel suction support No.2.

NOTICE:

Do not damage the fuel suction plate No.2 or fuel sub–tank.

(e) Disconnect the fuel suction plate No.1 with the fuel filter assembly from the fuel sub–tank.



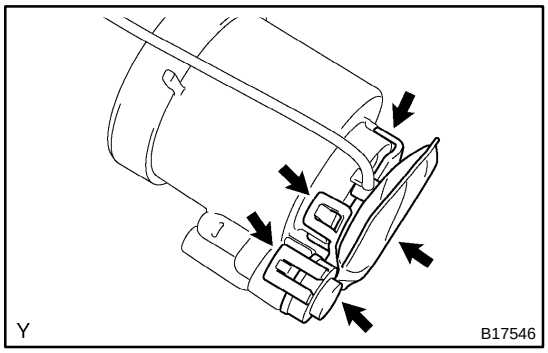
3. REMOVE FUEL FILTER WITH FUEL PUMP

(a) Using a screwdriver with the tip wrapped in tape, disconnect the 2 snap–claws from the fuel suction support.

NOTICE:

Do not damage the fuel filter assembly or fuel suction support.

(b) Remove the fuel filter assembly with fuel pump from the fuel suction support.



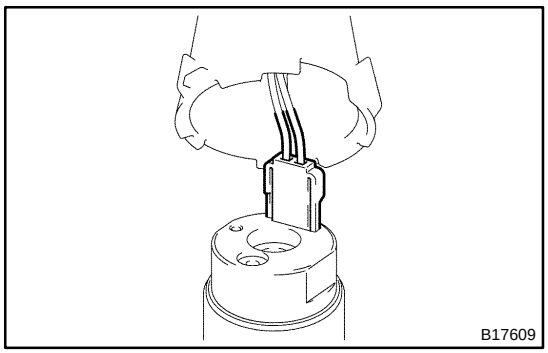
4. REMOVE FUEL PUMP

(a) Using a screwdriver with the tip wrapped in tape, disconnect the 5 snap–claws from the suction filter.

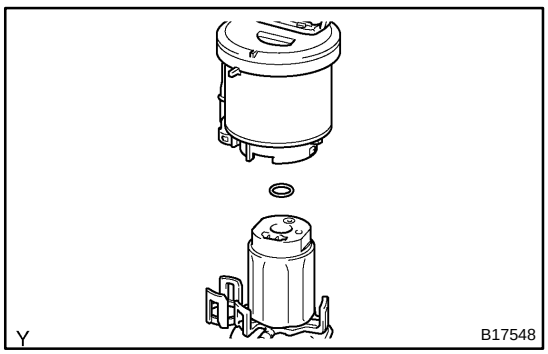
NOTICE:

Do not damage the fuel filter assembly or suction filter.

(b) Remove the fuel suction filter with fuel pump from the fuel filter.



(c) Disconnect the fuel pump harness from the fuel pump.



(d) Remove the O–ring from the fuel pump.

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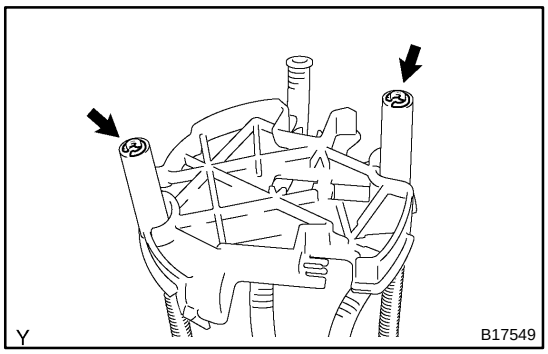

5. REMOVE FUEL SUCTION PLATE NO.2

(a) Using a screwdriver, remove the 2 E–rings from the suction plate No.2.

(b) Remove the suction plate No.2 and 2 springs from the fuel suction plate No.1.

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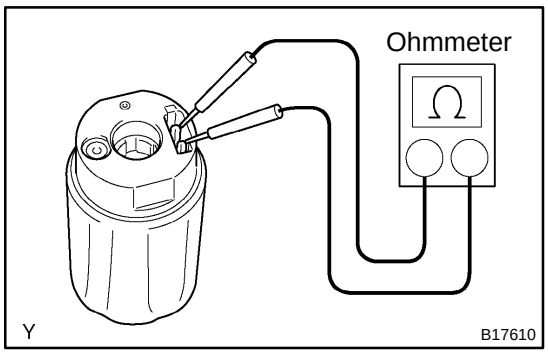
SF131–03

INSPECTION

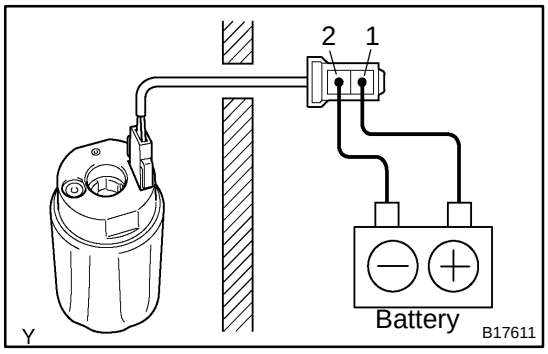


1. INSPECT FUEL PUMP RESISTANCE

Using an ohmmeter, measure the resistance between the terminals.

Resistance: 0.2 to 3.0 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the fuel pump.



2. INSPECT FUEL PUMP OPERATION

(a) Connect the lead wire to the fuel pump.

(b) Connect the positive (+) lead from the battery to terminal 1 of the connector, and the negative (–) lead to terminal 2. Check that the fuel pump operates.

NOTICE:

- **These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always do switching on the battery side.**

If operation is not as specified, replace the fuel pump and/or read wire.

(c) Disconnect the lead wire to the fuel pump.

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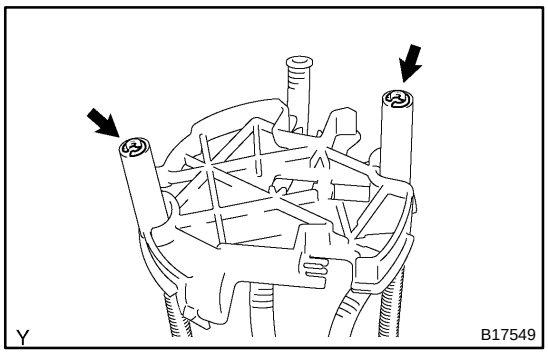
SF1XF–01

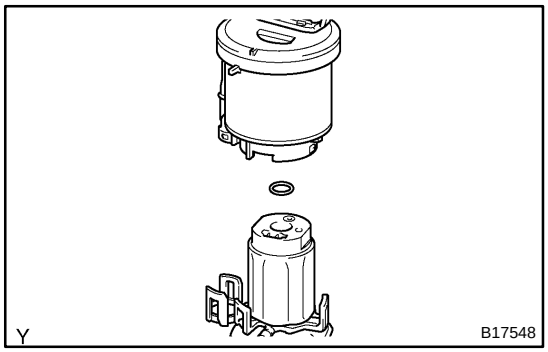
REASSEMBLY



1. REMOVE FUEL SUCTION PLATE NO.2

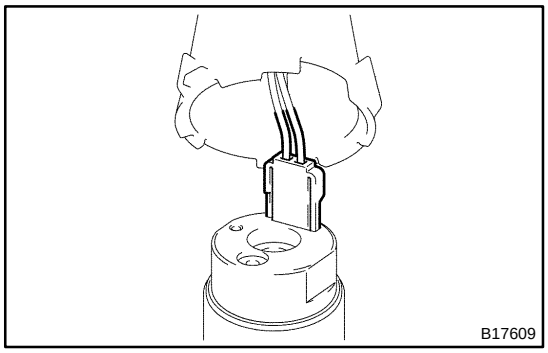
(a) Install the 2 springs and suction plate No.2 to the suction plate No.1.

(b) Using a needle–nose pliers, install the 2 new E–rings to the suction plate No.2.

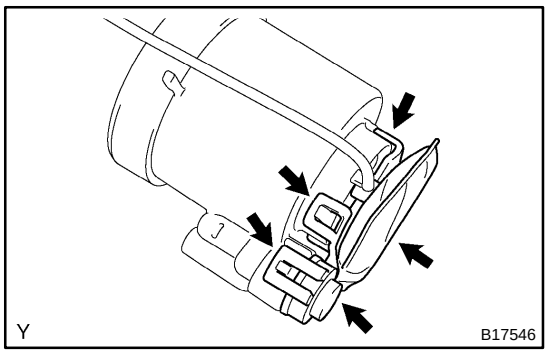


2. INSTALL FUEL PUMP

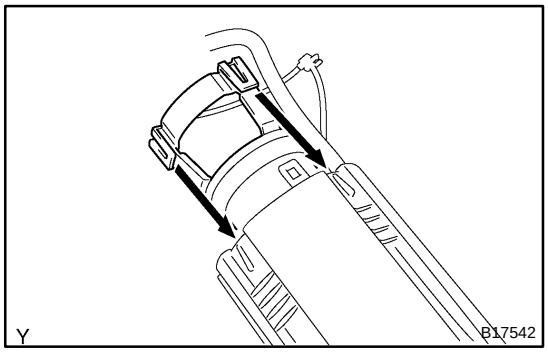
(a) Apply a light coat of gasoline or spindle oil to a new O–ring, and install it to the fuel pump.



(b) Connect the fuel pump harness connector to the fuel pump.



(c) Install the fuel pump with the suction filter to the fuel filter.



3. INSTALL FUEL FILTER

Install the fuel filter to the fuel sub–tank.

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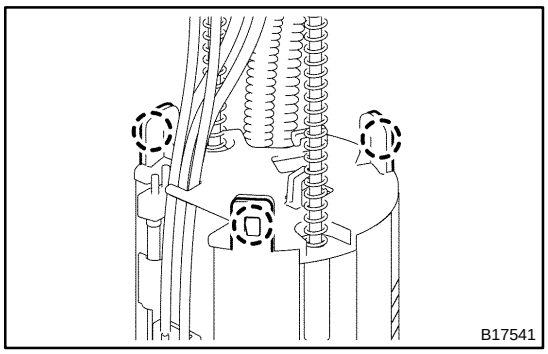
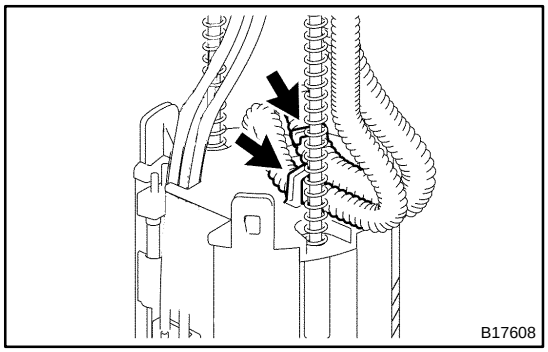
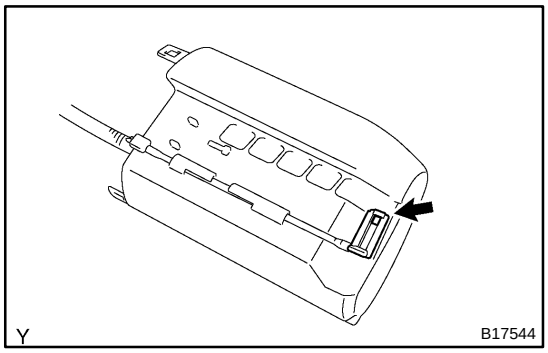


4. INSTALL FUEL SUB–TANK

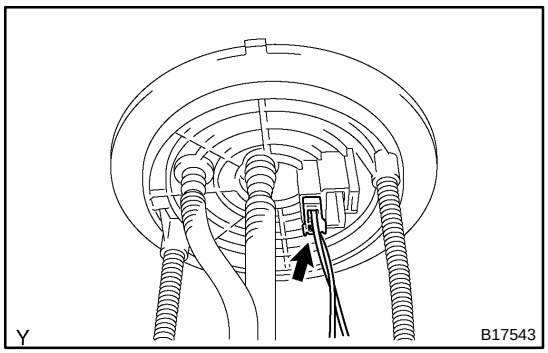
(a) Connect the fuel suction plate No.2 to the fuel sub–tank with the 3 snap–claws engaged.



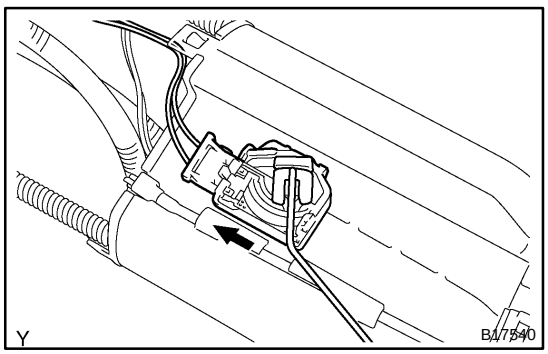
(b) Connect the 2 tubes to the tube clamps.



(c) Connect the suction filter hose to the fuel sub–tank.



(d) Connect the fuel pump harness connector to the fuel suction plate No.1.



5. INSTALL FUEL SENDER GAUGE

(a) Install the fuel sender gauge to the fuel suction support.

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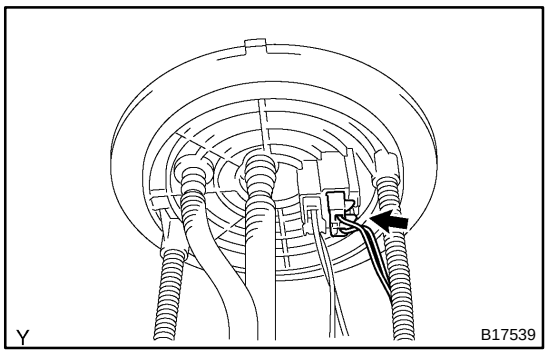

(b) Connect the sender gauge connector to the fuel suction plate No.1.

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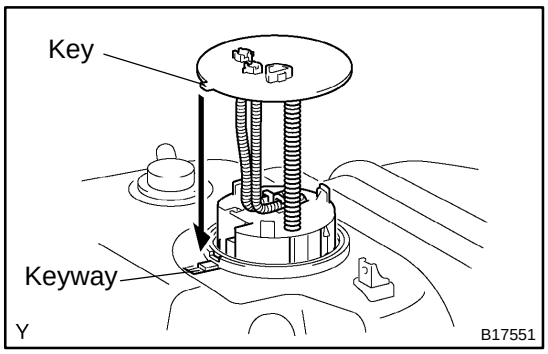
SF1XG–01

INSTALLATION

1. INSTALL FUEL PUMP ASSEMBLY



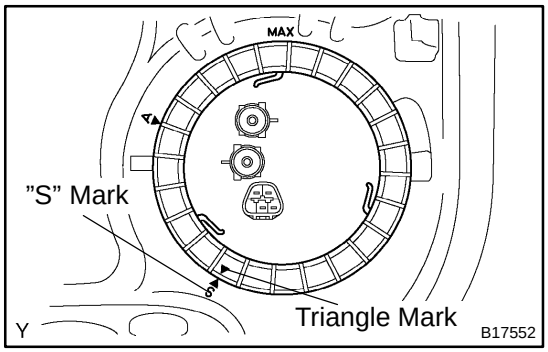
(a) Install a new gasket to the fuel tank.

(b) Install the fuel pump assembly to the fuel tank.

NOTICE:

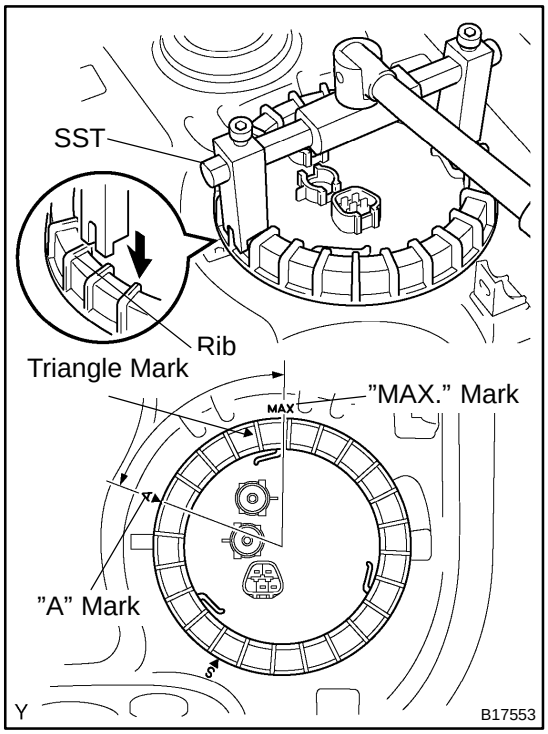
Be careful not to bend the arm of the fuel sender gauge.

(c) Align the keyway of the fuel suction tube support with the key of the fuel suction plate No.1.



(d) Apply MP grease to the entire interior surface of the fuel pump gauge retainer.

(e) Align the triangle mark on the new fuel pump gauge retainer with the "S" mark on the fuel tank while pushing down the fuel suction tube. Attach the fuel pump gauge retainer.



(f) Rotate the fuel pump gauge retainer by hand. Use an SST to tighten the fuel pump gauge retainer by turning it one and a half times. The triangle mark on the fuel pump gauge retainer must be positioned between the "A" and "MAX." marks on the fuel tank.

SST 09808–14020 (09808–01410, 09808–01420, 09808–01430)

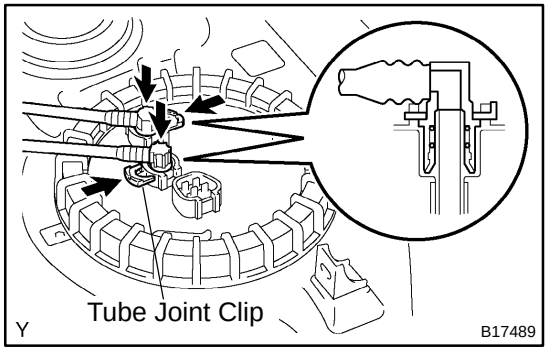
NOTICE:

Do not use other tools in this operation. Damage to the fuel pump gauge retainer and the fuel tank may result.

HINT:

A rib on the fuel pump gauge retainer fits into a tip of the SST.

2. CONNECT FUEL SUCTION TUBE



Connect the fuel pump tube and return tube to the fuel tank with the tube joint clips.

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NOTICE:

- **Check that there are no scratches or foreign objects on the connecting part.**
- **Check that the fuel tube joint is inserted securely.**
- **Check that the tube joint clip is on the collar of the fuel tube joint.**
- **After installing the tube joint clip, check that the fuel tube joint has not been pulled off.**

3. **CHECK FOR FUEL LEAKS**
4. **INSTALL FUEL TANK ASSEMBLY (See page SF–36)**

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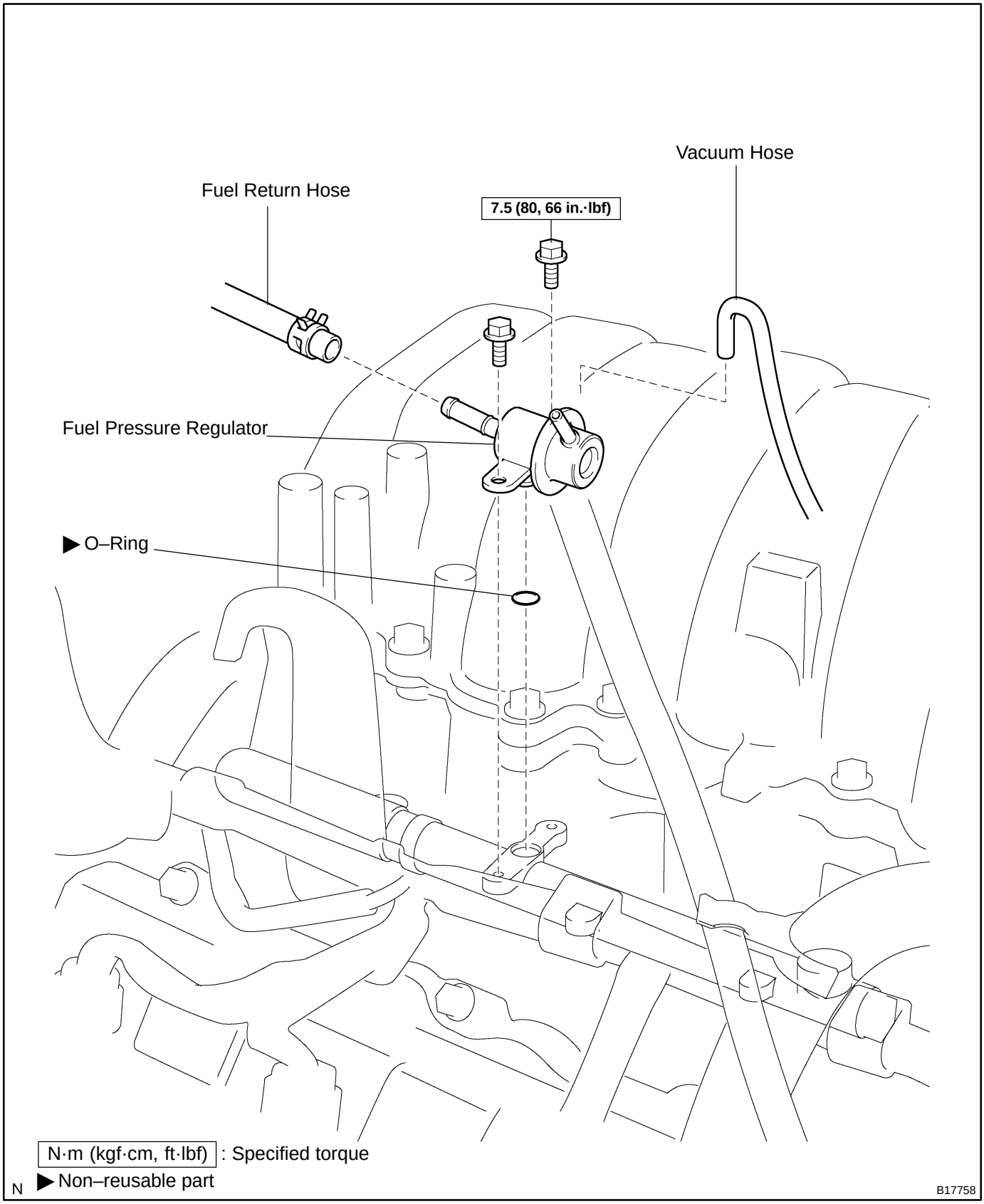
FUEL PRESSURE REGULATOR

COMPONENTS

SF0XZ–14



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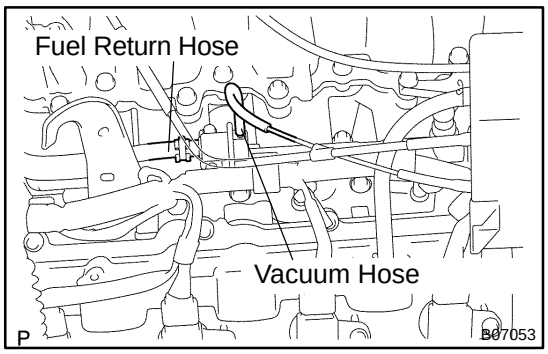
SF0Y0–10



REMOVAL

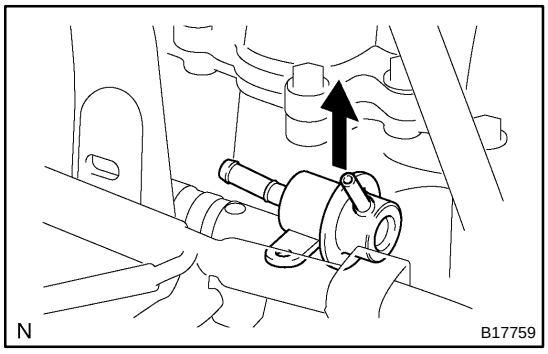
REMOVE FUEL PRESSURE REGULATOR

(a) Disconnect the vacuum hose from intake air resonator.

(b) Disconnect the fuel return hose from the pressure regulator.

CAUTION:

Put a shop towel under the pressure regulator.



(c) Remove the 2 bolts, and pull out the pressure regulator.

(d) Remove the O–ring from the pressure regulator.

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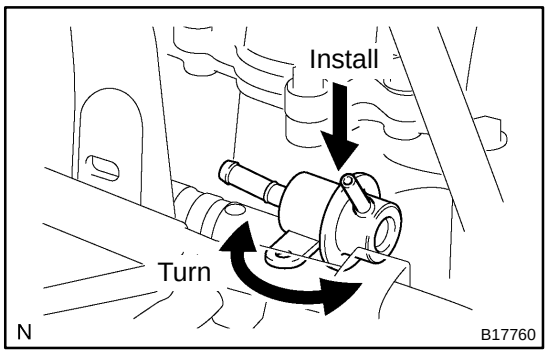
SF0Y1–13

INSTALLATION

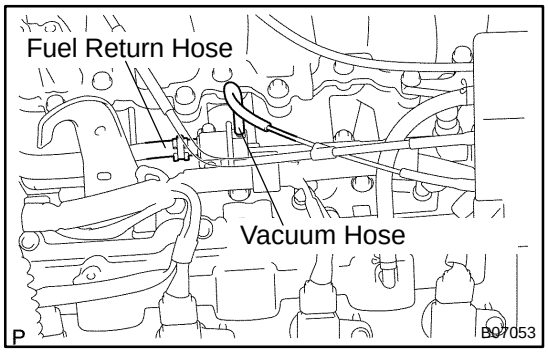


1. INSTALL FUEL PRESSURE REGULATOR

(a) Apply a light coat of gasoline to a new O–ring, and install it to the pressure regulator.

(b) While turning the pressure regulator left and right, install it to the delivery pipe.

(c) Install the pressure regulator with the 2 bolts.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



(d) Connect the vacuum hose to intake air resonator.

(e) Connect the fuel return hose to the pressure regulator.

2. CHECK FOR FUEL LEAKS (See page SF–1)

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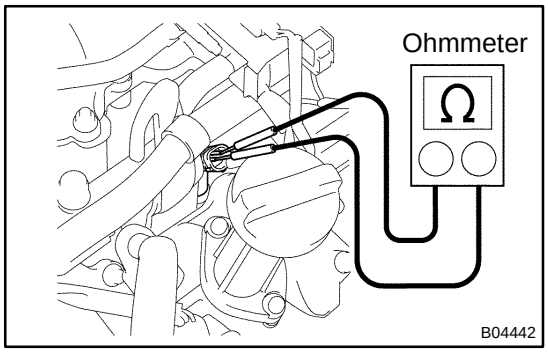
INJECTOR

SF0OR–12

ON–VEHICLE INSPECTION

1. REMOVE THROTTLE BODY COVER

2. REMOVE INTAKE AIR CONNECTOR



3. INSPECT INJECTOR RESISTANCE

(a) Disconnect the 8 injector connectors.

(b) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 13.4 to 14.2 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the injector.

(c) Reconnect the 8 injector connectors.

4. REINSTALL INTAKE AIR CONNECTOR

5. REINSTALL THROTTLE BODY COVER

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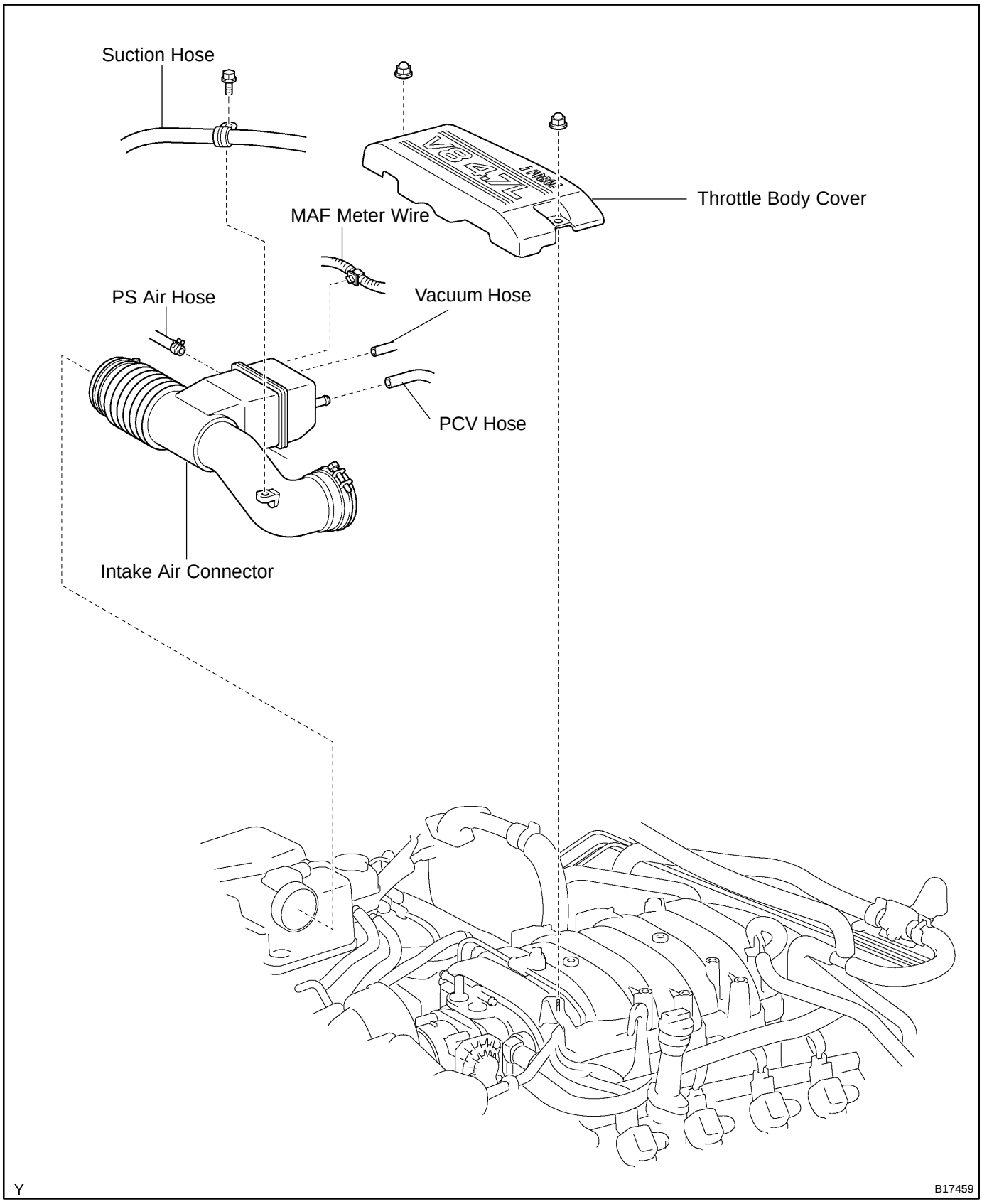
SF0OS–16

COMPONENTS



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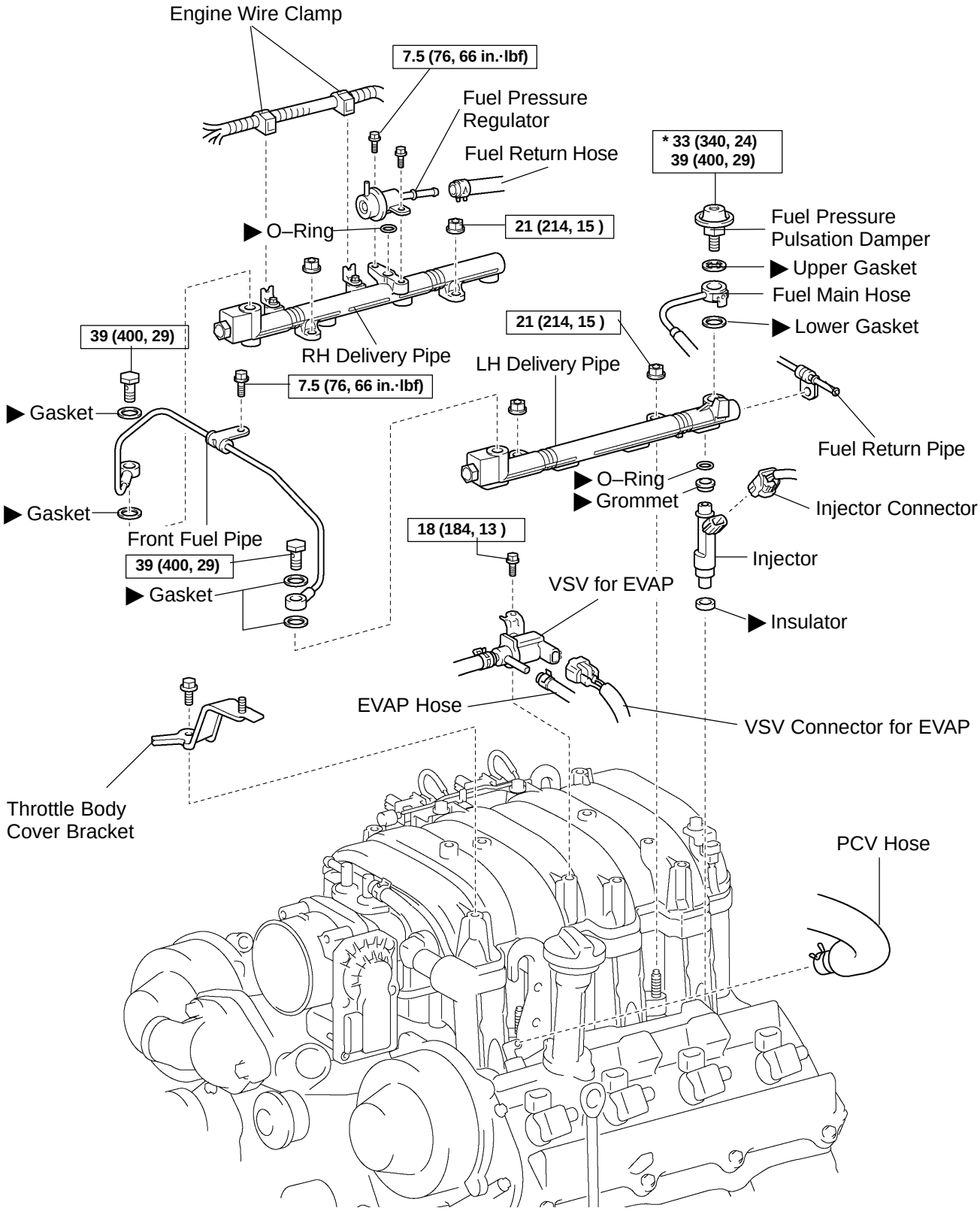
Engine Wire Clamp
7.5 (76, 66 in.·lbf)
Fuel Pressure Regulator
Fuel Return Hose
* 33 (340, 24)
39 (400, 29)
▶ O–Ring
21 (214, 15)
Fuel Pressure Pulsation Damper
▶ Upper Gasket
Fuel Main Hose
▶ Lower Gasket
39 (400, 29)
21 (214, 15)
RH Delivery Pipe
LH Delivery Pipe
7.5 (76, 66 in.·lbf)
▶ Gasket
Fuel Return Pipe
▶ O–Ring
▶ Grommet
Injector Connector
▶ Gasket
Front Fuel Pipe
18 (184, 13)
39 (400, 29)
Injector
VSV for EVAP
▶ Gasket
▶ Insulator
EVAP Hose
VSV Connector for EVAP
Throttle Body Cover Bracket
PCV Hose
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
* For use with SST
B17460

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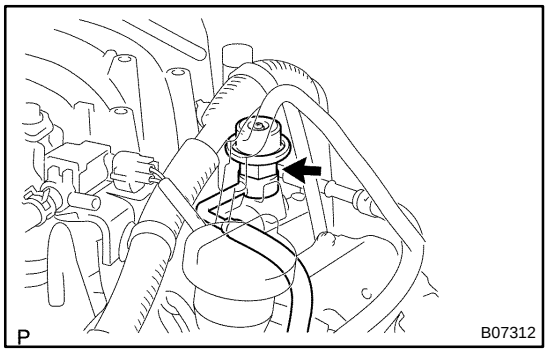
SF133–08

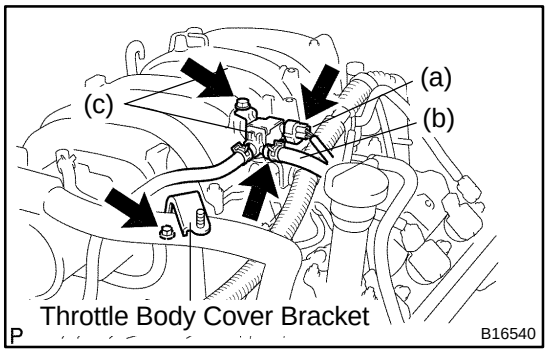
REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE
(See page SF–1)
2. REMOVE THROTTLE BODY COVER
3. REMOVE INTAKE AIR CONNECTOR

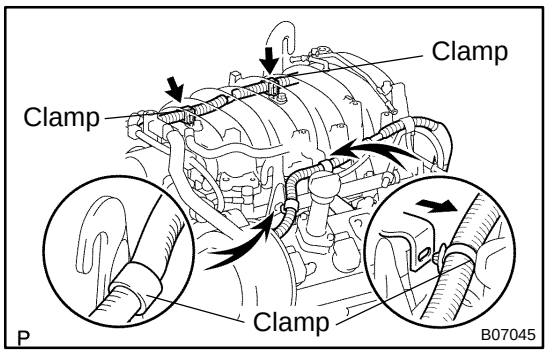


4. REMOVE FUEL PRESSURE PULSATION DAMPER
Remove the pulsation damper, upper gasket, fuel main hose and lower gasket.
NOTICE:
- **Put a shop rag under the delivery pipe.**
- **Slowly loosen the pulsation damper.**

5. DISCONNECT PCV HOSE FROM PCV VALVE



6. DISCONNECT VSV FOR EVAP
(a) Disconnect the VSV connector for EVAP.
(b) Disconnect the EVAP hose.
(c) Remove the VSV for EVAP from the intake manifold.
7. REMOVE THROTTLE BODY COVER BRACKET
Remove the bolt and throttle body cover bracket.



8. DISCONNECT ENGINE WIRES
(a) Disconnect the engine wire clamps from the No.1 engine hanger and engine wire bracket.
(b) Disconnect the 2 wire clamps on the engine wire from the brackets on the RH delivery pipe.
9. REMOVE DELIVERY PIPES AND INJECTORS
NOTICE:
- **Be careful not to drop the injectors when removing the delivery pipes.**
- **Do not apply any load to the injector in horizontal direction.**

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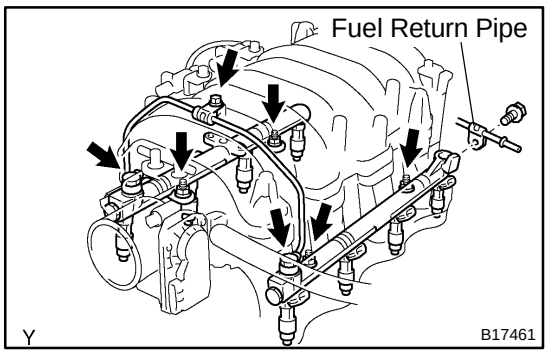

(a) Remove the bolt holding the clamp on the fuel return pipe to the LH delivery pipe.
(b) Remove the bolt, 2 union bolts, 4 gaskets and front fuel pipe.
(c) Disconnect the 8 injector connectors.
(d) Remove the 4 nuts holding the delivery pipes to the lower intake manifold.
(e) Remove the 2 delivery pipes, 8 injectors, and 8 insulators.
(f) Remove the O–ring and grommet from each injector.

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SF134–04

INSPECTION

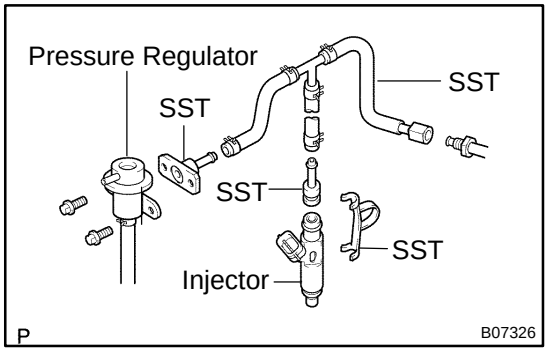
1. INSPECT INJECTOR INJECTION

CAUTION:

Keep the injector clean of sparks during the test.

(a) Disconnect the fuel inlet hose (fuel tube connector) from the fuel filter.

(b) Connect SST (attachment and hose) to the fuel tube.
SST 09268–41047 (09268–52011)

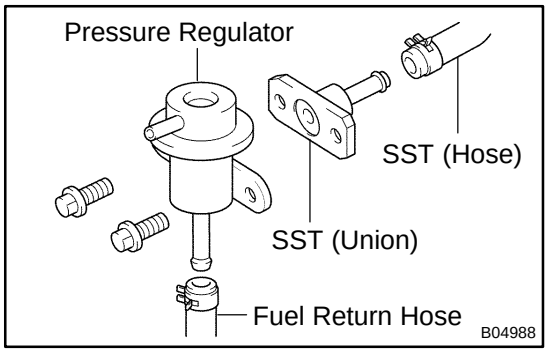


(c) Remove the pressure regulator from the delivery pipe.

(d) Install the O–ring to the fuel inlet of the pressure regulator.

(e) Connect SST (hose) to the fuel inlet of the pressure regulator with SST (union) and the 2 bolts.
SST 09268–41047 (09268–41091)
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(f) Connect the fuel return hose to the fuel outlet of the pressure regulator.



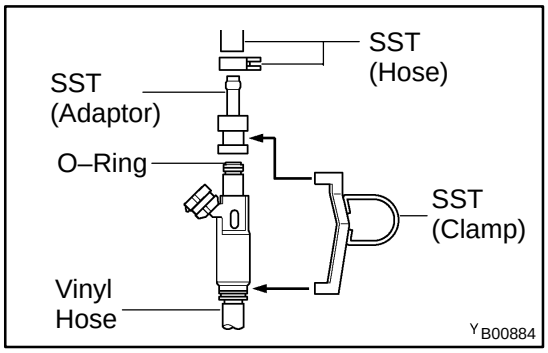
(g) Install the O–ring to the injector.

(h) Connect SST (adaptor and hose) to the injector, and hold the injector and union with SST (clamp).
SST 09268–41047 (09268–41110, 09268–41300)

(i) Put the injector into the graduated cylinder.

CAUTION:

Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.



(j) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).

(k) Connect the battery negative (–) cable to the battery.

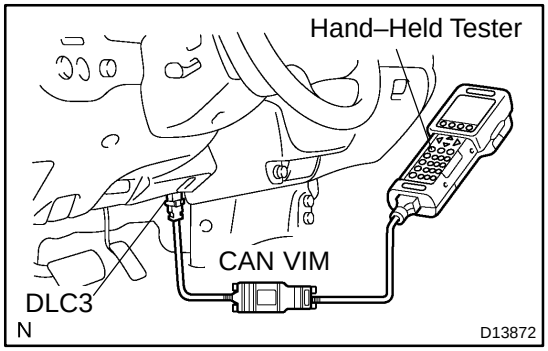
(l) Turn the ignition switch ON, and push the hand–held tester main switch ON.

NOTICE:

Do not start the engine.

(m) Enter the following menus: DIAGNOSIS / ENHANCED OBDII / ACTIVE TEST / FUEL PUMP / SPD

(n) Please refer to the hand–held tester operator's manual for further details.



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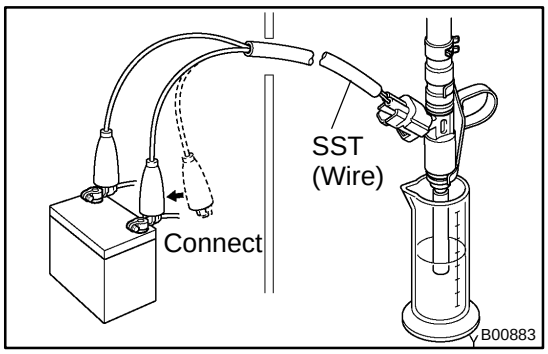
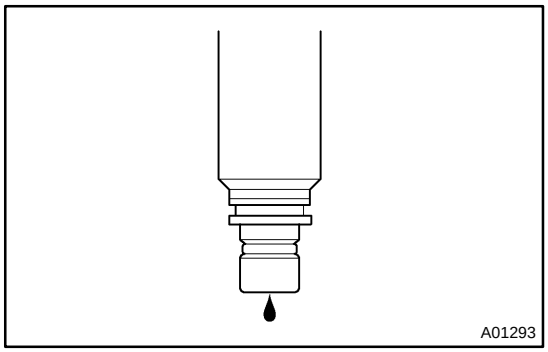


(o) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.
SST 09842–30070
Volume: 56 to 69 cm^3 (3.4 to 4.2 cu in.) per 15 seconds
Difference between each injector:
13 cm^3 (0.8 cu in.) or less

If the injection volume is not as specified, replace the injector.



2. INSPECT LEAKAGE

(a) Under the above conditions, disconnect the tester probes of SST (wire) from the battery and check fuel leakage from the injector.
SST 09842–30070
Fuel drop: 1 drop or less per 12 minutes

(b) Turn the ignition switch off.

(c) Disconnect the negative (–) terminal cable from the battery.

(d) Remove the SST and fuel tube connector.
SST 09268–41047, 09842–30070

(e) Disconnect the hand–held tester and CAN VIM from the DLC3.

(f) Reconnect the fuel inlet pipe to the fuel tube.

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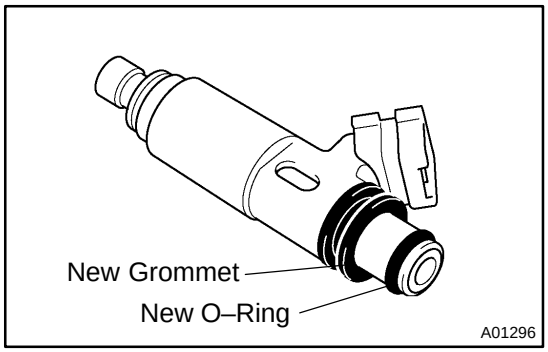
SF135–06

INSTALLATION

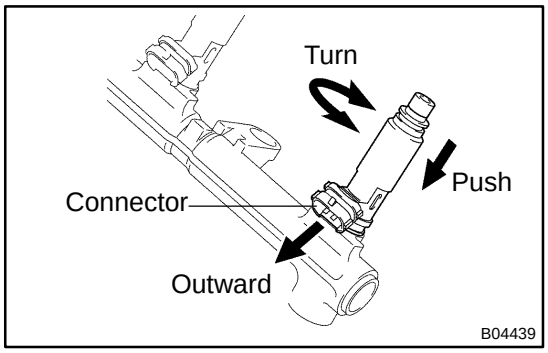
1. INSTALL INJECTORS AND DELIVERY PIPES

NOTICE:

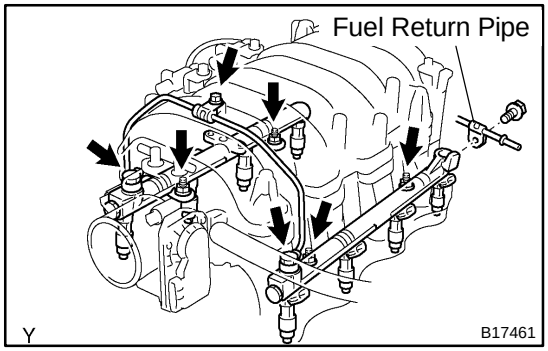
- **Be careful not to drop the injectors when installing the delivery pipes.**
- **Do not apply any load to the injector on horizontal direction.**



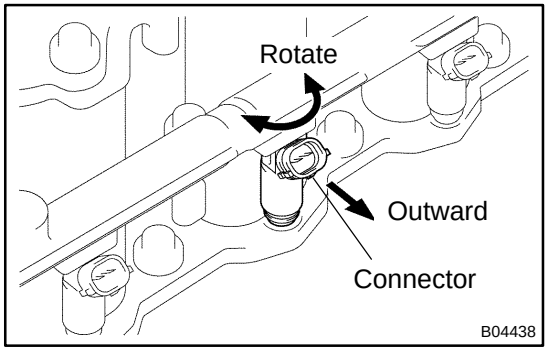
(a) Install a new grommet to each injector.
(b) Apply a light coat of gasoline to a new O–ring and install it to each injector.



(c) While turning the injector clockwise and counterclockwise, push it to the delivery pipes. Install the 8 injectors.
(d) Position the injector connector outward.
(e) Place the 8 new insulators on the intake manifold.
(f) Place the 2 delivery pipes and injectors assemblies on the lower intake manifold.
(g) Temporarily install the 4 nuts.
(h) Install the front fuel pipe with the bolt, 4 new gaskets and 2 union bolts.
Torque:
39 N·m (400 kgf·cm, 29 ft·lbf) for union bolts
7.5 N·m (76 kgf·cm, 66 in.·lbf) for bolt



(i) Install the bolt holding the clamp on the fuel return pipe to the LH delivery pipe.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



(j) Check that the injectors rotate smoothly.

HINT:

If the injectors do not rotate smoothly, the probable cause is incorrect installation of O–rings. Replace the O–ring of the injector that does not rotate smoothly.

(k) Position injector connector outward.
(l) Tighten the 4 nuts holding the delivery pipes to the lower intake manifold.
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

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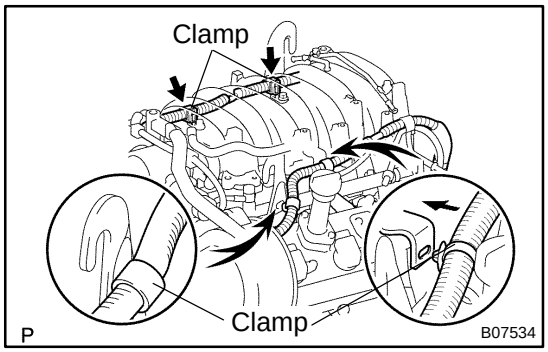
(m) Connect the 8 injector connectors.



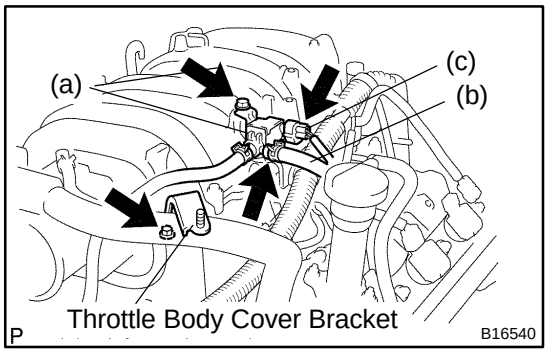
2. INSTALL ENGINE WIRES

(a) Install the 2 wire clamps on the engine wire to the brackets on the RH delivery pipe.

(b) Connect the engine wire clamps to the No.1 engine hanger and engine wire bracket.

(c) Install the engine wire protector with the 2 bolts.

3. CONNECT PCV HOSE TO PCV VALVE



4. CONNECT VSV FOR EVAP TO UPPER INTAKE MANIFOLD

(a) Install the VSV for the EVAP to the upper intake manifold.

(b) Connect the EVAP hose.

(c) Connect the VSV connector for the EVAP.

5. INSTALL THROTTLE BODY COVER BRACKET

Install the throttle body cover bracket with the bolt.

6. INSTALL FUEL PRESSURE PULSATION DAMPER (See page SF–1)

7. INSTALL INTAKE AIR CONNECTOR

8. INSTALL THROTTLE BODY COVER

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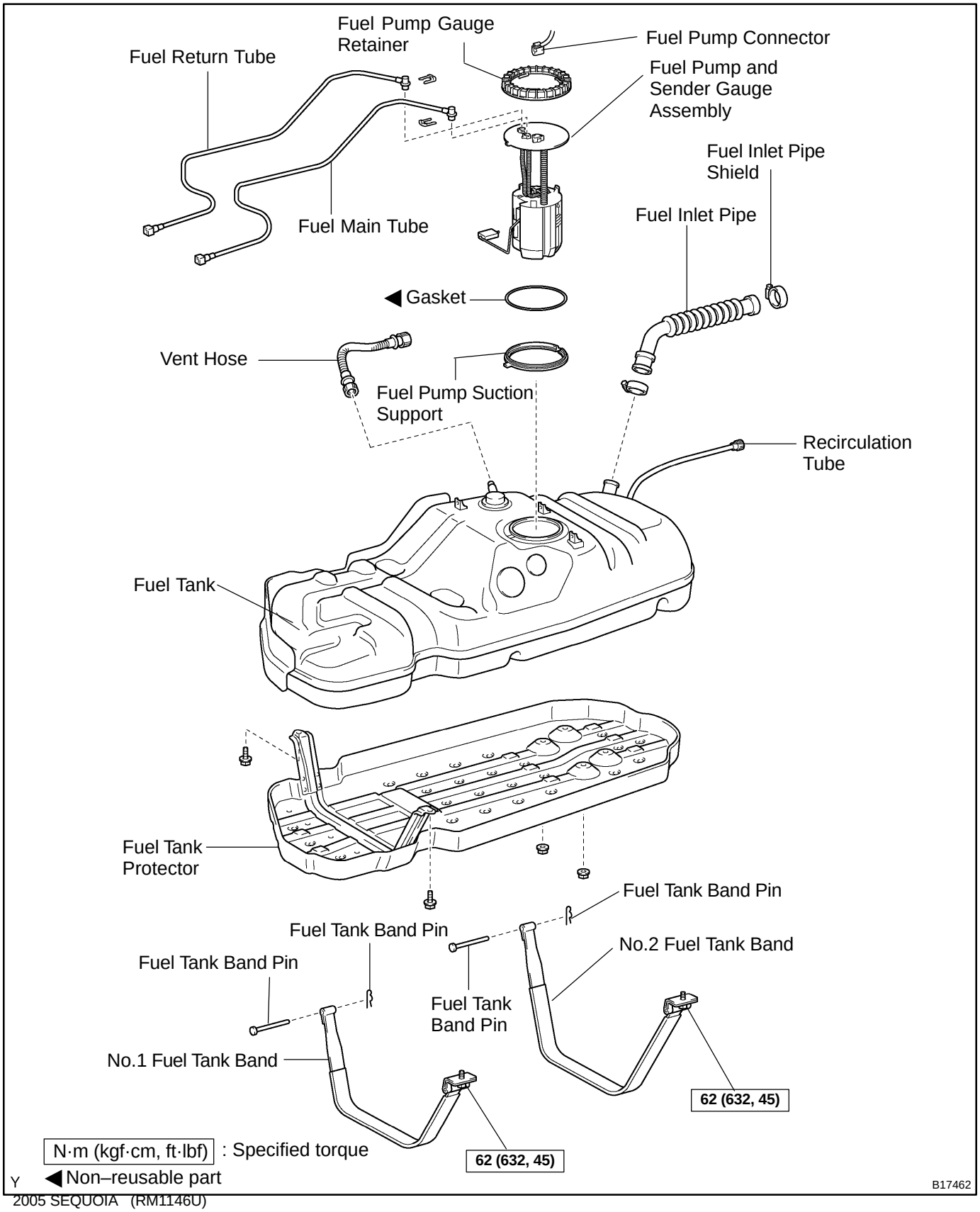
FUEL TANK AND LINE

SF0OZ–17

COMPONENTS

CAUTION:

- ▶ **Always use new gaskets when replacing the fuel tank or component parts.**
- ▶ **Apply the proper torque to all parts tightened**



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SF1XH–01

REMOVAL

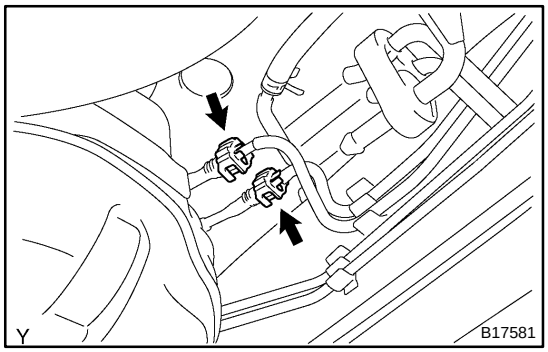
1. DISCHARGE FUEL SYSTEM PRESSURE
(See page SF–1)

2. REMOVE SPARE TIRE

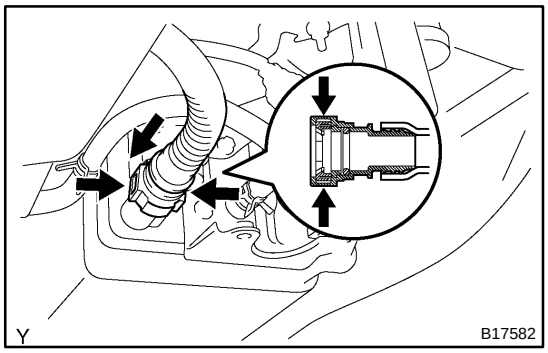
3. DISCONNECT FUEL PUMP CONNECTOR

4. REMOVE FUEL TANK PROTECTOR

Remove the 2 bolts, 2 nuts and fuel tank protector.



5. DISCONNECT FUEL MAIN TUBE AND RETURN TUBE
(See page SF–1)

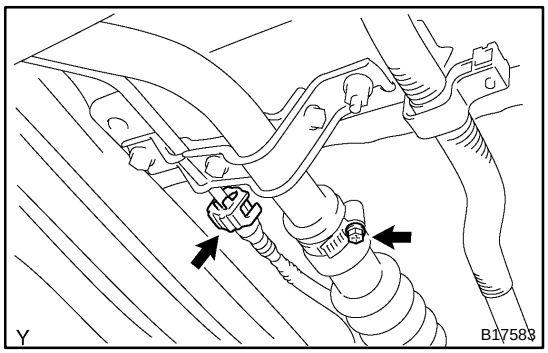


6. DISCONNECT FUEL TANK VENT HOSE

(a) Push the connector deep into the charcoal canister to release the locking tab.

(b) Pinch portion A.

(c) Pull out the connector.



7. DISCONNECT INLET HOSE AND BREATHER HOSE

(a) Loosen the hose clamp bolt and disconnect the fuel inlet hose from the fuel filler pipe.

(b) Disconnect the breather tube. (See page SF–1)

8. REMOVE FUEL TANK ASSEMBLY

(a) Set up a transmission jack under the fuel tank.

(b) Remove the 2 bolts and disconnect the 2 fuel tank bands from the fuel tank.

(c) Operate the transmission jack and remove the fuel tank.

9. REMOVE FUEL PUMP ASSEMBLY
(See page SF–11)

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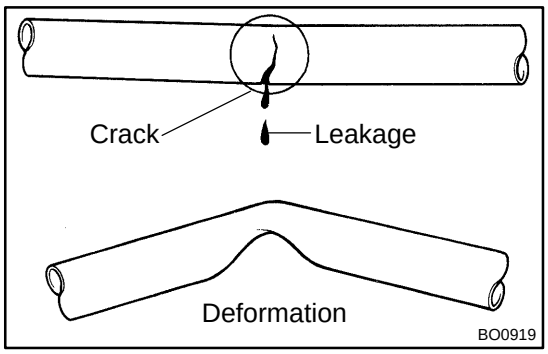
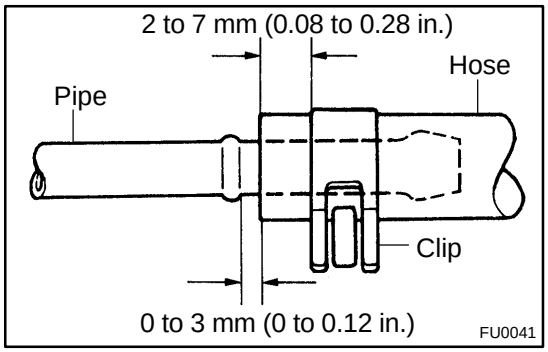
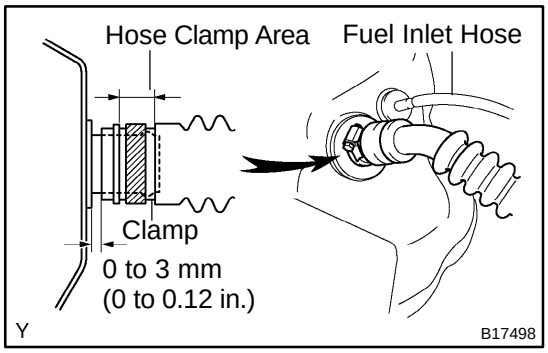
SF0P0–14







INSPECTION

INSPECT FUEL TANK AND LINE

(a) Check the fuel lines for cracks or leakage, and all connections for deformation.

(b) Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.

(c) Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.

(d) Check the filler neck for damage or fuel leakage.

(e) Hose and pipe connections are as shown in the illustration.

If a problem is found, repair or replace the parts as necessary.

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SF1XI–01

INSTALLATION

1. INSTALL FUEL PUMP ASSEMBLY (See page SF–19)

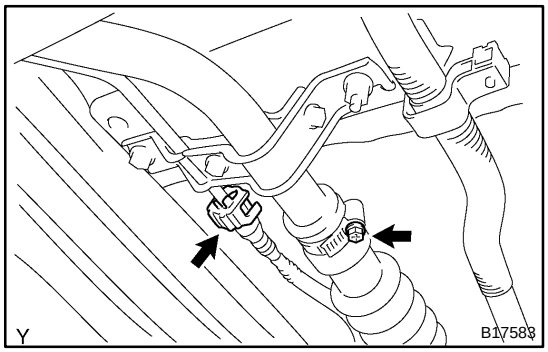
2. INSTALL FUEL TANK ASSEMBLY

(a) Set up the fuel tank to the transmission jack.

(b) Operate the transmission jack and install the fuel tank.

(c) Install the 2 fuel tank bands with the 2 bolts.

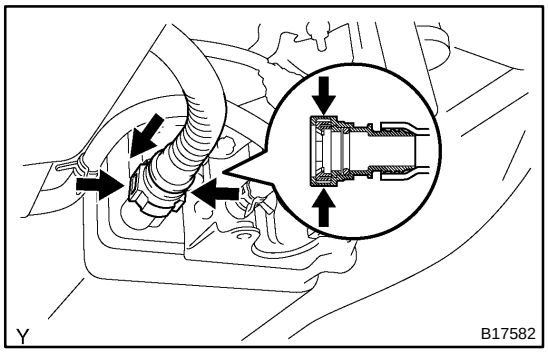
Torque: 62 N·m (632 kgf·cm, 45 ft·lbf)



3. CONNECT FUEL INLET HOSE AND BREATHER TUBE

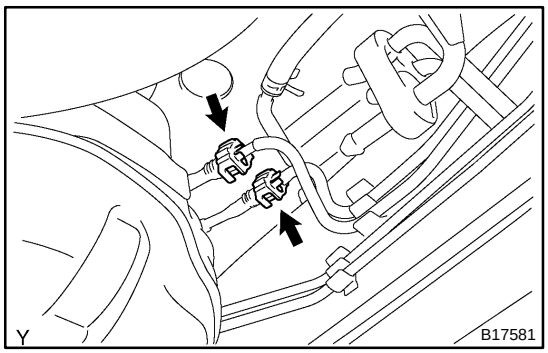
(a) Connect the fuel inlet hose to the filler pipe and install the clamp.

(b) Connect the breather tube. (See page SF–1)



4. DISCONNECT FUEL TANK VENT HOSE

Connect the fuel tank vent hose to the charcoal canister.



5. CONNECT FUEL MAIN TUBE AND RETURN TUBE (See page SF–1)

6. INSTALL FUEL TANK PROTECTOR

Install the fuel tank protector with the 2 bolts and 2 nuts.

7. CONNECT FUEL PUMP CONNECTOR

8. CHECK FOR FUEL LEAKS

9. INSTALL SPARE TIRE

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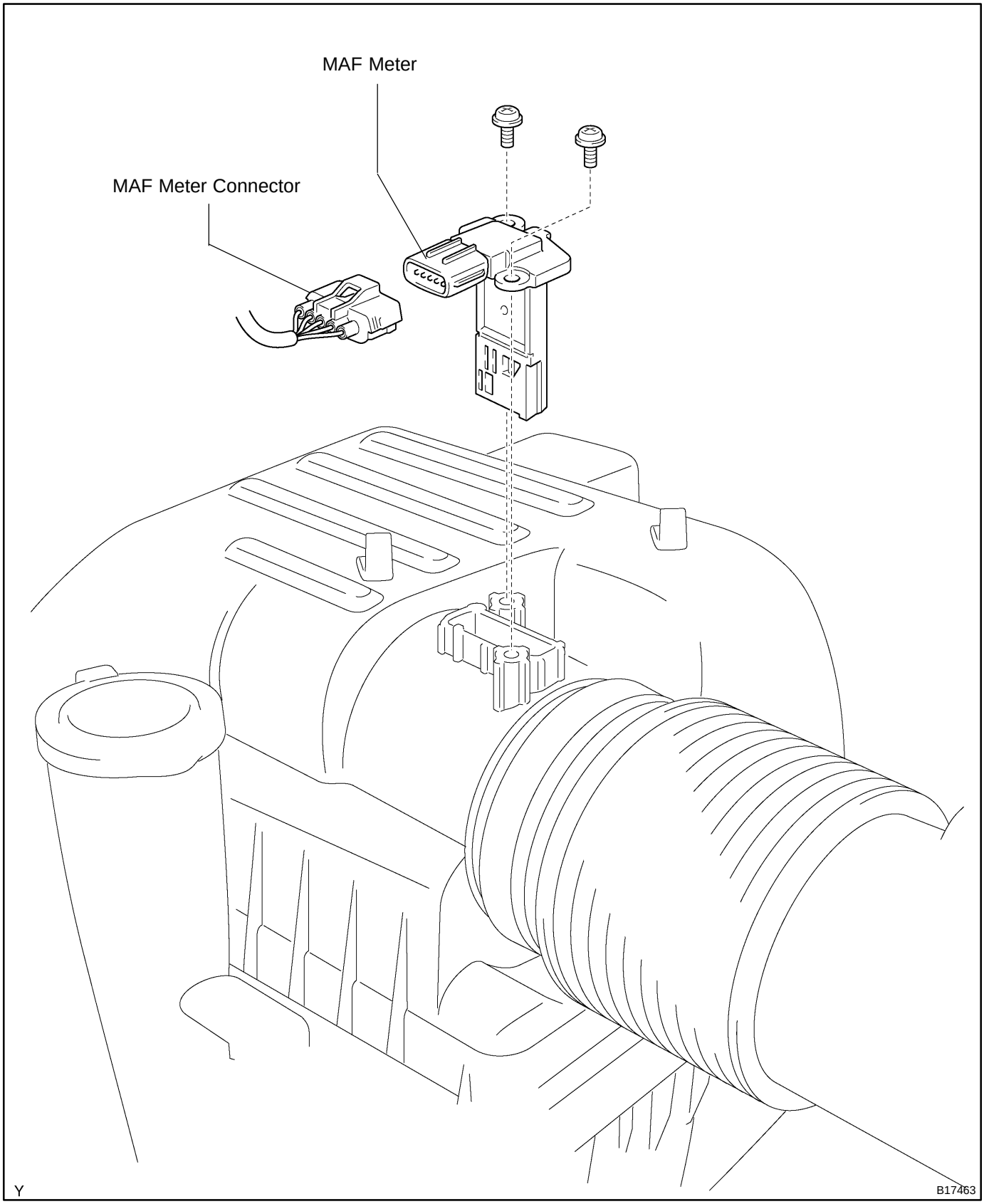
MASS AIR FLOW (MAF) METER

SF0P1–12

COMPONENTS



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SF0P2–09

INSPECTION

1. INSPECT OUTPUT VOLTAGE

(a) Apply battery voltage across terminals 1 (+B) and 2 (E2G).

(b) Connect the positive (+) tester probe to terminal 3 (VG), and the negative (–) tester probe to terminal 2 (E2G).

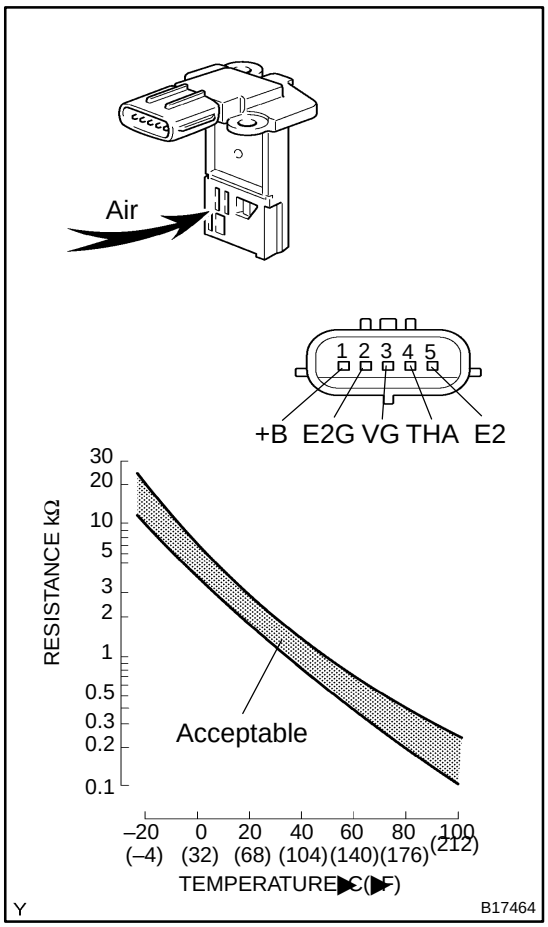
(c) Blow air into the MAF meter, and check if the voltage fluctuates.

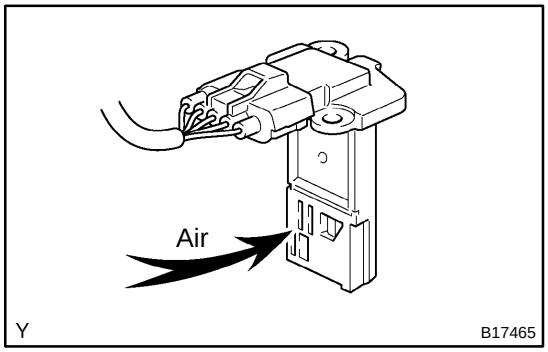
2. INSPECT RESISTANCE

Using an ohmmeter, measure the resistance between terminals 4 (THA) and 5 (E2).

Resistance:

12.5 to 16.9 kΩ at –20°C (–4°F)
2.19 to 2.67 kΩ at 20°C (68°F)
0.50 to 0.68 kΩ at 60°C (140°F)





3. INSPECT MASS AIR FLOW METER

(a) If using a hand–held tester:

(1) Connect the hand–held tester to the DLC3.

(2) Turn the ignition switch to the ON position.

(3) Blow air into the MAF meter, and check that the air flow value of the CURRENT DATA changes.

If operation is not as specified, check the MAF meter (see page DI–110 and DI–113) as well as the wiring and the ECM.

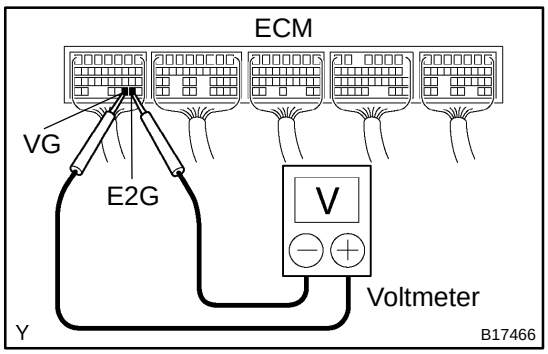
(b) If not using a hand–held tester:

(1) Turn the ignition switch to the ON position.

(2) Connect the positive tester probe of the voltmeter to terminal VG of the ECM and the negative tester probe of the voltmeter to terminal E2G of the ECM.

(3) Blow air into the air flow meter, and check if the voltage fluctuates.

If operation is not as specified, check the MAF meter (see page DI–110 and DI–113), the wiring and the ECM.



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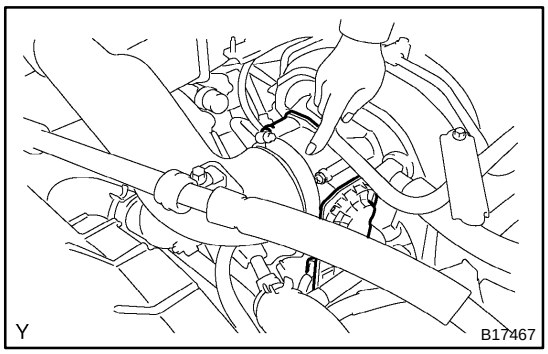


THROTTLE BODY

SF1XJ–01

ON–VEHICLE INSPECTION

1. REMOVE THROTTLE BODY COVER

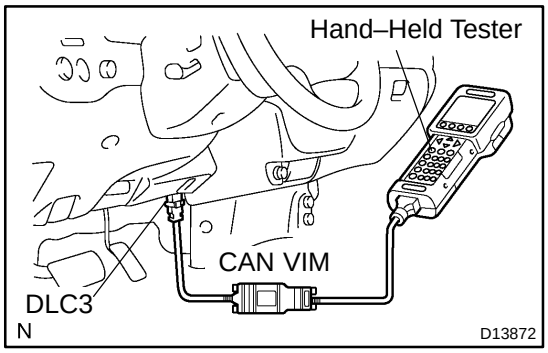
2. INSPECT SYSTEM OPERATION

(a) Inspect the throttle control motor for operating sound.

(1) Turn the ignition switch ON.

(2) When depressing the accelerator pedal, check the running sound of the motor. Also, check that there is no friction sound.

If operation is not as specified, check the throttle control motor (see step 3), wiring and ECM.



(b) Inspect the accelerator pedal position sensor.

(1) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).

(2) Check that the MIL does not light up.

(3) When turning the accelerator pedal position sensor lever to the full–open position, check that the throttle valve opening percentage (THROTTLE POS) of the CURRENT DATA showns the standard value.

Standard throttle valve opening percentage:
60% or more

If operation is not as specified, check that the accelerator pedal position sensor (see page DI–370), wiring and ECM.

If not using a hand–held tester, measure the voltage between terminals (VTA1–E2, VTA2–E2) of the ECM connector (See page DI–127).

(c) Inspect the idle speed.

(1) Start the engine and check that the MIL does not light up.

(2) Allow the engine to warm up to normal operating temperature.

(3) Turn the A/C compressor ON to OFF, and check the idle speed.

Idle speed (Transmission in neutral): 700 ± 50 rpm

NOTICE:

Perform inspection without an electrical load.

(d) After checking the above (a) to (c), perform the driving test and check that there is no sense of incongruity.

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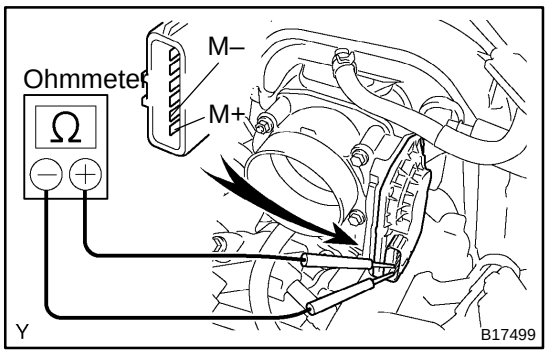


3. INSPECT THROTTLE CONTROL MOTOR

(a) Disconnect the throttle control motor connector.

(b) Using an ohmmeter, measure the motor resistance between terminals M+ and M–.

Motor resistance: 0.3 to 100 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the throttle body assembly (see page SF–42).

(c) Reconnect the throttle control motor connector.

4. INSPECT THROTTLE POSITION SENSOR

(See page DI–127)

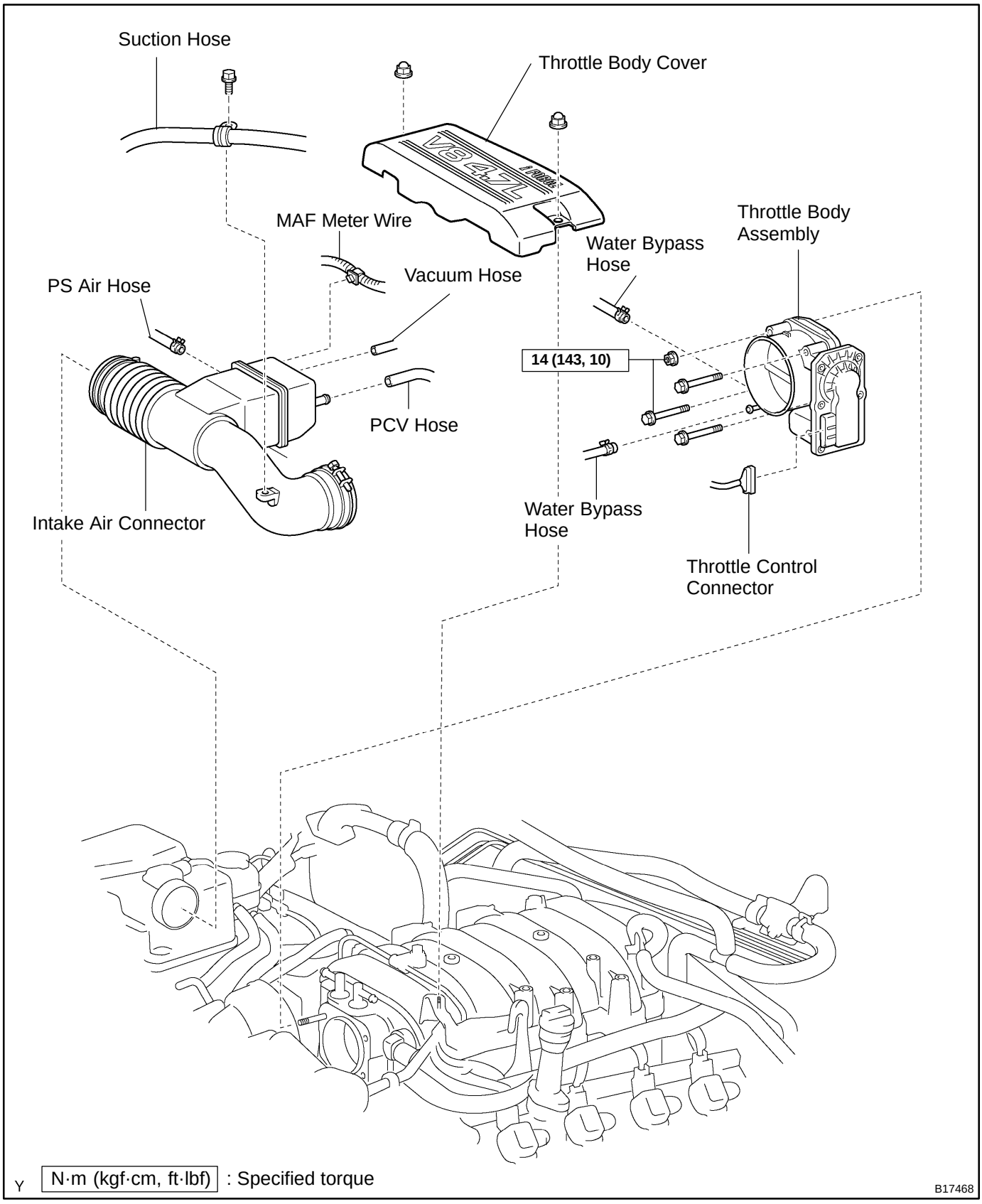
If necessary, replace the throttle body assembly (see page SF–42).

5. REINSTALL THROTTLE BODY COVER

Dardoor.com

SF1UP–02

COMPONENTS



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SF0P5–16

REMOVAL

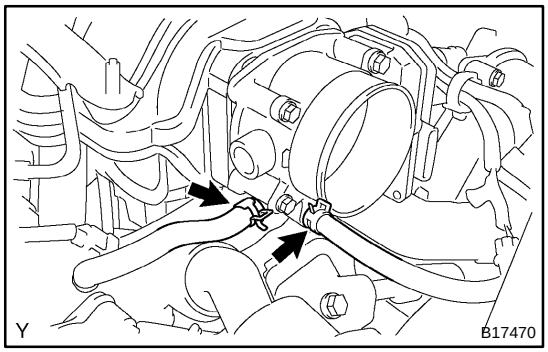
1. REMOVE THROTTLE BODY COVER

2. DRAIN ENGINE COOLANT

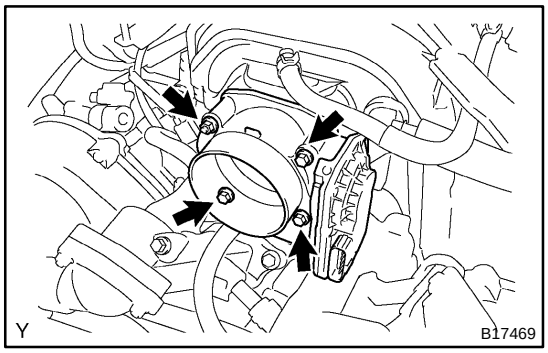
3. REMOVE INTAKE AIR CONNECTOR

4. REMOVE THROTTLE BODY

(a) Disconnect the throttle control connector.



(b) Disconnect the 2 water bypass hoses from the throttle body.



(c) Remove the nut and 3 bolts, and remove the throttle body from the intake manifold.

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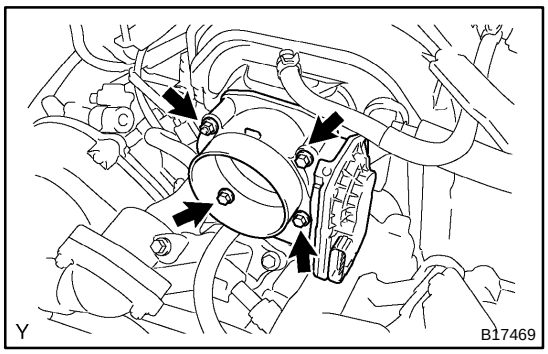
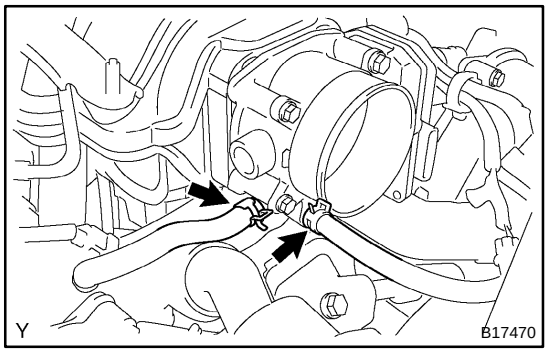
SF0P7–16



INSTALLATION

1. INSTALL THROTTLE BODY

(a) Install the throttle body with the nut and 3 bolts.
Torque: 14 N·m (143 kgf·cm, 10 ft·lbf)



(b) Connect the 2 water bypass hoses to the throttle body.
(c) Connect the throttle control connector.

2. INSTALL INTAKE AIR CONNECTOR

3. FILL WITH ENGINE COOLANT (See page CO–2)

4. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS

5. INSTALL THROTTLE BODY COVER

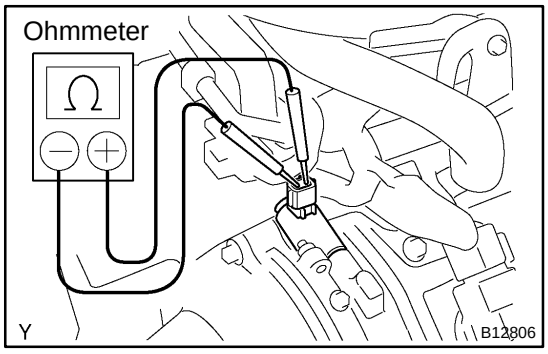
Dardoor.com

CAMSHAFT TIMING OIL CONTROL VALVE

SF0P8–03

ON–VEHICLE INSPECTION

(a) Remove the throttle body cover.
(b) Remove the intake air connector.
(c) Disconnect the oil control valve connector.



(d) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 6.9 to 7.9 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the valve.
(e) Reconnect the oil control valve connector.
(f) Reinstall the intake air connector.
(g) Reinstall the throttle body cover.

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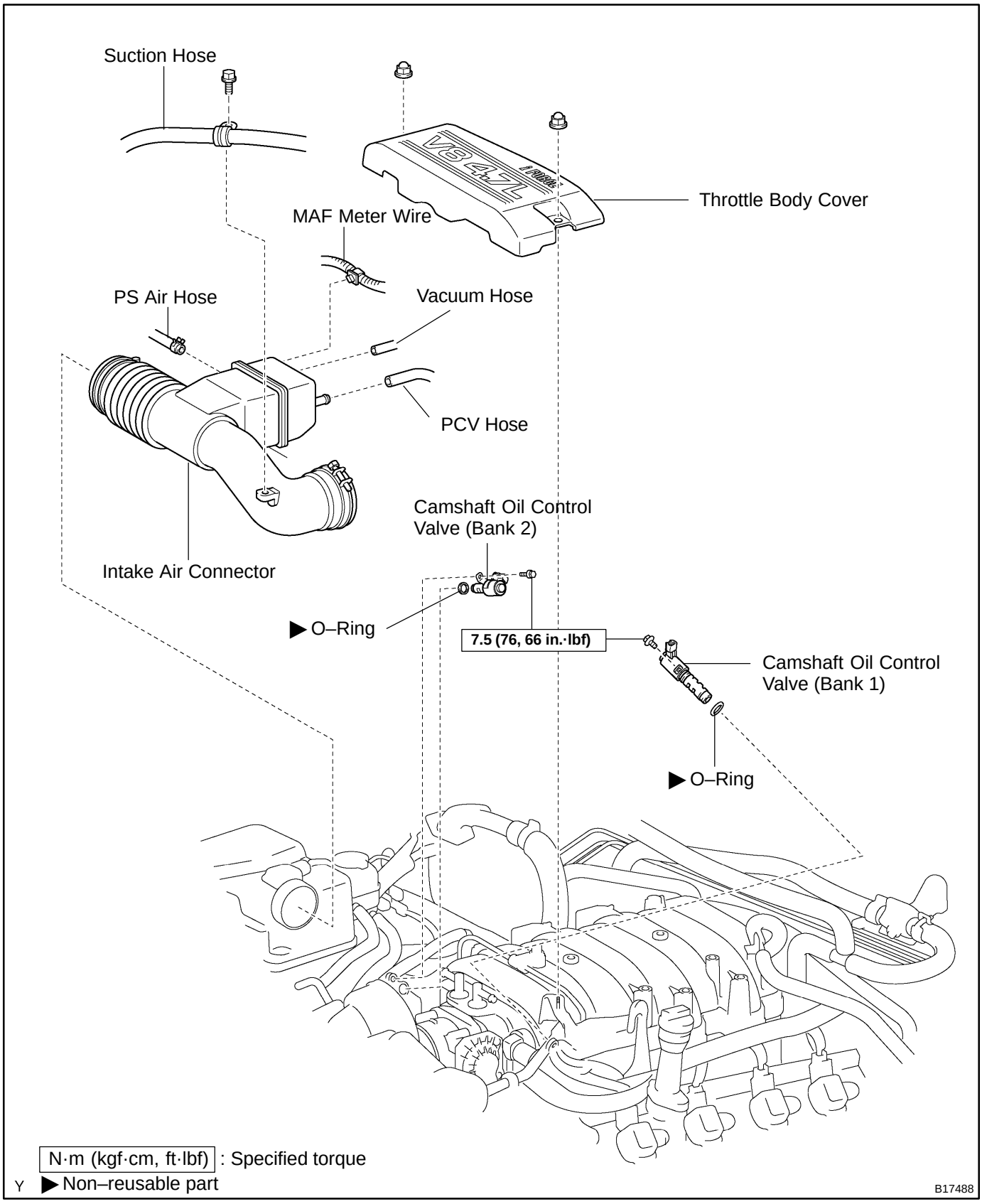
SF0P9–04

COMPONENTS



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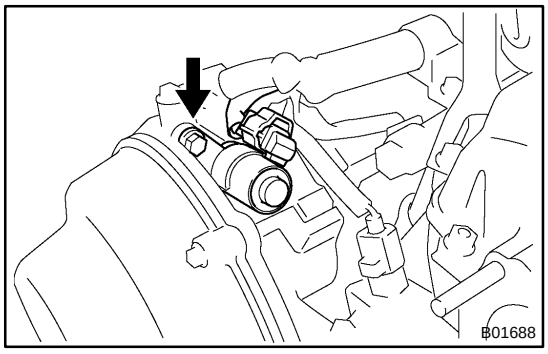
SF1XK–01

REMOVAL

1. REMOVE THROTTLE BODY COVER

2. REMOVE INTAKE AIR CONNECTOR



3. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE

(a) Disconnect the 2 camshaft oil control valve connectors.

(b) Remove the bolt, camshaft oil control valve and O–ring.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(c) Remove the O–ring from the each camshaft oil control valve.

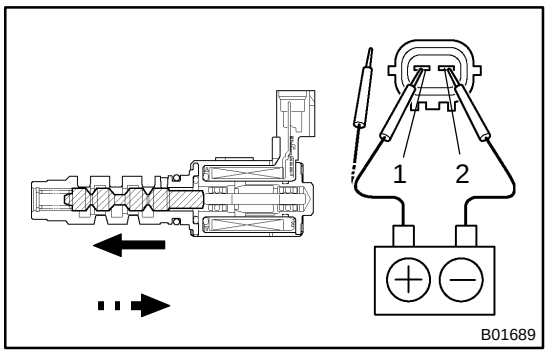
HINT:

At the time of installation, please refer to the following items.

Use a new O–rings.

Dardoor.com

SF0PB–02



INSPECTION

INSPECT OIL CONTROL VALVE OPERATION

Connect the positive ≧ lead to terminal 1 of the connector and the negative ⊖ lead to terminal 2, then check the movement of the valve.

When battery positive voltage is applied.	Valve moves in ← direction.
When battery positive voltage is cut off.	Valve moves in ⇢ direction.

If operation is not as specified, replace the oil control valve.

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SF1XL–01

INSTALLATION

Installation is in the reverse order of removal. (See page SF–46)

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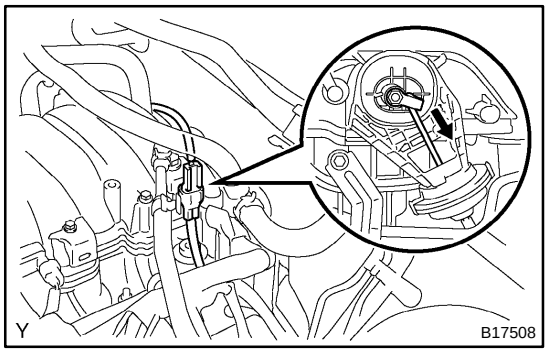
ACOUSTIC CONTROL INDUCTION SYSTEM (ACIS)

SF0PD–04

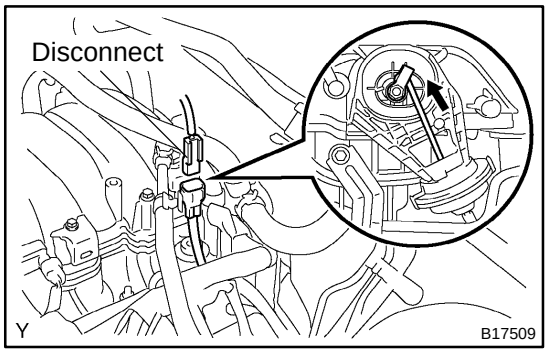
ON–VEHICLE INSPECTION

INSPECT INTAKE AIR CONTROL VALVE OPERATION

(a) Start the engine.



(b) While the engine idling, check that the actuator rod moves.



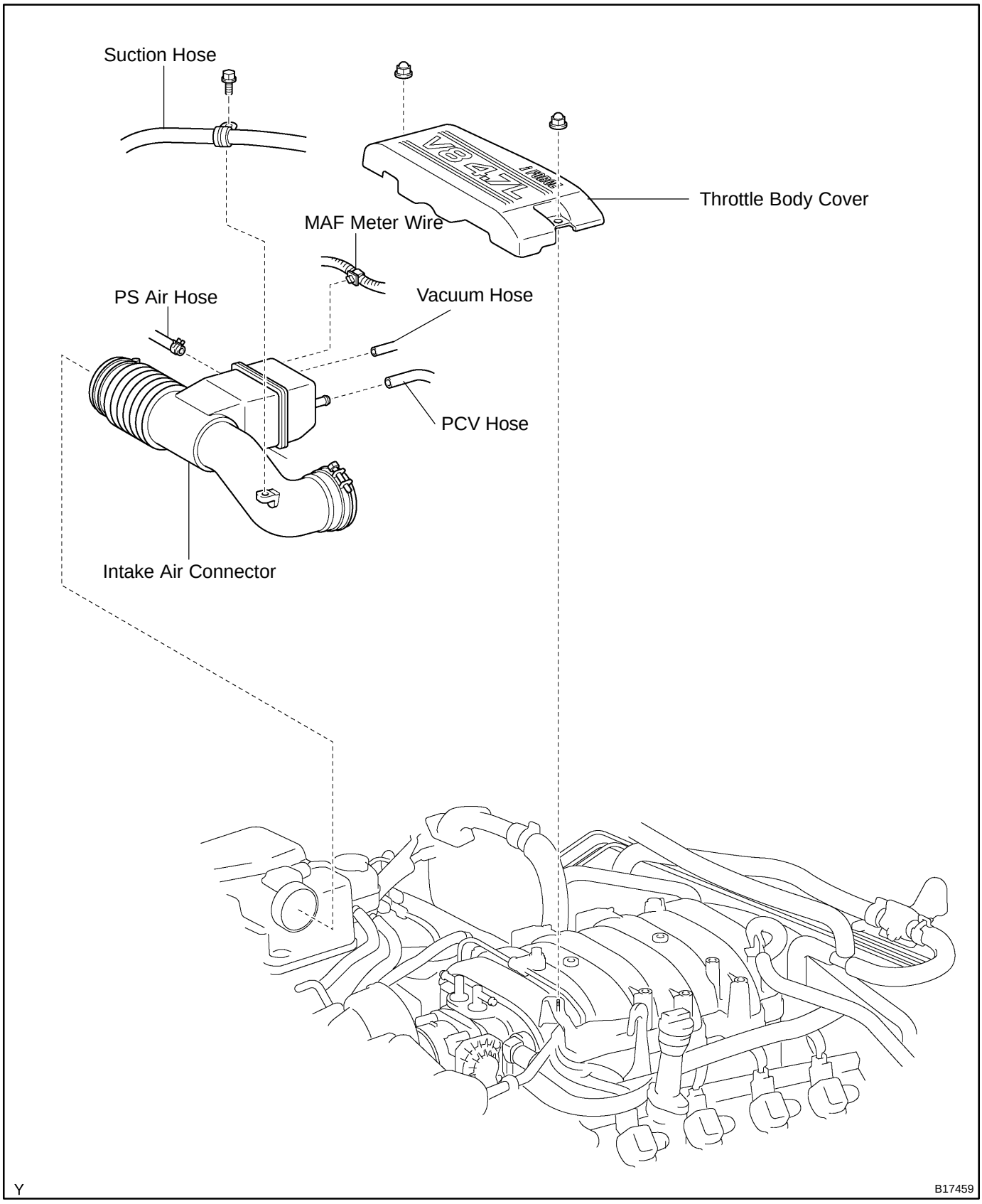
(c) Disconnect the VSV connector, and check that the actuator rod is returned.

If the operation is not as specified, inspect the intake air control valve, VSV and ECM.

Dardoor.com

SF1XM–01

COMPONENTS



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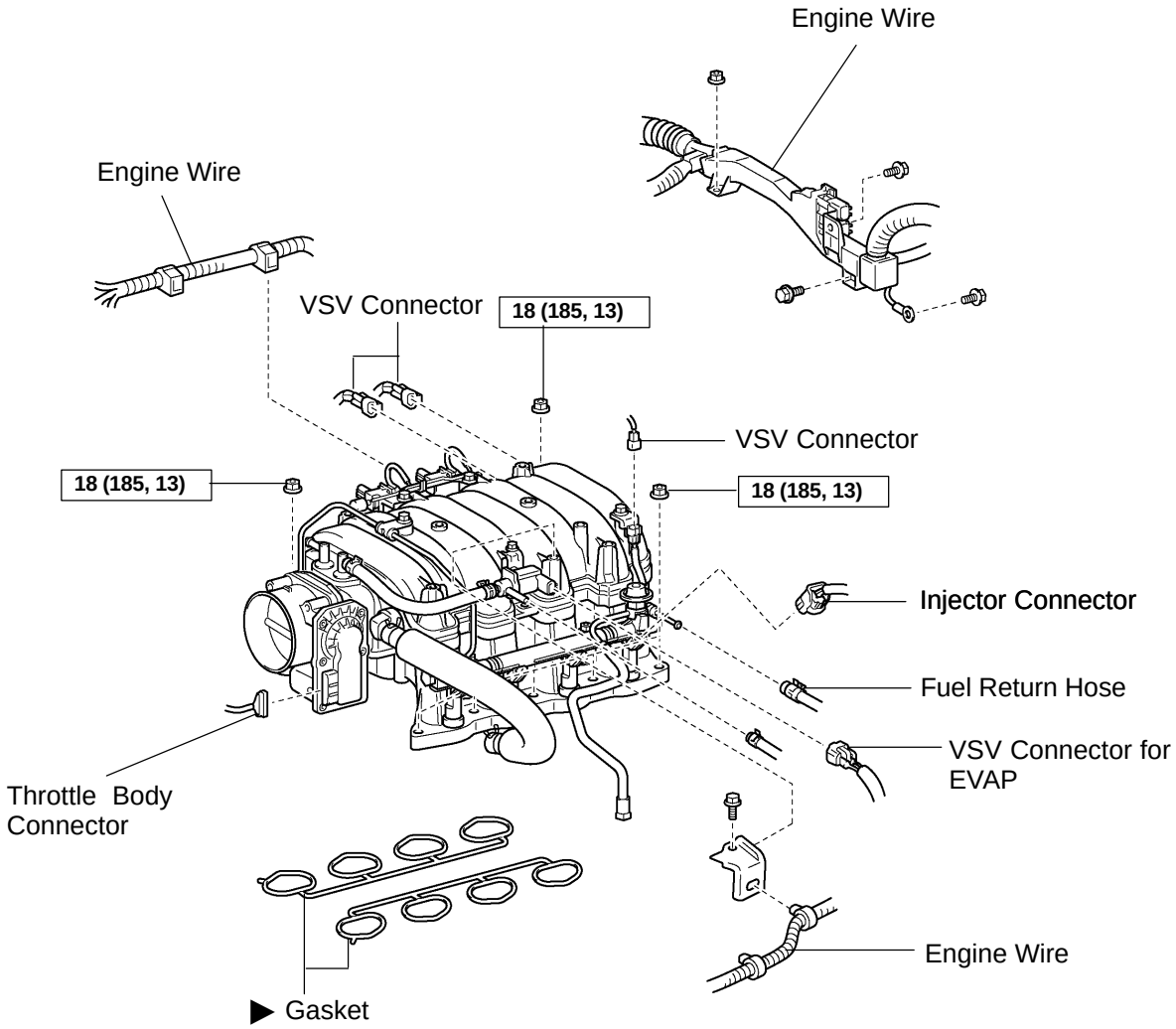
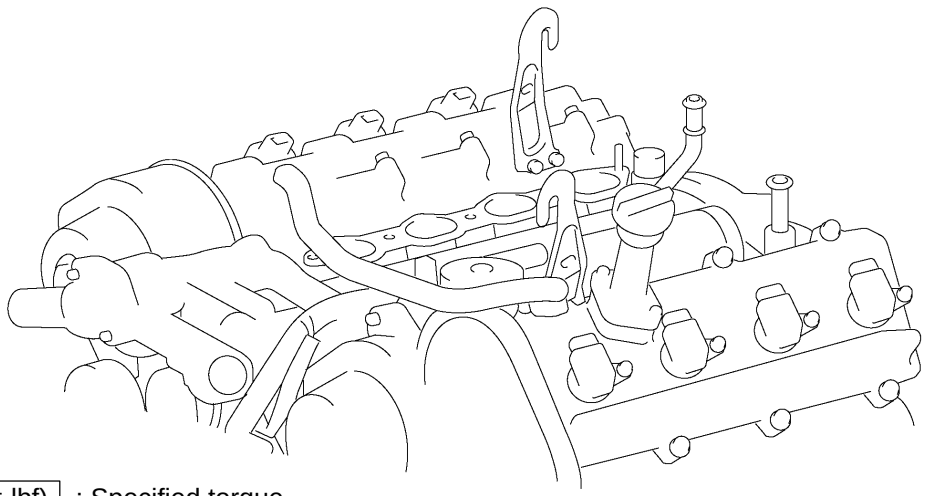




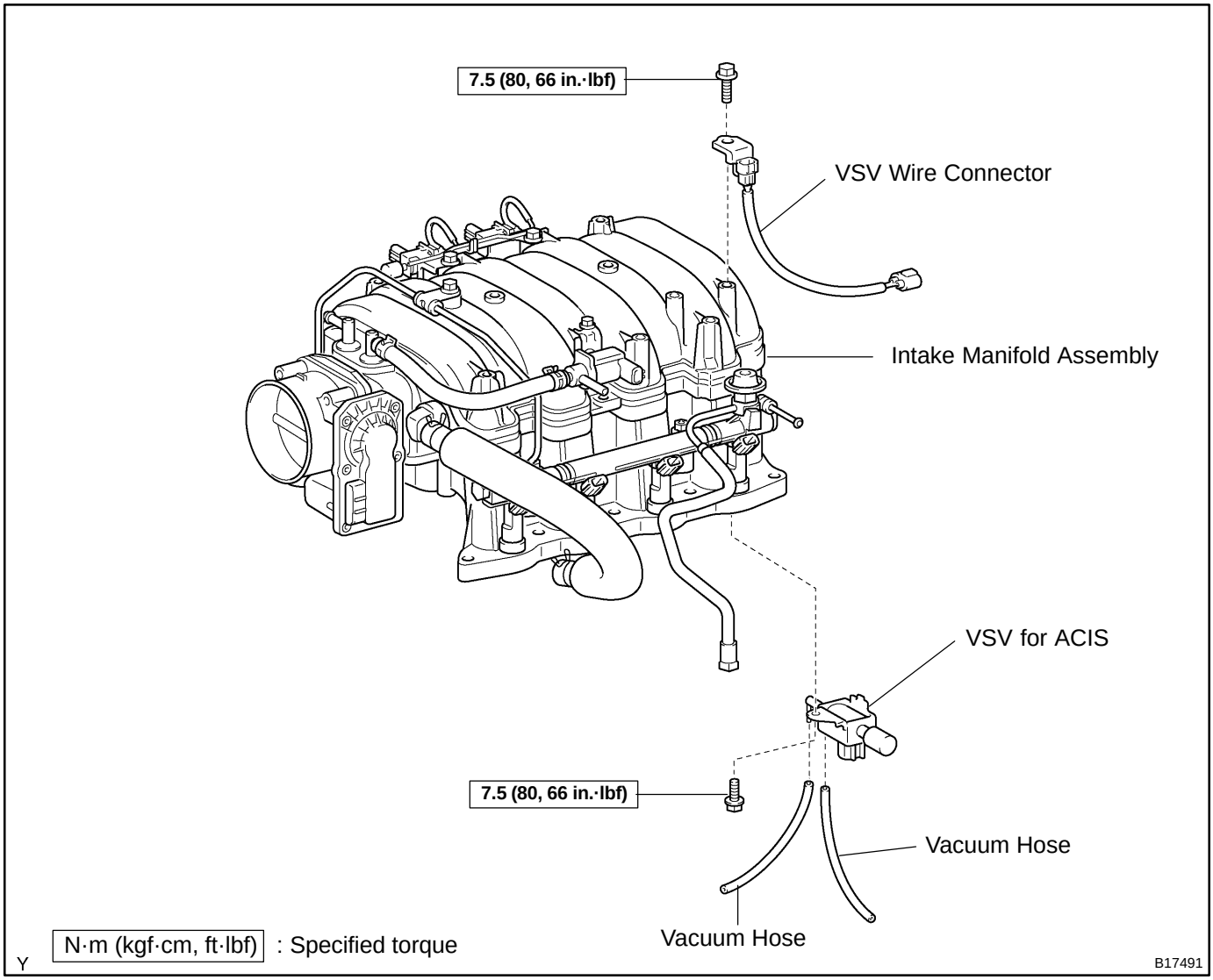
N·m (kgf·cm, ft·lbf) : Specified torque

▶ Non–reusable part

Y

B17490

Dardoor.com


7.5 (80, 66 in.·lbf)
VSV Wire Connector
Intake Manifold Assembly
VSV for ACIS
7.5 (80, 66 in.·lbf)
Vacuum Hose
Vacuum Hose
N·m (kgf·cm, ft·lbf) : Specified torque
Y
B17491

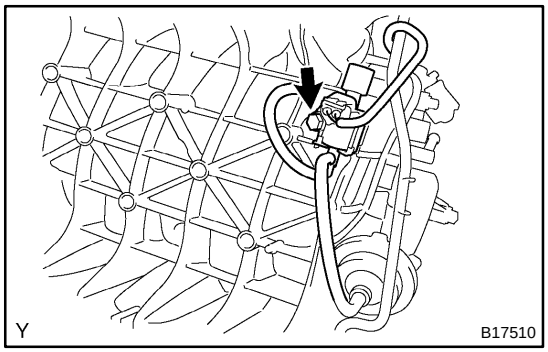
Dardoor.com

SF1XN–01

REMOVAL

1. REMOVE THROTTLE BODY COVER

2. REMOVE INTAKE MANIFOLD ASSEMBLY
(See page EM–36)



3. REMOVE VSV FOR ACIS

(a) Remove the 2 vacuum hoses from the VSV.

(b) Remove the bolt and VSV from the intake manifold.

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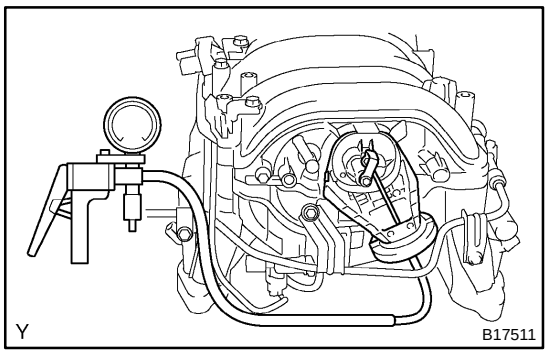
SF1XO–01

INSPECTION

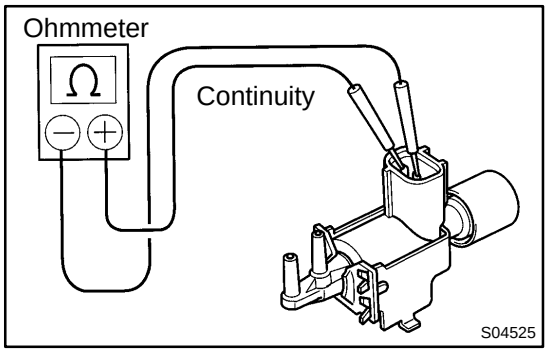


1. INSPECT INTAKE AIR CONTROL VALVE

(a) With 39.9 kPa (300 mmHg, 11.8 in.Hg) of vacuum applied to the actuator, check that the actuator rod moves.

(b) One minute after applying the vacuum in step (a), check that the actuator rod does not return.

If the operation is not as specified, replace the intake manifold.

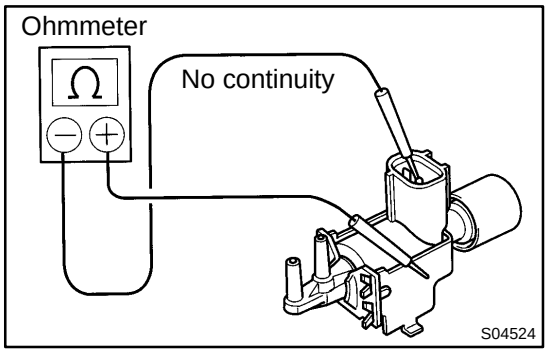


2. INSPECT VSV

(a) Using an ohmmeter, check that there is continuity between each terminal.

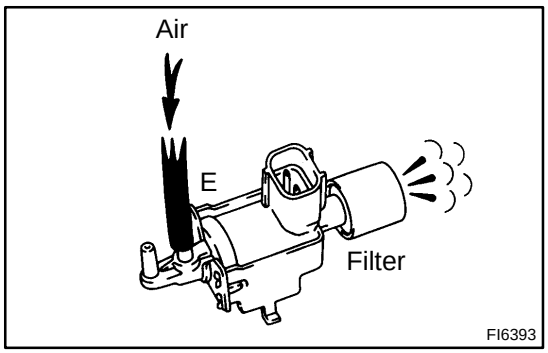
Resistance: 33 to 39 Ω at 20˚C (68˚F)

If there is no continuity, replace the VSV.

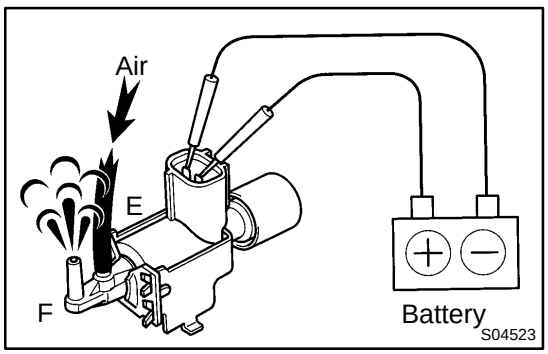


(b) Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Check that air flows from port E to the filter.



(d) Apply battery voltage across the terminals.

(e) Check that air flows from port E to port F.

If operation is not as specified, replace the VSV.

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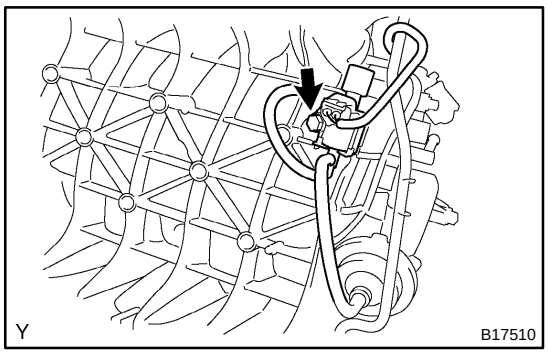
SF1XP–01



INSTALLATION

1. INSTALL VSV FOR ACIS

(a) Install the VSV to the intake manifold with the bolt.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(b) Connect the 2 vacuum hoses to the VSV.

2. INSTALL INTAKE MANIFOLD ASSEMBLY
(See page EM–60)

3. INSTALL THROTTLE BODY COVER

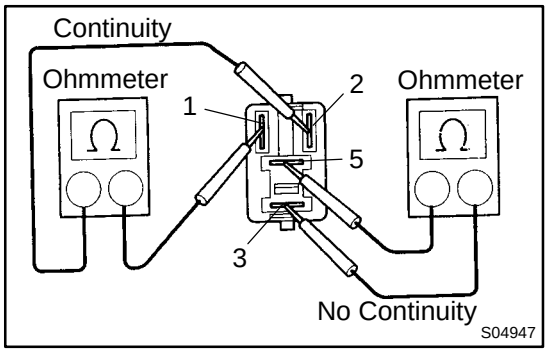
Dardoor.com

EFI MAIN RELAY

SF1XQ–01

INSPECTION

1. REMOVE RELAY BOX COVER
2. REMOVE EFI MAIN RELAY (Marking: EFI)



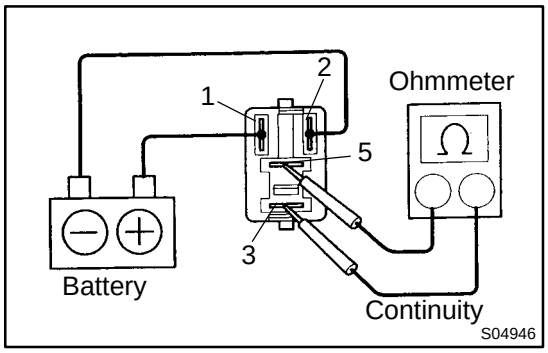
3. INSPECT EFI MAIN RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.



4. INSPECT EFI MAIN RELAY OPERATION

(a) Apply battery voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

5. REINSTALL EFI MAIN RELAY
6. REINSTALL RELAY BOX COVER

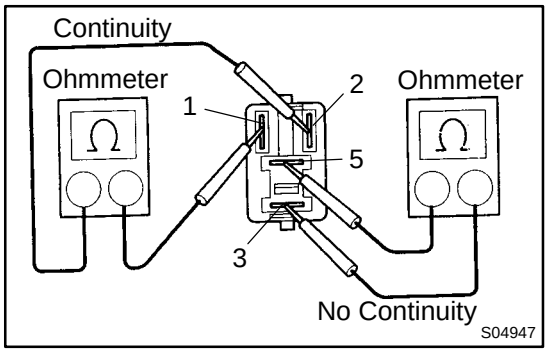
Dardoor.com

A/F SENSOR HEATER RELAY

SF1XR–01

INSPECTION

1. **REMOVE RELAY BOX COVER**
2. **REMOVE A/F SENSOR HEATER RELAY (Marking: A/F HTR)**



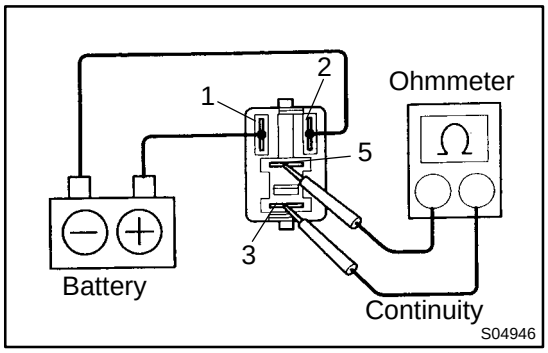
3. **INSPECT A/F SENSOR HEATER RELAY CONTINUITY**

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.



4. **INSPECT A/F SENSOR HEATER RELAY OPERATION**

(a) Apply battery voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

5. **REINSTALL A/F SENSOR HEATER RELAY**
6. **REINSTALL RELAY BOX COVER**

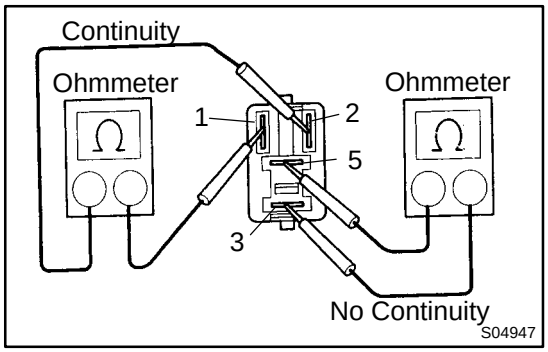
Dardoor.com

CIRCUIT OPENING RELAY

SF1XS–01

INSPECTION

1. **REMOVE RELAY BOX COVER**
2. **REMOVE CIRCUIT OPENING RELAY (Marking: C/O)**



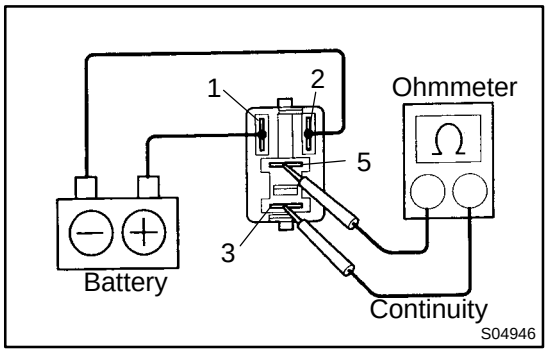
3. **INSPECT CIRCUIT OPENING RELAY CONTINUITY**

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.



4. **INSPECT CIRCUIT OPENING RELAY OPERATION**

(a) Apply battery positive voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

5. **REINSTALL CIRCUIT OPENING RELAY**
6. **REINSTALL RELAY BOX COVER**

Dardoor.com

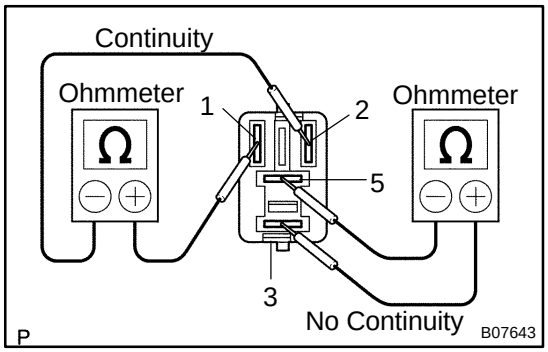
FUEL PUMP RELAY

SF1XT–01

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE FUEL PUMP RELAY (Marking: F/P)



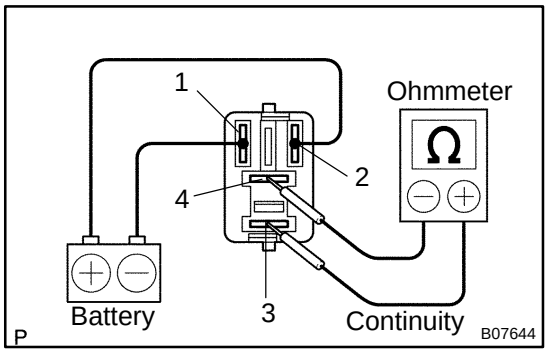
3. INSPECT FUEL PUMP RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is continuity between terminals 3 and 4.

If there is no continuity, replace the relay.



4. INSPECT FUEL PUMP RELAY OPERATION

(a) Apply battery positive voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If there is continuity, replace the relay.

5. REINSTALL FUEL PUMP RELAY

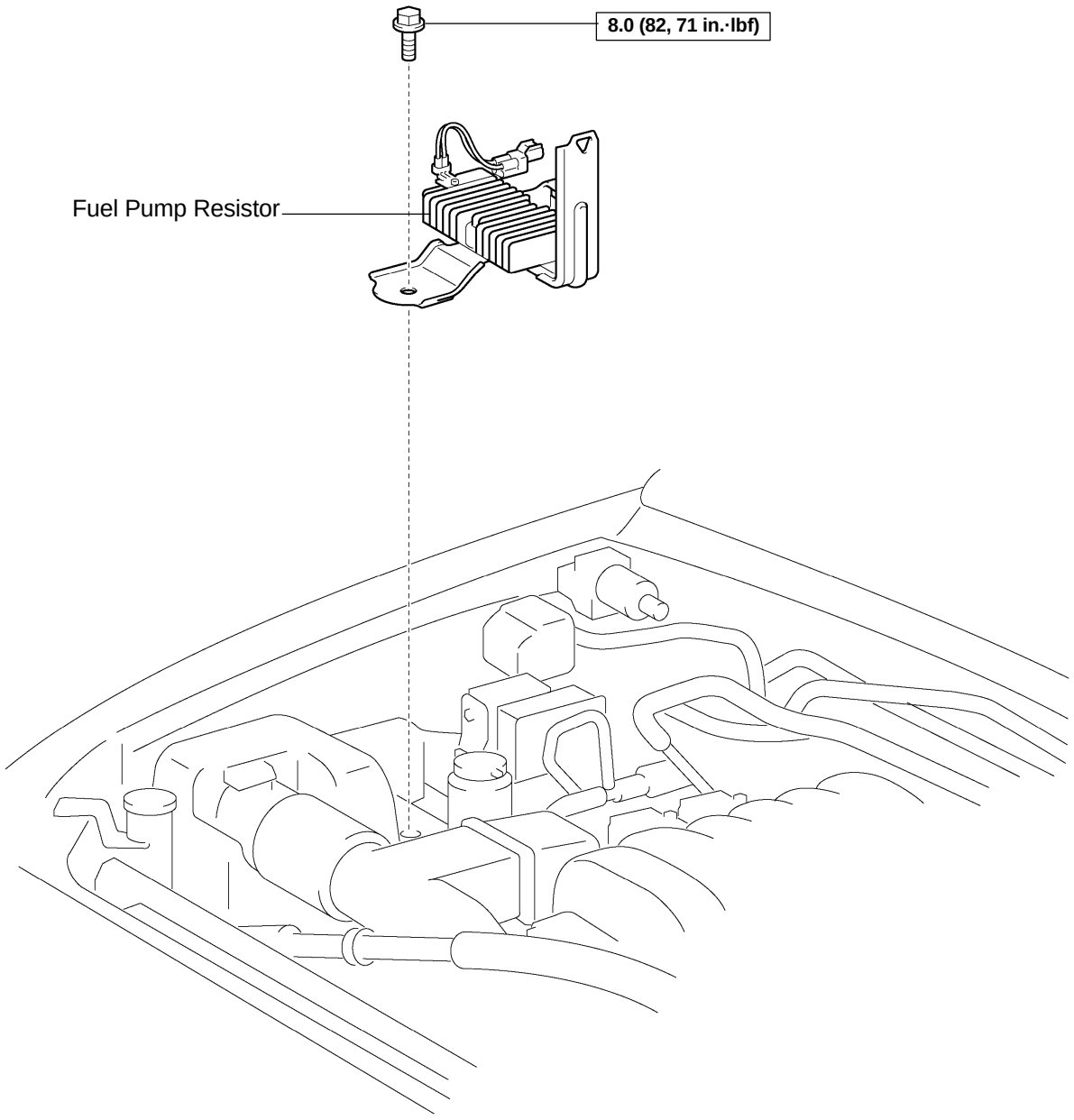
6. REINSTALL RELAY BOX COVER

Dardoor.com

FUEL PUMP RESISTOR

COMPONENTS

SF138–05



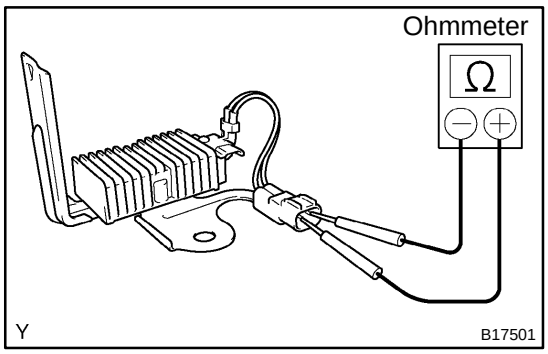
N·m (kgf·cm, ft·lbf) : Specified torque

Y

B17500

Dardoor.com

SF139–05



INSPECTION

1. REMOVE FUEL PUMP RESISTOR

2. INSPECT FUEL PUMP RESISTOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance: 0.70 to 0.76 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the resistor.

3. REINSTALL FUEL PUMP RESISTOR

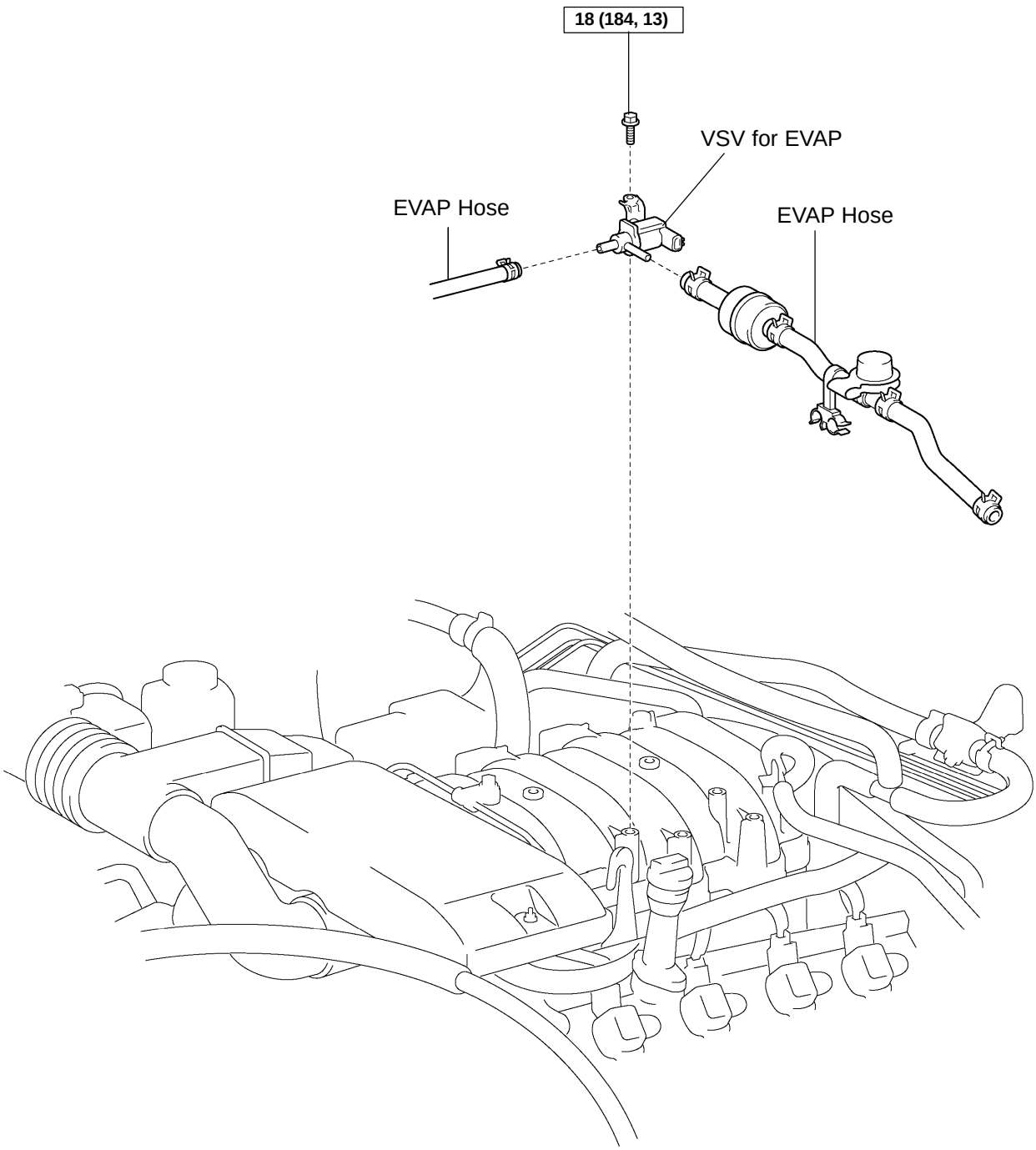
Torque: 8.0 N·m (82 kgf·cm,71 in.·lbf)

Dardoor.com

VSV FOR EVAPORATIVE EMISSION (EVAP)

COMPONENTS

SF0Y7–10



Y N·m (kgf·cm, ft·lbf) : Specified torque

B17502

Dardoor.com

SF0PJ–10

INSPECTION

1. REMOVE VSV

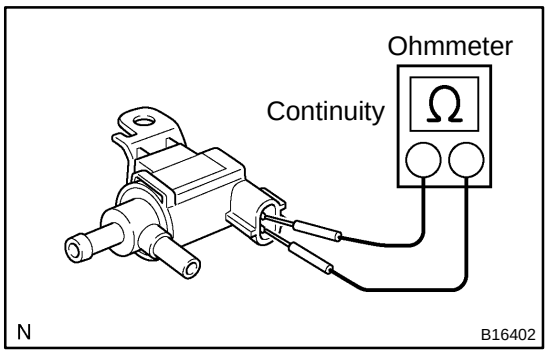
2. INSPECT VSV

(a) Inspect the VSV for open circuit.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 30 to 34 Ω at 20˚C (68˚F)

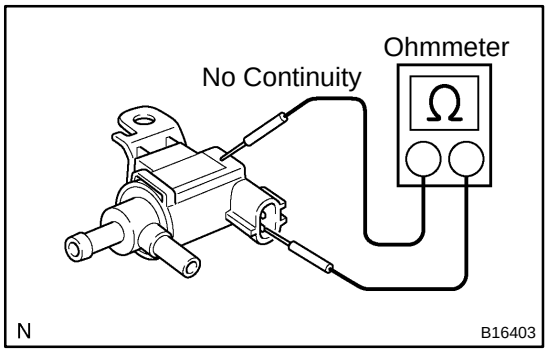
If there is no continuity, replace the VSV.



(b) Inspect the VSV for ground.

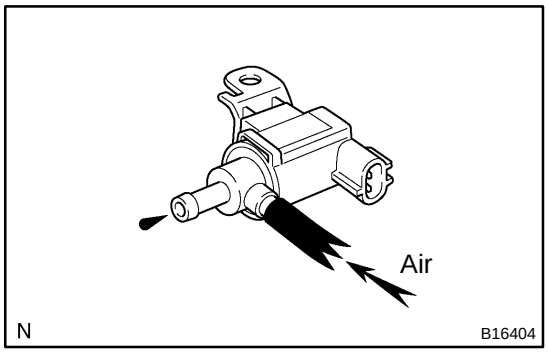
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.

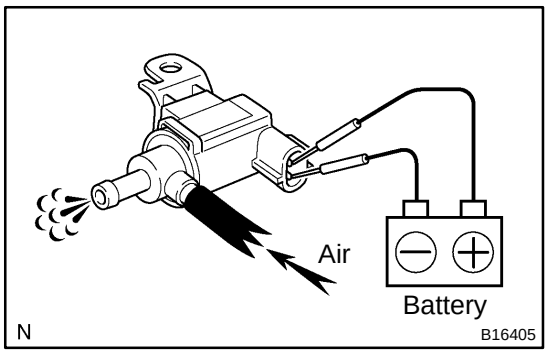
(1) Check that air dose not flow from port.



(2) Apply battery positive voltage across the terminals.

(3) Check that air flows from port.

If operation is not as specified, replace the VSV.



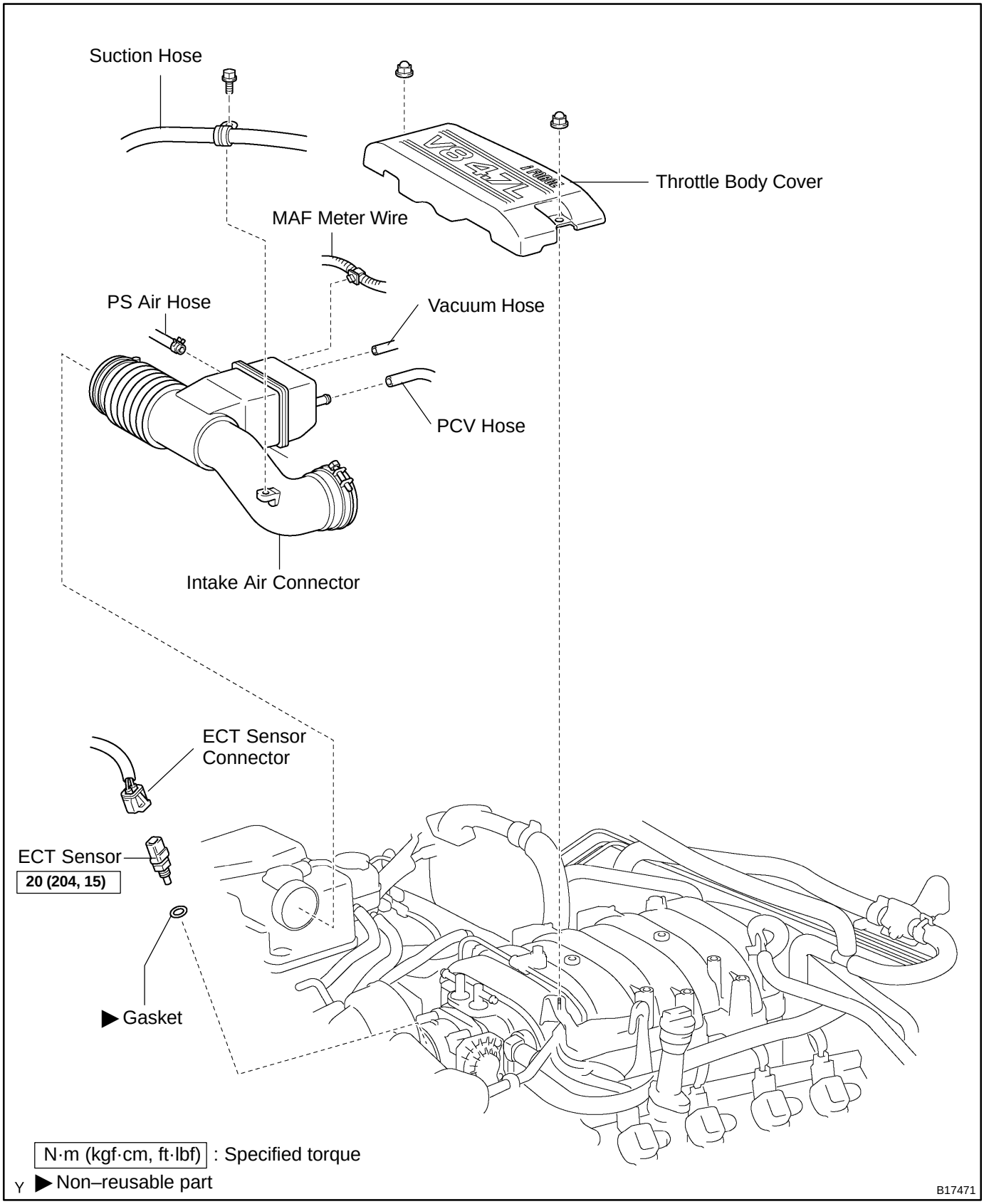
3. REINSTALL VSV

Dardoor.com

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

SF0PN–14

COMPONENTS



Dardoor.com

SF0PO–19

INSPECTION

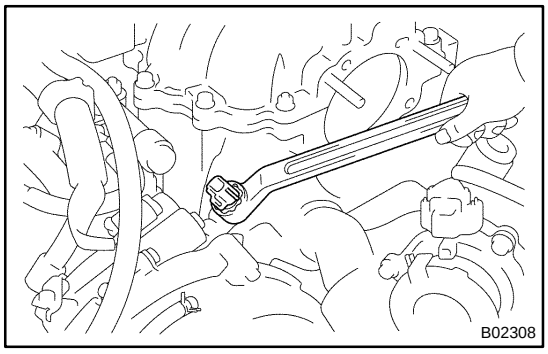
1. DRAIN ENGINE COOLANT

2. REMOVE THROTTLE BODY COVER

3. REMOVE INTAKE AIR CONNECTOR

4. DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLDS

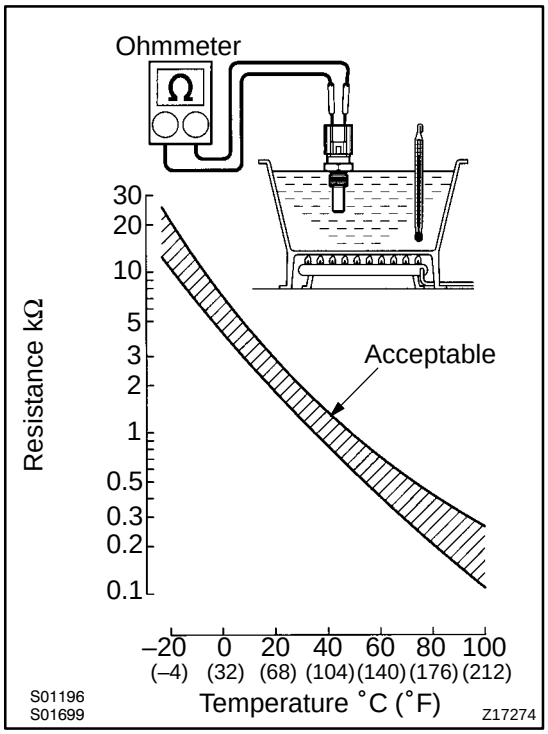
Remove the nut and 3 bolts, and disconnect the throttle body from the intake manifold.



5. REMOVE ECT SENSOR

(a) Disconnect the ECT sensor connector.

(b) Remove the ECT sensor and gasket.



6. INSPECT ECT SENSOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

If the resistance is not as specified, replace the ECT sensor.

7. REINSTALL ECT SENSOR

(a) Install a new gasket and the ECT sensor.

Torque: 19.6 N·m (200 kgf·cm, 14 ft·lbf)

(b) Connect the ECT sensor connector.

8. REINSTALL THROTTLE BODY TO INTAKE MANIFOLDS

Install a new gasket and the throttle body with the 2 bolts and 2 nuts.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

9. REINSTALL INTAKE AIR CONNECTOR

10. REFILL WITH ENGINE COOLANT (See page CO–2)

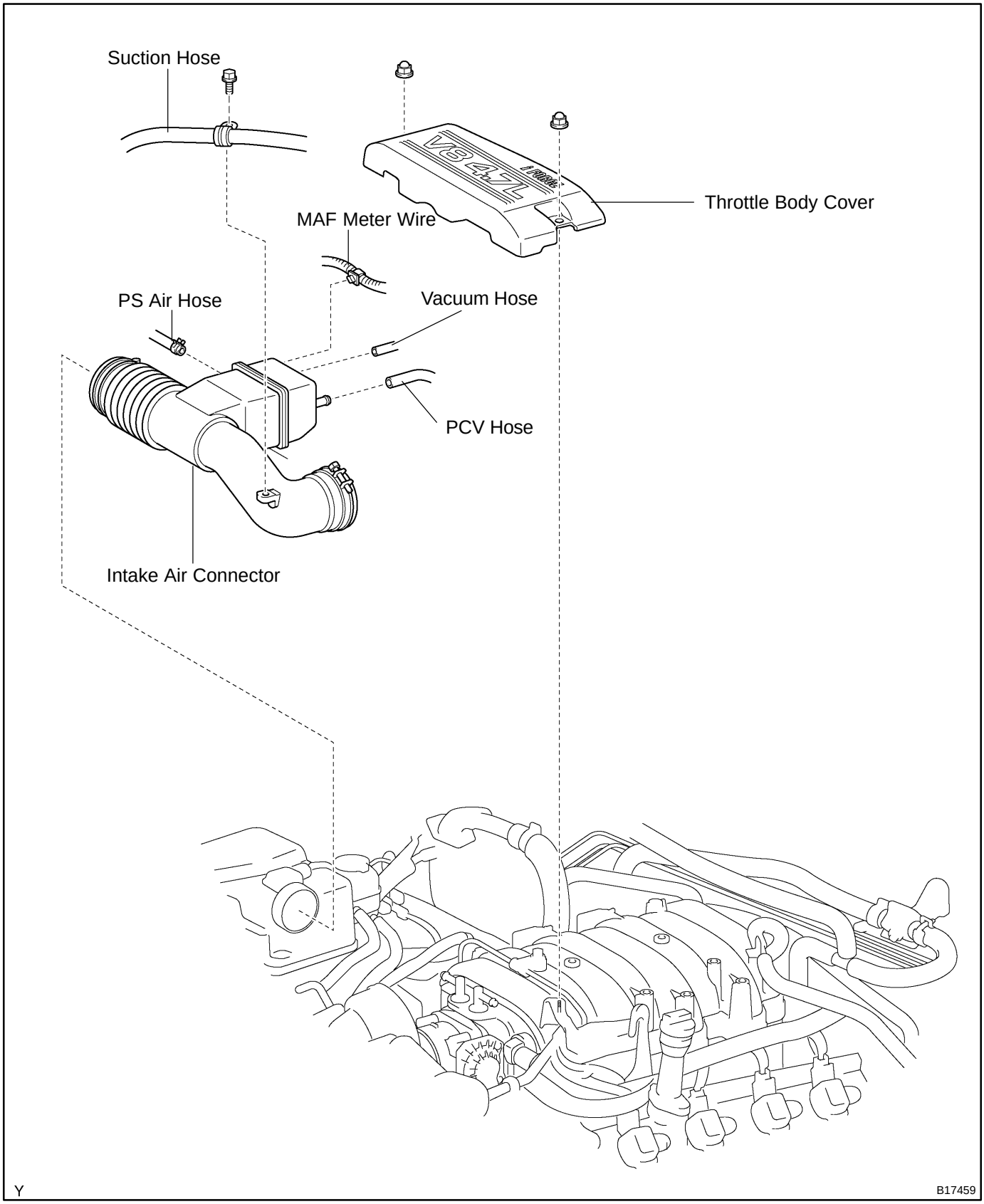
11. REINSTALL THROTTLE BODY COVER

Dardoor.com

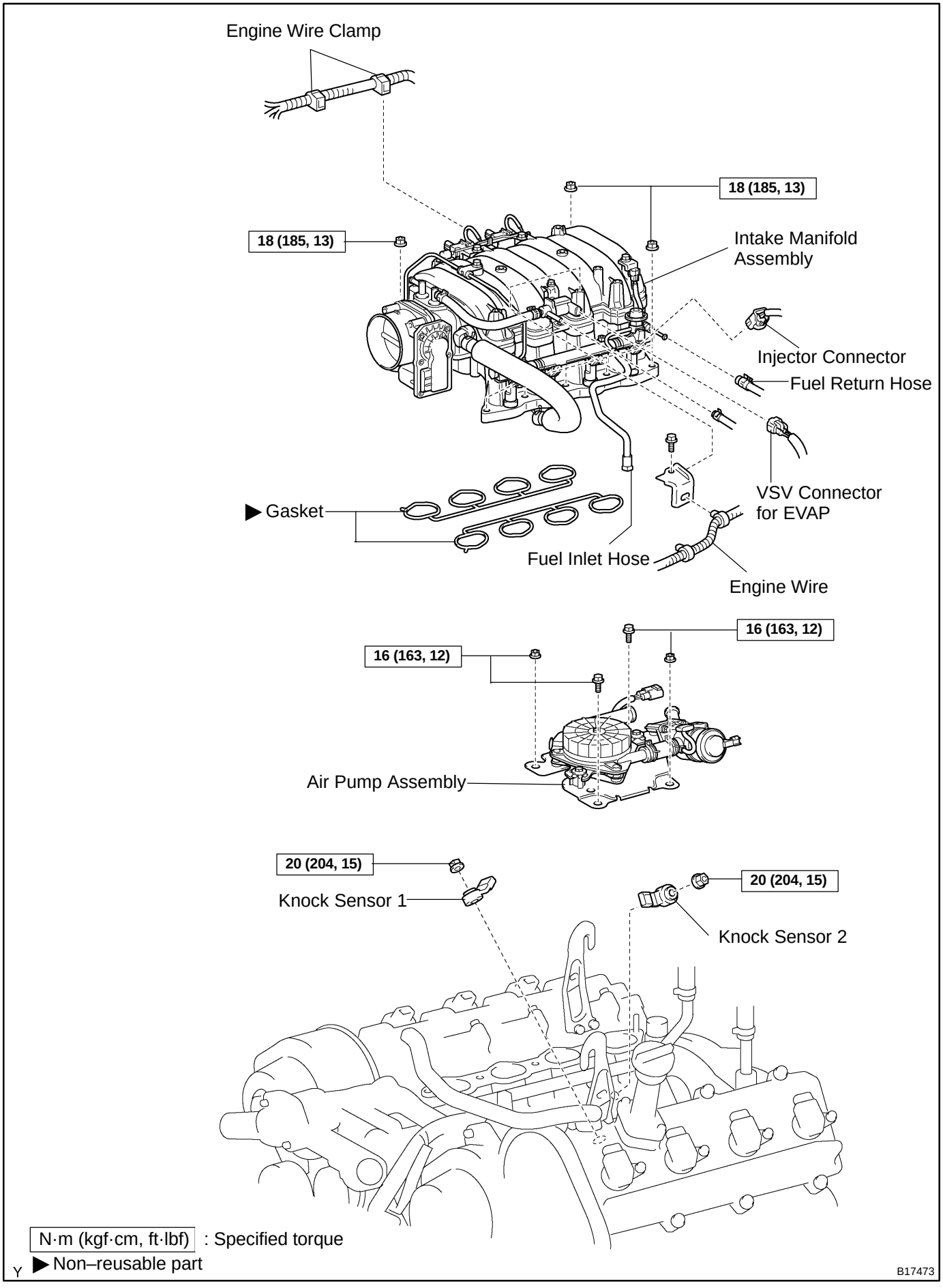
KNOCK SENSOR

COMPONENTS

SF0PR–17



Dardoor.com

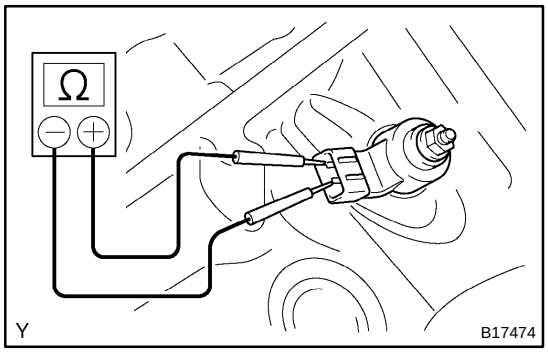

Engine Wire Clamp
18 (185, 13)
18 (185, 13)
Intake Manifold Assembly
Injector Connector
Fuel Return Hose
VSV Connector for EVAP
▶ Gasket
Fuel Inlet Hose
Engine Wire
16 (163, 12)
16 (163, 12)
Air Pump Assembly
20 (204, 15)
20 (204, 15)
Knock Sensor 1
Knock Sensor 2
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
B17473

Dardoor.com

SF1XU–01

INSPECTION

1. REMOVE THROTTLE BODY COVER
2. REMOVE INTAKE AIR CONNECTOR
3. REMOVE INTAKE MANIFOLDS ASSEMBLY
   (See page EM–36)



4. **INSPECT KNOCK SENSORS 1 AND 2**

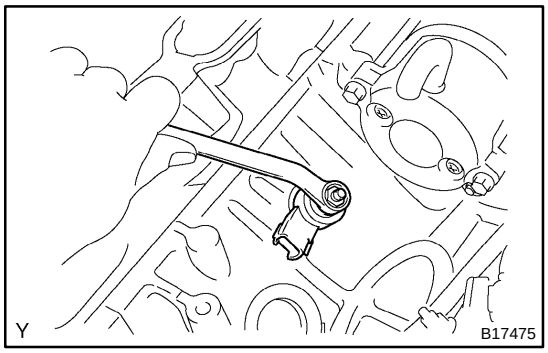
(a) Disconnect the knock sensor connectors.

(b) Using an ohmmeter, measure the resistance between terminals.

Resistance: 120 to 280 kΩ at 20˚C (68˚F)

HINT:

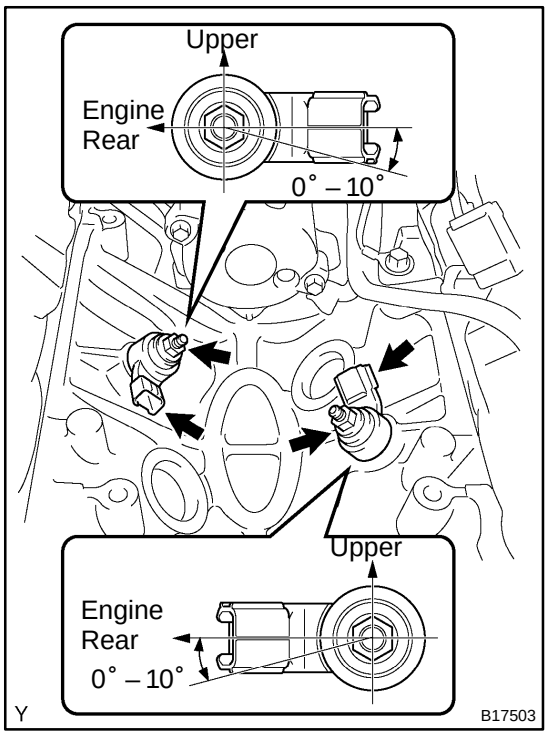
If the resistance is not as specified, replace the sensor.



5. **REMOVE KNOCK SENSOR**

(a) Disconnect the 2 knock sensor connectors.

(b) Remove the 2 nuts and 2 knock sensors.



6. **INSTALL KNOCK SENSOR**

(a) Install the 2 knock sensors with the 2 nuts as shown in the illustration.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(b) Connect the 2 knock sensor connectors.

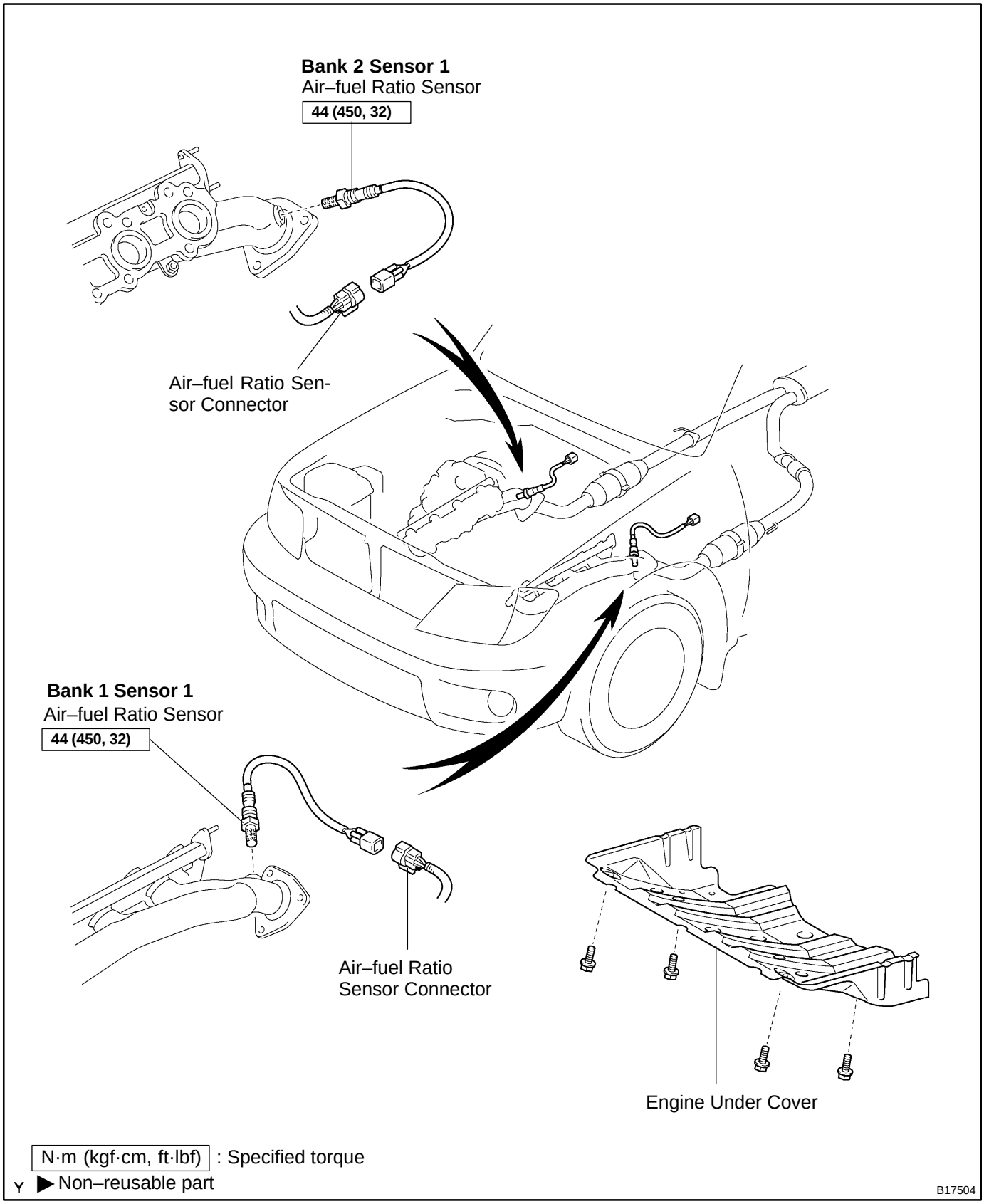
7. **INSTALL INTAKE MANIFOLD ASSEMBLY**
   (See page EM–60)
8. **INSTALL INTAKE AIR CONNECTOR**
9. **INSTALL THROTTLE BODY COVER**

Dardoor.com

AIR–FUEL RATIO (A/F) SENSOR

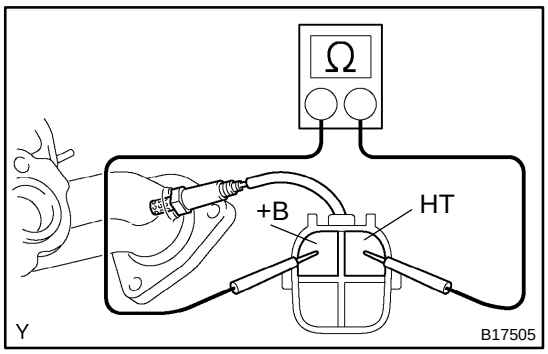
SF1XV–01

COMPONENTS



Dardoor.com

SF1XW–01



INSPECTION

1. INSPECT HEATER RESISTANCE OF AIR FUEL RATIO SENSOR

(a) Disconnect the air fuel ratio sensor connector.

(b) Using an ohmmeter, measure the resistance between terminals +B and HT.

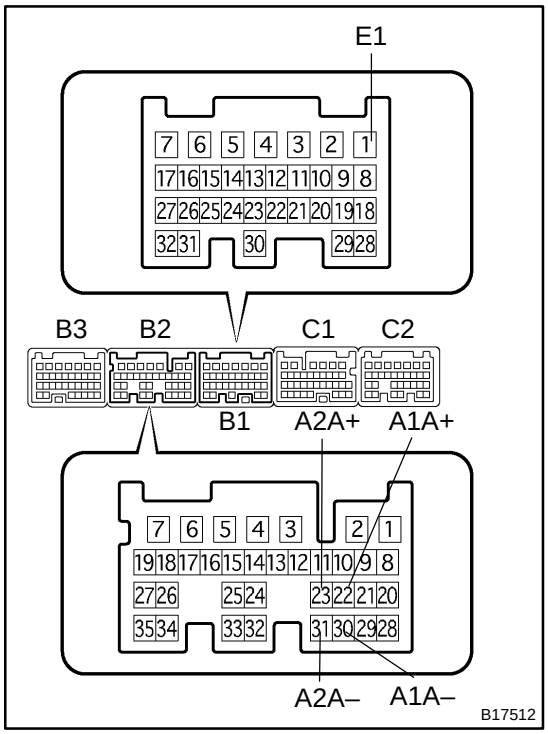
Resistance 11 to 16 kΩ at 20˚C (68˚F)

If the resistance is not as specified, replace the sensor.

Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

(c) Reconnect the air fuel ratio sensor connector.

2. INSPECT OPERATION OF AIR FUEL RATIO SENSOR (See page DI–88)



3. INSPECT AIR–FUEL RATIO COMPENSATION SYSTEM

(a) Measure the voltage between the terminals of the ECM connectors.

Standard:

Tester Connection	Condition	Specified Condition
B2–22 (A1A+) – B1–1 (E1)	Ignition switch ON	3.3 V
B2–30 (A1A–) – B1–1 (E1)	Ignition switch ON	2.9 V
B2–23 (A2A+) – B1–1 (E1)	Ignition switch ON	3.3 V
B2–31 (A2A–) – B1–1 (E1)	Ignition switch ON	2.9 V

NOTICE:

Connect test leads from the back side of the connector. The connectors should not be disconnected from the ECM.

HINT:

The voltage between the terminals of the ECM is kept constant regardless of the voltage of the A/F sensor.

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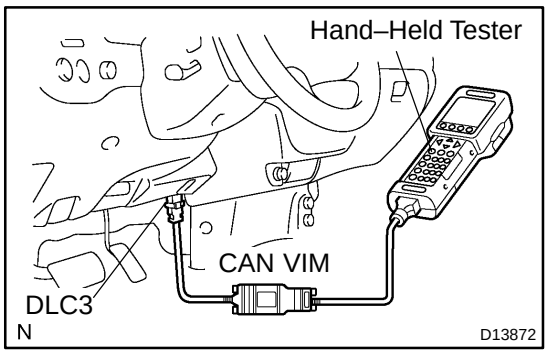
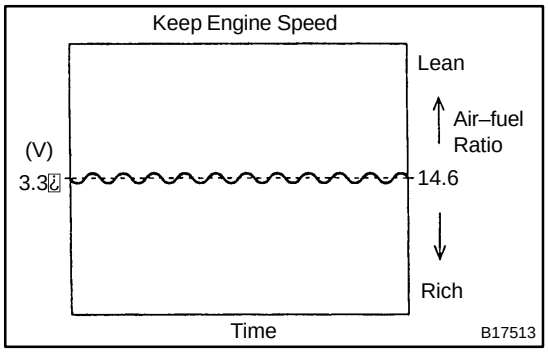


(b) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).
(c) Turn the ignition switch ON.
(d) Select the following menu items : Data List / A/FS B1 S1 and O2S B1 S2.
(e) Warm up the A/F sensor by running the engine at 2,500 rpm for approximately 2 minutes.



(f) Keep the engine speed at 2,500 rpm and confirm that the display of the ”A/FS B1 S1” is as shown in the illustration.

HINT:

- The illustration may slightly differ from the display on the hand–held tester.
- The waveform of the A/F sensor is displayed only on the hannd–heldtester.

(g) Confirm that the display of the ”O2S B1 S2” changes between 0 and 1 V with the engine speed at 2,500 rpm.

OK:

The voltage output oscillates more than 8 times in 10 seconds.

CAUTION:

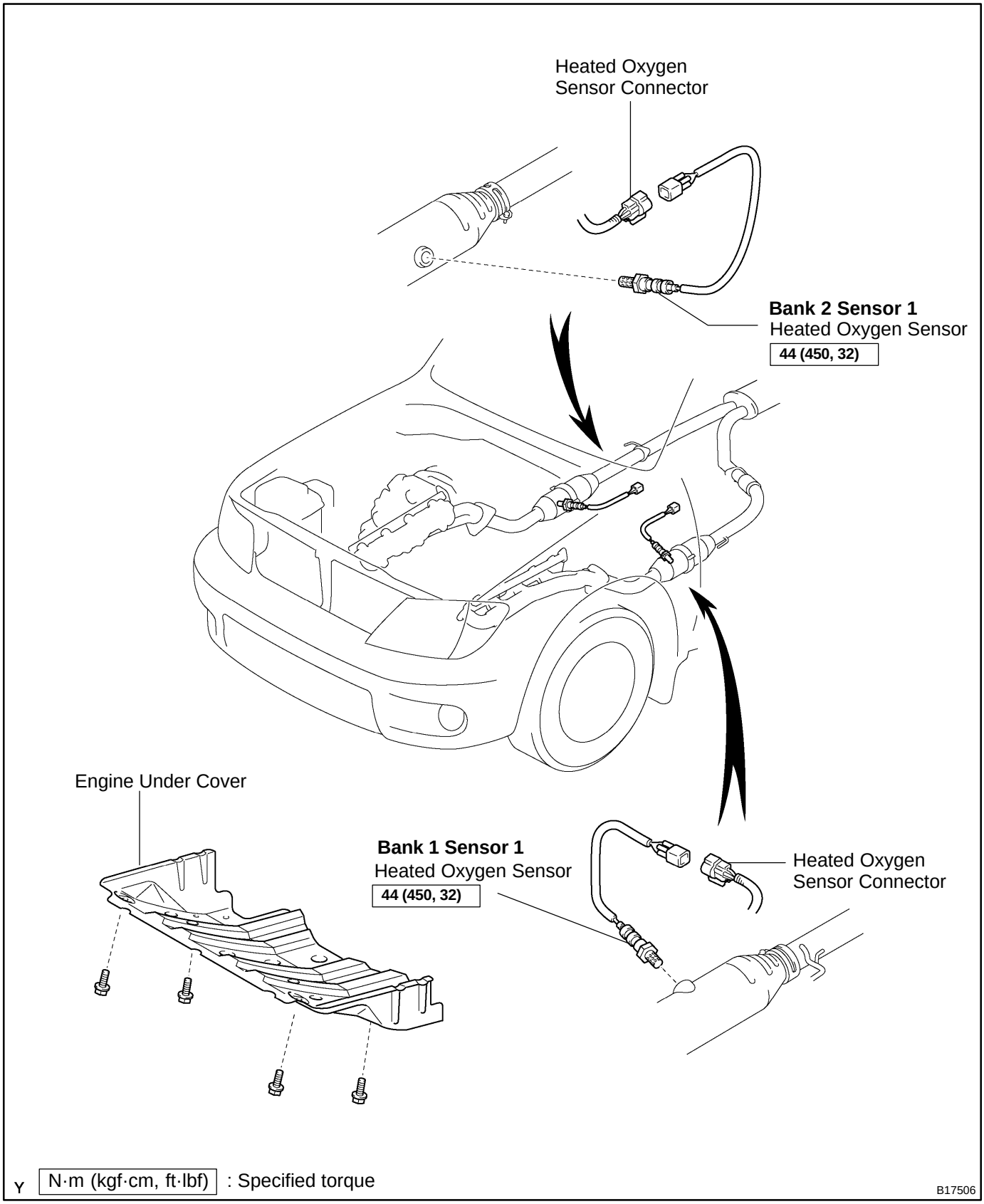
- **Perform the check immediately after warming up the engine.**
- **If the voltage variation could not be verified, warm up the heated oxygen sensor again. If it could not be verified even after warming up the sensor again, check the DTC No. (See page DI–88)**

Dardoor.com

HEATED OXYGEN SENSOR

COMPONENTS

SF0Y9–11

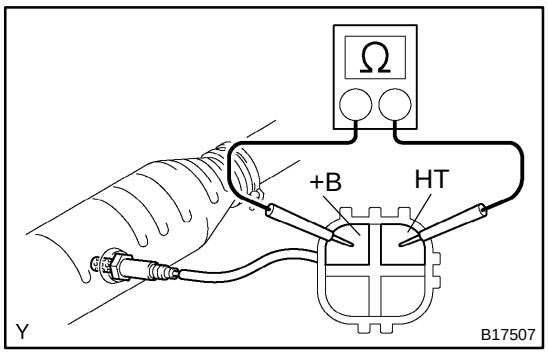


Y N·m (kgf·cm, ft·lbf) : Specified torque

B17506

Dardoor.com

SF0YA–14



INSPECTION

1. INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSOR

(a) Disconnect the oxygen sensor connector.

(b) Using an ohmmeter, measure the resistance between terminals +B and HT.

Resistance: 11 to 16 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the sensor.

Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

(c) Reconnect the oxygen sensor connector.

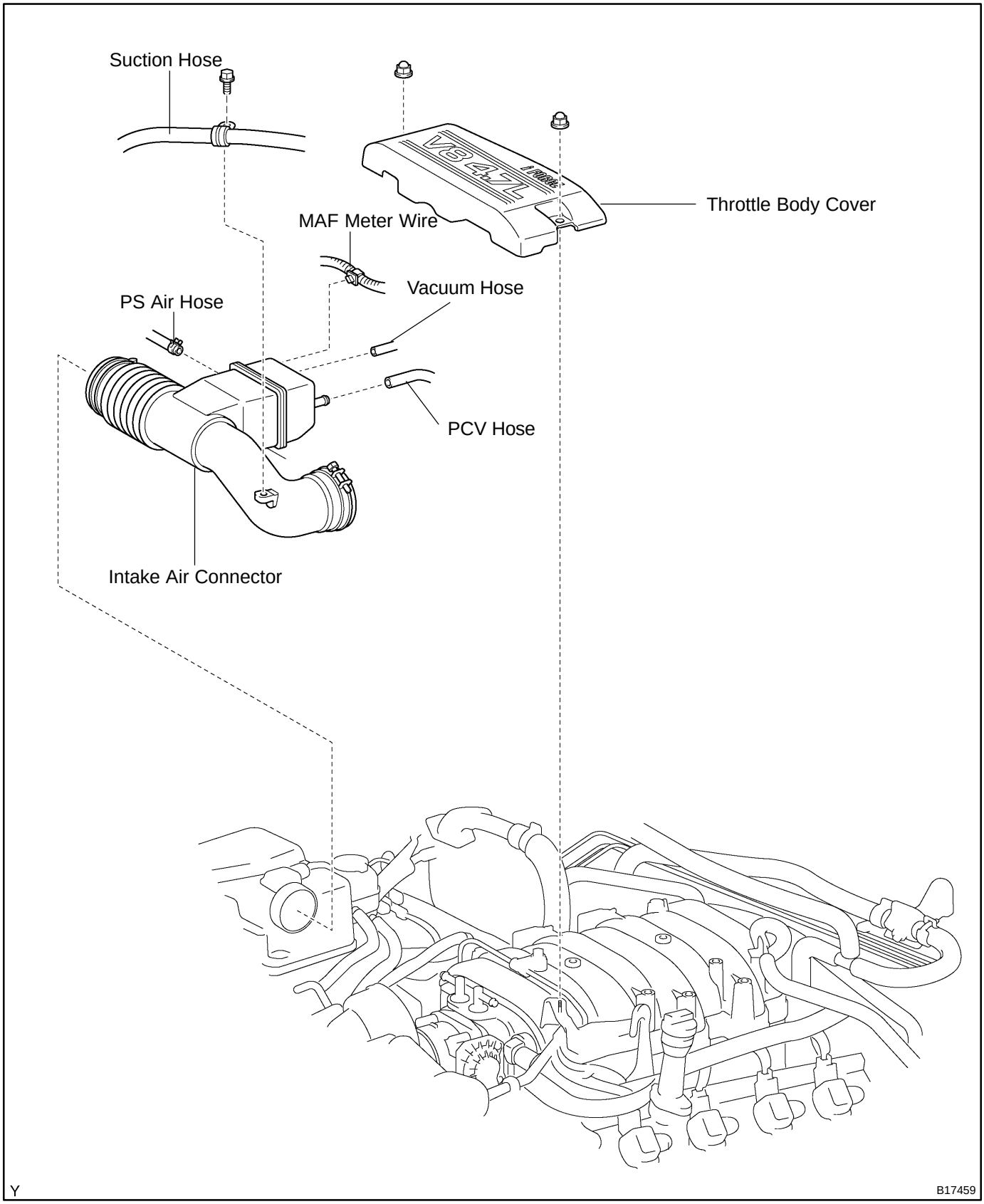
2. INSPECT OPERATION OF HEATED OXYGEN SENSOR (See page DI–93)

Dardoor.com

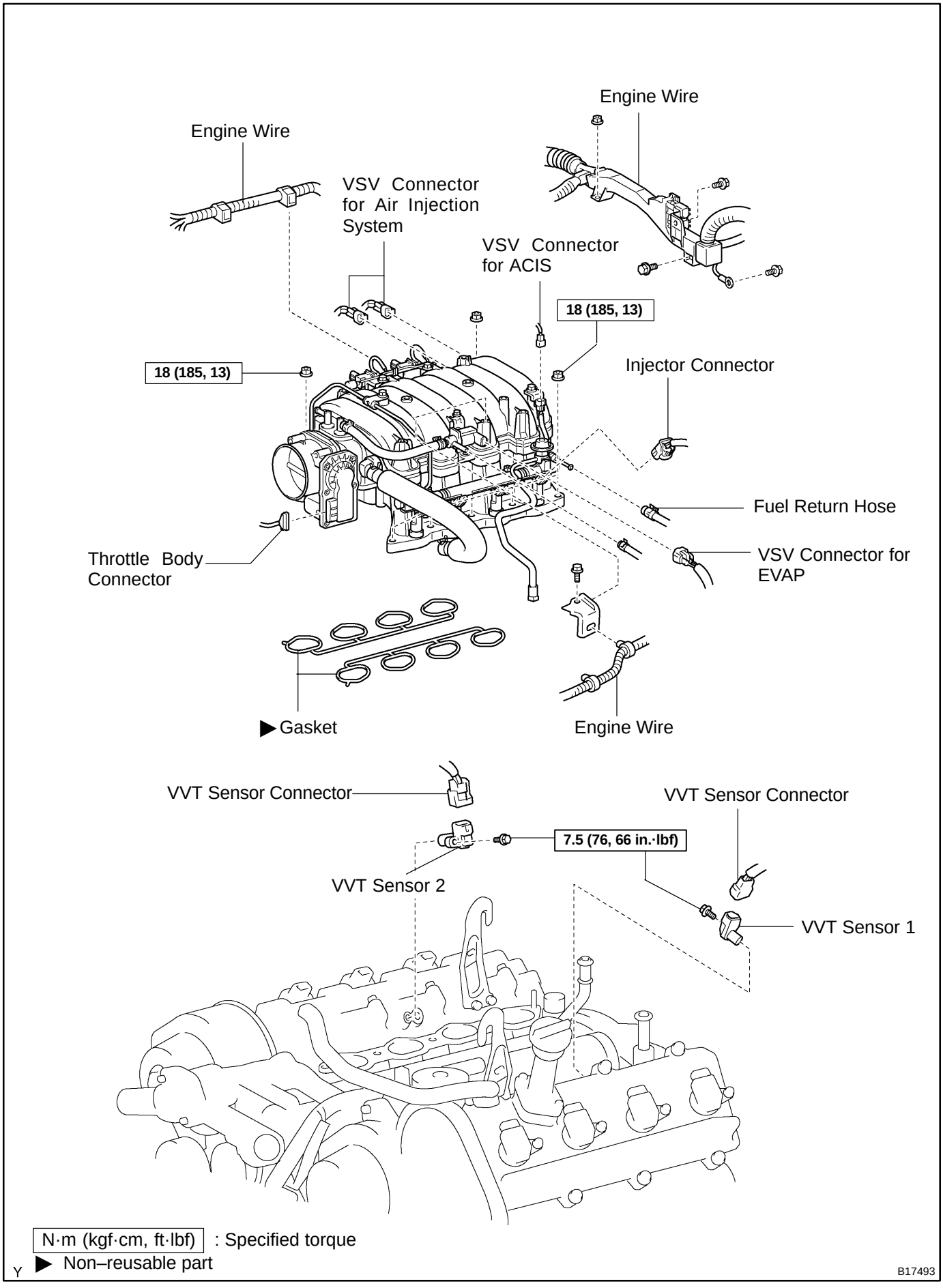
VVT SENSOR

COMPONENTS

SF1XX–02



Dardoor.com


Engine Wire
Engine Wire
VSV Connector for Air Injection System
VSV Connector for ACIS
18 (185, 13)
18 (185, 13)
Injector Connector
Fuel Return Hose
VSV Connector for EVAP
Throttle Body Connector
▶Gasket
Engine Wire
VVT Sensor Connector
VVT Sensor Connector
7.5 (76, 66 in.·lbf)
VVT Sensor 2
VVT Sensor 1
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
Y
B17493

Dardoor.com

SF0PW–03

INSPECTION

NOTICE:

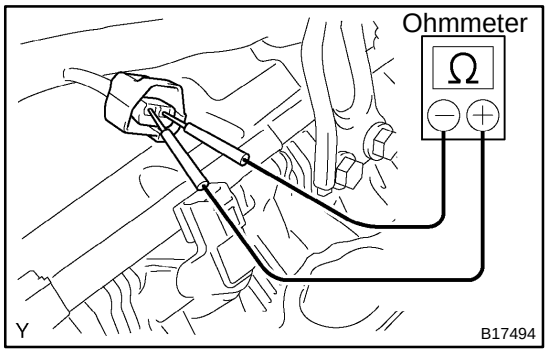
"Cold" and "Hot in these sentences express the temperature of the sensors themselves. "Cold" is from – 10˚C (14˚F) to 50˚C (122˚F) and "Hot" is from 50 ˚C (122˚F) to 100˚C (212˚F).

1. REMOVE THROTTLE BODY COVER

2. REMOVE INTAKE MANIFOLD ASSEMBLY
(See page EM–36)

3. INSPECT VVT SENSOR RESISTANCE

(a) Disconnect the VVT sensor connector.



(b) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Cold	835 to 1,400 Ω
Hot	1,060 to 1,645 Ω

If the resistance is not as specified, replace the sensor.

(c) Reconnect the VVT sensor connector.

(d) Connect the VVT sensor connector.

4. REINSTALL INTAKE MANIFOLD ASSEMBLY
(See page EM–60)

5. REINSTALL THROTTLE BODY COVER

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SF1XY–01

REPLACEMENT

1. REMOVE THROTTLE BODY COVER

2. REMOVE INTAKE MANIFOLD ASSEMBLY
(See page EM–36)

3. REMOVE VVT SENSOR

(a) Disconnect the VVT sensor connector.

(b) Remove the bolt and VVT sensor.

4. INSTALL VVT SENSOR

(a) Attach a new VVT sensor to the cylinder head.

(b) Install the VVT sensor with the bolt.
Torque: 6.5 N·m (65 kgf·cm, 58 in.·lbf)

5. REINSTALL INTAKE MANIFOLD ASSEMBLY
(See page EM–60)

6. REINSTALL THROTTLE BODY COVER

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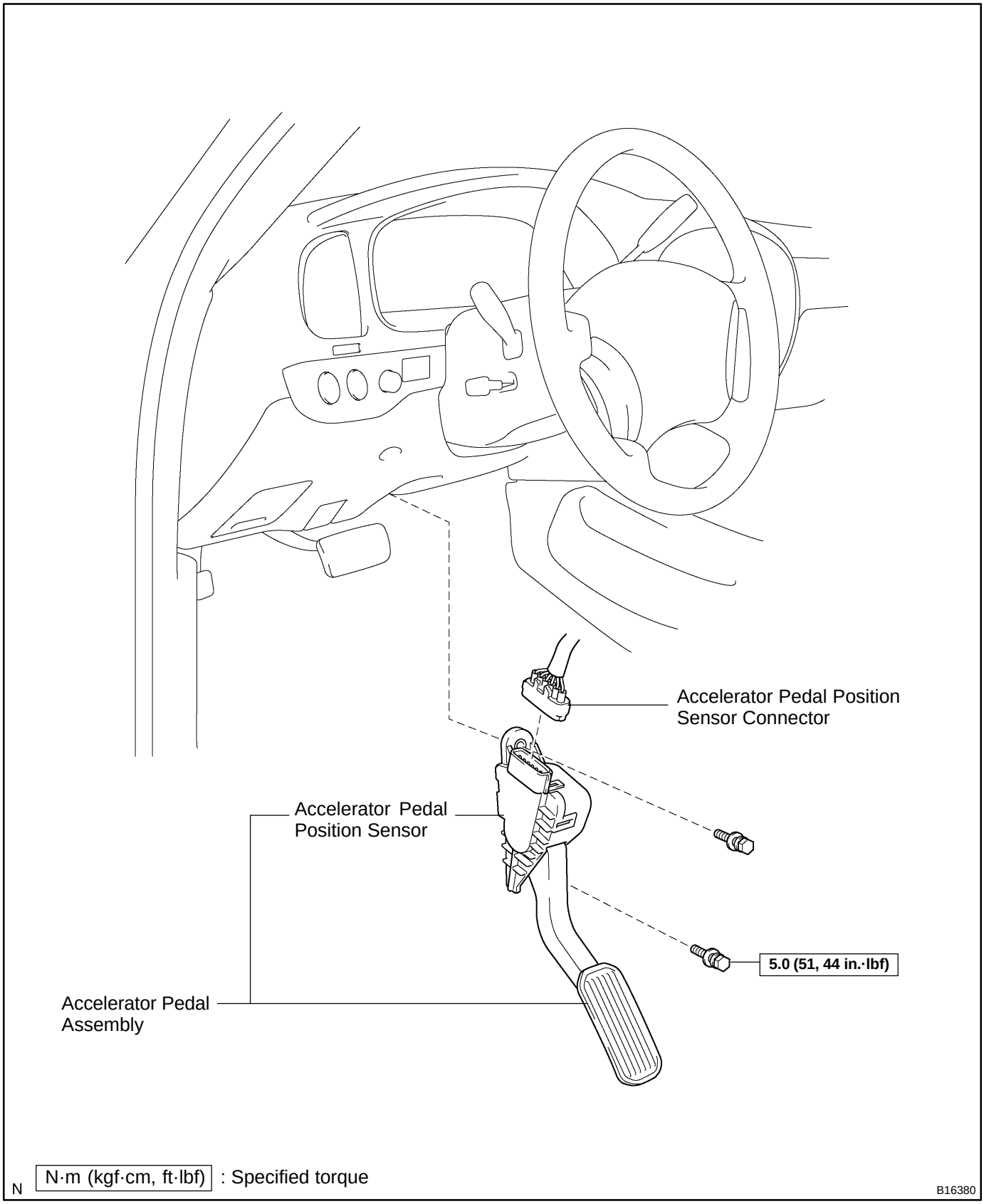
ACCELERATOR PEDAL POSITION SENSOR

SF1UM–05

COMPONENTS



Dardoor.com

SF1UN–02

INSPECTION

INSPECT ACCELERATOR PEDAL POSITION SENSOR (See page DI–370)

If necessary, replace the accelerator pedal assembly.

NOTICE:

- **Be care not to give a shock to the accelerator pedal assembly.**
- **Be care not to disassemble the accelerator pedal assembly.**

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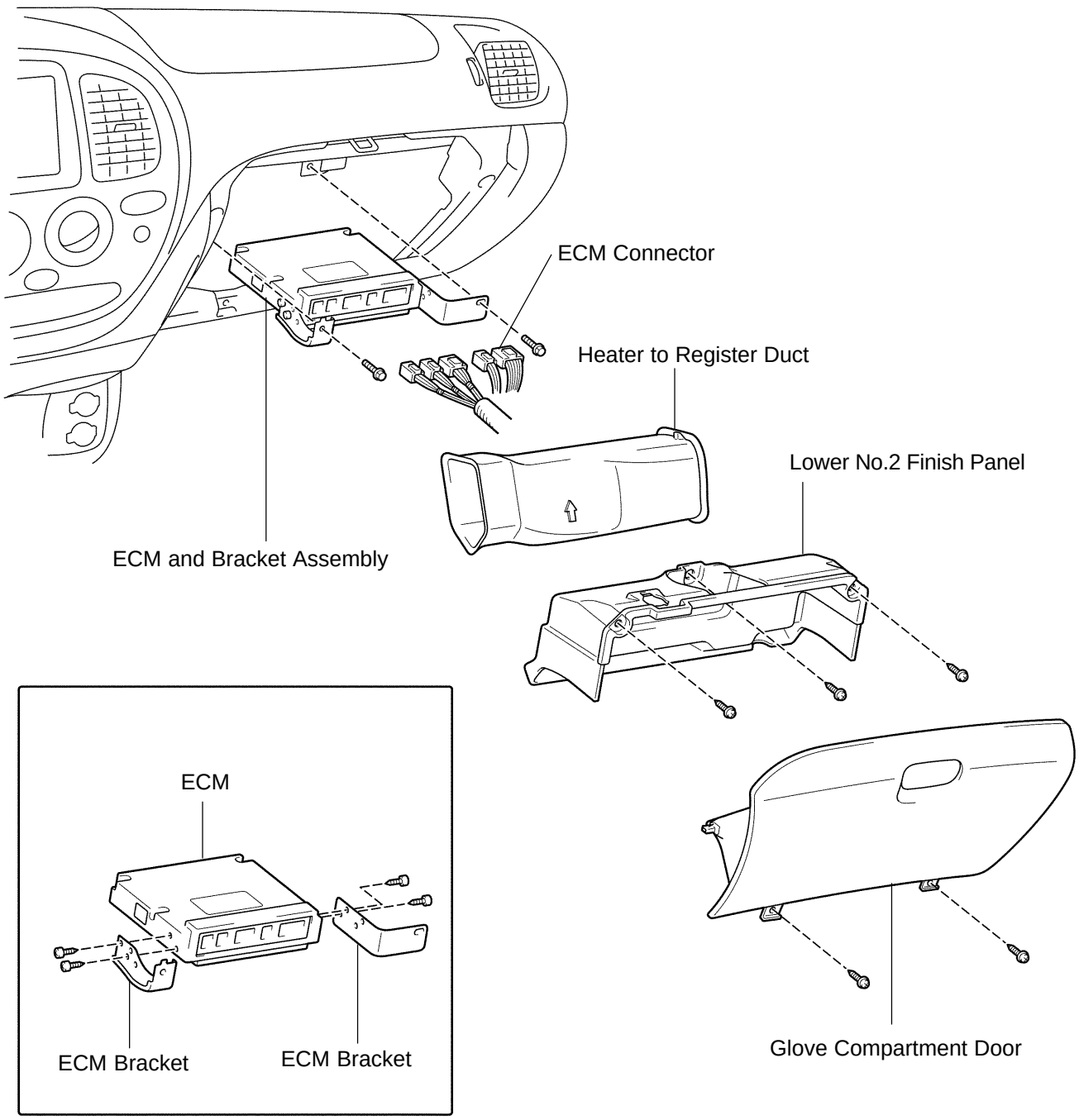
ENGINE CONTROL MODULE (ECM)

SF0Q0–14

COMPONENTS



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SF0Q1–12

INSPECTION

1. DISCONNECT CABLE FROM NEGATIVE (–) BATTERY TERMINAL

2. REMOVE REMOVE GLOVE COMPARTMENT

(a) Remove the 2 screws and glove compartment door.

(b) Remove the 3 screws and lower No.2 finish panel.

3. REMOVE HEATER TO REGISTER DUCT

4. REMOVE ECM

(a) Disconnect the 5 connectors.

(b) Remove the 2 bolts and ECM.

5. INSPECT ECM (See page DI–34)

6. REINSTALL ECM

(a) Install the ECM with the 2 bolts.

(b) Connect the 5 connectors.

7. INSTALL HEATER TO REGISTER DUCT

8. INSTALL GLOVE COMPARTMENT

(a) Install the lower No.2 finish panel with 3 screws.

(b) Install the glove compartment door with the 2 screws.

9. CONNECT CABLE TO NEGATIVE (–) BATTERY TERMINAL

10. PERFORM INITIALIZATION (See page IN–20)

Some system need initialzation when disconnecting the cable from the battery terminal.

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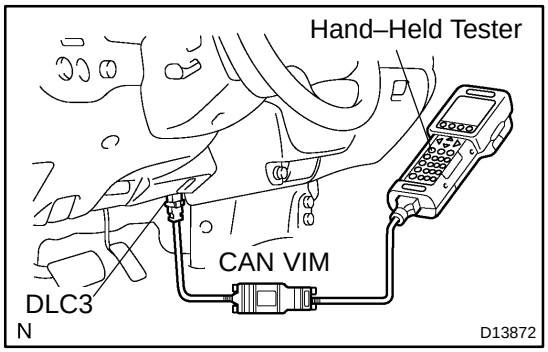
FUEL CUT RPM

SF0Q2–16

INSPECTION

1. WARM UP ENGINE

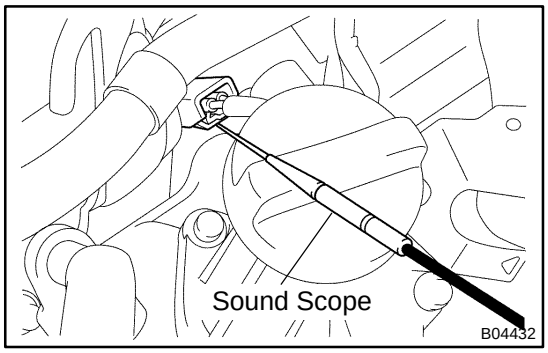
Allow the engine to warm up to normal operating temperature.



2. CONNECT HAND–HELD TESTER

(a) Connect a hand–held tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Date Link Connector 3 (DLC3).

(b) Please refer to the hand–held tester operator's manual for further details.



3. INSPECT FUEL CUTOFF RPM OPERATION

(a) Increase the engine speed to at least 2,500 rpm.

(b) Check for injector operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

HINT:

- ▶ The vehicle should be stopped.
- ▶ Measure with the A/C OFF.

Fuel return speed: 1,400 rpm

(d) Disconnect the hand–held tester and CAN VIM from the DLC3.

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COOLANT

CO0IO–07

INSPECTION

HINT:

Check the coolant level when the engine is cold.

1. CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR

The engine coolant level should be between the ”LOW” and ”FULL” lines at normal temperature (20˚C(68˚F)).

If low, check for leaks and add ”Toyota Super Long Life Coolant” or similar high quality ethylene glycol based non–silicate, non–amine, non–nitrite, and non–borate coolant with long–life hybrid organic acid technology up to the ”FULL” line.

2. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(b) There should not be any excessive deposits of rust or scale around the radiator cap or radiator filler hole, and the coolant should be free from oil.

If excessively dirty, clean the coolant passages and replace the coolant.

(c) Reinstall the radiator cap.

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CO0IP–12

REPLACEMENT

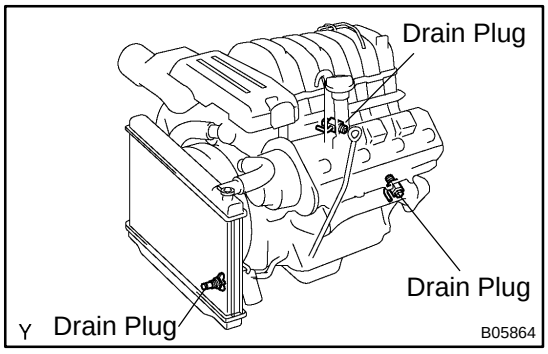
CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

1. REMOVE ENGINE UNDER COVER

2. DRAIN ENGINE COOLANT

(a) Remove the radiator cap.



(b) Remove the 3 drain plugs on the engine and radiator, and drain the coolant.

(c) Close the 3 drain plugs.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf) for engine

3. REFILL WITH ENGINE COOLANT

(a) Slowly fill the system with coolant.

Capacity: 11.6 liters (12.3 US qts, 10.2 Imp. qts)

NOTICE:

Do not use plain water alone.

HINT:

- Use of improper coolants may damage the engine cooling system.
- Use ”Toyota Super Long Life Coolant” or similar high quality ethylene glycol based non–silicate, non–amine, non–nitrite, and non–borate coolant with long–life hybrid organic acid technology.
- New Toyota vehicles are filled with Toyota Super Long Life Coolant (color is pink, premixed ethylene glycol concentration is approximately 50 % and freezing temperature is –35˚C (–31˚F)). When replacing the coolant, Toyota Super long Life Coolant is recommended.
- Observe the coolant level inside the radiator by pressing the inlet and outlet radiator hoses several times by hand. if the coolant level goes down, add the coolant.

(b) Install the radiator cap.

(c) Bleed the cooling system.

(1) Start the engine, and open the heater water valve.

(2) Maintain the engine speed at 2,000 – 2,500 rpm, and warm up the engine.

(d) Stop the engine, and wait until the engine coolant cools down.

(e) Refill coolant into the reservoir until it is ”FULL”.

4. CHECK FOR ENGINE COOLANT LEAKS

5. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

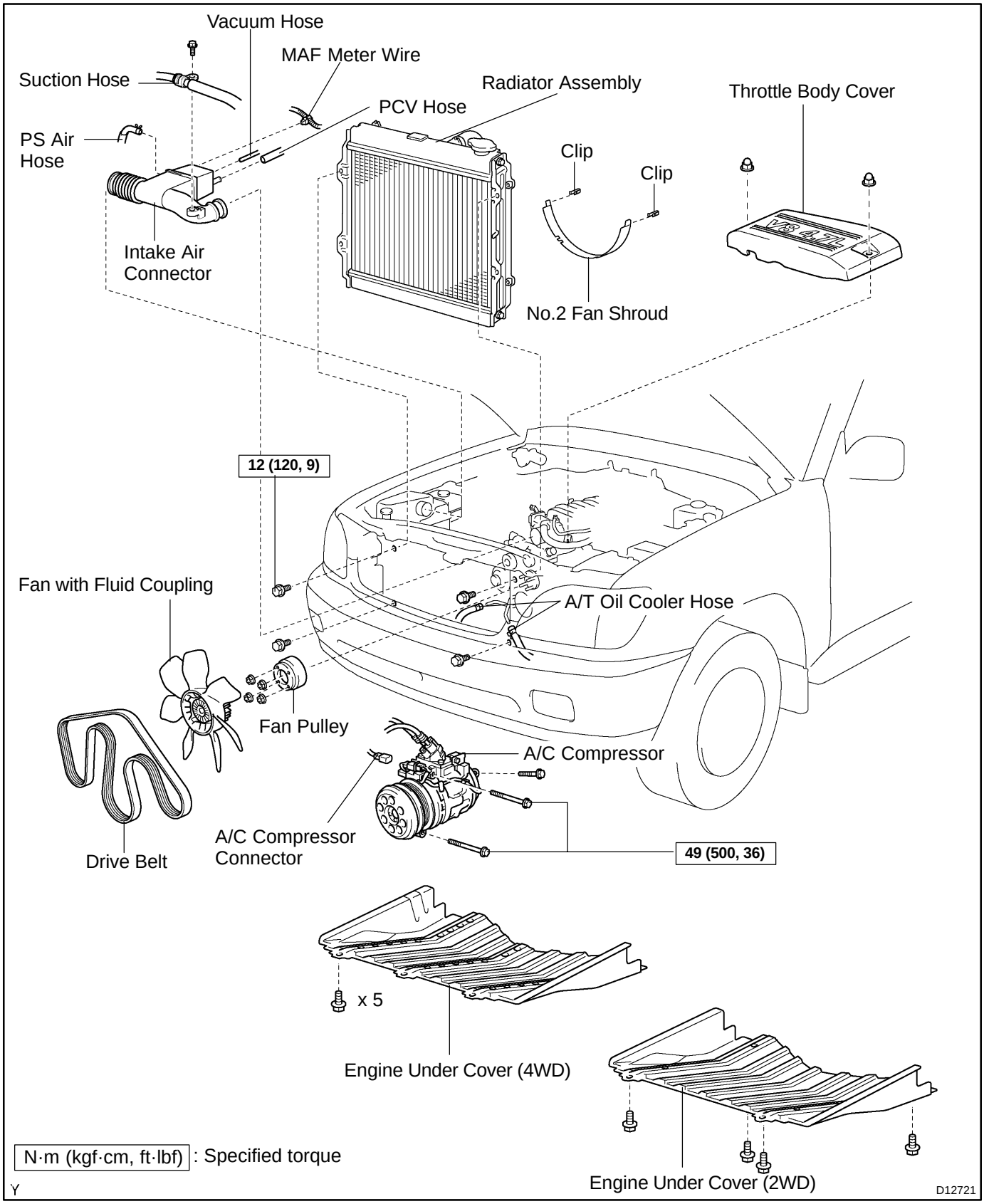
6. REINSTALL ENGINE UNDER COVER

Dardoor.com

WATER PUMP

COMPONENTS

CO0IQ–10



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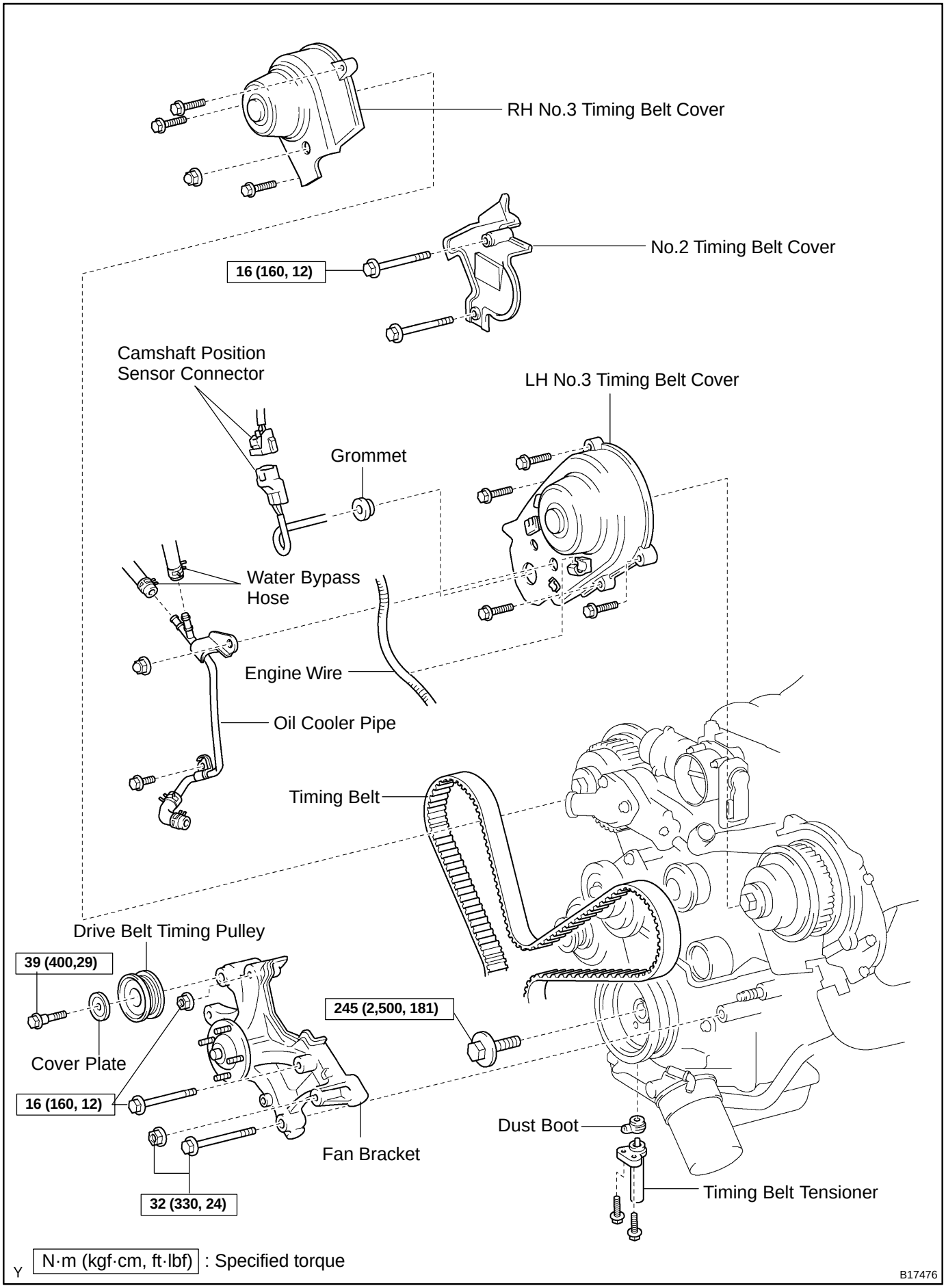
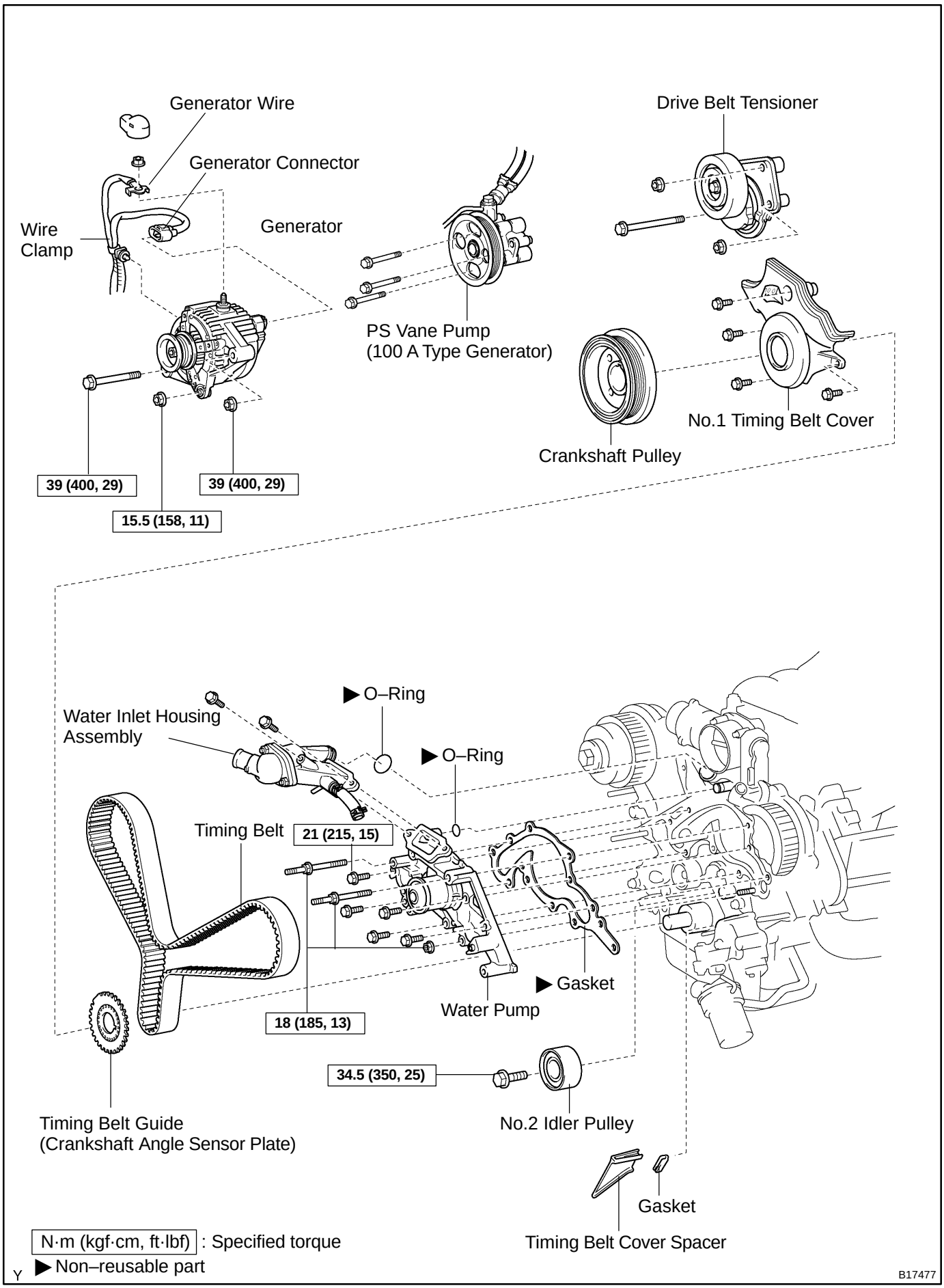

RH No.3 Timing Belt Cover
No.2 Timing Belt Cover
16 (160, 12)
Camshaft Position Sensor Connector
LH No.3 Timing Belt Cover
Grommet
Water Bypass Hose
Engine Wire
Oil Cooler Pipe
Timing Belt
Drive Belt Timing Pulley
39 (400,29)
Cover Plate
16 (160, 12)
245 (2,500, 181)
Fan Bracket
32 (330, 24)
Dust Boot
Timing Belt Tensioner
Y
N·m (kgf·cm, ft·lbf) : Specified torque
B17476

Dardoor.com

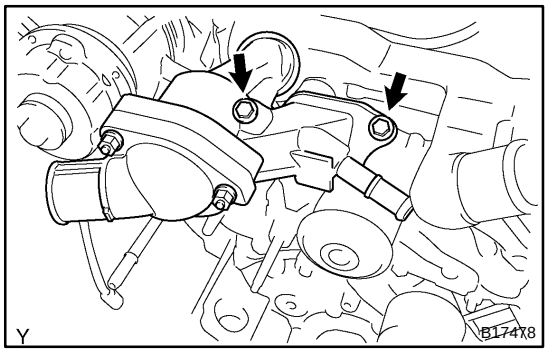

Generator Wire
Generator Connector
Wire Clamp
Generator
PS Vane Pump
(100 A Type Generator)
Drive Belt Tensioner
No.1 Timing Belt Cover
Crankshaft Pulley
39 (400, 29)
39 (400, 29)
15.5 (158, 11)
▶ O–Ring
Water Inlet Housing Assembly
▶ O–Ring
Timing Belt
21 (215, 15)
▶ Gasket
Water Pump
18 (185, 13)
34.5 (350, 25)
No.2 Idler Pulley
Timing Belt Guide
(Crankshaft Angle Sensor Plate)
Gasket
Timing Belt Cover Spacer
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
Y
B17477

Dardoor.com

CO0IR–06

REMOVAL

1. **DRAIN ENGINE COOLANT**
2. **REMOVE TIMING BELT (See page EM–16)**
3. **REMOVE NO.2 IDLER PULLEY (See page EM–16)**



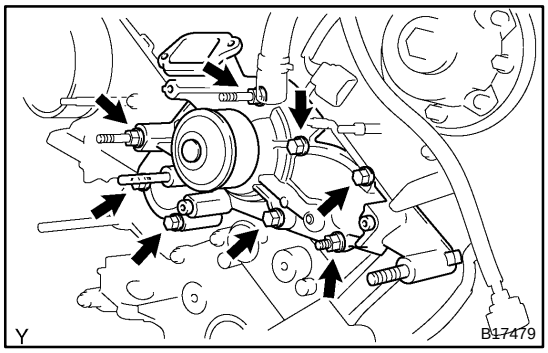
4. **REMOVE WATER INLET AND INLET HOUSING ASSEMBLY**

(a) Disconnect the water bypass hose from the water inlet housing.

(b) Remove the 2 bolts holding the water inlet housing to the water pump.

(c) Disconnect the water inlet housing from the front water bypass joint, and remove the water inlet and inlet housing assembly.

(d) Remove the O–ring from the water inlet housing.



5. **REMOVE WATER PUMP**

(a) Remove the 5 bolts, 2 stud bolts, nut, water pump and gasket.

(b) Remove the O–ring from the water bypass pipe.

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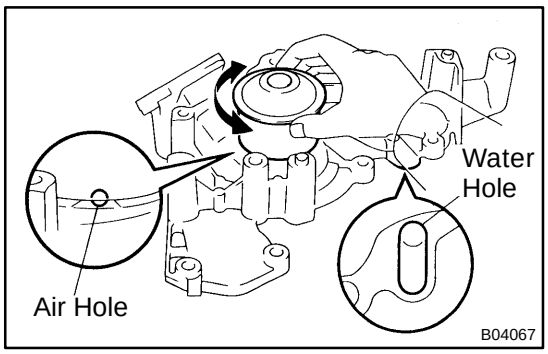
CO0UZ–05

INSPECTION



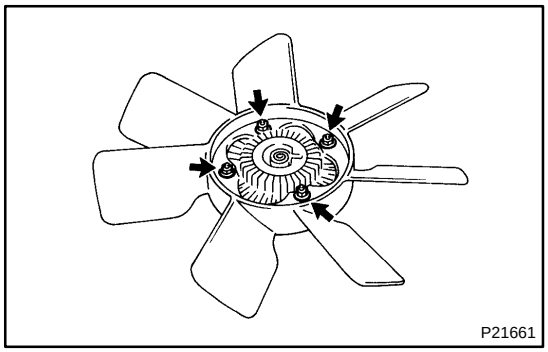
1. INSPECT WATER PUMP

(a) Visually check the air hole and water hole for coolant leakage.

If leakage is found, replace the water pump and timing belt.

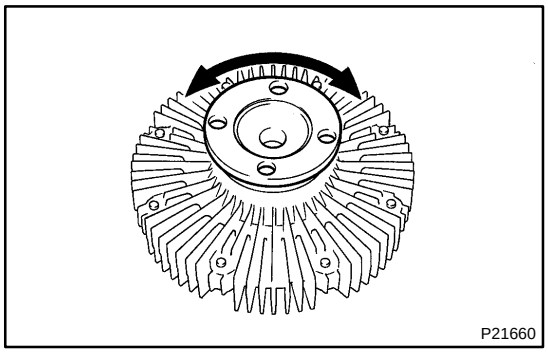
(b) Turn the pulley, and check that the water pump bearing moves smoothly and quietly.

If necessary, replace the water pump.



2. INSPECT FLUID COUPLING

(a) Remove the 4 nuts and fan from the fluid coupling.

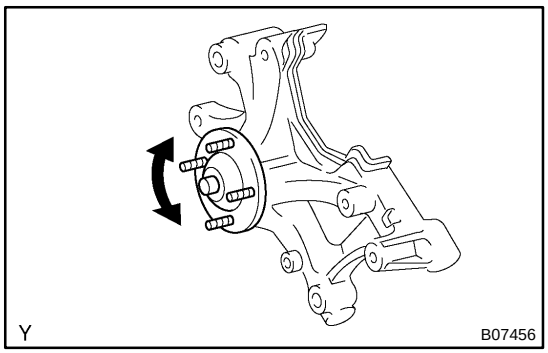


(b) Check that the fluid coupling is not damaged and that no silicon oil leaks.

If necessary, replace the fluid coupling.

(c) Reinstall the fan to the fluid coupling with the 4 nuts.

Torque: 8.5 N·m (85 kgf·cm, 75 in.·lbf)



3. INSPECT FAN PULLEY BRACKET

Check the turning smoothness of the fan pulley.

If necessary, replace the pulley bracket.

4. INSPECT TIMING BELT COMPONENTS

(See page EM–21)

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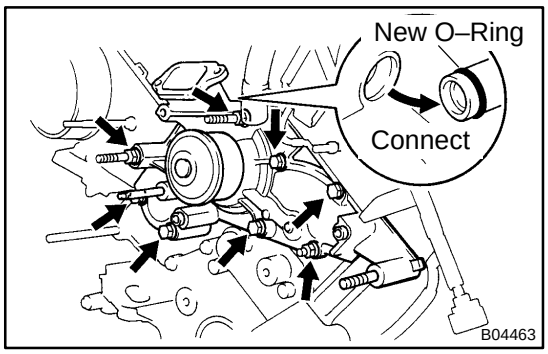
CO0IT–06



INSTALLATION

1. INSTALL WATER PUMP

(a) Install a new O–ring to the water bypass pipe end.

(b) Apply soapy water to the O–ring.

(c) Connect the water pump to the water bypass pipe end.

(d) Install the water pump and a new gasket with the 5 bolts, 2 stud bolts and nut. Uniformly tighten the bolts, stud bolts and nut in several passes.

Torque:

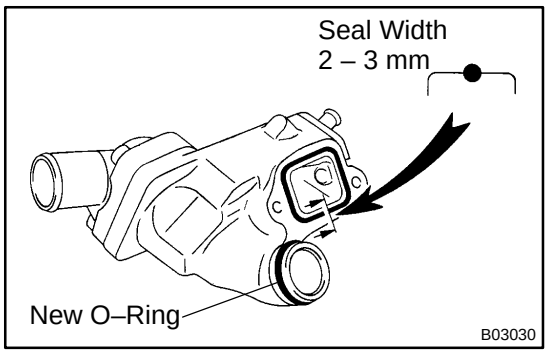
Bolt: 21 N·m (215 kgf·cm, 15 ft·lbf)

Stud bolt and nut: 18 N·m (185 kgf·cm, 13 ft·lbf)

2. INSTALL WATER INLET AND INLET HOUSING ASSEMBLY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the water inlet housing and water pump.

- ▶ Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- ▶ Thoroughly clean all components to remove all the loose material.
- ▶ Using a non–residue solvent, clean both sealing surfaces.



(b) Apply seal packing to the sealing groove of water inlet housing as shown in the illustration.

Seal packing: Part No. 08826–00100 or equivalent

- ▶ Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- ▶ Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- ▶ Immediately remove nozzle from the tube and reinstall cap.

(c) Install a new O–ring to the water inlet housing.

(d) Apply soapy water on the O–ring.

(e) Attach the water inlet housing end to the front water bypass joint hole.

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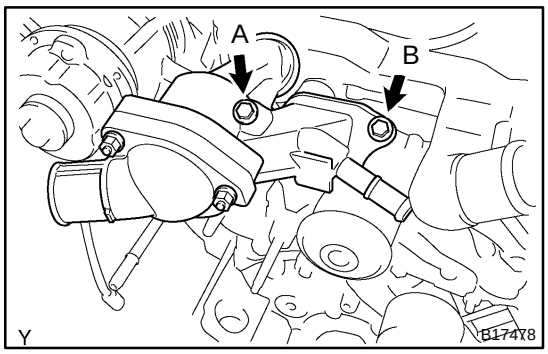


(f) Install the water inlet and housing assembly with the 2 bolts. Alternately tighten the bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

HINT:
Each bolt length is indicated in the illustration.
Bolt length:
76 mm (3.00 in.) for A
22 mm (0.87 in.) for B

(g) Connect the water bypass hose to the water inlet housing.

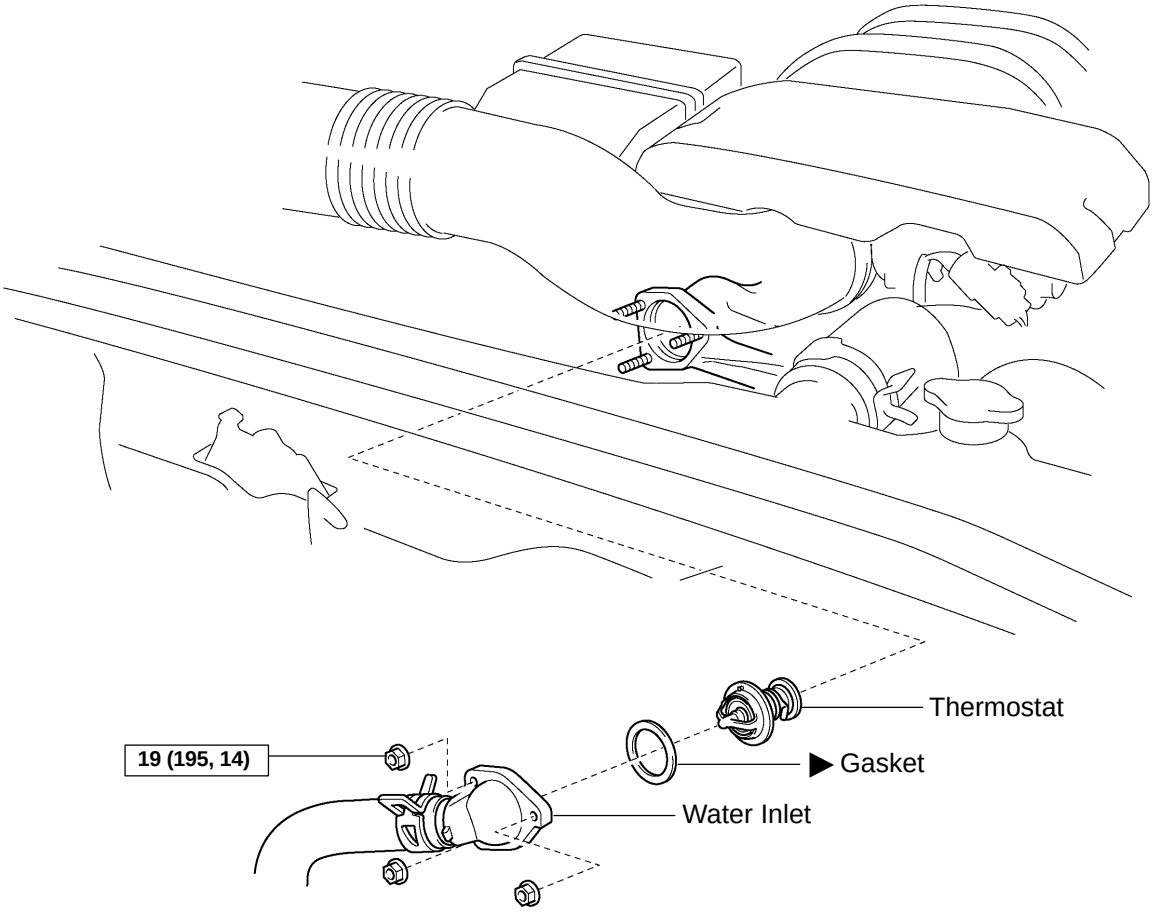
3. INSTALL NO.2 IDLER PULLEY (See page EM–23)
4. INSTALL TIMING BELT (See page EM–23)
5. FILL WITH ENGINE COOLANT
6. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS
7. RECHECK ENGINE COOLANT LEVEL

Dardoor.com

THERMOSTAT

COMPONENTS

CO0IU–07



N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part

B05865

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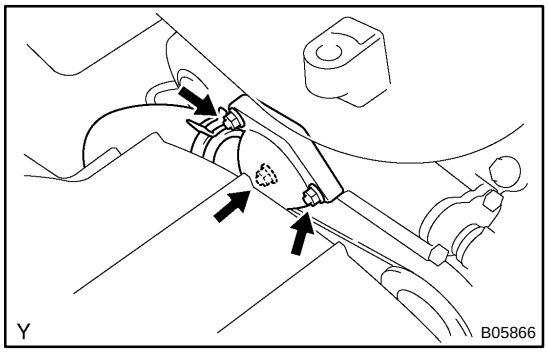
CO0IV–04

REMOVAL

HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. DRAIN ENGINE COOLANT



2. DISCONNECT WATER INLET FROM WATER INLET HOUSING

Remove the 3 nuts and disconnect the water inlet from the water inlet housing.

3. REMOVE THERMOSTAT

(a) Remove the thermostat.

(b) Remove the gasket from the thermostat.

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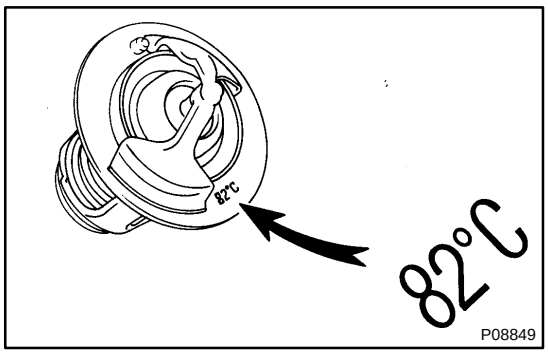
CO0IW–08



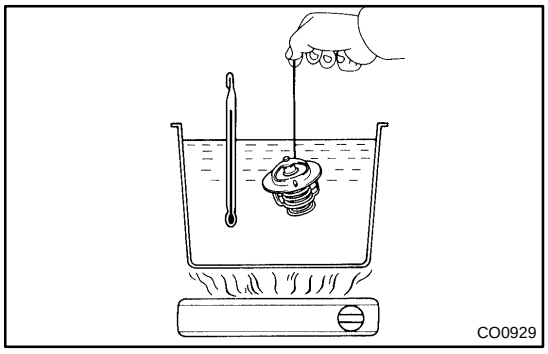
P08849

INSPECTION

INSPECT THERMOSTAT

HINT:

The thermostat is numbered with the valve opening temperature.

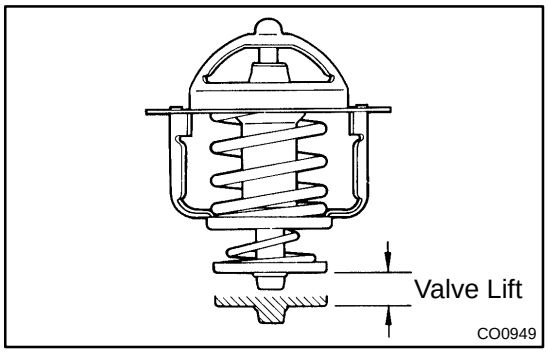

CO0929

(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature.

Valve opening temperature: 80 to 84˚C (176 to 183˚F)

If the valve opening temperature is not as specified, replace the thermostat.



CO0949

(c) Check the valve lift.

Valve lift: 10 mm (0.39 in.) or more at 95˚C (203˚F)

If the valve lift is not as specified, replace the thermostat.

(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 40˚C (104˚F)).

If not closed, replace the thermostat.

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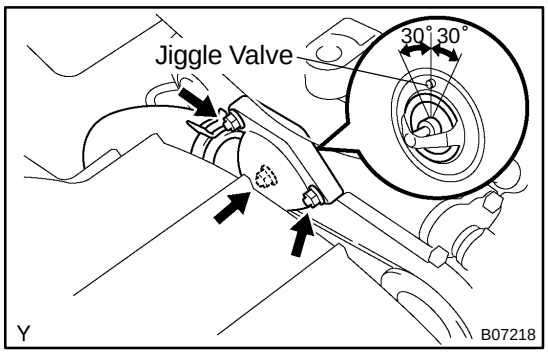
CO0IX–05



INSTALLATION

1. PLACE THERMOSTAT IN WATER INLET HOUSING

(a) Install a new gasket to the thermostat.

(b) Insert the thermostat into the water inlet housing with the jiggle valve facing straight upward.

HINT:

The jiggle valve may be set within 30° of either side of the prescribed position.

2. INSTALL WATER INLET

Install the water inlet with the 3 nuts.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

3. FILL WITH ENGINE COOLANT

4. START ENGINE AND CHECK FOR COOLANT LEAKS

5. RECHECK ENGINE COOLANT LEVEL

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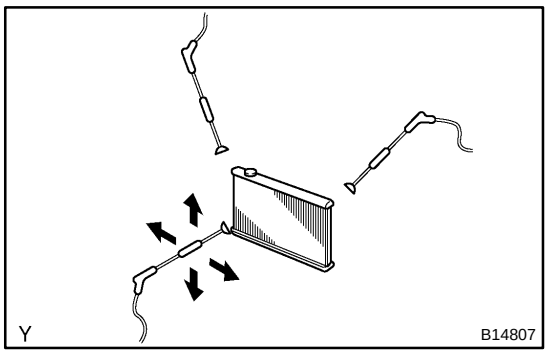

RADIATOR

CO1B9–02

ON–VEHICLE CLEANING

INSPECT FINS FOR BLOCKAGE

If fins are clogged, wash them with water or a steam cleaner and dry with compressed air.

NOTICE:

- **If the distance between the steam cleaner and the core is too close, there is a possibility of damaging the fin, so keep the following injection distance.**

Injection Pressure	Injection Distance
2,942 to 4,903 kpa (30 to 50 kg/cm^2, 427 to 711 psi)	300 mm (11.811 in)
4,903 to 7,845 kpa (50 to 80 kg/cm^2, 711 to 1,138 psi)	500 mm (19.685 in)

- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Never apply water directly onto the electronic components.**

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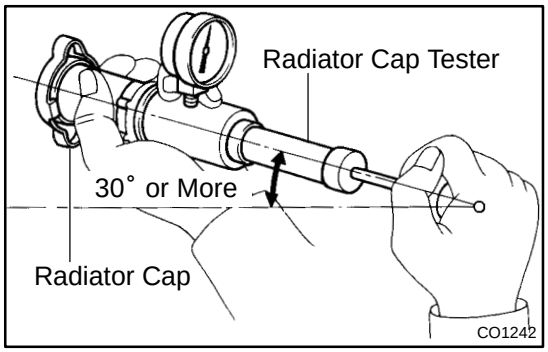
CO0IZ–08

ON–VEHICLE INSPECTION

1. REMOVE RADIATOR CAP

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



2. INSPECT RADIATOR CAP

NOTICE:

- **If the radiator cap has contaminations, always rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.**
- **When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.**

(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push/(3 seconds or more)

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(b) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

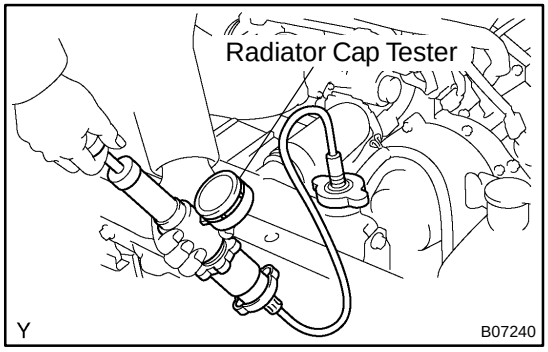
Opening pressure:

Standard	74 to 103 kPa (0.75 to 1.05 kgf/cm^2,10.7 to 14.9 psi)
Minimum	59 kPa (0.6 kgf/cm^2, 8.6 psi)

HINT:

Use the tester's maximum reading as the opening pressure.

If the opening pressure is less than minimum, replace the radiator cap.



3. INSPECT COOLING SYSTEM FOR LEAKS

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

4. REINSTALL RADIATOR CAP

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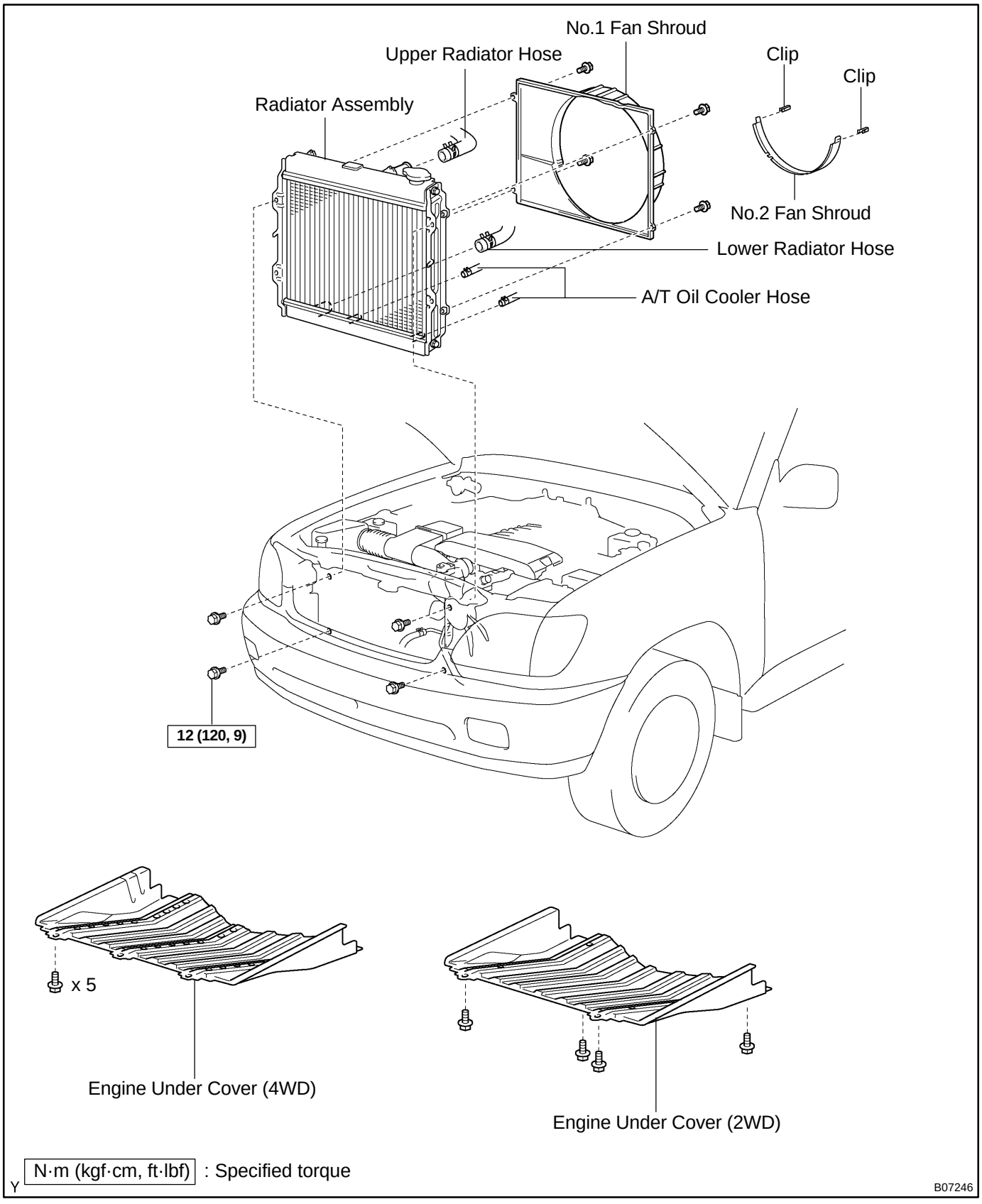
CO1D2–01

COMPONENTS



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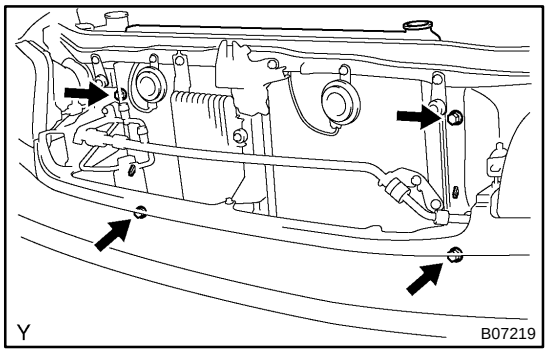
CO0UV–03

REMOVAL

1. **REMOVE ENGINE UNDER COVER**
2. **DRAIN ENGINE COOLANT**
3. **DISCONNECT RADIATOR RESERVOIR HOSE FROM RADIATOR**
4. **DISCONNECT UPPER RADIATOR HOSE FROM RADIATOR**
5. **DISCONNECT LOWER RADIATOR HOSE FROM RADIATOR**
6. **DISCONNECT A/T OIL COOLER HOSES FROM RADIATOR**
7. **REMOVE NO.2 FAN SHROUD**

Remove the 2 clips and No.2 fan shroud.



8. **REMOVE RADIATOR ASSEMBLY**

Remove the 4 bolts and radiator assembly.

9. **REMOVE NO.1 FAN SHROUD**

Remove the 4 bolts and No.1 fan shroud.

Dardoor.com

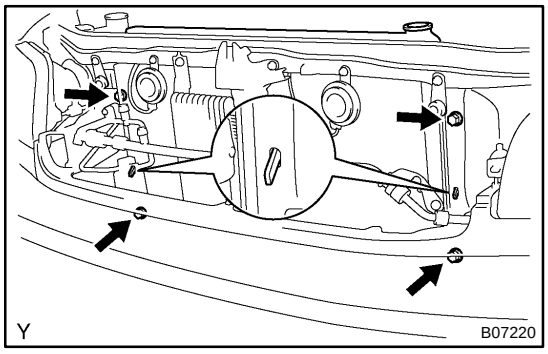
CO0UY–03

INSTALLATION

1. INSTALL NO.1 FAN SHROUD

Install the No.1 fan shroud with the 4 bolts.

Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)



2. INSTALL RADIATOR ASSEMBLY

(a) Set the radiator bracket hooks to the radiator support holes.

(b) Install the 4 bolts.

Torque: 12 N·m (120 N·m, 9 ft·lbf)

3. INSTALL NO.2 FAN SHROUD

Install the No.2 fan shroud with the 2 clips.

4. CONNECT A/T OIL COOLER HOSES TO RADIATOR

5. CONNECT UPPER RADIATOR HOSE TO RADIATOR

6. CONNECT LOWER RADIATOR HOSE TO RADIATOR

7. CONNECT RADIATOR RESERVOIR HOSE TO RADIATOR

8. FILL WITH ENGINE COOLANT

9. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS

10. RECHECK ENGINE COOLANT LEVEL

11. INSTALL ENGINE UNDER COVER

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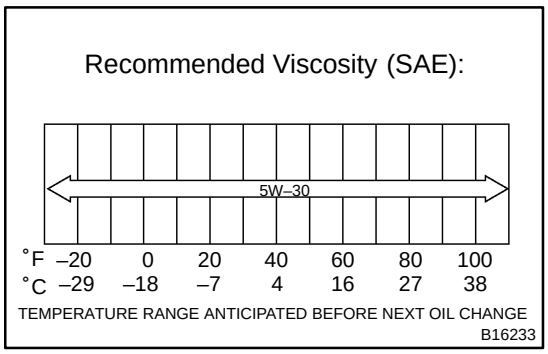


OIL AND FILTER

LU0GV–05

INSPECTION

1. CHECK ENGINE OIL QUALITY

Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

Oil grade:

API grade SL Energy–Conserving or ILSAC multi-grade engine oil.

2. CHECK ENGINE OIL LEVEL

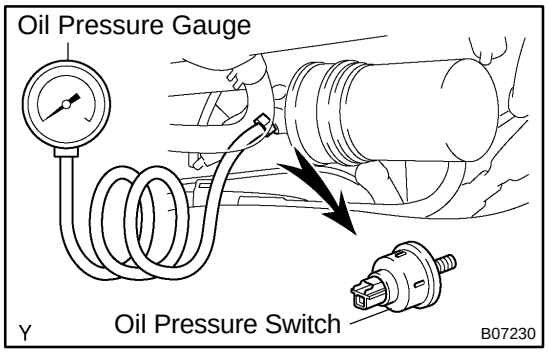
The oil level should be between the ”L” and ”F” marks on the dipstick.

If low, check for leakage and add oil up to the ”F” mark.

NOTICE:

Do not fill with engine oil above the ”F” mark.

3. REMOVE ENGINE UNDER COVER



4. REMOVE OIL PRESSURE SWITCH

5. INSTALL OIL PRESSURE GAUGE

6. WARM UP ENGINE

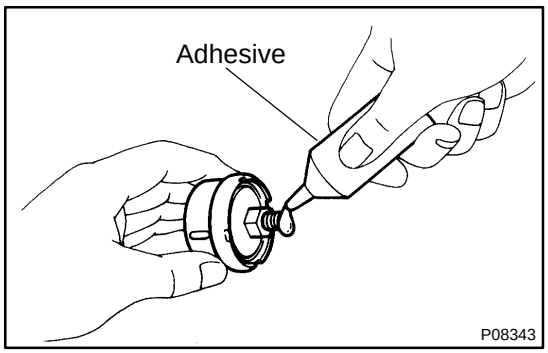
Allow the engine to warm up to normal operating temperature.

7. CHECK OIL PRESSURE

Oil pressure:

At idle	29 kPa (0.3 kgf/cm^2, 4.2 psi) or more
At 3,000 rpm	294 – 588 kPa (3.0 – 6.0 kgf/cm^2, 43 – 85 psi)

8. REMOVE OIL PRESSURE GAUGE



9. REINSTALL OIL PRESSURE SWITCH

(a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Reinstall the oil pressure switch.

10. START ENGINE, AND CHECK FOR ENGINE OIL LEAKS

11. REINSTALL ENGINE UNDER COVER

Dardoor.com

LU0GW–07

REPLACEMENT

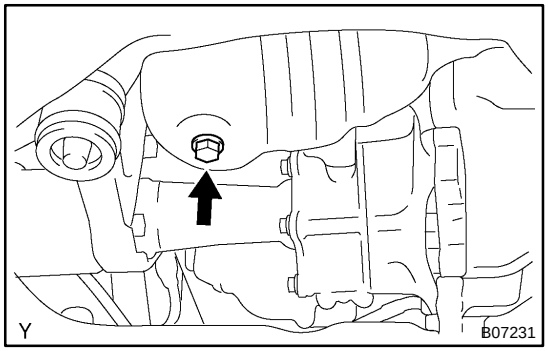
CAUTION:

- **Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Care should be taken, therefore, when changing engine oil to minimize the frequency and length of time your skin is exposed to used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. The skin should be thoroughly washed with soap and water, or use water–less hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.**
- **In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.**

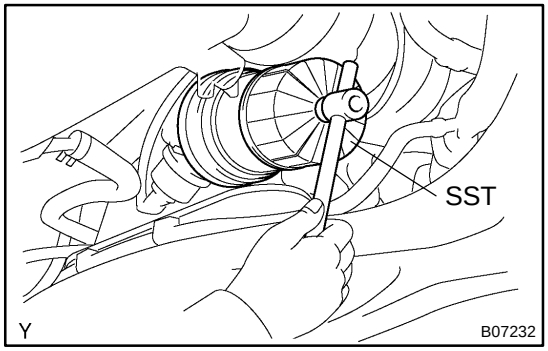
1. w/ Oil filter change:
REMOVE ENGINE UNDER COVER

2. DRAIN ENGINE OIL

(a) Remove the oil filler cap.



(b) Remove the oil drain plug and gasket, and drain the oil into a container.



3. REPLACE OIL FILTER

(a) Using SST, remove the oil filter.
SST 09228–07501

(b) Clean the oil filter contact surface on the oil filter mounting.

(c) Lubricate the filter rubber gasket with clean engine oil.

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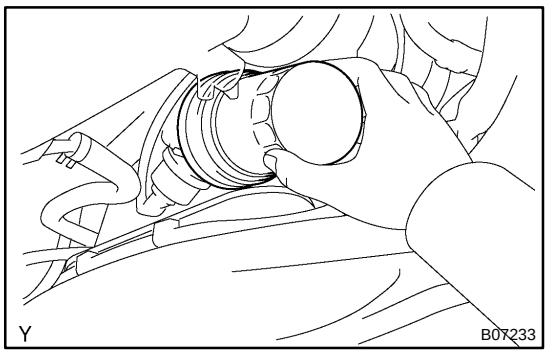
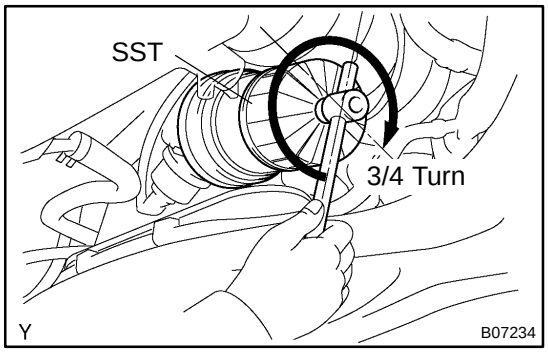


(d) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.



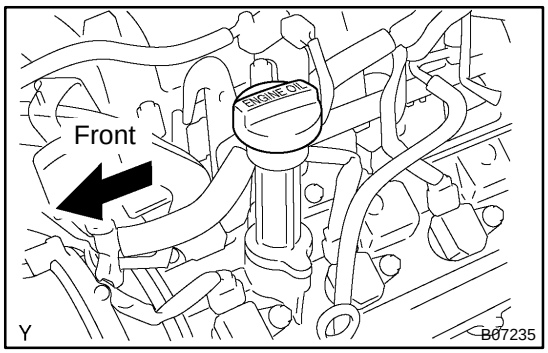
(e) Using SST, give it an additional 3/4 turn to seat the filter.
SST 09228–07501

4. REFILL WITH ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Fill with fresh engine oil.
Capacity:

Drain and refill	w/ Oil filter change	6.2 liters (6.6 Us qts, 5.5 Imp. qts)
	w/o Oil filter change	5.7 liters (6.0 Us qts, 5.0 Imp. qts)
Dry fill		7.1 liters (7.5 Us qts, 6.2 Imp. qts)



(c) Reinstall the oil filler cap.

HINT:

Install the oil filler cap facing the direction as shown in the illustration.

5. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

6. RECHECK ENGINE OIL LEVEL

7. w/ Oil filter change:
REINSTALL ENGINE UNDER COVER

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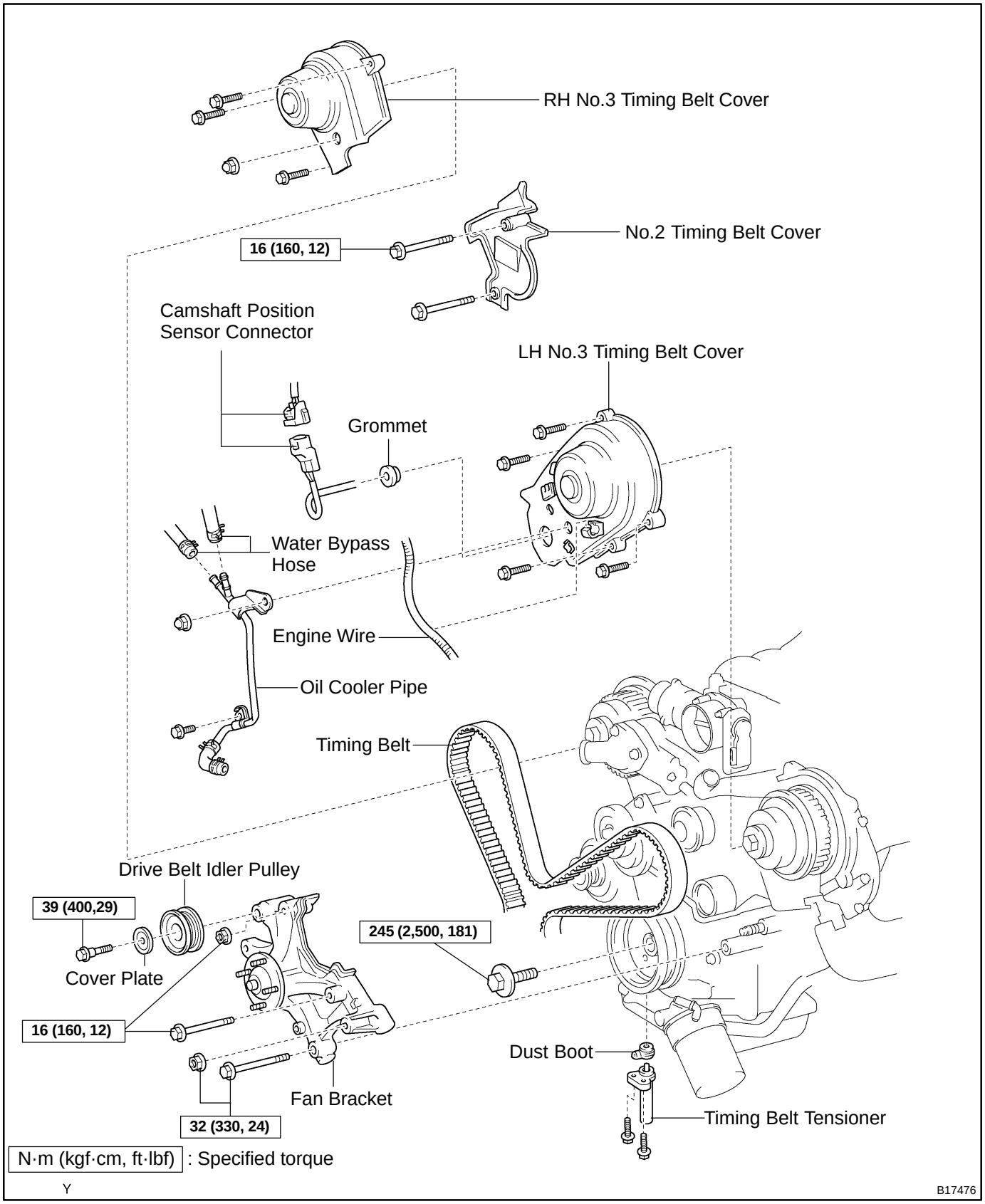
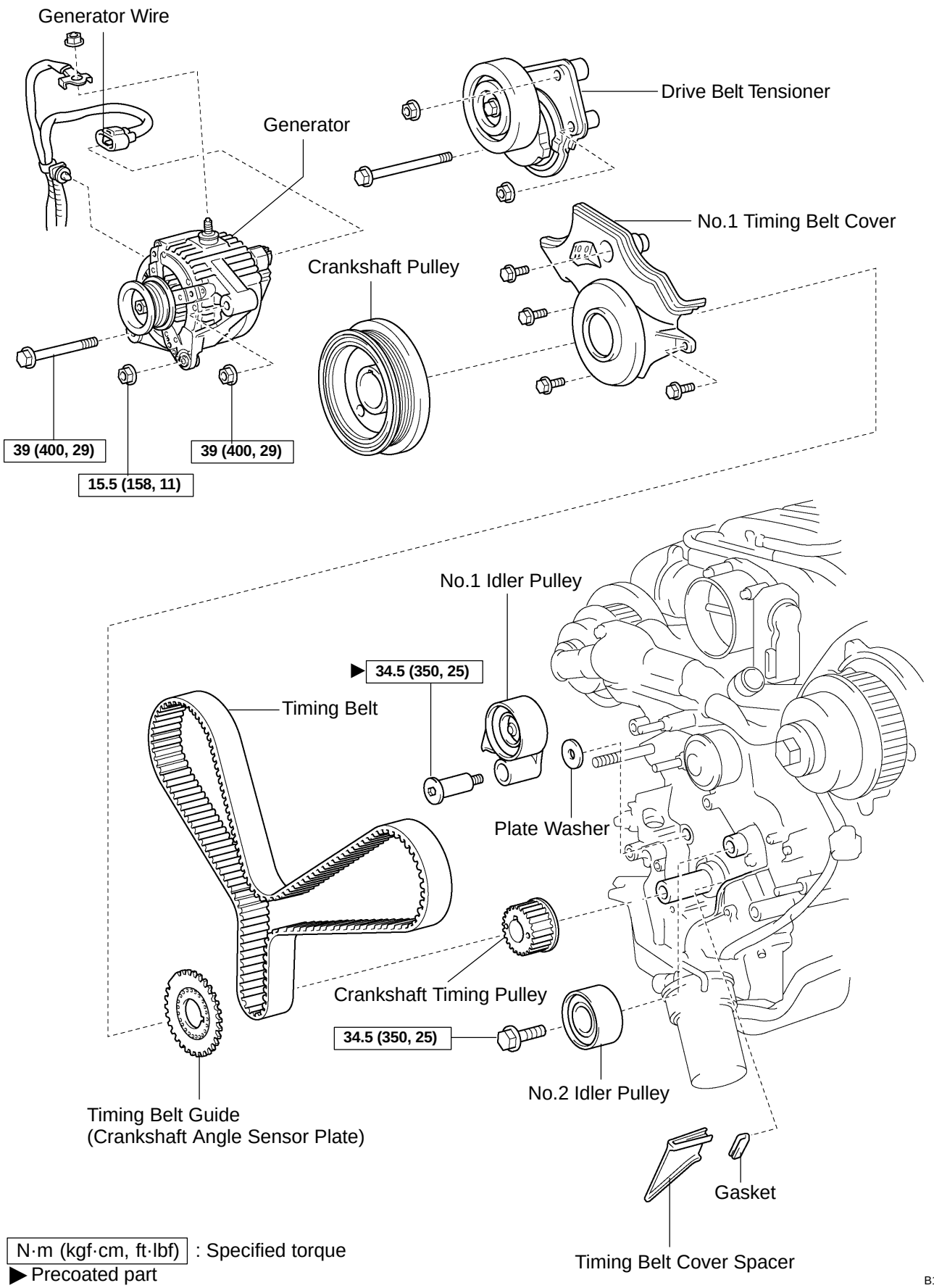
OIL PUMP

COMPONENTS

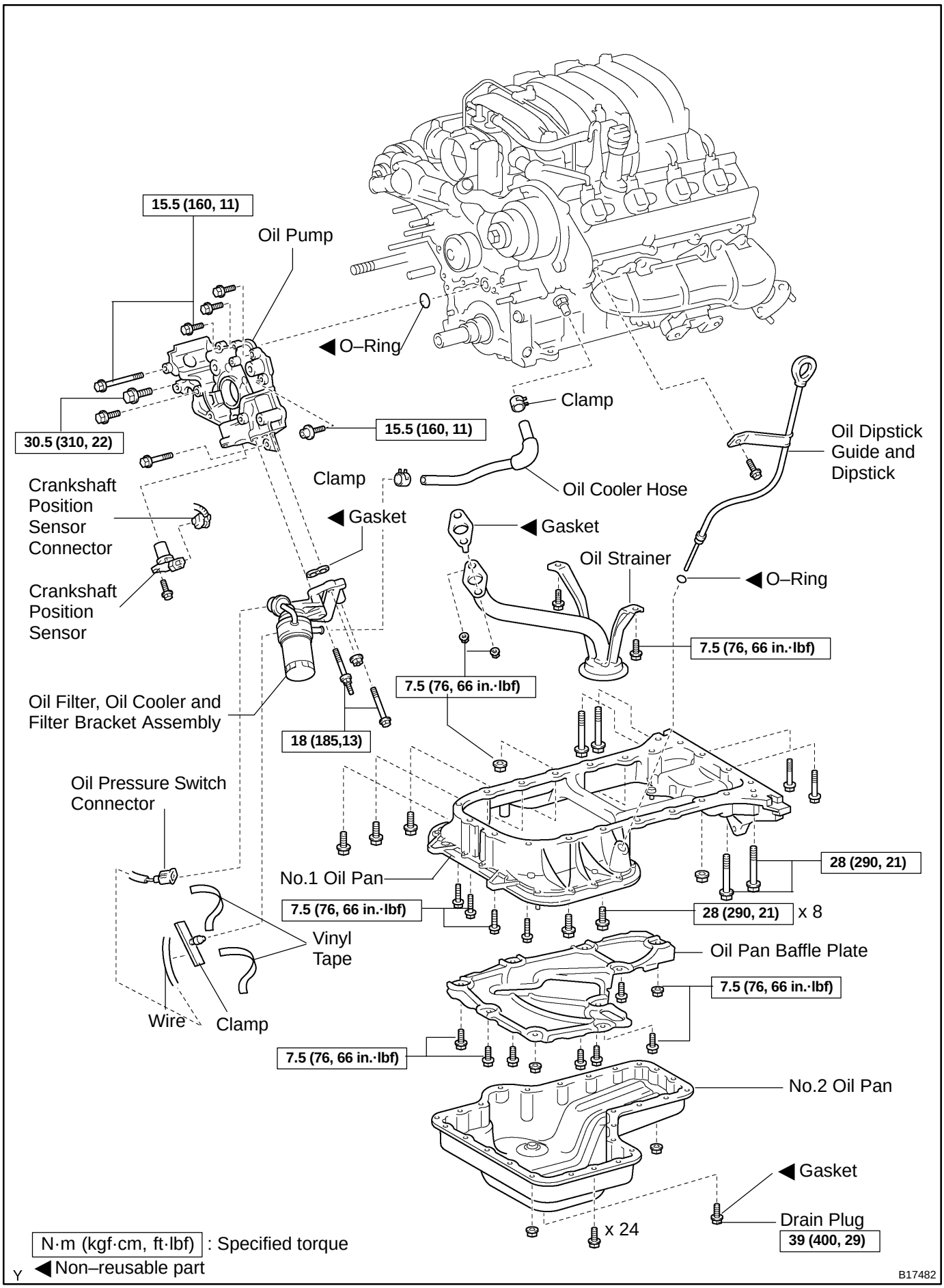
LU08P–10



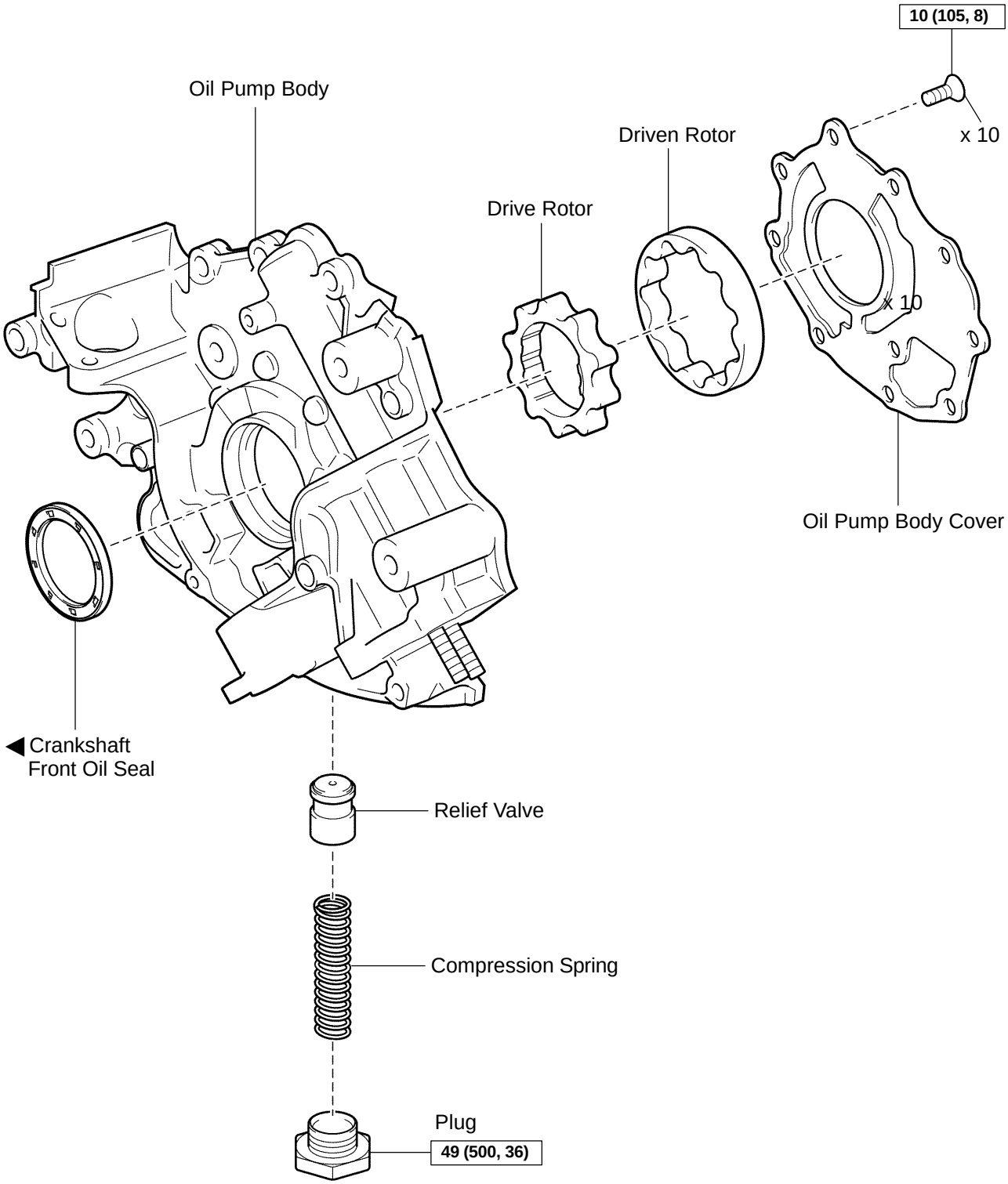
Dardoor.com


Generator Wire
Generator
Drive Belt Tensioner
No.1 Timing Belt Cover
Crankshaft Pulley
39 (400, 29)
39 (400, 29)
15.5 (158, 11)
No.1 Idler Pulley
▶ 34.5 (350, 25)
Timing Belt
Plate Washer
Crankshaft Timing Pulley
34.5 (350, 25)
No.2 Idler Pulley
Timing Belt Guide
(Crankshaft Angle Sensor Plate)
Gasket
Timing Belt Cover Spacer
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Precoated part
Y
B17481

Dardoor.com


15.5 (160, 11)
Oil Pump
◀ O–Ring
30.5 (310, 22)
15.5 (160, 11)
Clamp
Oil Dipstick Guide and Dipstick
Clamp
Oil Cooler Hose
Crankshaft Position Sensor Connector
Crankshaft Position Sensor
◀ Gasket
◀ Gasket
Oil Strainer
◀ O–Ring
7.5 (76, 66 in.·lbf)
7.5 (76, 66 in.·lbf)
Oil Filter, Oil Cooler and Filter Bracket Assembly
18 (185,13)
Oil Pressure Switch Connector
No.1 Oil Pan
28 (290, 21)
7.5 (76, 66 in.·lbf)
28 (290, 21) x 8
Vinyl Tape
Oil Pan Baffle Plate
7.5 (76, 66 in.·lbf)
Wire
Clamp
7.5 (76, 66 in.·lbf)
No.2 Oil Pan
◀ Gasket
Drain Plug
x 24
39 (400, 29)
N·m (kgf·cm, ft·lbf) : Specified torque
◀ Non–reusable part
Y
B17482

Dardoor.com



N·m (kgf·cm, ft·lbf) : Specified torque
◀ Non–reusable part

B02608

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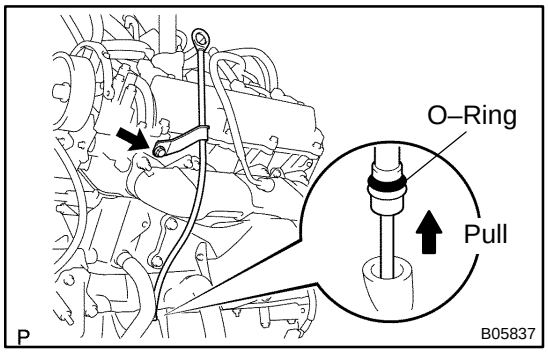
LU08Q–10

REMOVAL

HINT:

When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

1. **REMOVE ENGINE FROM VEHICLE**
   (2WD: See page EM–79)
   (4WD: See page EM–92)
2. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**
3. **REMOVE TIMING BELT (See page EM–16)**
4. **REMOVE NO.1 IDLER PULLEY (See page EM–16)**
5. **REMOVE NO.2 IDLER PULLEY (See page EM–16)**
6. **REMOVE CRANKSHAFT TIMING PULLEY**
   (See page EM–16)
7. **REMOVE CRANKSHAFT POSITION SENSOR**
   (See page IG–11)



8. **REMOVE OIL DIPSTICK AND GUIDE**

(a) Remove the bolt holding the oil dipstick to the LH cylinder head.

(b) Pull out the dipstick guide together with the dipstick from the No.1 oil pan.

(c) Remove the O–ring from the dipstick guide.

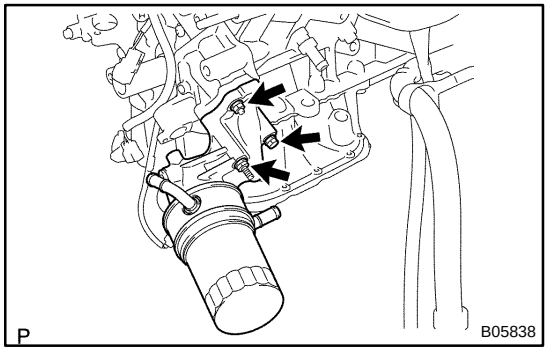
9. **REMOVE OIL FILTER, OIL COOLER AND FILTER BRACKET ASSEMBLY**

(a) Disconnect the oil pressure switch connector.

(b) Take out the vinyl tape, and disconnect the wire from the clamp.

(c) Turn the clamp counterclockwise, and remove the clamp from the oil filter bracket.

(d) Disconnect the oil cooler hose from the oil cooler.



(e) Remove the 2 bolts, nut, the oil filter, oil cooler and filter bracket assembly.

(f) Remove the gasket from the filter bracket.

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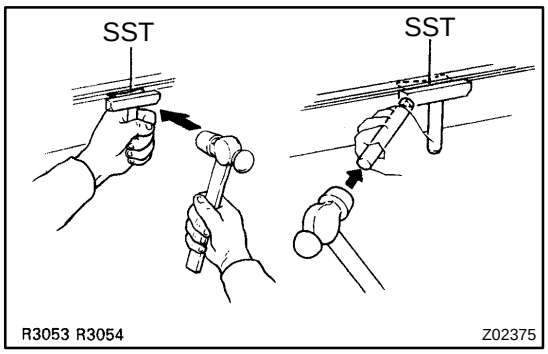


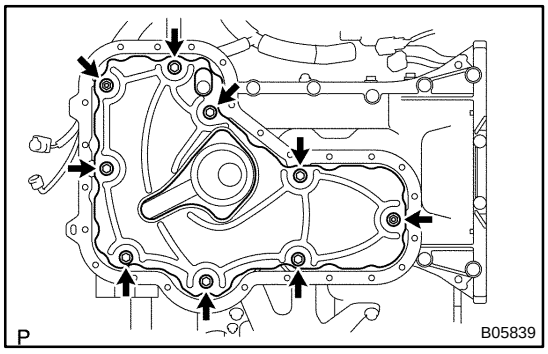
10. REMOVE NO.2 OIL PAN

(a) Remove the 24 bolts and 2 nuts.

(b) Insert the blade of SST between the No.1 and No.2 oil pans, cut off applied sealer and remove the No.2 oil pan.
SST 09032–00100

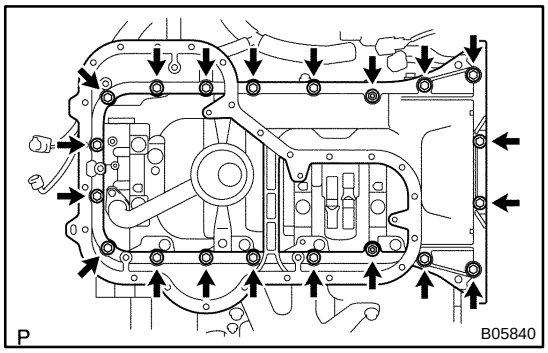
NOTICE:

- **Be careful not to damage the No.2 oil pan contact surface of the No.1 oil pan.**
- **Be careful not to damage the No.2 oil pan flange.**



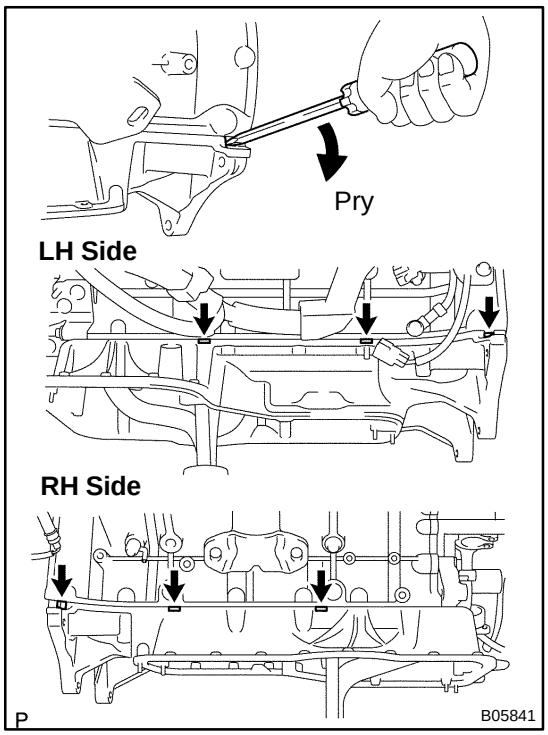
11. REMOVE OIL PAN BAFFLE PLATE

Remove the 7 bolts, 2 nuts and baffle plate.



12. REMOVE NO.1 OIL PAN

(a) Remove the 18 bolts and 2 nuts.



(b) Using a screwdriver, remove the No.1 oil pan by prying between the oil pan and cylinder block in the sequence shown.

NOTICE:

Be careful not to damage the contact surface of the cylinder block and No.1 oil pan.

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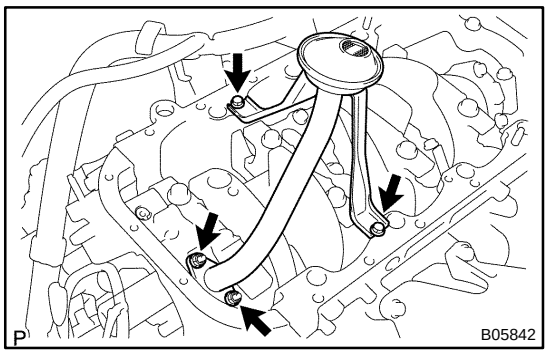
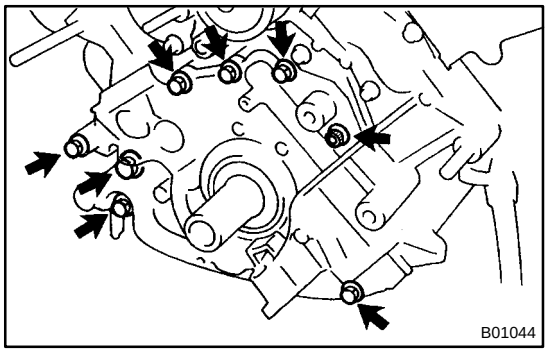


13. REMOVE OIL STRAINER

Remove the 2 bolt, 2 nuts, oil strainer and gasket.

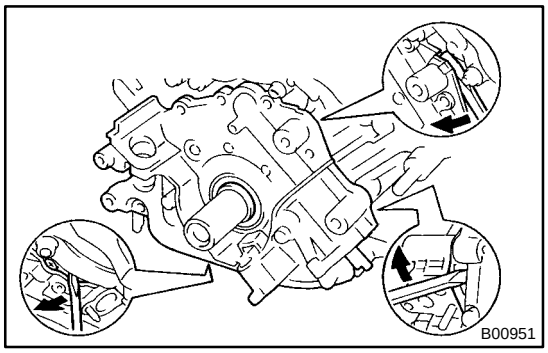


14. REMOVE OIL PUMP

(a) Remove the 8 bolts.

HINT:

Use a 6 mm hexagon wrench for the hexagon head bolt.



(b) Using a screwdriver, remove the oil pump by prying the portions between the oil pump and cylinder block.

NOTICE:

Be careful not to damage the contact surface of the cylinder block and oil pump.

(c) Remove the O–ring from the cylinder block.

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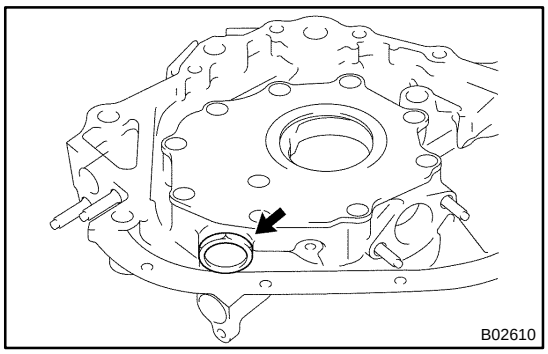
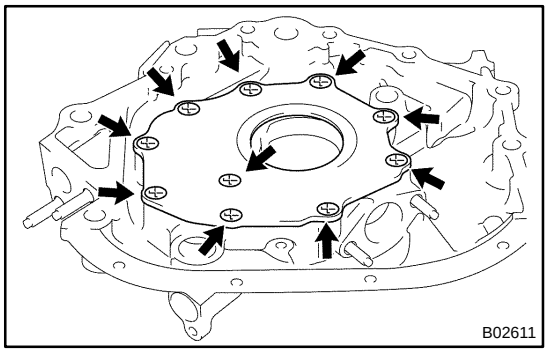
LU08R–09

DISASSEMBLY



1. REMOVE RELIEF VALVE

Remove the plug, compression spring and relief valve.



2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 10 screws, pump body cover, the drive and driven rotors.

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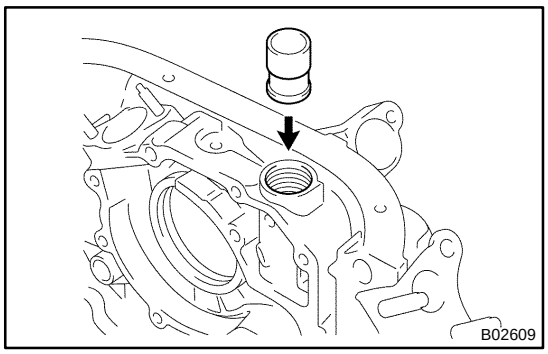
LU08S–07

INSPECTION



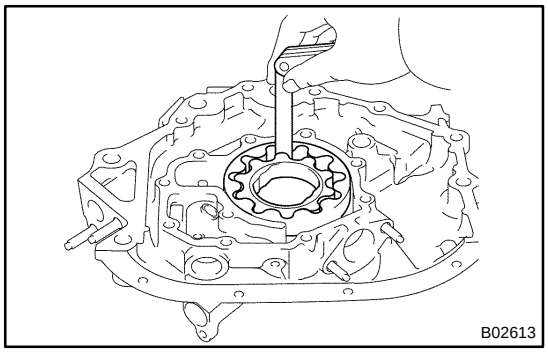
1. INSPECT RELIEF VALVE

Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.

2. INSPECT DRIVE AND DRIVEN ROTORS

(a) Place the drive and driven rotors into the oil pump body. (see page LU–14)

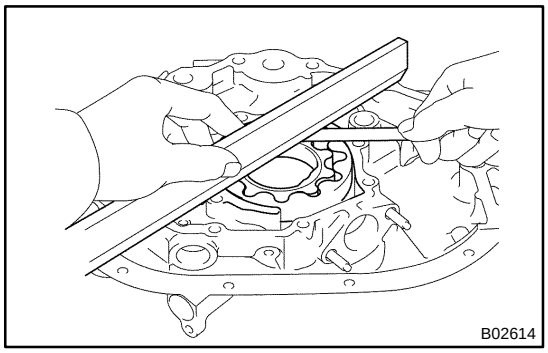


(b) Inspect the rotors for the body clearance.

Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:
0.060 to 0.180 mm (0.0024 to 0.0071 in.)
Maximum tip clearance: 0.18 mm (0.0071 in.)

If the tip clearance is greater than maximum, replace the rotors as a set.

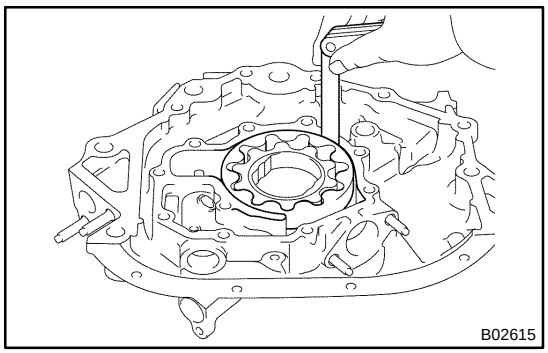


(c) Inspect the rotors for the side clearance.

Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Side clearance:
0.030 to 0.090 mm (0.0012 to 0.0035 in.)
Maximum body clearance: 0.09 mm (0.0035 in.)

If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



(d) Inspect the rotor for the body clearance.

Using a feeler gauge, measure the clearance between the driven rotor and body.

Standard body clearance:
0.250 to 0.325 mm (0.0098 to 0.0128 in.)
Maximum body clearance: 0.325 mm (0.0128 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

(e) Remove the drive and drive rotors.

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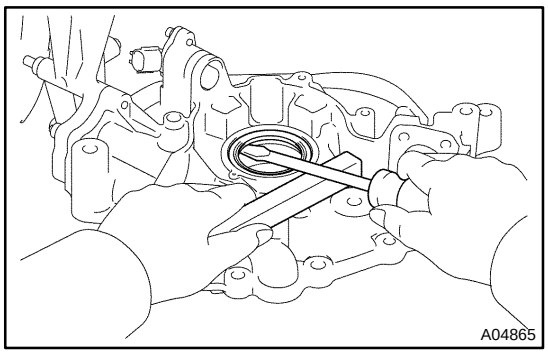
LU0GX–05



REPLACEMENT

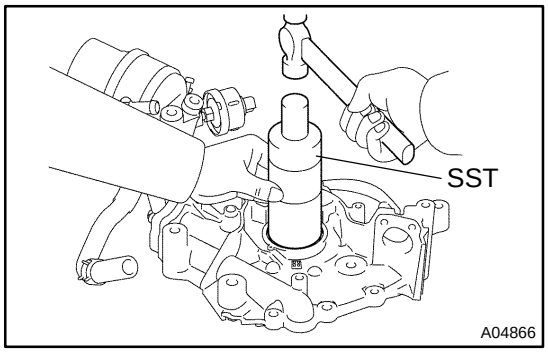
REPLACE CRANKSHAFT FRONT OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to replace the oil seal.

(a) If the oil pump is removed from the cylinder block:

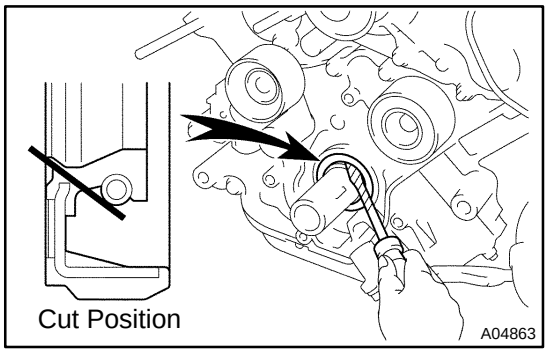
(1) Using a screwdriver, pry out the oil seal.



(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.

SST 09316–60011 (09316–00011)

(3) Apply MP grease to the oil seal lip.



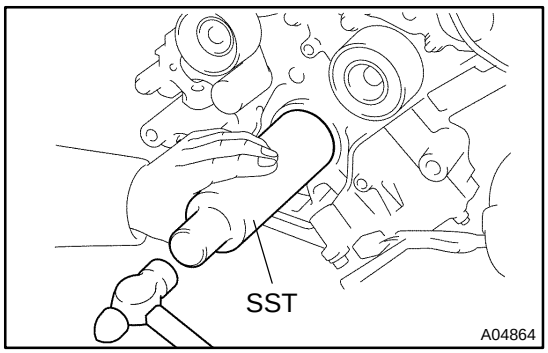
(b) If the oil pump is installed to the cylinder block:

(1) Using a knife, cut off the oil seal lip.

(2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip.



(3) Apply MP grease to a new oil seal lip.

(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.

SST 09316–60011 (09316–00011)

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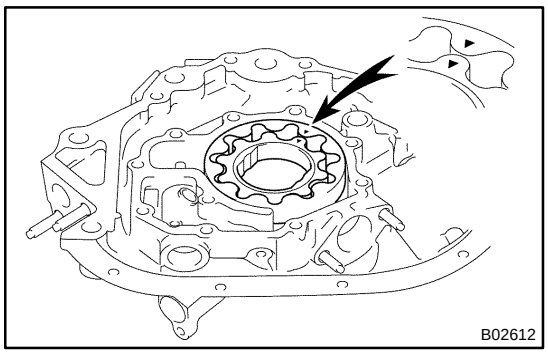
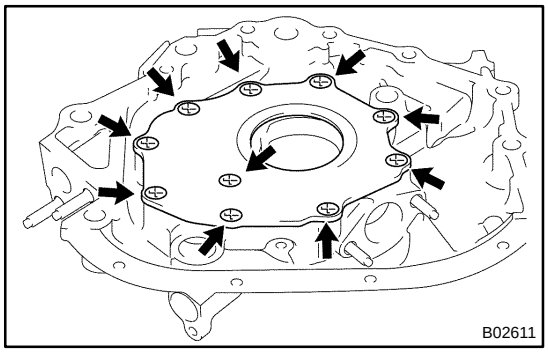
LU08U–07

REASSEMBLY

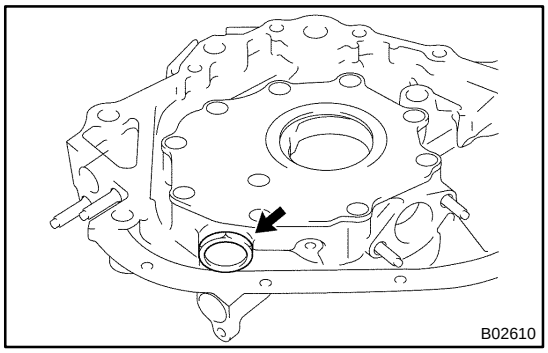


1. INSTALL DRIVE AND DRIVEN ROTORS

(a) Place the drive and driven rotors into pump body with the marks facing the pump body cover side.



(b) Install the pump body cover with the 10 screws.
Torque: 10 N·m (105 kgf·cm, 7 ft·lbf)



2. INSTALL RELIEF VALVE

(a) Insert the relief valve and compression spring into the oil pump body hole.

(b) Install the plug.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

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LU0GY-06

INSTALLATION

1. INSTALL OIL PUMP

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pump and cylinder block.

- ▶ Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- ▶ Thoroughly clean all components to remove all the loose material.
- ▶ Using a non-residue solvent, clean both sealing surfaces.

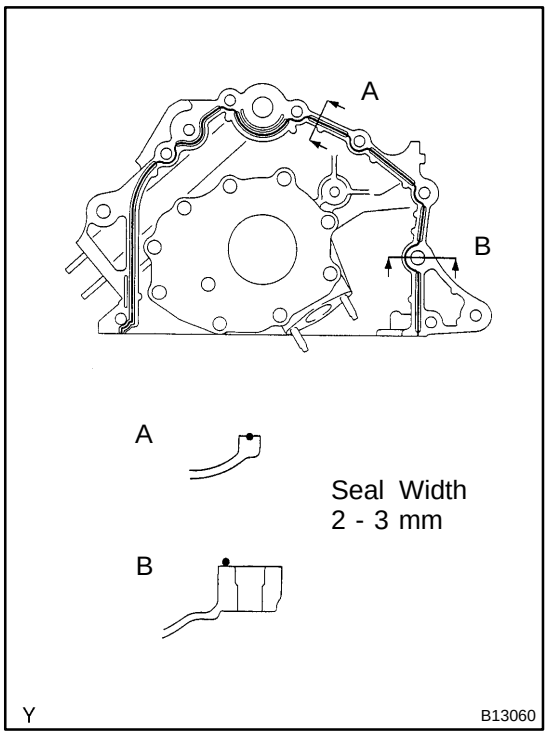
(b) Apply seal packing to the oil pump as shown in the illustration.

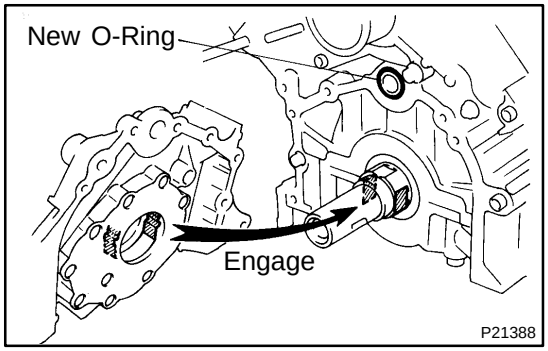
Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Avoid applying an excessive amount to the surface. Be particularly careful near oil passage.

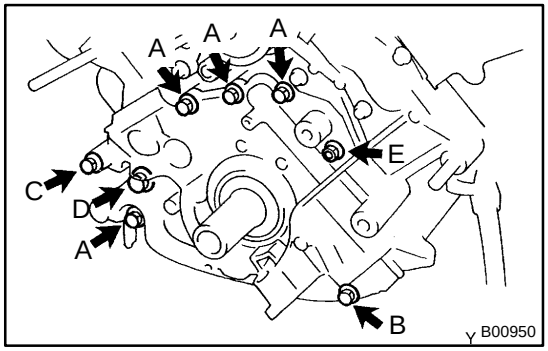
- ▶ Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
- ▶ Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- ▶ Immediately remove nozzle from the tube and reinstall cap.





(c) Install a new O-ring to the cylinder block.

(d) Engage the spline teeth of the oil pump drive gear with the large teeth of the crankshaft, and slide the oil pump on the crankshaft.



(e) Install the oil pump with the 8 bolts. Uniformly tighten the bolts in several passes.

Torque:

30.5 N·m (310 kgf·cm, 22 ft·lbf) for 14 mm head

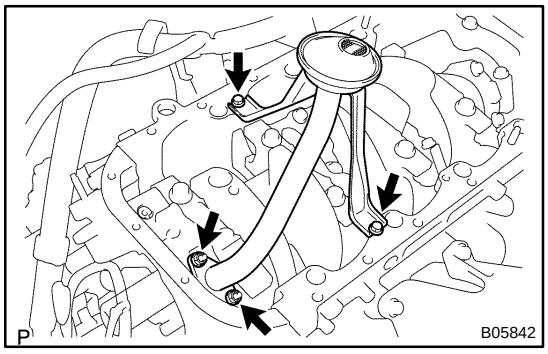
15.5 N·m (160 kgf·cm, 11 ft·lbf) for others

Dardoor.com

HINT:

- Use a 6 mm hexagon wrench for the hexagon head bolt.
- Each bolt length is indicated in the illustration.

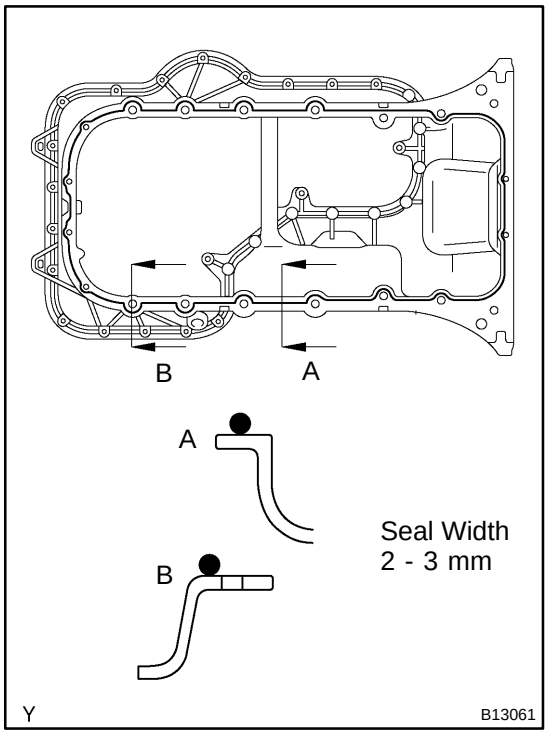
Bolt length:
35 mm (1.38 in.) for A of 12 mm head
50 mm (1.97 in.) for B of 12 mm head
106 mm (4.17 in.) for C of 12 mm head
40 mm (1.57 in.) for D of 14 mm head
30 mm (1.18 in.) for E of 6 mm hexagon head



2. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the 2 bolts and 2 nuts.

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



3. INSTALL NO.1 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No.1 oil pan, cylinder block, oil pump and rear oil seal retainer.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non-residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the No.1 oil pan as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

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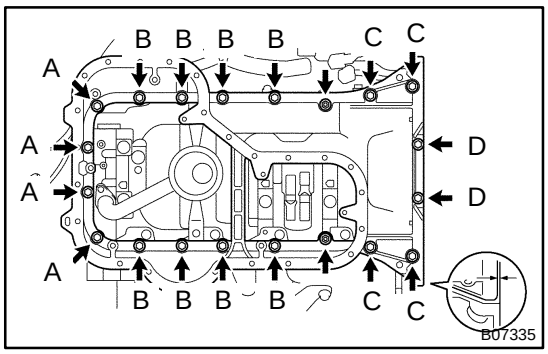


(c) Temporarily install the No.1 oil pan with the 18 bolts, stud bolt and 2 nuts.

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

20 mm (0.79 in.) for A of 10 mm head

25 mm (0.98 in.) for B of 12 mm head

60 mm (2.36 in.) for C of 12 mm head

35 mm (1.38 in.) for D of 10 mm head

(d) Set the No.1 oil pan as shown in the illustration.

NOTICE:

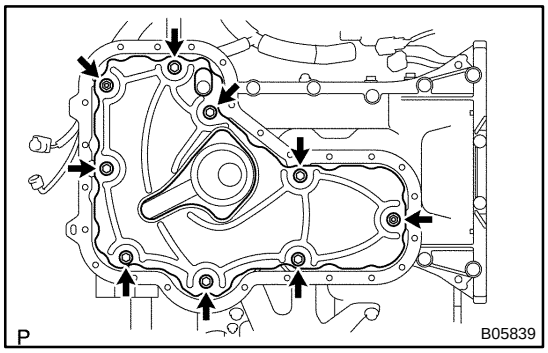
Make sure the clearance between the rear ends of the No.1 oil pan and cylinder block is 0.2 mm (0.008 in.) or less. If the clearance is more than 0.2 mm (0.008 in.), the No.1 oil pan will be stretched.

(e) Uniformly tighten the bolts, and nuts in several passes.

Torque:

7.5 N·m (76 kgf·cm, 66 in.·lbf) for 10 mm head

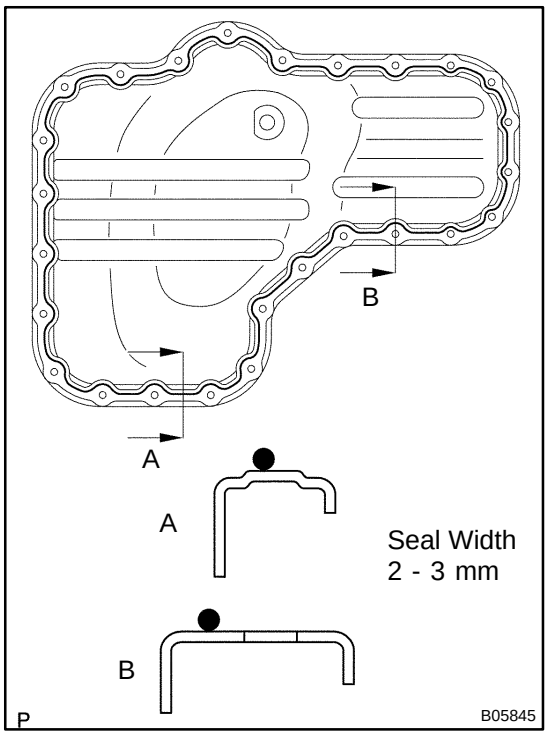
28 N·m (290 kgf·cm, 21 ft·lbf) for 12 mm head



4. INSTALL OIL PAN BAFFLE PLATE

Install the baffle plate with the 7 bolts and 2 nuts.

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



5. INSTALL NO.2 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No.1 and No.2 oil pans.

- ▶ Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- ▶ Thoroughly clean all components to remove all the loose material.
- ▶ Using a non-residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.

(b) Apply seal packing to the No.2 oil pan as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

- ▶ Install a nozzle that has been cut to a 3 - 4 mm (0.12 - 0.16 in.) opening.

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▶ Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.

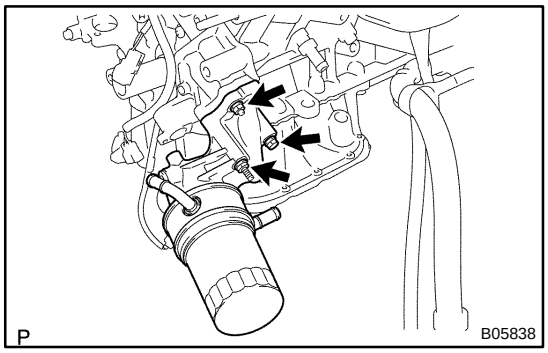
▶ Immediately remove nozzle from the tube and reinstall cap.

(c) Install the No.2 oil pan with the 24 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

6. INSTALL CRANKSHAFT POSITION SENSOR
(See page IG-13)

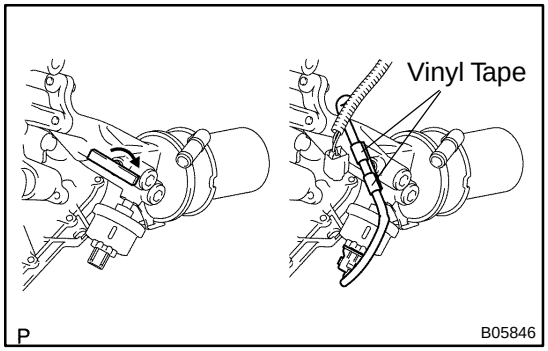
7. INSTALL OIL FILTER, OIL COOLER AND FILTER BRACKET ASSEMBLY

(a) Install a new gasket to the oil filter bracket.



(b) Install the oil filter, oil cooler and filter bracket assembly with the 2 bolts and nut.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

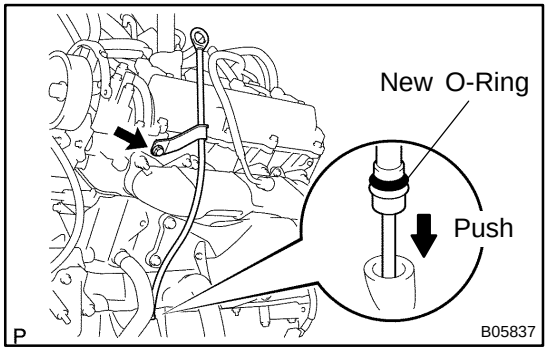
(c) Connect the oil cooler hose to the oil cooler.



(d) Install the clamp.
Turn the clamp clockwise, and install the clamp to the oil filter bracket.

(e) Install the wire to the clamp with a vinyl tape.

(f) Connect the oil pressure switch connector.



8. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK

(a) Install a new O-ring to the dipstick guide.

(b) Apply soapy water to the O-ring.

(c) Push in the oil dipstick guide end into the guide hole of the No.1 oil pan.

(d) Install the oil dipstick guide with the bolt.
Torque: 15 N·m, (155 kgf·cm, 11 ft·lbf)

(e) Install the oil dipstick.

9. INSTALL CRANKSHAFT TIMING PULLEY
(See page EM-23)

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10. INSTALL NO.1 IDLER PULLEY (See page EM-23)
11. INSTALL NO.2 IDLER PULLEY (See page EM-23)
12. INSTALL TIMING BELT (See page EM-23)
13. DISCONNECT ENGINE FROM ENGINE STAND
14. INSTALL ENGINE TO VEHICLE
    (2WD: See page EM-83)
    (4WD: See page EM-95)

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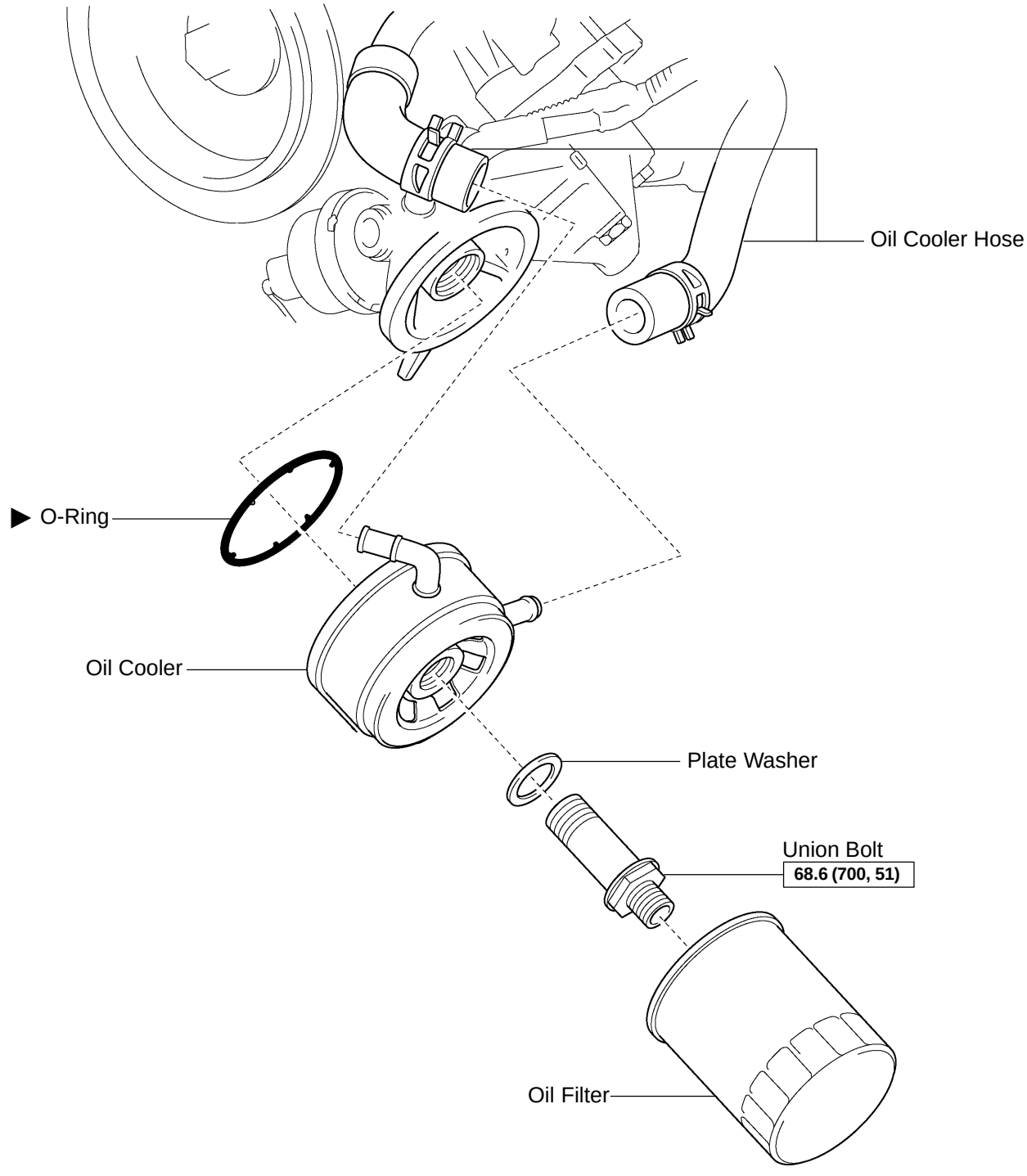
OIL COOLER

COMPONENTS

LU08W-11



N·m (kgf·cm, ft·lbf): Specified torque
▶ Non-reusable part

B07331

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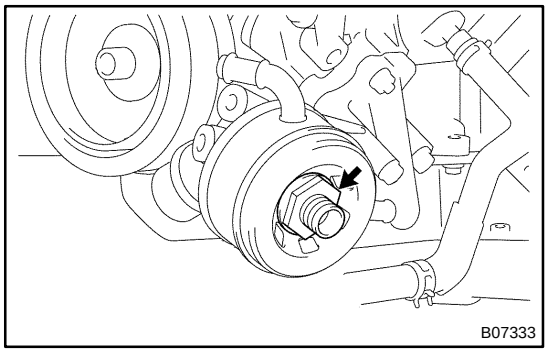
LU08X-08

REMOVAL

1. DRAIN ENGINE COOLANT

2. REMOVE OIL FILTER (See page LU-2)



3. REMOVE OIL COOLER

(a) Disconnect the 2 oil cooler hoses from the oil cooler.

(b) Remove the union bolt, plate washer and oil cooler.

(c) Remove the O-ring from the oil cooler.

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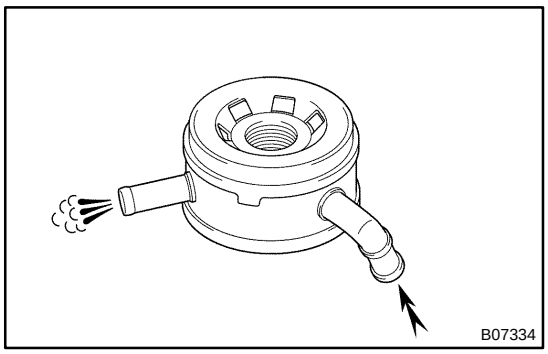
LU08Y–08



INSPECTION

INSPECT OIL COOLER

Check the oil cooler for damage or clogging.
If necessary, replace the oil cooler.

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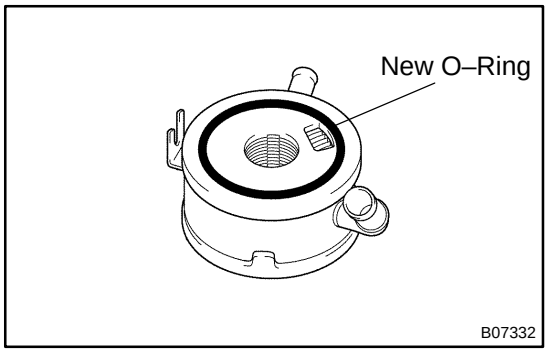
LU08Z–10

INSTALLATION

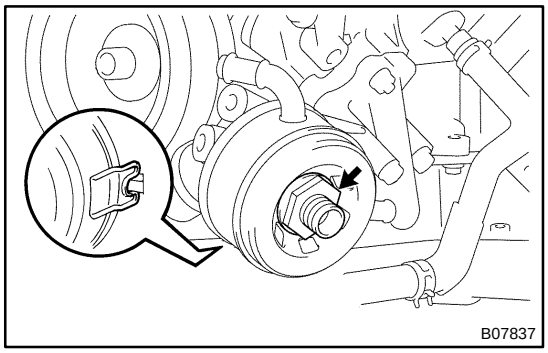
1. INSTALL OIL COOLER

(a) Clean the oil cooler contact surface on the cooler mounting.



(b) Place a new O–ring to the oil cooler.

(c) Apply a light coat of engine oil on the threads and under the head of the union bolt.



(d) Install the oil cooler and plate washer with the union bolt.
Torque: 68.6 N·m (700 kgf·cm, 51 ft·lbf)

(e) Connect the 2 oil cooler hoses to the oil cooler.

2. INSTALL OIL FILTER (See page LU–2)

3. FILL WITH ENGINE COOLANT

4. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

5. CHECK ENGINE OIL LEVEL

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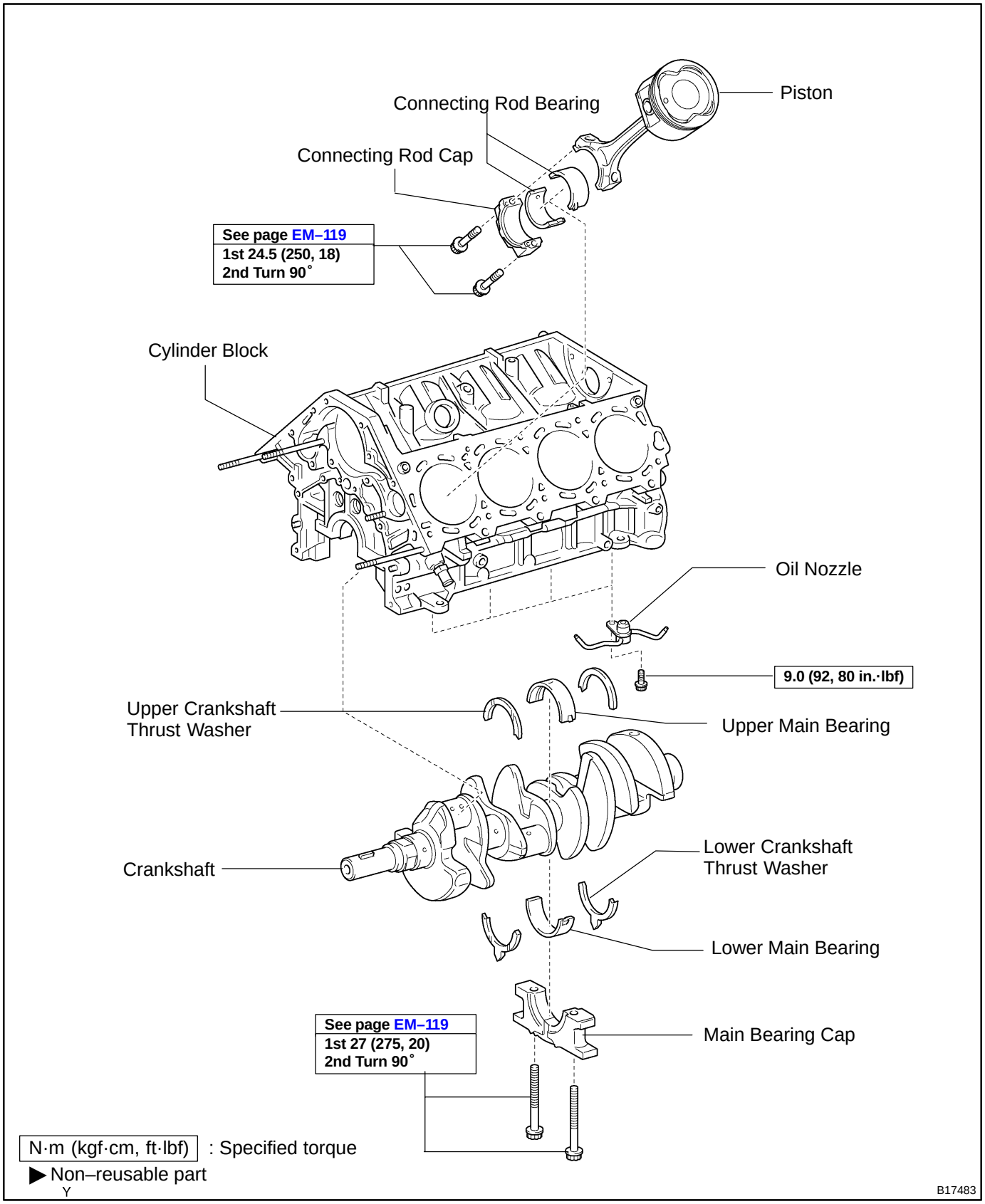
OIL NOZZLE

COMPONENTS

LU0IH–06



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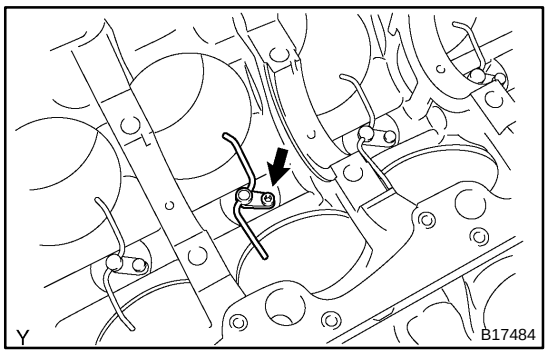
LU0ID–05



REMOVAL

1. REMOVE CRANKSHAFT (See page EM–101)

2. REMOVE OIL NOZZLE (WITH RELIEF VALVE)

Using a 5 mm hexagon wrench, remove the bolt and oil nozzle.

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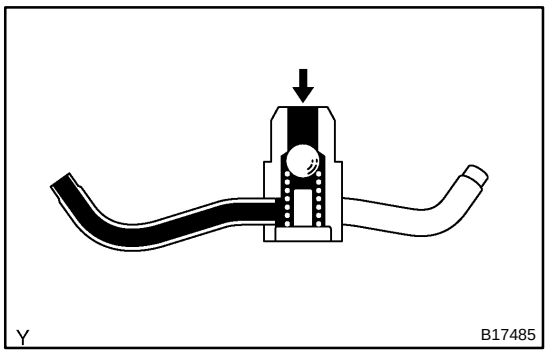
LU0IE–05



INSPECTION

INSPECT RELIEF VALVE (OIL NOZZLE)

Push the valve with a wooden stick to check if it is stuck.
If stuck, replace the relief valve.

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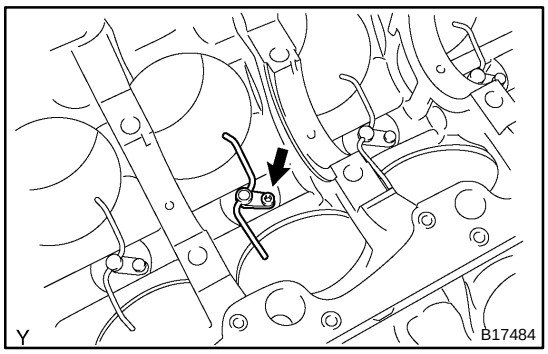
LU0IF–05



INSTALLATION

1. INSTALL OIL NOZZLE (WITH RELIEF VALVE)

Using a 5 mm hexagon wrench, install the oil nozzle with the bolt.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

2. INSTALL CRANKSHAFT (See page EM–119)

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IGNITION SYSTEM

IG0MF–01

ON–VEHICLE INSPECTION

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves. "Cold" is from –10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

1. INSPECT IGNITION COIL (WITH IGNITER) AND SPARK TEST

Check that the spark occurs.

(1) Remove the ignition coils (with igniter).
(see page IG–5)

(2) Remove the spark plugs.

(3) Install the spark plugs to each ignition coil (with igniter), and connect the ignition coil (with igniter) connector.

(4) Disconnect the 8 injector connectors.

(5) Ground the spark plug.

(6) Check that spark occurs while engine is being cranked.

NOTICE:

To prevent gasoline from being injected out of injectors during this test, crank the engine for no more than 5 to 10 seconds at a time.

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If the spark does not occur, do the test as follows:

SPARK TEST
↓ NG
CHECK TDC
↓ NG
CHECK CONNECTION OF IGNITION COIL CONNECTOR → BAD → Connect securely.
↓ OK
CHANGE IT TO NORMAL IGNITION COIL (WITH IGNITER) AND PERFORM SPARK TEST AGAIN → OK → Replace the ignition coil (with igniter).
↓ NO
CHECK POWER SUPPLY TO IGNITION COIL (WITH IGNITER)
1. Turn ignition switch to ON.
2. Check that there is battery voltage at ignition coil positive (+) terminal.

→ BAD → Check wiring between ignition switch to ignition coil (with igniter).
↓ OK
CHECK RESISTANCE OF CRANKSHAFT POSITION SENSOR (See page IG–12)

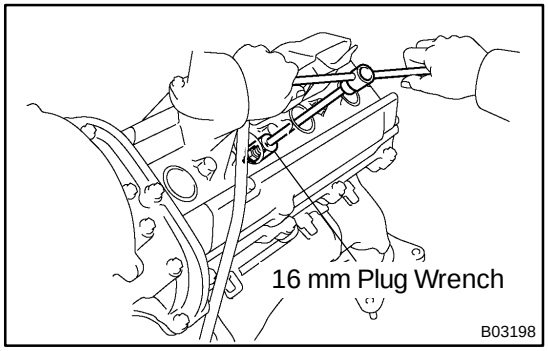
	Cold	Hot
Resistance:	**985 – 1,600 Ω**	**1,265 – 1,890 Ω**

→ BAD → Replace the crankshaft position sensor.
↓ OK
CHECK IGT SIGNAL FROM ECM (See page DI–221) → BAD → Check ECM (See page IN–35)
↓ OK
REPAIR WIRING BETWEEN IGNITION COIL AND ECM

(7) Using a 16 mm plug wrench, install the spark plugs.
Torque: 17.5 N·m (180 kgf·cm, 13 ft·lbf)
(8) Reinstall the ignition coils (with igniter).
(see page IG–6)

2. INSPECT SPARK PLUGS

(a) Remove the ignition coils (with igniter).
(see page IG–5)



(b) Using a 16 mm plug wrench, remove the spark plugs.

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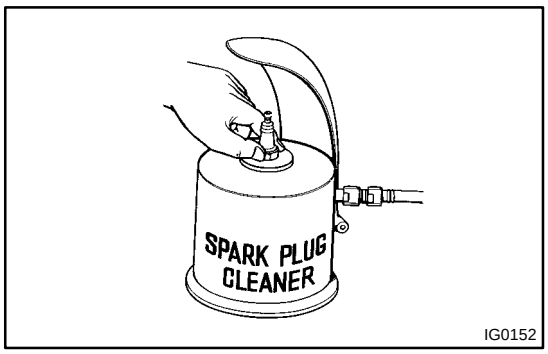


(c) Clean the spark plugs.

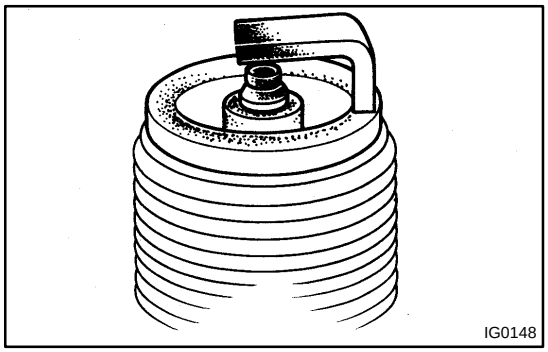
If the electrode has traces of wet carbon, allow it to dry and then clean with a spark plug cleaner.

Air pressure: Below 588 kPa (6 kgf/cm^2, 85 psi)

Duration: 20 seconds or less

HINT:

If there are traces of oil, remove it with gasoline before using the spark plug cleaner.

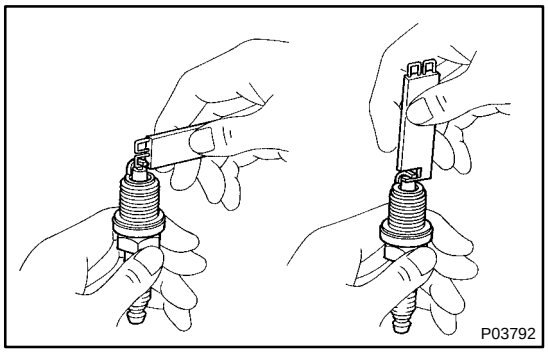


(d) Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

DENSO made	SK20R11
NGK made	IFR6A11



(e) Adjust the spark plug electrode gap.

Electrode gap: 1.0 to 1.1 mm (0.039 to 0.043 in.)

(f) Using a 16 mm plug wrench, install the spark plugs.

Torque: 17.5 N·m (180 kgf·cm, 13 ft·lbf)

(g) Reinstall the ignition coils (with igniter).

(see page IG–6)

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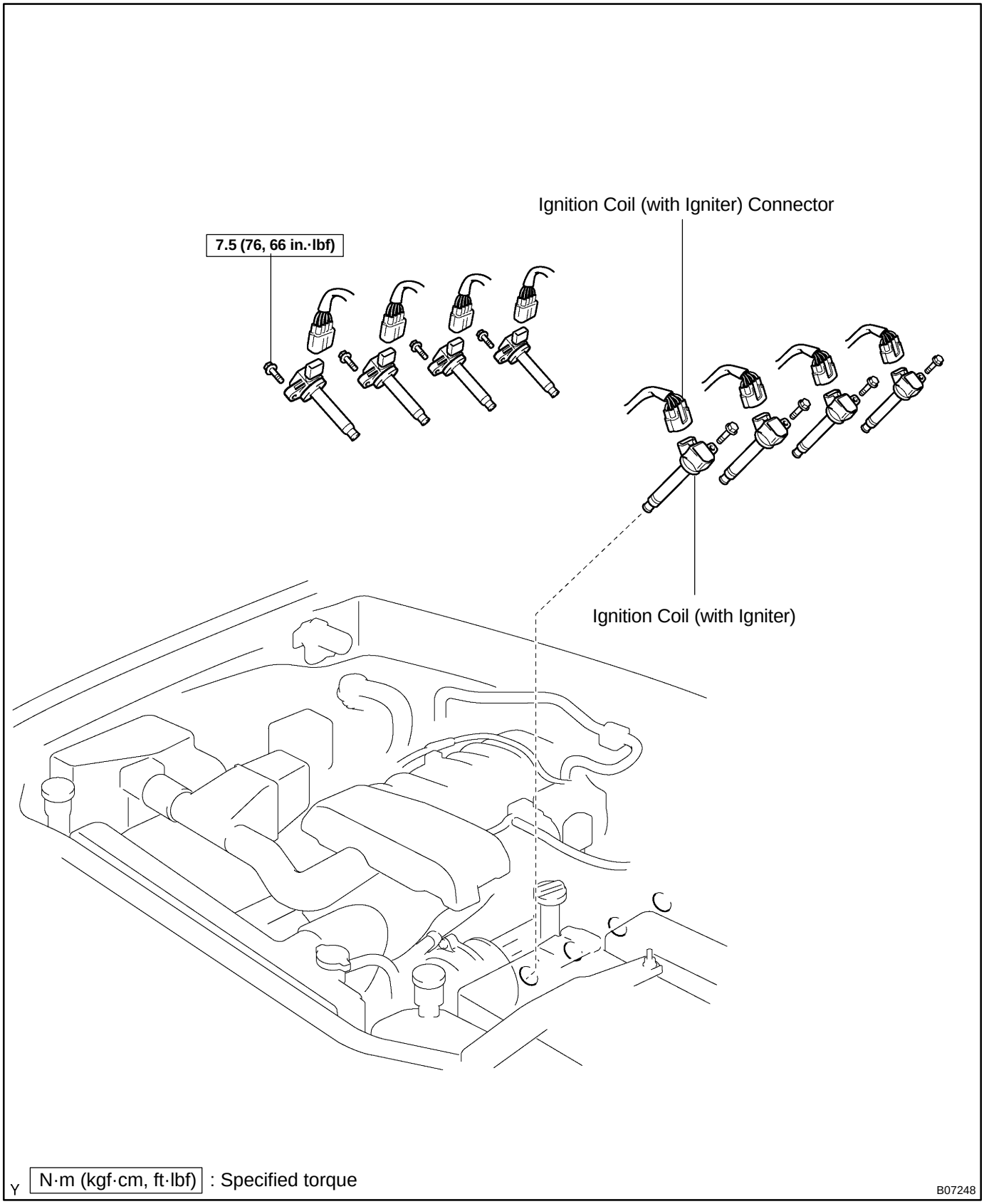
IGNITION COIL

COMPONENTS

IG08Q–06



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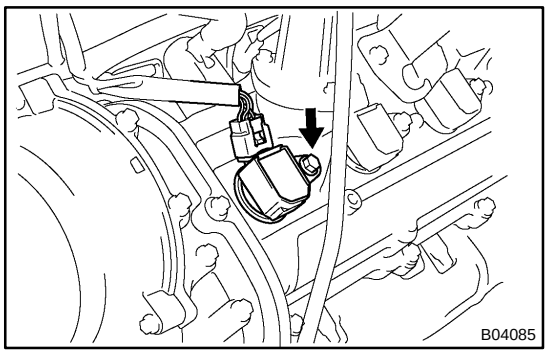
IG08R–05



REMOVAL

1. DISCONNECT IGNITION COIL (WITH IGNITER) CONNECTORS

2. REMOVE IGNITION COILS (WITH IGNITER)

Remove the bolt, and pull out the ignition coil (with igniter). Remove the 8 ignition coils (with igniter).

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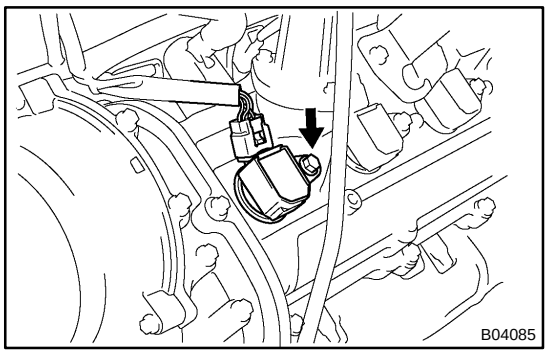
IG0EN–04



INSTALLATION

1. INSTALL IGNITION COILS (WITH IGNITER)

Install the ignition coil (with igniter) with the bolt. Install the 8 ignition coils (with igniter).

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

2. CONNECT IGNITION COIL (WITH IGNITER) CONNECTORS

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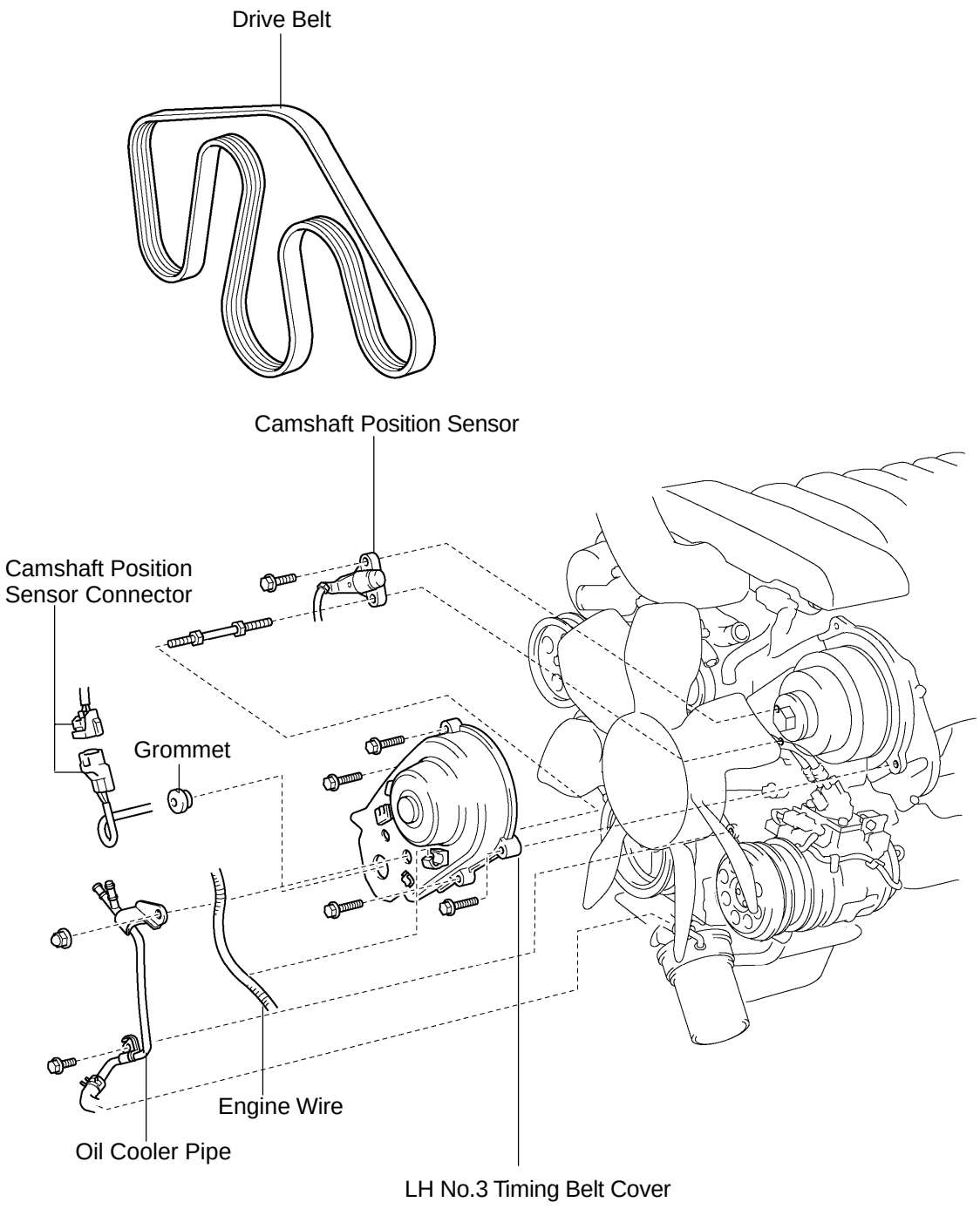
CAMSHAFT POSITION SENSOR

IG08T–08

COMPONENTS



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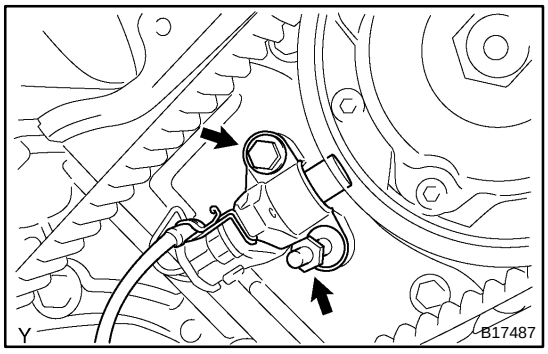
IG08U–08

REMOVAL

1. DRAIN ENGINE COOLANT
2. REMOVE DRIVE BELT (See page CH–7)
3. REMOVE LH NO.3 TIMING BELT COVER (See page EM–16)



4. REMOVE CAMSHAFT POSITION SENSOR

Remove the bolt, stud bolt and camshaft position sensor.

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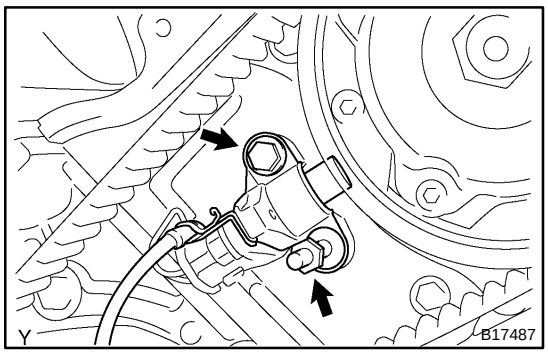
IG08V–06



INSTALLATION

1. INSTALL CAMSHAFT POSITION SENSOR

Install the camshaft position sensor with the bolt and stud bolt

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

2. INSTALL LH NO.3 TIMING BELT COVER (See page EM–23)

3. INSTALL DRIVE BELT (See page CH–16)

4. FILL ENGINE COOLANT (See page CO–2)

5. CHECK ENGINE COOLANT FOR LEAKS

6. CHECK IGNITION TIMING (See page EM–9)

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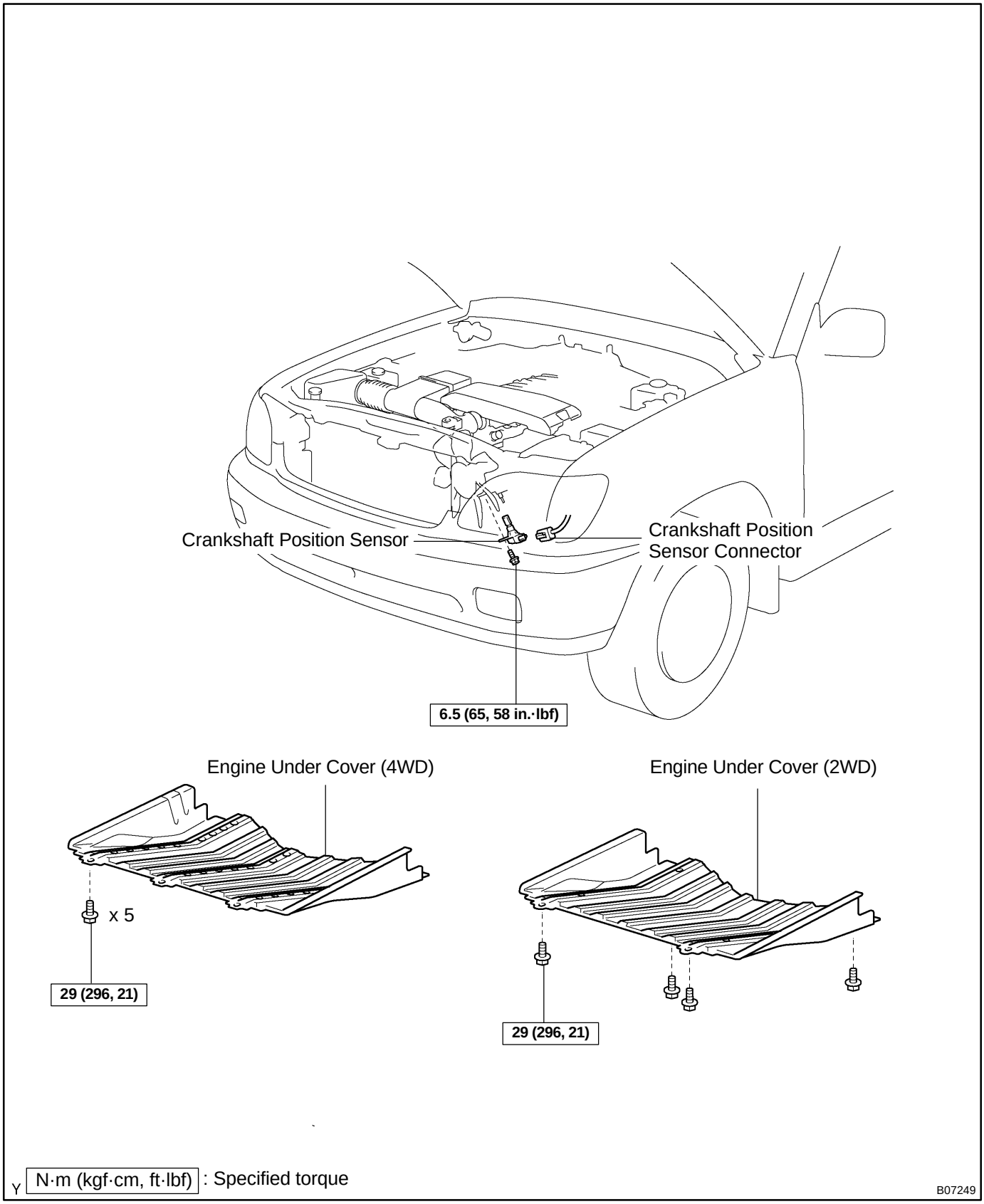
CRANKSHAFT POSITION SENSOR

IG08W–06

COMPONENTS



Y N·m (kgf·cm, ft·lbf) : Specified torque

B07249

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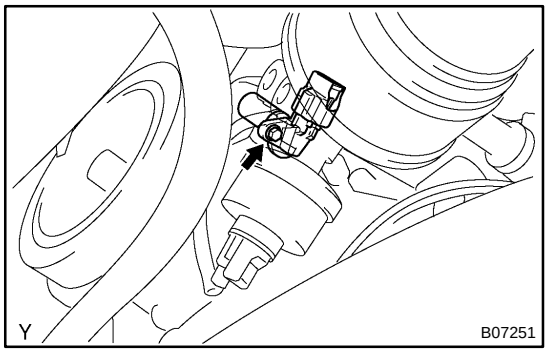
IG08X–05

REMOVAL

1. REMOVE ENGINE UNDER COVER



2. REMOVE CRANKSHAFT POSITION SENSOR

(a) Disconnect the crankshaft position sensor connector.

(b) Remove the bolt and crankshaft position sensor.

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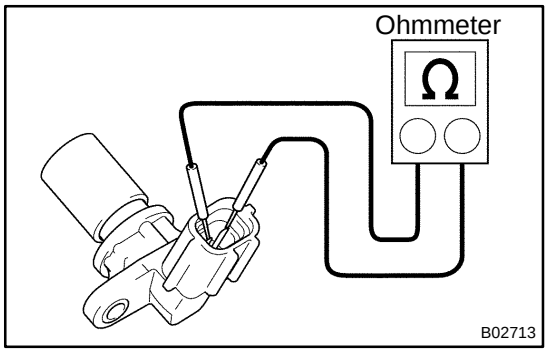
IG0EL–04

INSPECTION

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves. "Cold" is from –10˚C (14˚F) to 50˚C (122˚F) and "Hot" is from 50˚C (122˚F) to 100˚C (212˚F).



INSPECT CRANKSHAFT POSITION SENSOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Cold	1,630 – 2,740 Ω
Hot	2,065 – 3,225 Ω

If the resistance is not as specified, replace the crankshaft position sensor.

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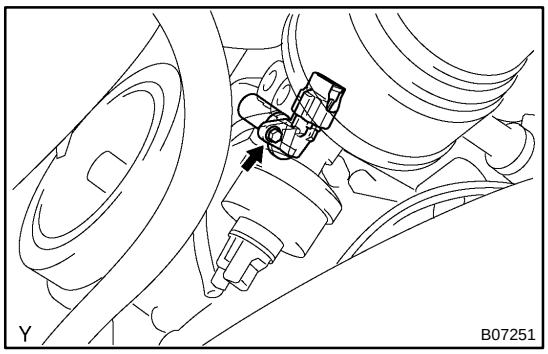
IG0EM–04



INSTALLATION

1. INSTALL CRANKSHAFT POSITION SENSOR

(a) Install the crankshaft position sensor with the bolt.
Torque: 6.5 N·m (65 kgf·cm, 58 in.·lbf)

(b) Connect the crankshaft position sensor connector.

2. INSTALL ENGINE UNDER COVER

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STARTING SYSTEM

ST08X–03

ON–VEHICLE INSPECTION

NOTICE:

Before changing the starter, check these items again:

- **Connector connection**
- **Accessory installation, e.g.: engine immobilizer system**

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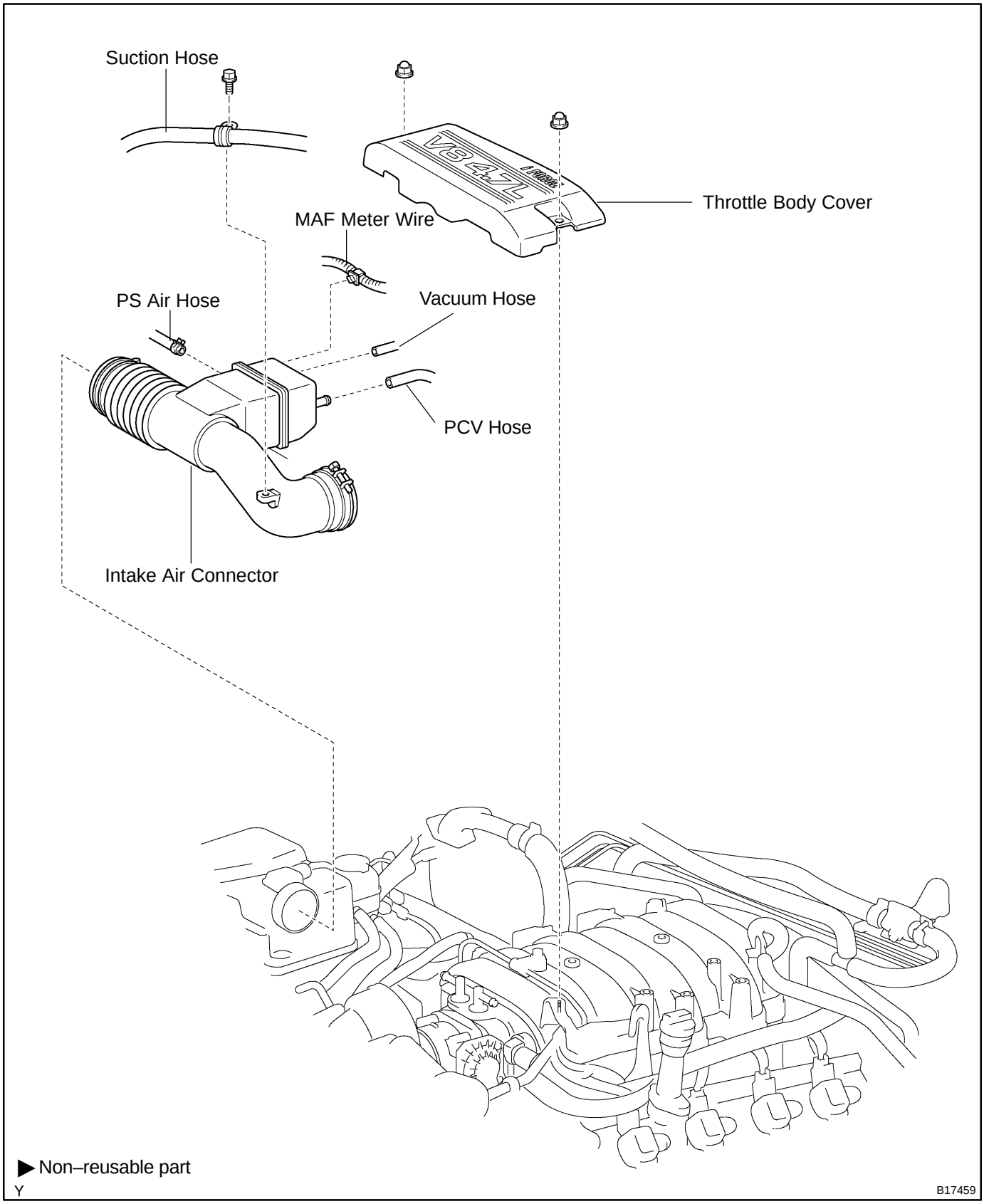
STARTER

COMPONENTS

ST08Y–06



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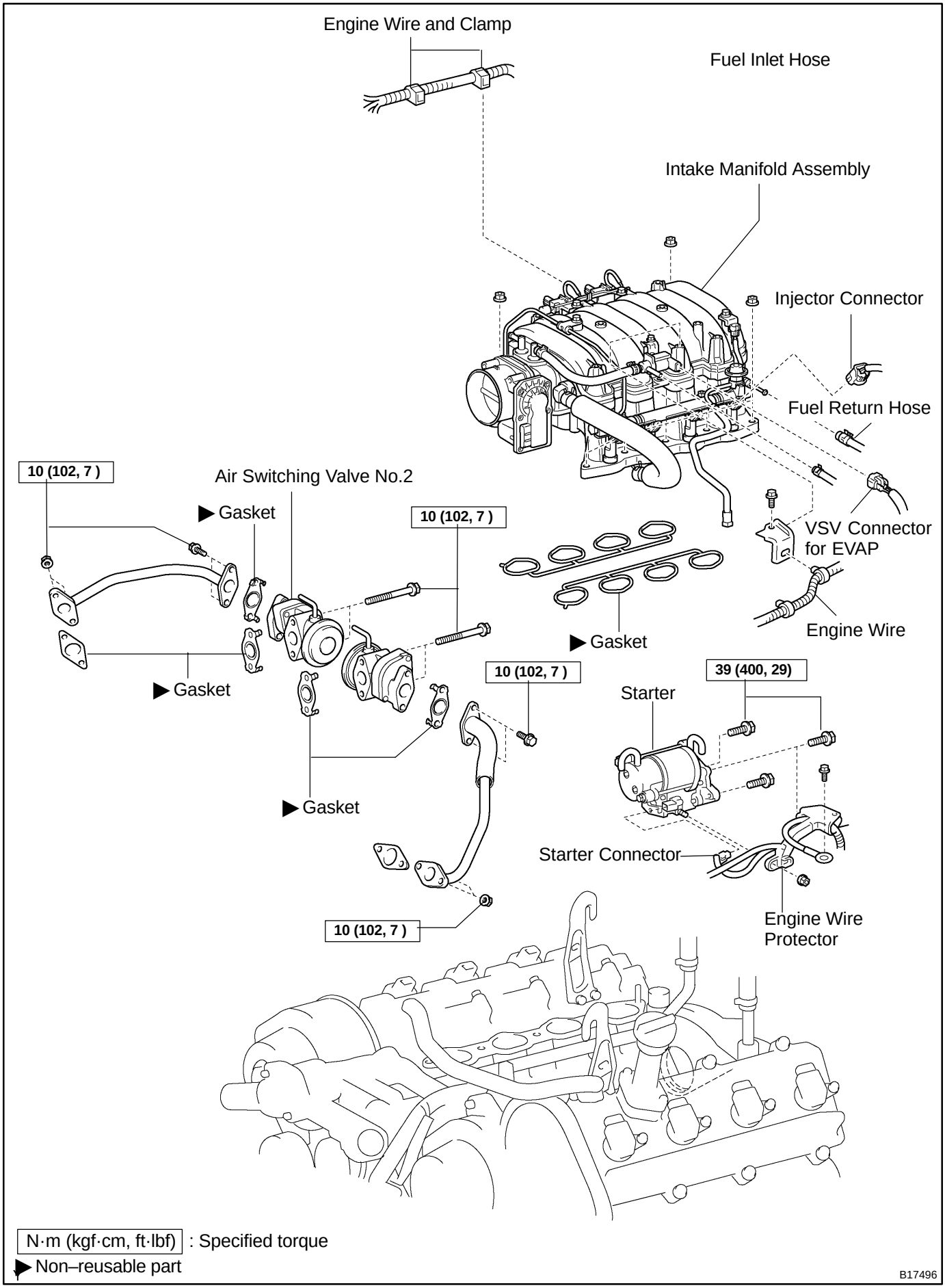
Engine Wire and Clamp
Fuel Inlet Hose
Intake Manifold Assembly
Injector Connector
Fuel Return Hose
VSV Connector for EVAP
Engine Wire
10 (102, 7)
Air Switching Valve No.2
▶ Gasket
10 (102, 7)
▶ Gasket
▶ Gasket
10 (102, 7)
▶ Gasket
39 (400, 29)
Starter
Starter Connector
Engine Wire Protector
10 (102, 7)
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
B17496

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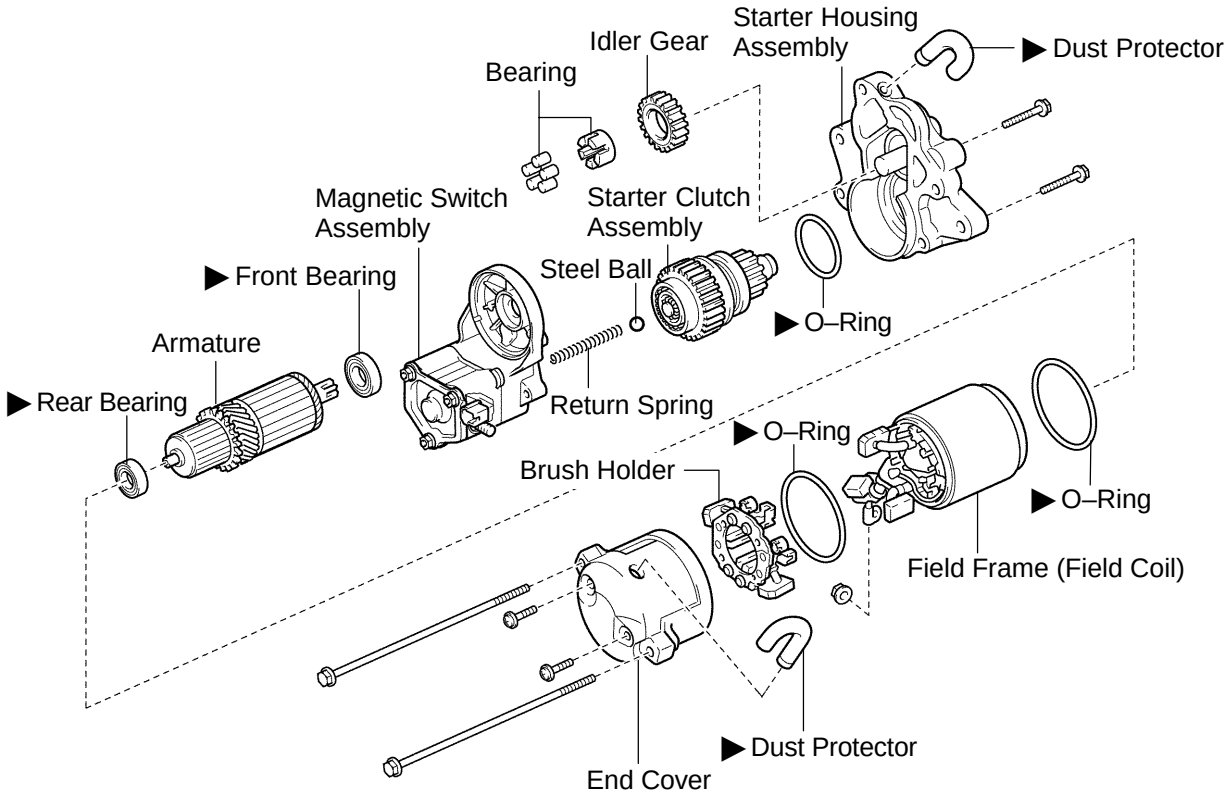
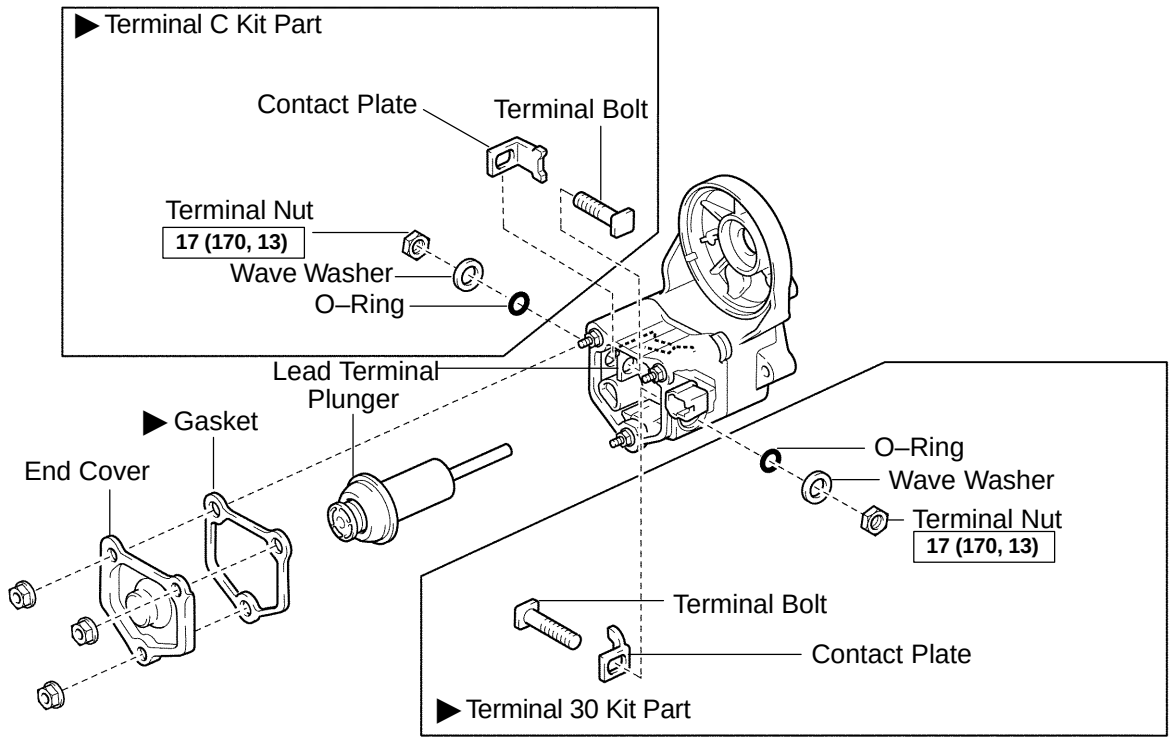


Magnetic Switch Assembly



N·m (kgf·cm, ft·lbf) : Specified torque

P ▶ Non–reusable part

B13802

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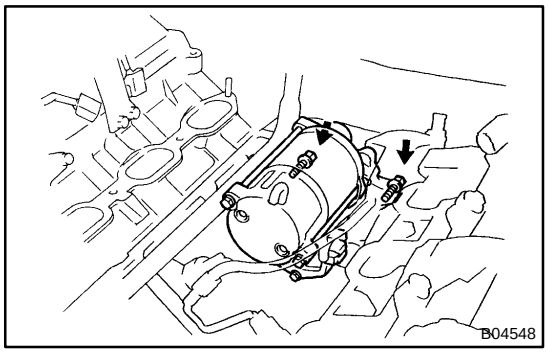
ST08Z–07

REMOVAL

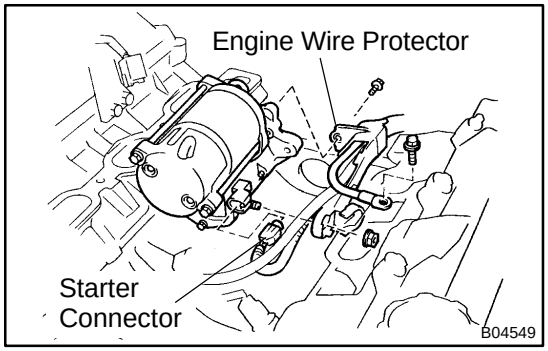
1. REMOVE THROTTLE BODY COVER
2. REMOVE INTAKE AIR CONNECTOR
3. DISCONNECT CABLE FROM NEGATIVE (–) BATTERY TERMINAL
4. DISCONNECT THROTTLE BODY ASSEMBLY FROM INTAKE MANIFOLD (See page SF–42)
5. REMOVE INTAKE MANIFOLD ASSEMBLY (See page EM–36)
6. REMOVE AIR PUMP ASSEMBLY (See page EC–22)



7. REMOVE STARTER

(a) Remove the 2 bolts holding the starter from the cylinder block.

(b) Disconnect the starter from the cylinder block.



(c) Disconnect the starter connector.

(d) Remove the nut, bolt and disconnect the starter wire.

(e) Remove the bolt, and disconnect the engine wire protector from the starter.

(f) Remove the starter.

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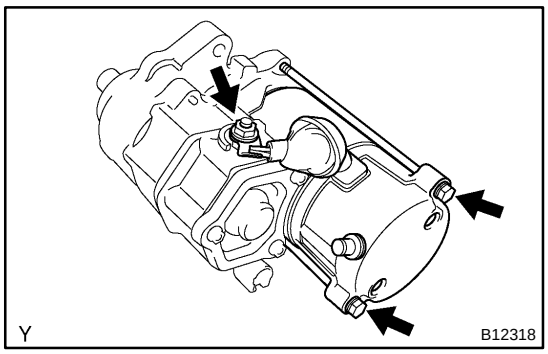
ST090–06

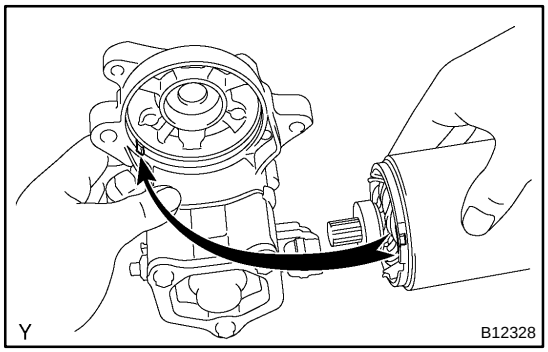
DISASSEMBLY



1. REMOVE FIELD FRAME AND ARMATURE

(a) Remove the nut, and disconnect the lead wire from the magnetic switch terminal.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)

(b) Remove the 2 through bolts.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)



(c) Pull out the field frame together with the armature from the magnetic switch assembly.

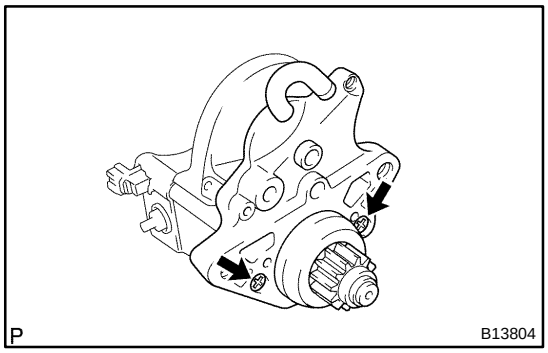
NOTICE:

At the time of assembly, align the protrusion of the field frame with the groove of the magnetic switch.

(d) Remove the O–ring from the field frame.

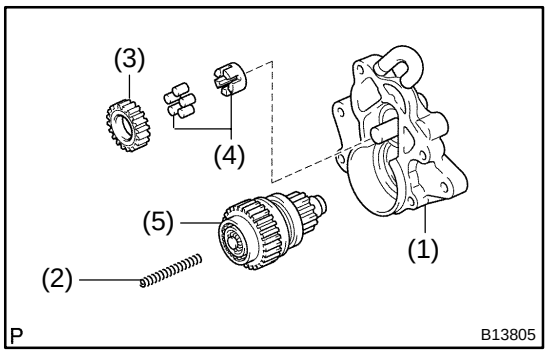
HINT:

At the time of assembly, use a new O–ring.



2. REMOVE STARTER HOUSING, CLUTCH ASSEMBLY AND GEAR

(a) Remove the 2 screws.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)



(b) Remove these parts from the magnetic switch assembly:
(1) Starter housing
(2) Return spring
(3) Idler gear
(4) Bearing
(5) Starter clutch assembly

HINT:

At the time of assembly, please refer to the following items.

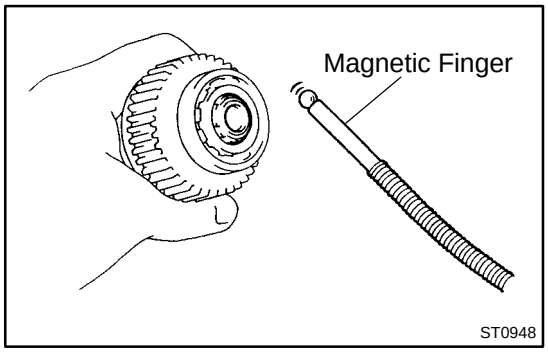
Apply grease to the return spring and insert the return spring into the clutch shaft hole.

3. REMOVE STEEL BALL

Using a magnetic finger, remove the steel ball from the clutch shaft hole.

HINT:

At the time of assembly, apply grease to the steel ball and insert the steel ball into the clutch shaft hole.



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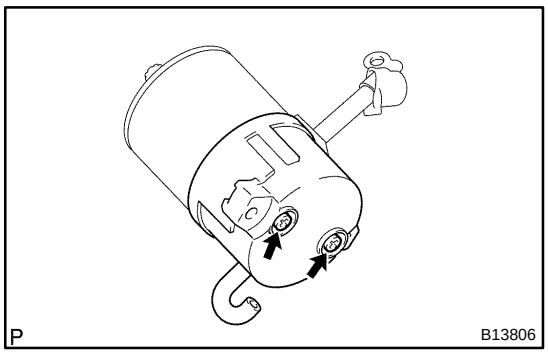


4. REMOVE BRUSH HOLDER

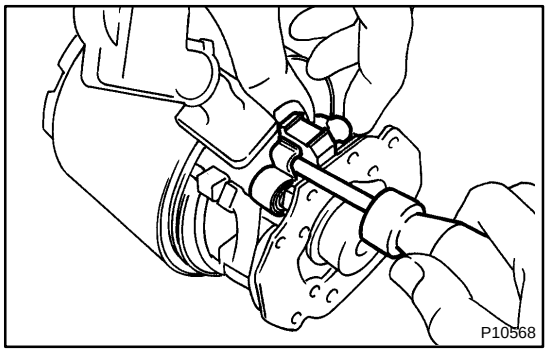
(a) Remove the 2 screws w/ O–ring and the end cover from the field frame.

Torque: 3.8 N·m (39 kgf·cm, 34 in.·lbf)

(b) Remove the O–ring from the field frame.

HINT:

At the time of assembly, use a new O–ring.



(c) Using a screwdriver, hold the spring back and disconnect the brush from the brush holder. Disconnect the 4 brushes, and remove the brush holder.

NOTICE:

Check that the positive (+) lead wires are not grounded.

5. REMOVE ARMATURE FROM FIELD FRAME

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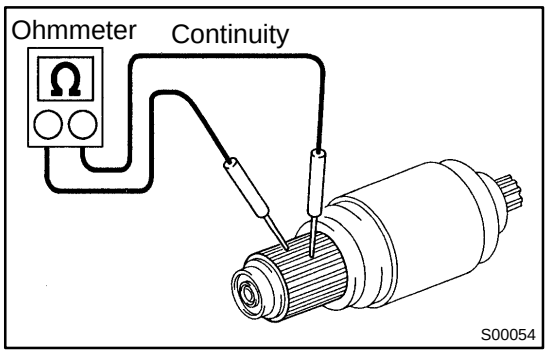
ST0N3–04

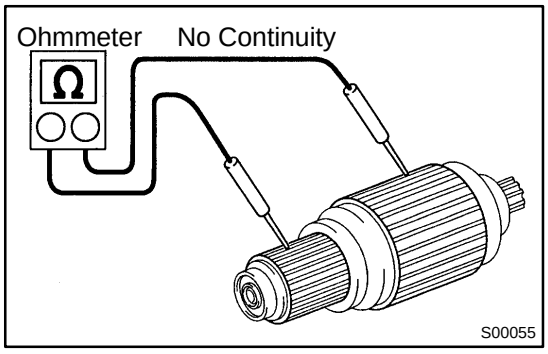
INSPECTION



1. INSPECT COMMUTATOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the segments of the commutator.

If there is no continuity between any segment, replace the armature.



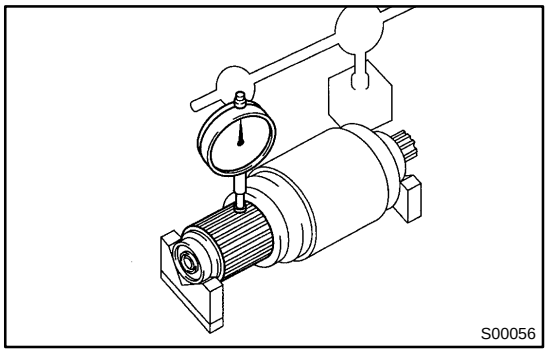
2. INSPECT COMMUTATOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the commutator and armature coil core.

If there is continuity, replace the armature.

3. INSPECT COMMUTATOR FOR DIRTY AND BURNT SURFACE

If the surface is dirty or burnt, correct it with sandpaper (No.400) or on a lathe.



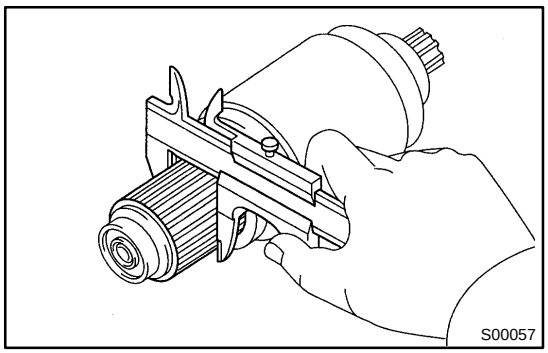
4. INSPECT COMMUTATOR CIRCLE RUNOUT

(a) Place the commutator on V–blocks.

(b) Using a dial indicator, measure the circle runout.

Maximum circle runout:
0.05 mm (0.0020 in.)

If the circle runout is greater than maximum, correct it on a lathe.

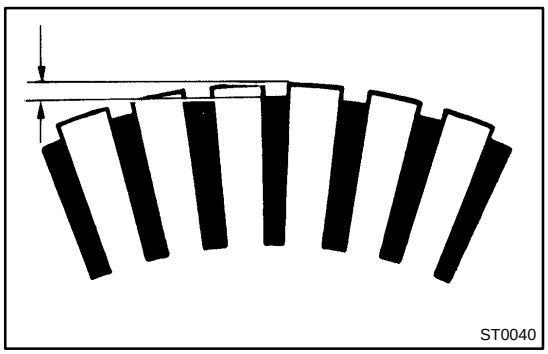


5. INSPECT COMMUTATOR DIAMETER

Using vernier calipers, measure the commutator diameter.

Standard diameter:
35.0 mm (1.378 in.)
Minimum diameter:
34.0 mm (1.339 in.)

If the diameter is less than minimum, replace the armature.



6. INSPECT UNDERCUT DEPTH

Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.

Standard undercut depth:
0.7 mm (0.028 in.)
Minimum undercut depth:
0.2 mm (0.008 in.)

If the undercut depth is less than minimum, correct it with a hacksaw blade.

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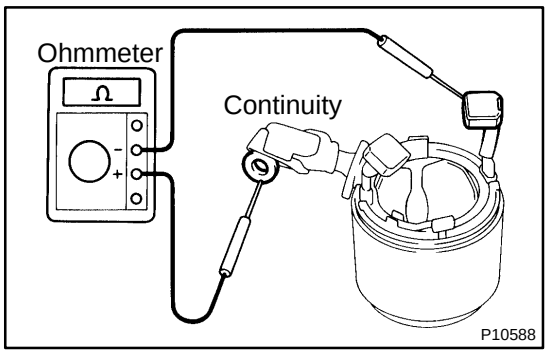
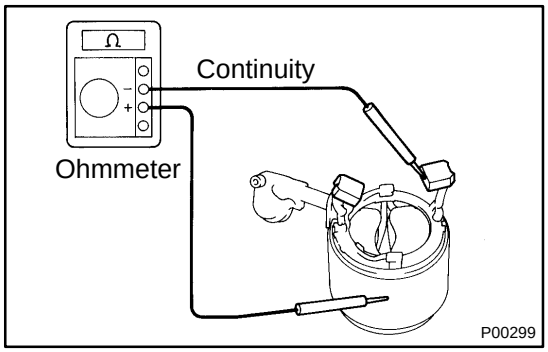


7. INSPECT FIELD COIL FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

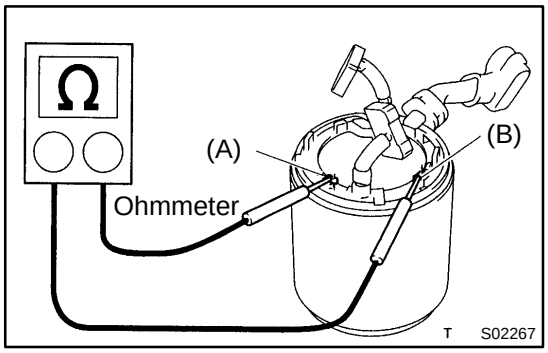
If there is no continuity, replace the field frame.



8. INSPECT SHUNT COIL FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the field coil end and field frame.

If there is no continuity, repair or replace the field frame.

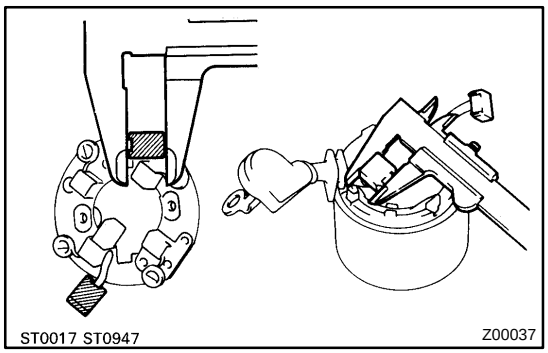


9. INSPECT SHUNT COIL FOR OPEN CIRCUIT

Using an ohmmeter, measure the resistance between shunt coil terminals (A) and (B).

Resistance: 1.5 to 1.9 Ω at 20 ˚C (68 ˚F)

If the resistance is not as specified, replace the field frame.



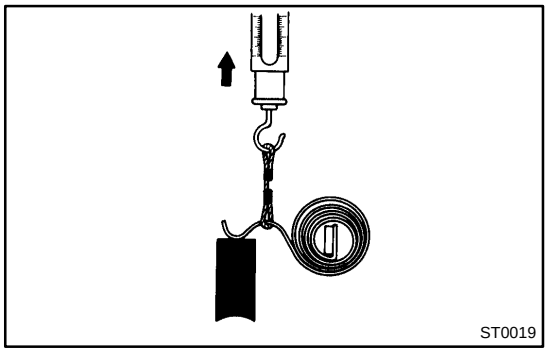
10. INSPECT BRUSH LENGTH

Using vernier calipers, measure the brush length.

Standard length: 15.0 mm (0.591 in.)

Minimum length: 9.0 mm (0.354 in.)

If the length is less than minimum, replace the brush holder and field frame.



11. INSPECT BRUSH SPRING LOAD

Using a pull scale, measure the spring load by pulling the spring from the brush until they are separated.

Standard spring installed load: 21.5 to 27.5 N (2.2 to 2.8 kgf, 4.8 to 6.2 lbf)

Minimum installed load: 12.7 N (1.3 kgf, 2.9 lbf)

If the installed load is less than minimum, replace the brush springs.

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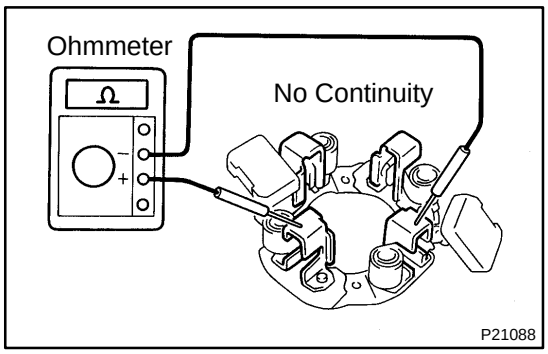


12. INSPECT BRUSH HOLDER INSULATION

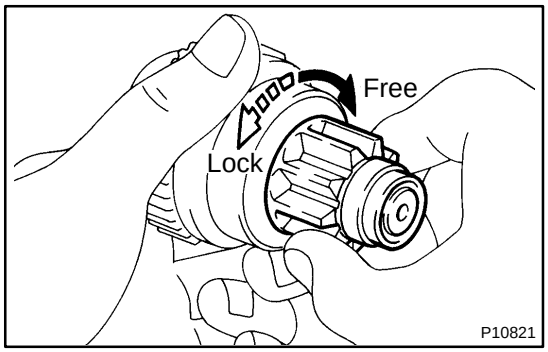
Using an ohmmeter, check that there is no continuity between the positive (+) and negative (–) brush holders.

If there is continuity, repair or replace the brush holder.

13. INSPECT GEAR TEETH

Check the gear teeth on the pinion gear, idle gear and the clutch assembly for wear or damage.

If any damage is found, replace the gear or clutch assembly, and also check the drive plate ring gear for wear or damage.



14. INSPECT CLUTCH PINION GEAR

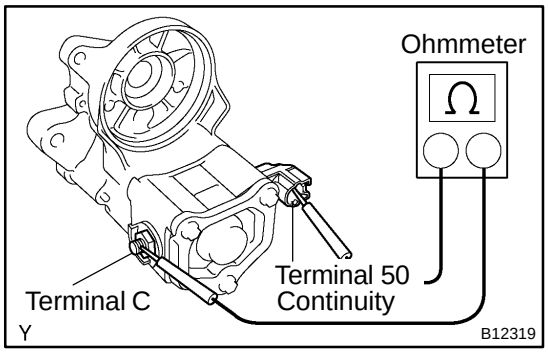
Rotate the pinion gear clockwise, and check that it turns freely. Check that it locks by rotating the pinion gear counterclockwise.

If necessary, replace the clutch assembly.

15. INSPECT FRONT AND REAR BEARING

Turn the bearing by hand as applying inward force.

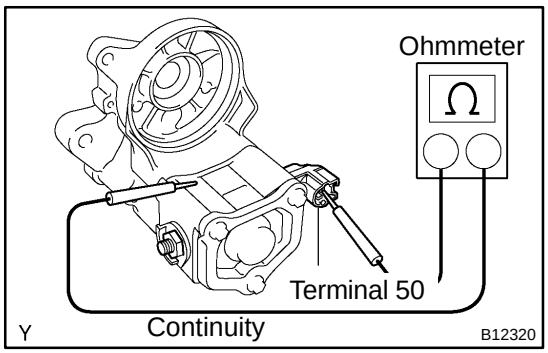
If resistance is felt or the bearing sticks, replace the bearing.



16. DO PULL–IN COIL OPEN CIRCUIT TEST

Using an ohmmeter, check that there is continuity between terminals 50 and C.

If there is no continuity, replace the magnetic switch.



17. DO HOLDING COIL OPEN CIRCUIT TEST

Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.

If there is no continuity, replace the magnetic switch.

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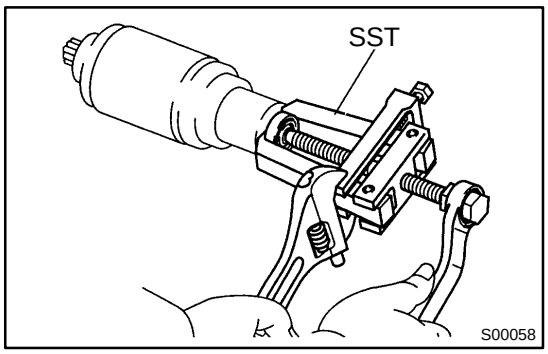
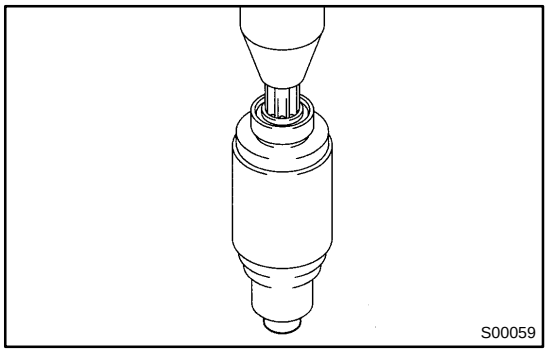
ST092–07

REPLACEMENT

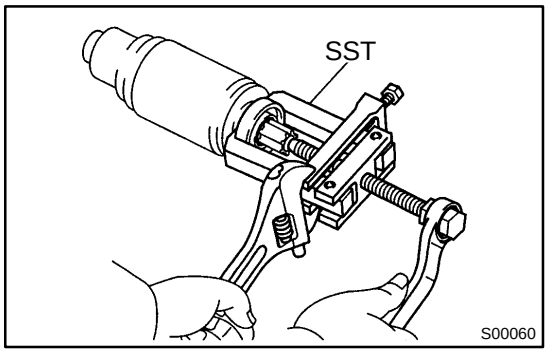


1. REPLACE REAR BEARING

(a) Using SST, remove the bearing.
SST 09286–46011

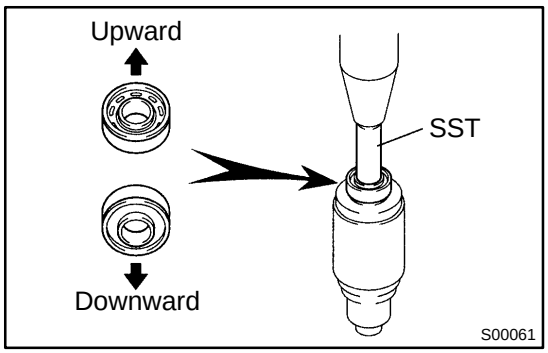


(b) Using a press, press in a new bearing.



2. REPLACE FRONT BEARING

(a) Using SST, remove the bearing.
SST 09286–46011

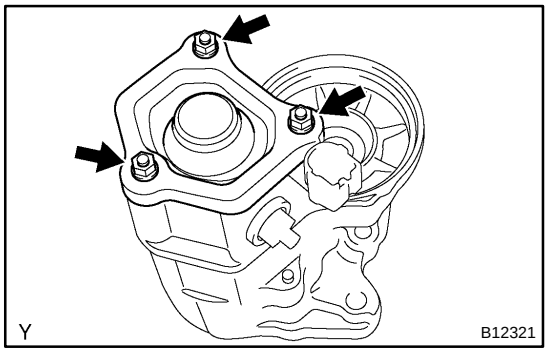


(b) Using SST and a press, press in a new bearing.

NOTICE:

Be careful of the bearing installation direction.

SST 09820–00031



3. REPLACE MAGNETIC SWITCH TERMINAL KIT PARTS

(a) Remove the magnetic switch end cover.
Remove the 3 nuts, the end cover, the gasket and the plunger.

NOTICE:

Do not loosen the 3 stud bolts.

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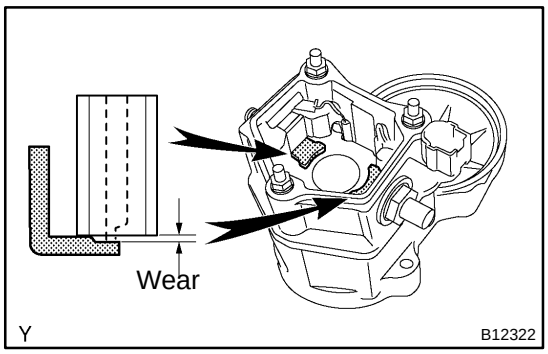
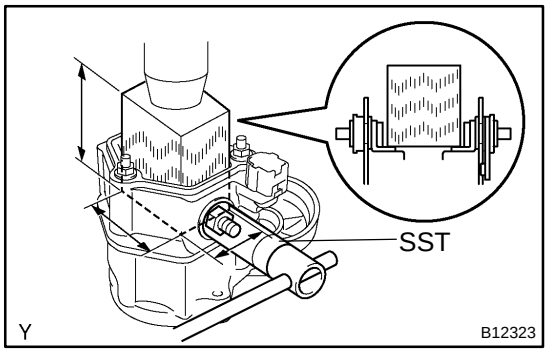
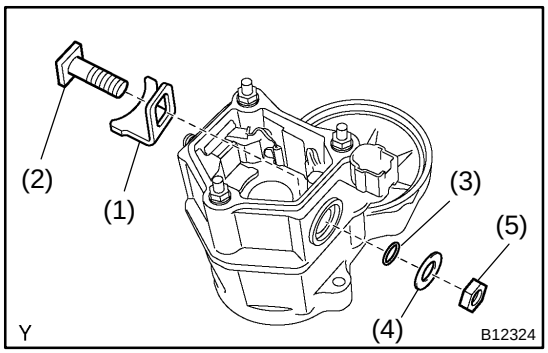


(b) Inspect contact plate for wear.
Using vernier calipers, measure the contact plate for depth of wear.
Maximum wear:
0.9 mm (0.035 in.)

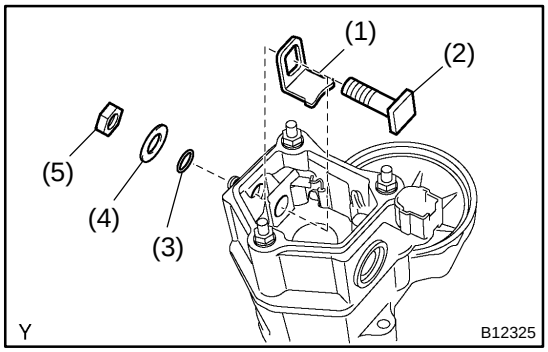
If the depth of wear is greater than the maximum, replace the contact plate.



(c) Remove terminal kit parts.
(1) Put a wooden block on the plate, and press it down with a hand press.
Dimensions of wooden block:
20 X 33 X 40 mm (0.79 X 1.30 X 1.57 in.)
(2) Using SST, loosen the terminal nuts.
SST 09810–38140
(3) Terminal C:
Remove the terminal nut, wave washer, terminal insulator (outside), O–ring, terminal bolt, contact plate and terminal insulator (inside).
(4) Terminal 30:
Remove the terminal nut, wave washer, terminal insulator (outside), O–ring, terminal bolt, contact plate, terminal insulator (inside) and insulation paper.



(d) Temporarily install these new terminal 30 kit parts:
(1) Contact plate
(2) Terminal bolt
(3) O–ring
(4) Wave washer
(5) Terminal nut



(e) Temporarily install these new terminal C kit parts:
(1) Contact plate
(2) Terminal bolt
(3) O–ring
(4) Wave washer
(5) Terminal nut

(f) Temporarily tighten the terminal nuts.

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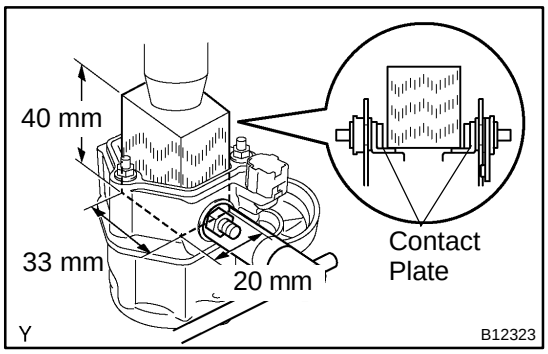


(g) Tighten terminal nuts.

(1) Put a wooden block on the contact plate and press it down with a hand press.

Dimensions of wooden block:
20 x 33 x 40 mm (0.79 x 1.30 x 1.57 in.)
Press force:
981 N (100 kgf, 221 lbf)

NOTICE:

- **Check the diameter of the hand press ram. Then calculate the gauge pressure of the press when 981 N (100 kgf, 221 lbf) of force is applied.**
  Gauge pressure:

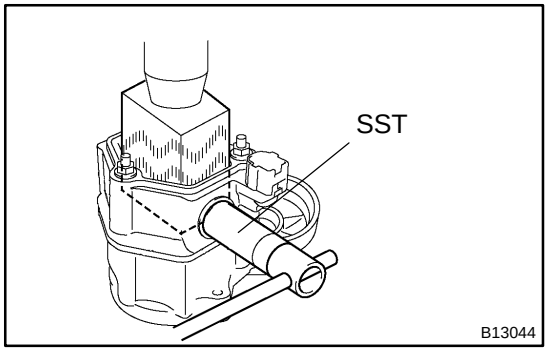
$$(\text{kgf/cm}^2) = \frac{100\ \text{kgf}}{\left(\frac{\text{Ram diameter (cm)}}{2}\right)^2 \times 3.14\ (\pi)}$$

$$(\text{psi}) = \frac{221\text{lbf}}{\left(\frac{\text{Ram diameter (in.)}}{2}\right)^2 \times 3.14\ (\pi)}$$

(kPa) = (kgf/cm^2) x 98.1

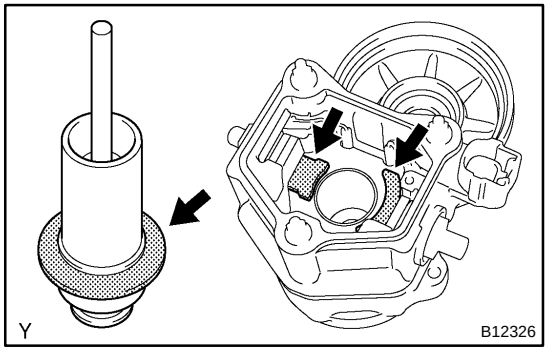
(kPa) = (psi) x 6.9

- **If the contact plate is not pressed down with the specified pressure, the contact plate may tilt due to coil deformation or the tightening of the nut.**



(2) Using SST, tighten the nuts to the specified torque.
SST 09810–38140
Torque: 17 N·m (170 kgf·cm, 13 ft·lbf)

NOTICE:
If the nut is over tightened, it may cause cracks on the plastic frame.



(h) Clean contact surfaces of the contact plate and the plunger.
Clean the contact surfaces of the remaining contact plate and plunger with a dry shop rag.

(i) Reinstall the magnetic switch end cover.
Install the plunger, the new gasket and the end cover with the 3 nuts.
Torque: 3.6 N·m (37 kgf·cm, 32 in.·lbf)

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ST093–03

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page ST–6).

HINT:

At the time of assembly, use high–temperature grease to lubricate the bearing and gears when assembling the starter.

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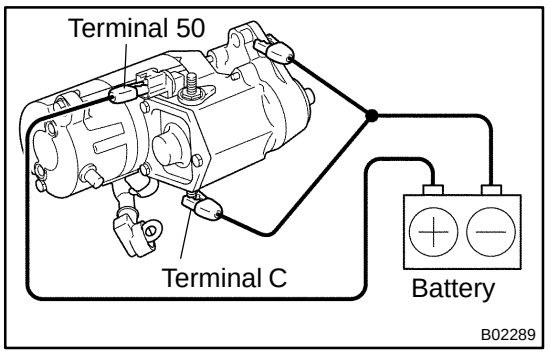
ST094–06



TEST

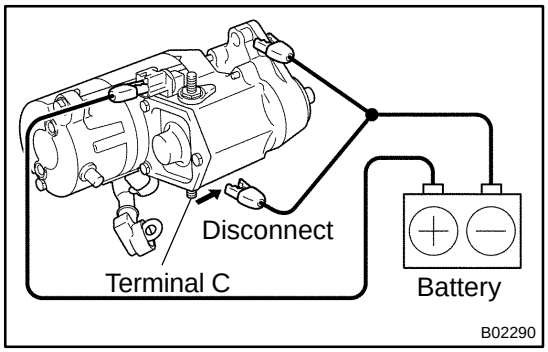
NOTICE:

These tests must be done within 3 to 5 seconds to avoid the coil to be burned – out.

1. DO PULL–IN TEST

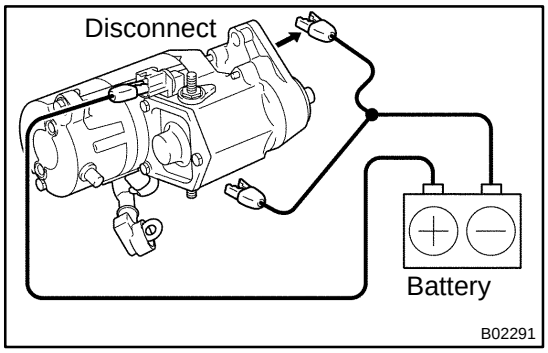
(a) Disconnect the field coil lead wire from terminal C.

(b) Connect the battery to the magnetic switch as shown. Check that the pinion gear moves outward.



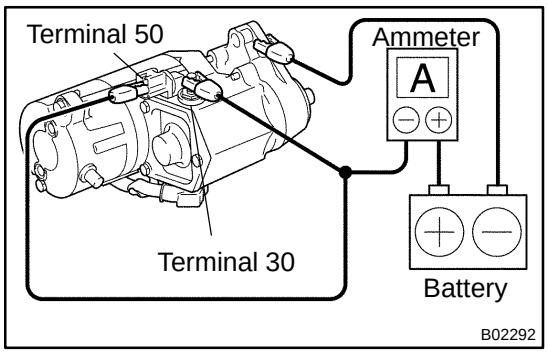
2. DO HOLDING TEST

While connected as above with the pinion gear out, disconnect the negative (–) lead from terminal C. Check that the pinion gear remains out.



3. INSPECT CLUTCH PINION GEAR RETURN

Disconnect the negative (–) lead from the starter body. Check that the pinion gear returns inward.



4. DO NO–LOAD PERFORMANCE TEST

(a) Connect the battery and ammeter to the starter as shown.

(b) Check that the starter rotates smoothly and steadily with the pinion gear moving out. Check that the ammeter shows the specified current.

Specified current:

At 11.5 V: 100 A or less

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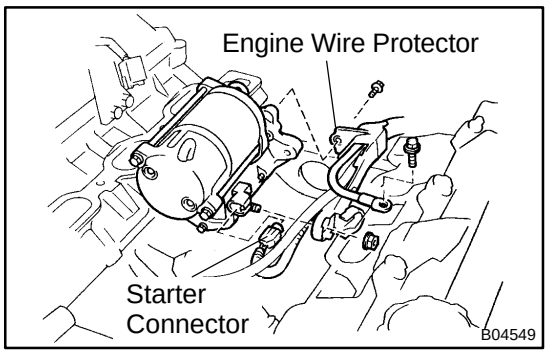
ST095–06

INSTALLATION



1. INSTALL STARTER

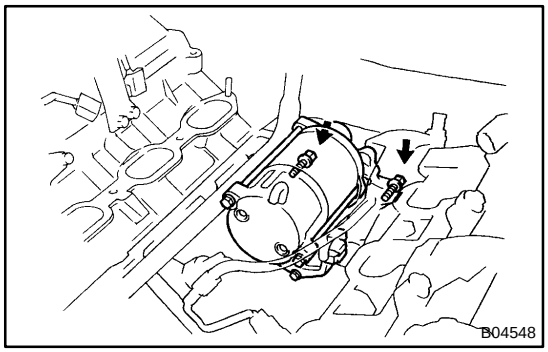
(a) Install the engine wire protector to the starter with the bolt.
Torque: 9.81 N·m (100 kgf·cm, 84 in.·lbf)

(b) Connect the starter wire with the nut.
Torque: 9.81 N·m (100 kgf·cm, 84 in.·lbf)

(c) Connect the starter connector.

(d) Connect the starter to the cylinder block.

(e) Connect the engine wire with the bolt.



(f) Install the starter with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

2. INSTALL AIR PUMP ASSEMBLY (See page EC–26)

3. INSTALL INTAKE MANIFOLD ASSEMBLY (See page EM–60)

4. CONNECT THROTTLE BODY ASSEMBLY TO INTAKE MANIFOLD (See page SF–43)

5. INSTALL INTAKE AIR CONNECTOR

6. INSTALL THROTTLE BODY COVER

7. CONNECT CABLE TO NEGATIVE (–) BATTERY TERMINAL

8. PERFORM INITIALIZATION (See page IN–20)

Some system need initialzation when disconnecting the cable from the battery terminal.

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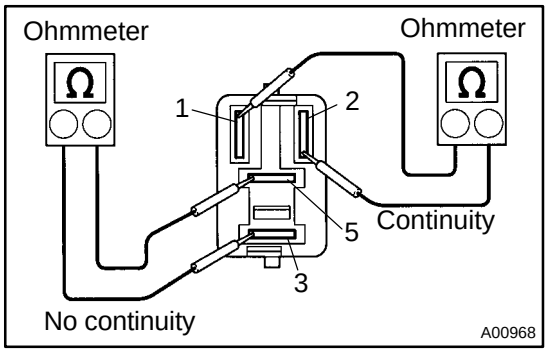
STARTER RELAY

ST0PJ–01

INSPECTION

1. REMOVE STARTER RELAY

Remove the relay box cover and starter relay.



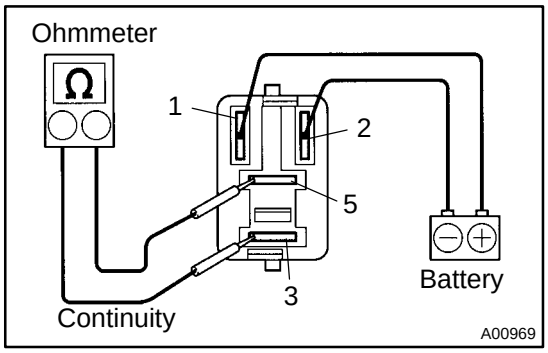
2. INSPECT STARTER RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.



3. INSPECT STARTER RELAY OPERATION

(a) Apply battery positive voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

4. REINSTALL STARTER RELAY

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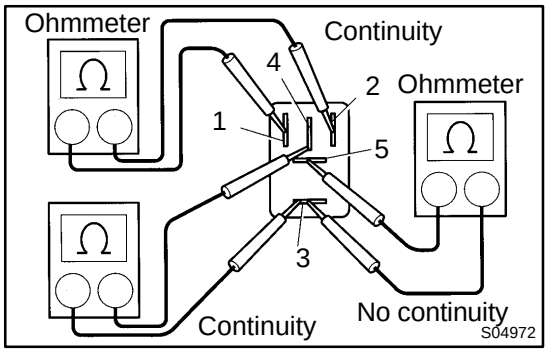
ACC CUT RELAY

ST0OT–02

INSPECTION

1. REMOVE ACC CUT RELAY

Remove the cowl side trim board LH and ACC cut relay.



2. INSPECT ACC CUT RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

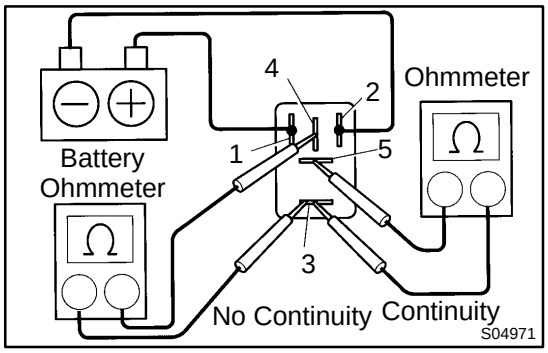
If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.

(c) Check that there is continuity between terminals 3 and 4.

If there is no continuity, replace the relay.



3. INSPECT ACC CUT RELAY OPERATION

(a) Apply battery positive voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If there is continuity, replace the relay.

(c) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

4. REINSTALL ACC CUT RELAY

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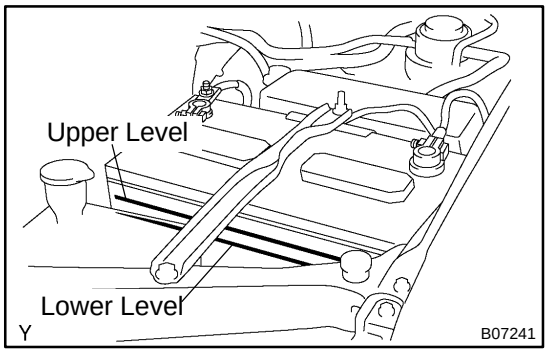
CHARGING SYSTEM

CH0K7–03

ON–VEHICLE INSPECTION

CAUTION:

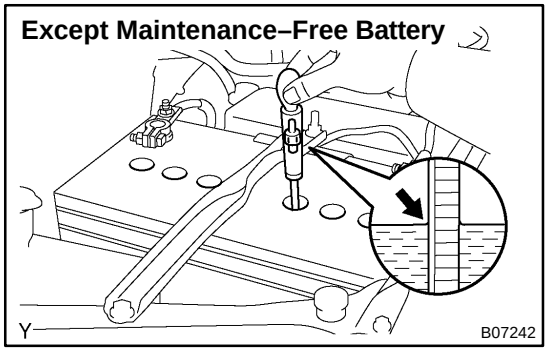
- **Check that the battery cables are connected to the correct terminals.**
- **Disconnect the battery cables when the battery is given a quick charge.**
- **Do not perform tests with a high voltage insulation resistance tester.**
- **Never disconnect the battery while the engine is running.**



1. CHECK BATTERY ELECTROLYTE LEVEL

Check the electrolyte quantity of each cell.

If under the lower level, replace the battery (or add distilled water if possible) and check the charging system.



2. Except Maintenance–Free Battery: CHECK BATTERY SPECIFIC GRAVITY

Check the specific gravity of each cell.

Standard specific gravity:
1.25 to 1.29 at 20˚C (68˚F)

If the specific gravity is less than the specification, charge the battery.

3. Maintenance–Free Battery: CHECK BATTERY VOLTAGE

(a) In the case that 20 minutes have not passe4d after stopping the engine, turn on the ignition switch and the electrical system (headlight, blower motor, rear defogger, etc.) for 60 seconds before removing the surface charge.

(b) Turn the ignition switch OFF and turn off the electrical systems.

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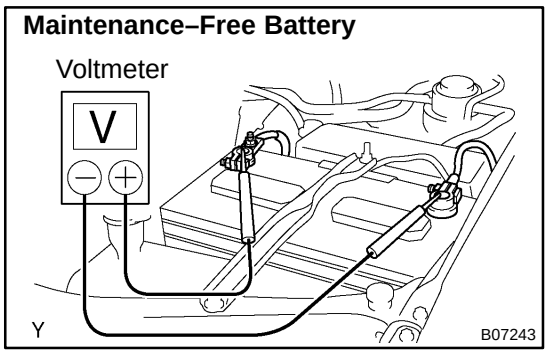
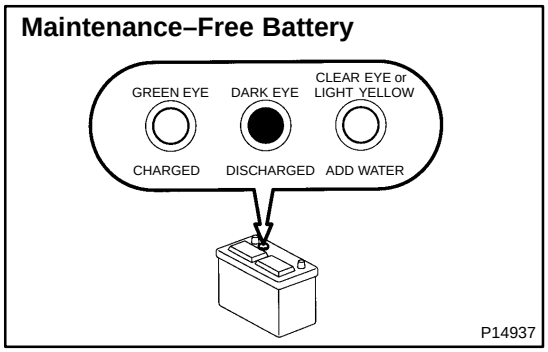


(c) Measure the battery voltage between the negative (–) and positive (+) terminals of the battery.
Standard voltage:
12.5 to 12.9 V at 20˚C (68˚F)

If the voltage is less than the specification, charge the battery.



HINT:
Check the indicator as shown in the illustration.

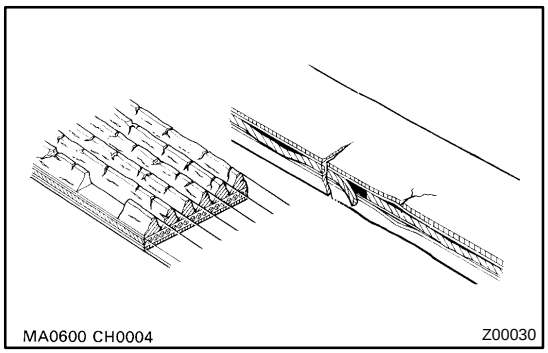
4. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Check that the battery terminals are not loose or corroded.

(b) Check the fusible link and fuses for continuity.

5. INSPECT DRIVE BELT

HINT:
Since the belt tensioner is used, checking the belt tension is not necessary.

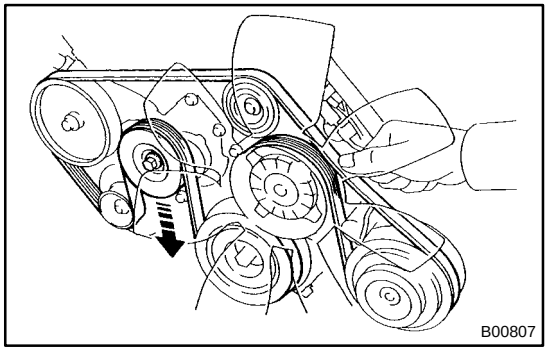


(a) Visually check the drive belt for excessive wear, frayed cords etc.

If necessary, replace the drive belt.

HINT:

- Cracks on the rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.
- The drive belt tension can be released by turning the belt tensioner counterclockwise. The pulley bolt for the belt tensioner has a left–hand thread.



(b) Check the belt tensioner operation.

- Check that the belt tensioner moves downward when the drive belt is pressed down at the points indicated in the illustration with approx. 98 N (10 kgf, 22.0 lbf) of force.
- Check the alignment of the belt tensioner pulley to make sure the drive belt does not slipped off the pulley.

If necessary, replace the belt tensioner.

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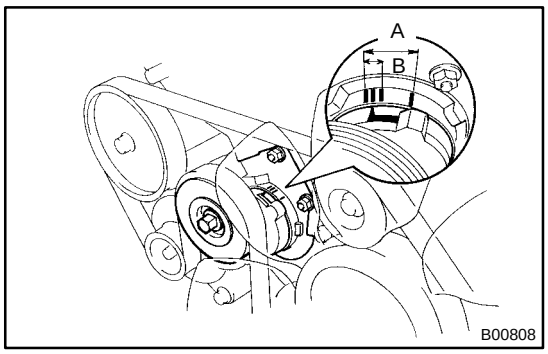
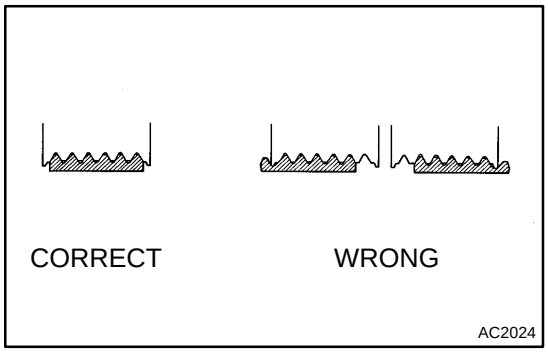


▶ Check that the arrow mark on the belt tensioner falls within area A of the scale.

If it is outside area A, replace the drive belt.

HINT:

▶ When a new belt is installed, it should lie within area B. If not, the drive belt is not correct.



▶ After installing a belt, check that it fits properly in the ribbed grooves.

▶ Check by hand to confirm that the belt does not slipped out of the groove on the bottom of the pulley.

6. REMOVE ENGINE UNDER COVER NO.1

7. VISUALLY CHECK GENERATOR WIRING AND LISTEN FOR ABNORMAL NOISES

(a) Check that the wiring is in good condition.

(b) Check that there is no abnormal noise from the generator while the engine is running.

8. CHECK CHARGE WARNING LIGHT CIRCUIT

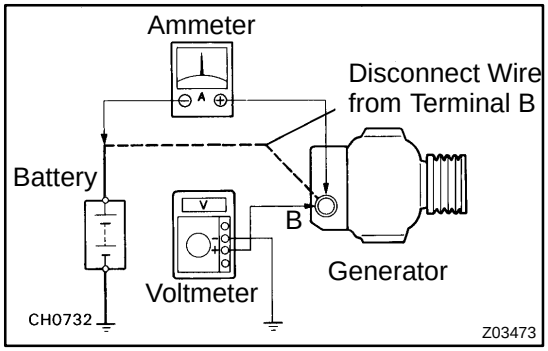
(a) Warm up the engine and then turn it off.

(b) Switch off all accessories.

(c) Turn the ignition switch ON, and check that the charge warning light comes on.

(d) Start the engine, and check that the light goes off.

If the light does not go off as specified, troubleshoot the charge light circuit.



9. INSPECT CHARGING CIRCUIT WITHOUT LOAD

HINT:

If a battery/generator tester is available, connect the tester to the charging circuit as per manufacturer's instructions.

(a) If a tester is not available, connect a voltmeter and ammeter to the charging circuit as follows:

▶ Disconnect the wire from terminal B of the generator, and connect it to the negative (–) tester probe of the ammeter.

▶ Connect the positive (+) tester probe of the ammeter to terminal B of the generator.

▶ Connect the positive (+) tester probe of the voltmeter to terminal B of the generator.

▶ Ground the negative (–) tester probe of the voltmeter.

(b) Check the charging circuit as follows:

With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.

Standard amperage: 10 A or less

Standard voltage: 13.2 to 14.0 V

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If the voltmeter reading is more than the standard voltage, replace the voltage regulator.

If the voltmeter reading is less than the standard voltage, check the voltage regulator and generator.

10. INSPECT CHARGING CIRCUIT WITH LOAD

(a) With the engine running at 2,000 rpm, turn on the high beam headlights and set the heater blower switch to HI.

(b) Check the reading on the ammeter.

Standard amperage: 30 A or more

If the ammeter reading is less than the standard amperage, repair the generator.

HINT:

If the battery is fully charged, the indication will sometimes be less than standard amperage.

11. REINSTALL ENGINE UNDER COVER

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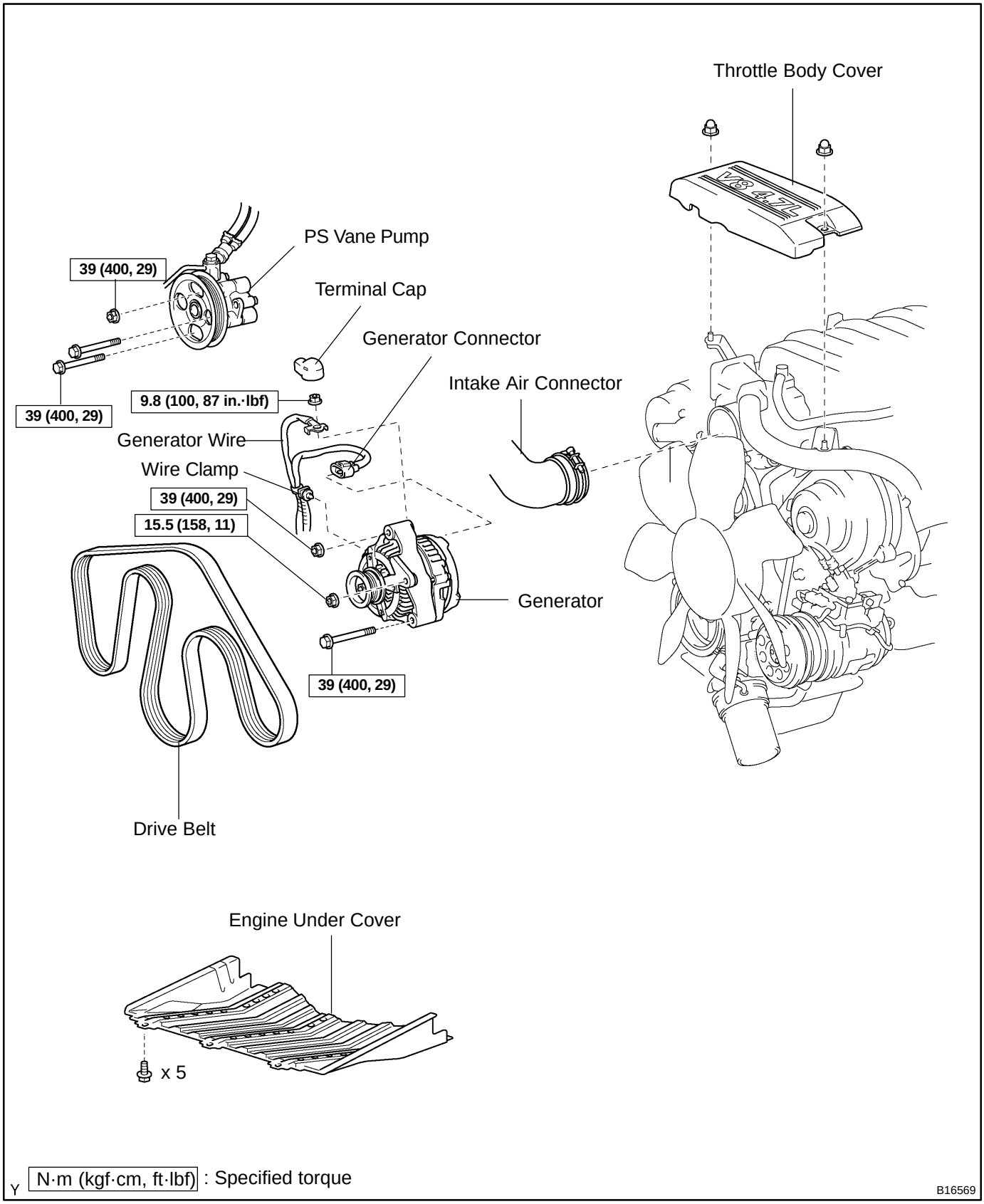
GENERATOR

COMPONENTS

CH073–08



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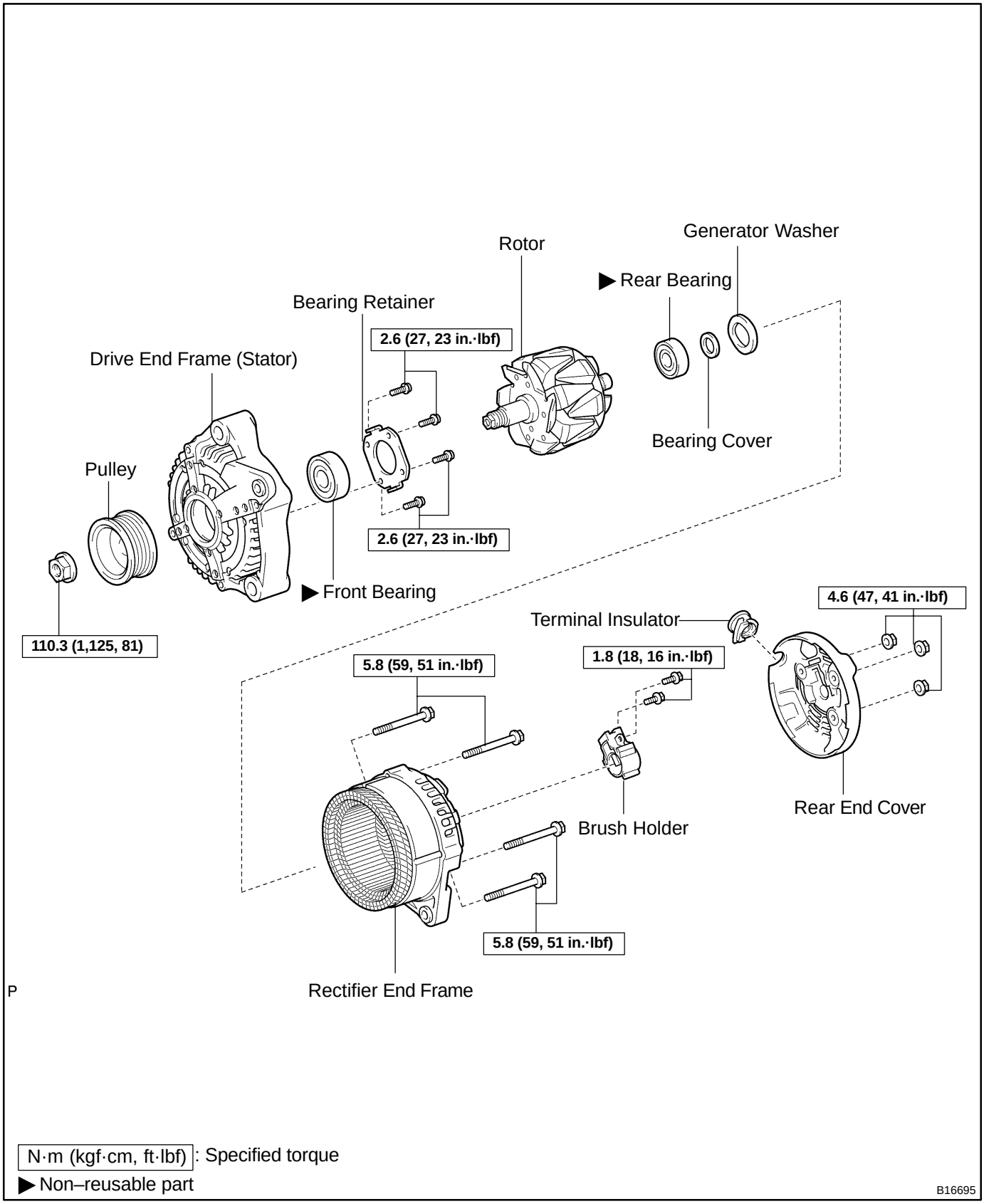
Generator Washer
Rotor
▶ Rear Bearing
Bearing Retainer
2.6 (27, 23 in.·lbf)
Drive End Frame (Stator)
Bearing Cover
Pulley
2.6 (27, 23 in.·lbf)
▶ Front Bearing
110.3 (1,125, 81)
4.6 (47, 41 in.·lbf)
Terminal Insulator
1.8 (18, 16 in.·lbf)
5.8 (59, 51 in.·lbf)
Rear End Cover
Brush Holder
5.8 (59, 51 in.·lbf)
Rectifier End Frame
P
N·m (kgf·cm, ft·lbf): Specified torque
▶ Non–reusable part
B16695

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CH0LY–02

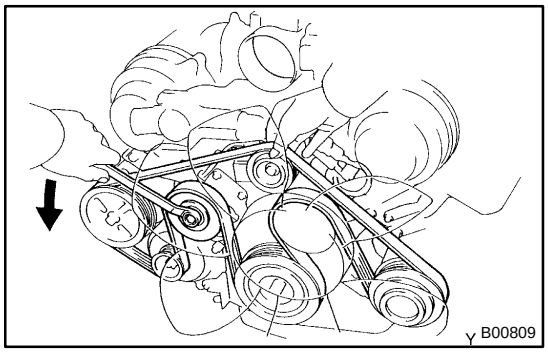
REMOVAL

1. REMOVE ENGINE UNDER COVER

2. REMOVE THROTTLE BODY COVER

3. DISCONNECT CABLE FROM NEGATIVE (–) BATTERY TERMINAL

4. DISCONNECT INTAKE AIR CONNECTOR FROM THROTTLE BODY



5. REMOVE DRIVE BELT

Loosen the belt tension by turning the belt tensioner counterclockwise, and remove the drive belt.

HINT:

The pulley bolt for the belt tensioner has a left hand thread.

6. REMOVE PS VANE PUMP FROM ENGINE
(See page SR–28)

7. REMOVE GENERATOR

(a) Disconnect the generator connector.

(b) Remove the terminal cap and nut, and disconnect the generator wire.

(c) Disconnect the wire clamp from the cord clip on the generator.

(d) Remove the bolt, the 2 nuts and the generator.

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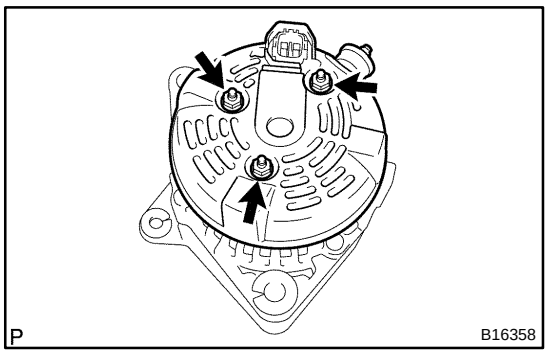
CH0LZ–02

DISASSEMBLY



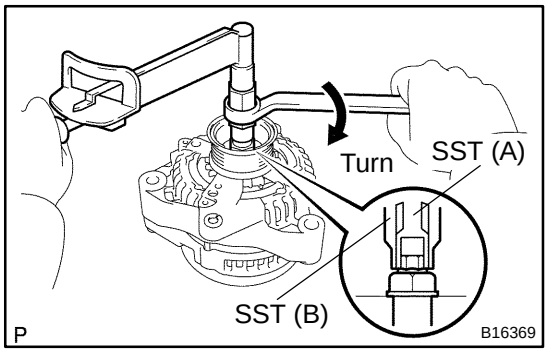
1. REMOVE REAR END COVER

(a) Remove the 3 nuts the and end cover.

(b) Remove the terminal insulator.

2. REMOVE BRUSH HOLDER

(a) Remove the 2 screws and brush holder.



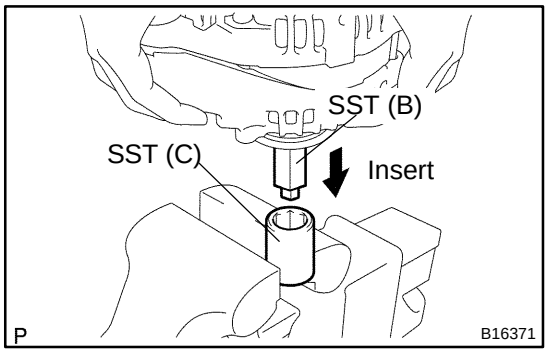
3. REMOVE PULLEY

(a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.

SST 09820–63011

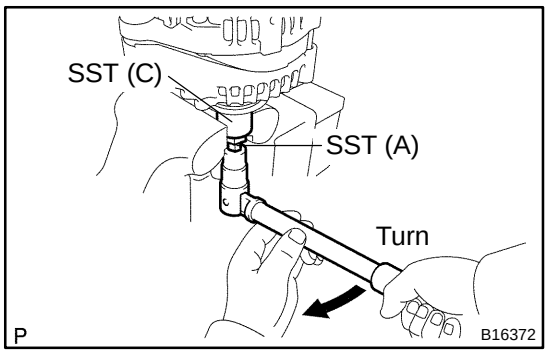
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Check that SST (A) is secured to the rotor shaft.



(c) Mount SST (C) in a vise.

(d) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

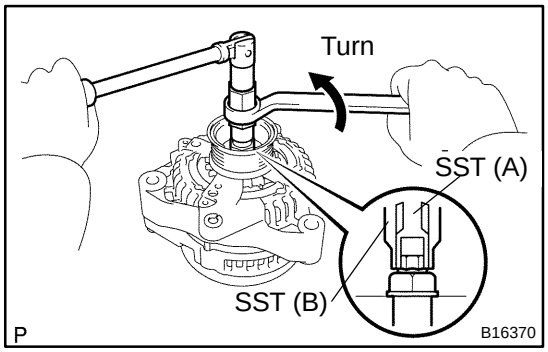


(e) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.

NOTICE:

To prevent damage to the rotor shaft, do not loosen the pulley nut more than one–half of a turn.

(f) Remove the generator from SST (C).



(g) Turn SST (B), and remove SST (A and B).

(h) Remove the pulley nut and pulley.

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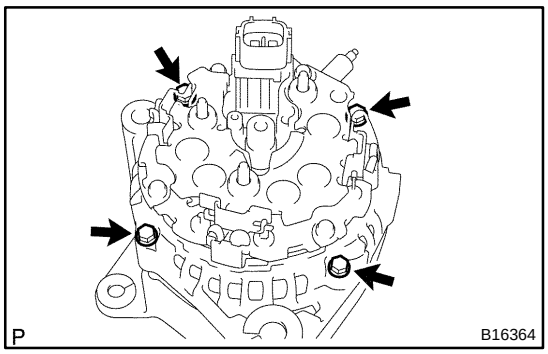
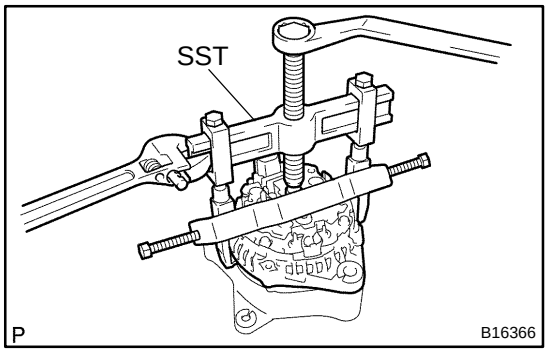


4. REMOVE COIL ASSEMBLY

(a) Remove the 4 bolts.



(b) Using SST, remove the coil assembly.
SST 09950–40011 (09951–04020, 09952–04010 09953–04020, 09954–04010, 09955–04071, 09958–04011)

(c) Remove the generator washer.

5. REMOVE ROTOR FROM DRIVE END FRAME

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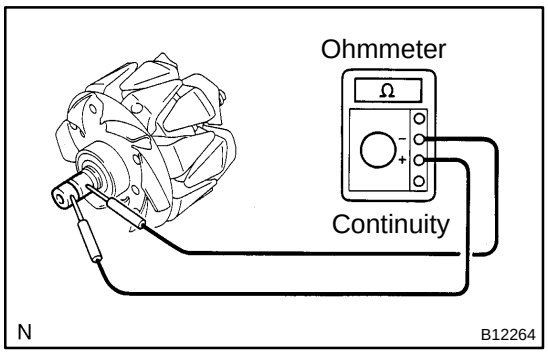
CH0M0–02

INSPECTION

1. INSPECT ROTOR

(a) Check the rotor for open circuit.
Using an ohmmeter, check that there is continuity between the slip rings.
Standard resistance: 1.5 to 1.9 Ω at 20˚C (68˚F)

If there is no continuity, replace the rotor.

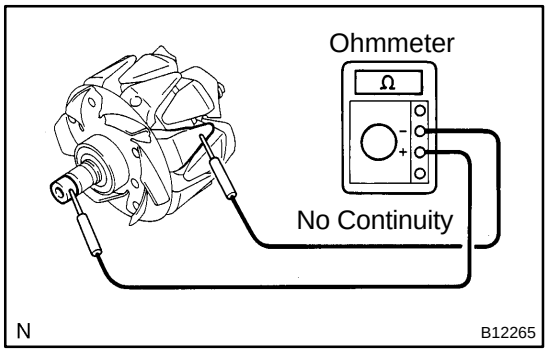


(b) Check the rotor for ground.
Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

If there is continuity, replace the rotor.

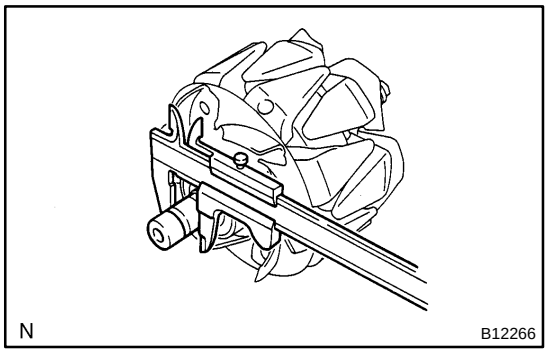
(c) Check that the slip rings are not rough or scored.

If rough or scored, replace the rotor.



(d) Using vernier calipers, measure the slip ring diameter.
Standard diameter: 14.2 to 14.4 mm (0.559 to 0.567 in.)
Minimum diameter: 14.0 mm (0.551 in.)

If the diameter is less than the minimum, replace the rotor.



2. INSPECT BRUSHES

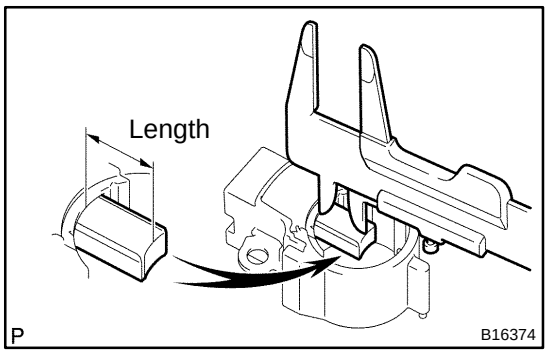
Using vernier caliper, measure the exposed brush length.
Standard exposed length: 10.5 mm (0.413 in.)
Minimum exposed length: 4.5 mm (0.177 in.)

If the exposed length is less than the minimum, replace the brushes and the brush holder assembly.

3. INSPECT BEARING

Check the bearing is not rough or worn.

If necessary, replace the bearing (See page CH–11).



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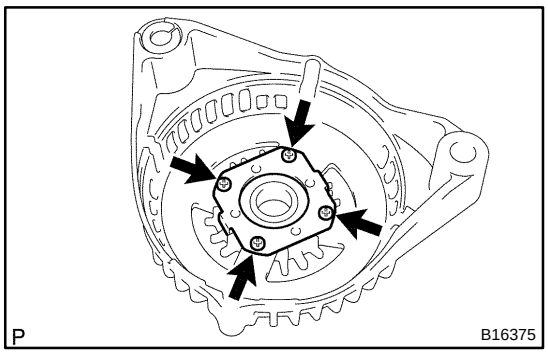
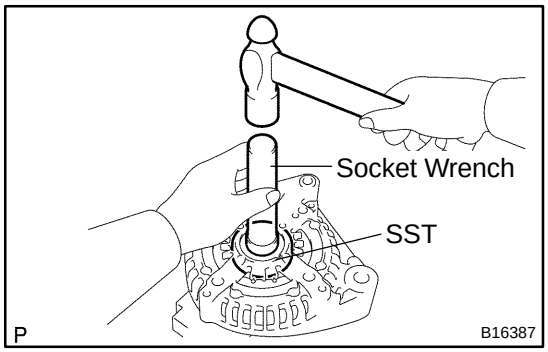
CH0M1–02

REPLACEMENT

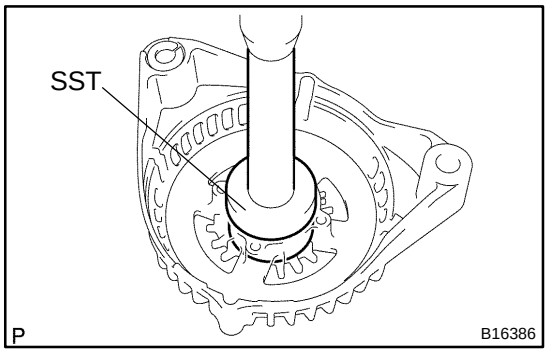


1. REPLACE FRONT BEARING

(a) Remove the 4 screws, the bearing retainer and the bearing.

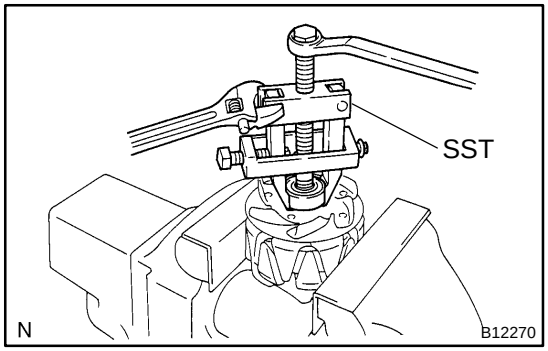


(b) Using SST and a hammer, tap out the bearing.
SST 09950–60010 (09951–00250), 09950–70010 (09951–07100)



(c) Using SST and a press, press in a new bearing.
SST 09950–60010 (09951–00470), 09950–70010 (09951–07100)

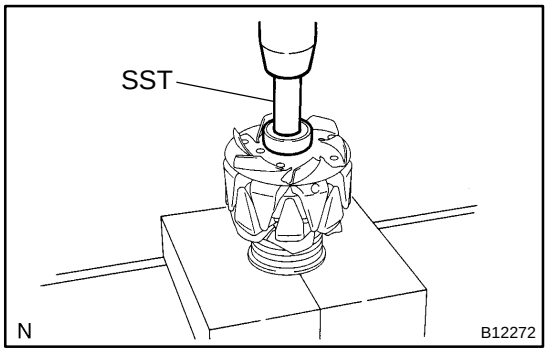
(d) Install the bearing retainer with the 4 screws.
Torque: 2.6 N·m (27 kgf·cm, 23 in.·lbf)



2. REPLACE REAR BEARING

(a) Using SST, remove the bearing cover (outside) and the bearing.
SST 09820–00021

NOTICE:
Be careful not to damage the fan.



(b) Using SST and a press, press in a new bearing.
SST 09820–00031

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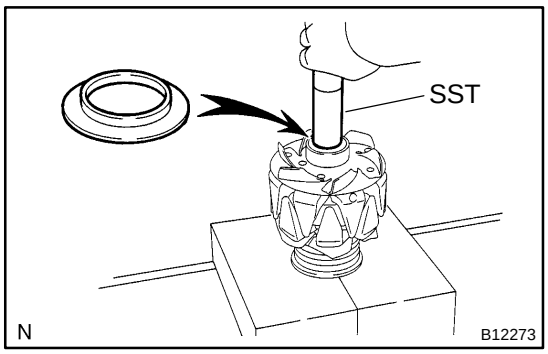

(c) Using SST, push in the bearing cover (outside).
SST 09285–76010

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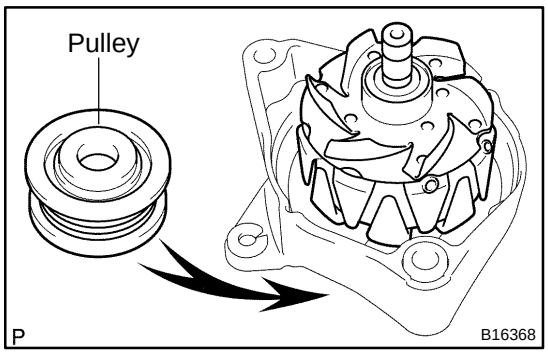
CH0M2–02

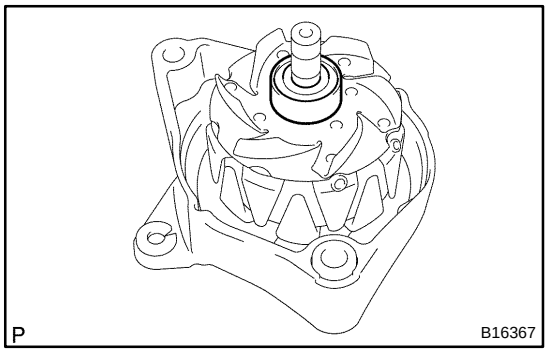
REASSEMBLY



1. INSTALL ROTOR TO DRIVE END FRAME

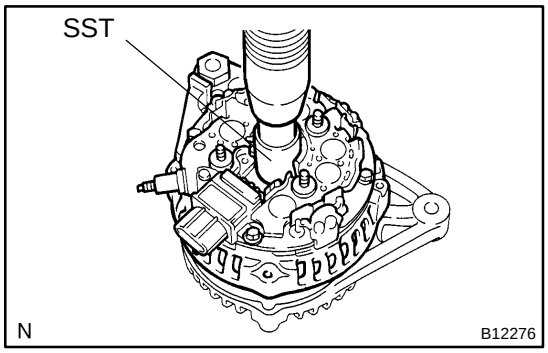
(a) Place the drive end frame on the pulley.

(b) Install the rotor to the drive end frame.

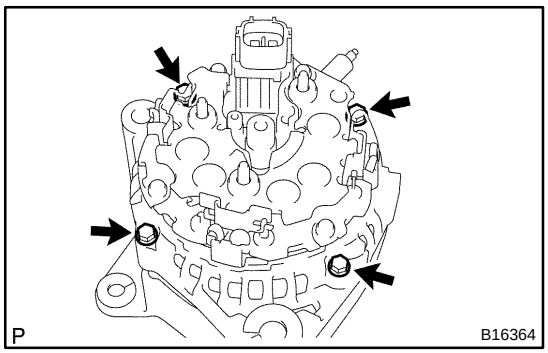


2. INSTALL COIL ASSEMBLY

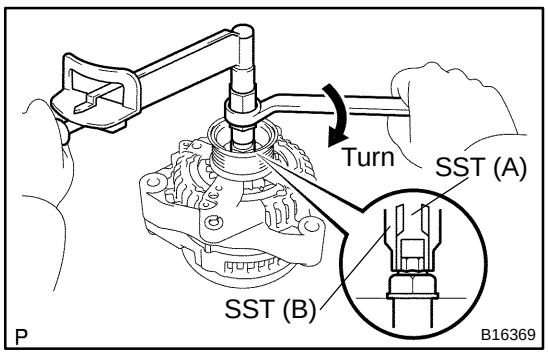
(a) Place the generator washer on the rotor.



(b) Using SST and a press, slowly press in the coil assembly.
SST 09285–76010



(c) Install the coil assembly with the 4 bolts.
Torque: 5.8 N·m (59 kgf·cm, 51 in.·lbf)



3. INSTALL PULLEY

(a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.

(b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820–63011
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(c) Check that SST (A) is secured to the pulley shaft.

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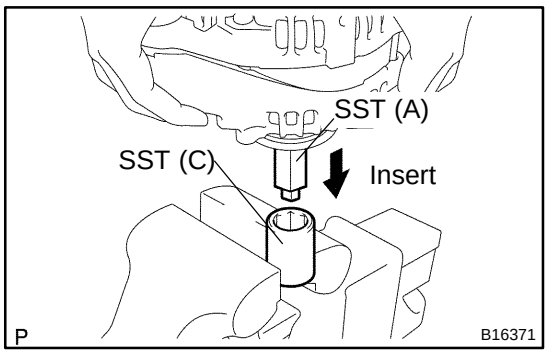
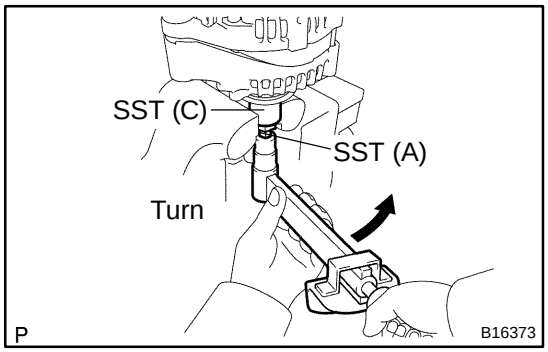
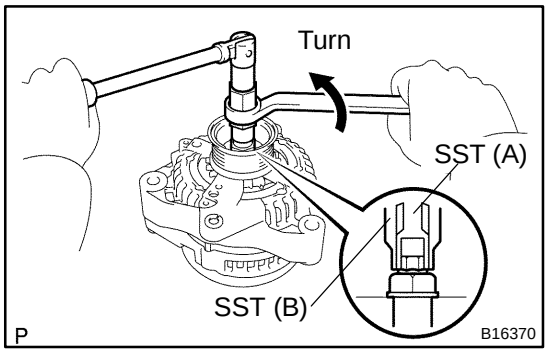


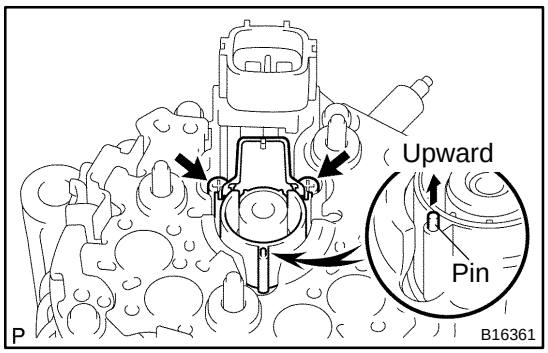
(d) Mount SST (C) in a vise.
(e) Insert SST (A) into SST (C), and attach the pulley nut to SST (C).



(f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 110.3 N·m (1,125 kgf·cm, 81 ft·lbf)
(g) Remove the generator from SST (C).



(h) Turn SST (B), and remove SST (A and B).

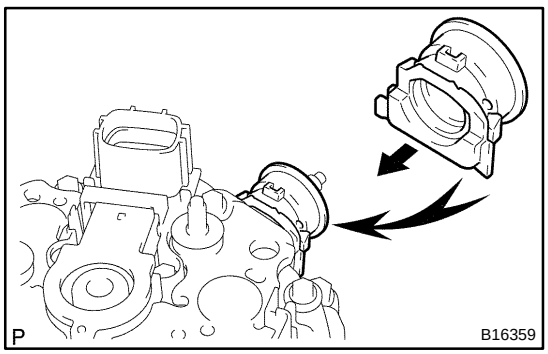


(i) Place the brush holder on the coil assembly with the pin facing upward.

NOTICE:

Be careful of the holder installation direction.

(j) Install the 2 screws.
Torque: 1.8 N·m (18 kgf·cm, 16 in.·lbf)



4. INSTALL REAR END COVER

(a) Install the terminal insulator.

NOTICE: Be careful of the terminal insulator installation direction.

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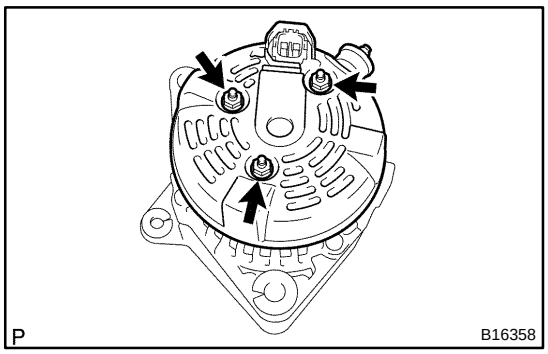


(b) Install the end cover with the 3 nuts.
Torque: 4.6 N·m (47 kgf·cm, 41 in.·lbf)

5. CHECK THAT ROTOR ROTATES SMOOTHLY

Dardoor.com

CH0M3–02

INSTALLATION

1. INSTALL GENERATOR

(a) Install the generator with the bolt and the 2 nuts.
Torque:
Bolt: 39 N·m (400 kgf·cm, 29 ft·lbf)
Nut 10 mm: 39 N·m (400 kgf·cm, 29 ft·lbf)
Nut 8 mm: 15.5 N·m (158 kgf·cm, 11 ft·lbf)

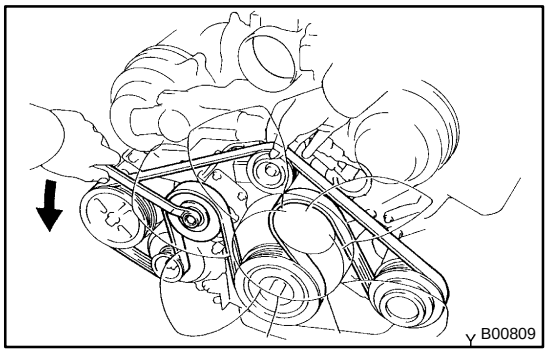
(b) Connect the generator connector.

(c) Connect the generator wire with the nut.
Torque: 9.8 N·m (100 kgf·cm, 87 in.·lbf)

(d) Install the terminal cap.

(e) Install the wire clamp to the cord clip on the generator.

2. INSTALL PS VANE PUMP (See page SR–36)



3. INSTALL DRIVE BELT

Install the belt by turning the belt tensioner counterclockwise.

HINT:

The pulley bolt for the belt tensioner has a left – hand thread.

4. CONNECT INTAKE AIR CONNECTOR TO THROTTLE BODY

5. PERFORM ON–VEHICLE INSPECTION (See page CH–1)

6. INSTALL THROTTLE BODY COVER

7. INSTALL ENGINE UNDER COVER

8. CONNECT CABLE TO NEGATIVE (–) BATTERY TERMINAL

9. PERFORM INITIALIZATION (See page IN–20)

Some system need initialzation when disconnecting the cable from the battery terminal.

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AUTOMATIC TRANSMISSION SYSTEM

AT130–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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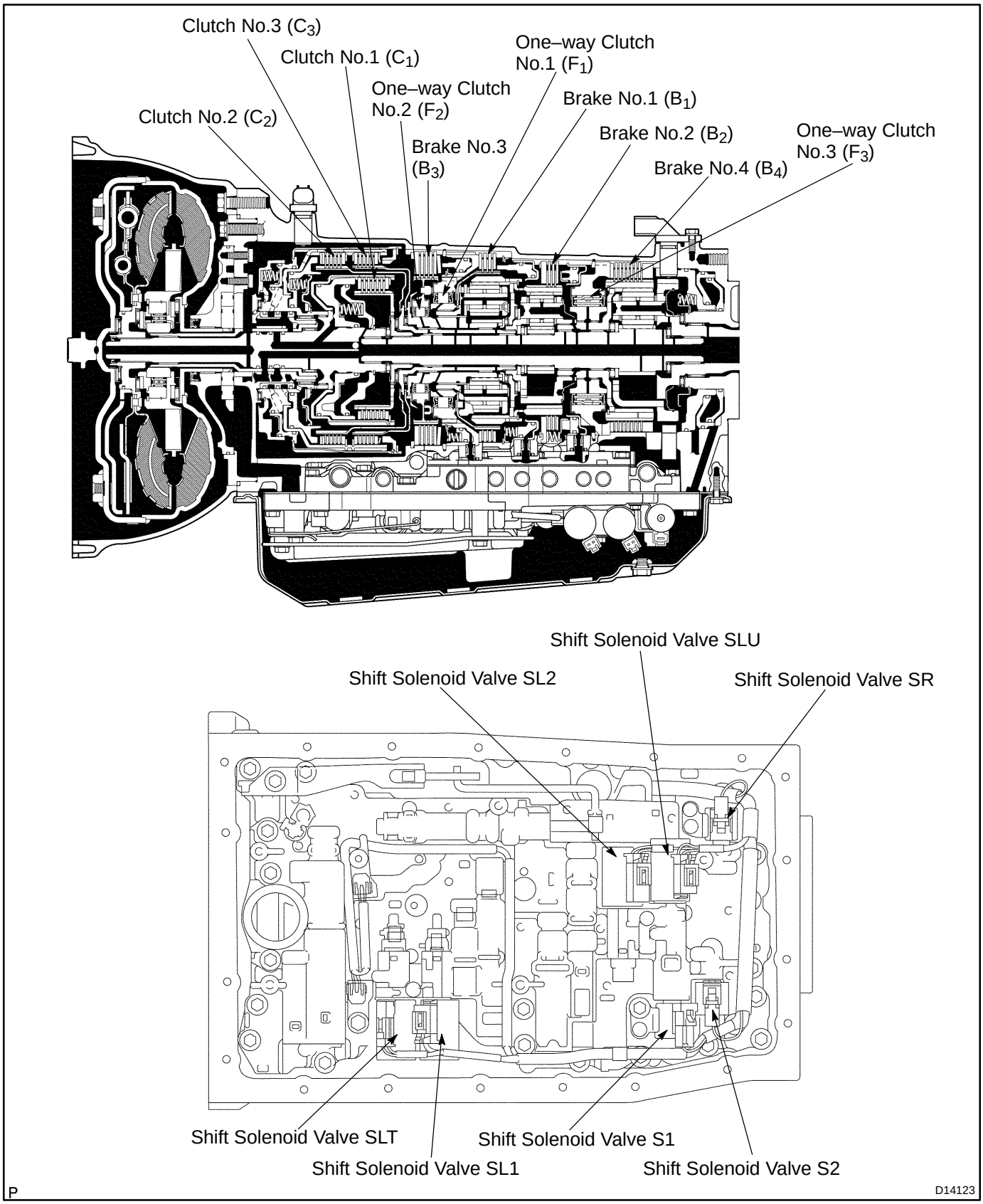
AT131–01

OPERATION



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Shift Lever Position	Gear Position	S1	S2	SR	SL1	SL2	SLU	C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
P	Park	○	¿	¿	¿	○	¿	¿	¿	¿	¿	¿	¿	¿	¿	¿	¿
R	Reverse	○	¿	¿	¿	○	¿	¿	¿	○	○	¿	¿	○	○	¿	¿
N	Neutral	○	¿	¿	¿	○	¿	¿	¿	¿	¿	¿	¿	¿	¿	¿	¿
D	1st	○	¿	¿	¿	○	¿	○	¿	¿	¿	¿	¿	¿	¿	¿	○
	2nd	○	○	¿	¿	○	¿	○	¿	¿	¿	¿	○	¿	○	○	¿
	3rd	¿	○	¿	¿	○	¿	○	¿	○	¿	¿	○	¿	○	¿	¿
	4th	¿	¿	¿	¿	○	○	○	○	○	¿	¿	○	¿	¿	¿	¿
	5th	¿	¿	○	○	¿	○	¿	○	○	○	¿	○	¿	¿	¿	¿
D (O/D OFF)	1st	○	¿	¿	¿	○	¿	○	¿	¿	¿	¿	¿	¿	¿	¿	○
	2nd	○	○	¿	¿	○	¿	○	¿	¿	¿	¿	○	¿	○	○	¿
	3rd	¿	○	¿	¿	○	¿	○	¿	○	¿	¿	○	¿	○	¿	¿
	4th	¿	¿	¿	¿	○	○	○	○	○	¿	¿	○	¿	¿	¿	¿
3	1st	○	¿	¿	¿	○	¿	○	¿	¿	¿	¿	¿	¿	¿	¿	○
	2nd	○	○	¿	¿	○	¿	○	¿	¿	¿	¿	○	¿	○	○	¿
	3rd	¿	○	¿	¿	¿	¿	○	¿	○	○	¿	○	¿	○	¿	¿
2	1st	○	¿	¿	¿	○	¿	○	¿	¿	¿	¿	¿	¿	¿	¿	○
	2nd	○	○	○	¿	¿	¿	○	¿	¿	¿	○	○	¿	○	○	¿
L	1st	○	¿	¿	¿	¿	¿	○	¿	¿	¿	¿	¿	○	¿	¿	○

○ : Operates

F1, F2, F3 : Operates only when driving

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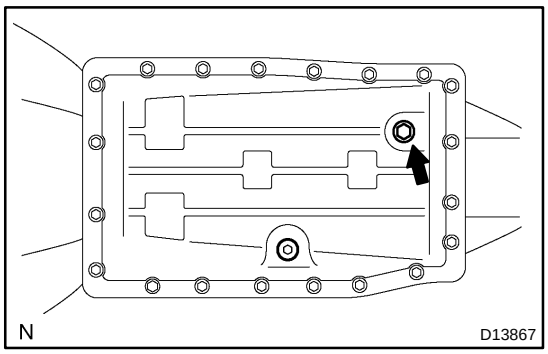


EXTENSION HOUSING OIL SEAL (A750E)

AT132–01

ON–VEHICLE REPAIR

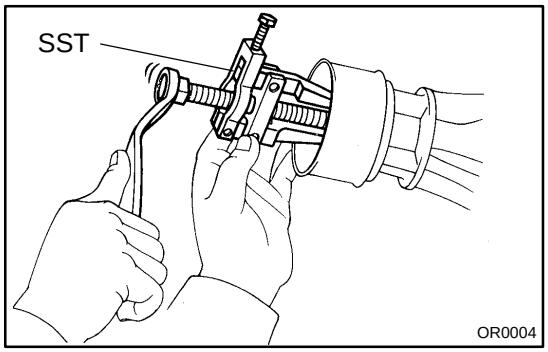
1. DRAIN AUTOMATIC TRANSMISSION FLUID

(a) Remove the drain plug and gasket, and drain the ATF.

(b) Install a new gasket and the drain plug.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

2. REMOVE PROPELLER SHAFT (See page PR–3)



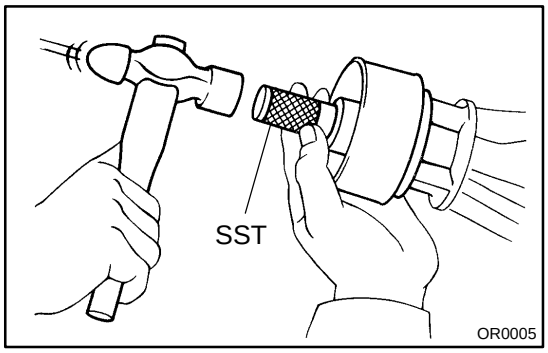
3. REMOVE REAR OIL SEAL

NOTICE:

Clean the extension housing before removing the oil seal.

Using SST, remove the oil seal.

SST 09308–10010



4. INSTALL OIL SEAL

(a) Using SST and a hammer, carefully drive a new oil seal in until it stops.

SST 09325–40010

(b) Coat the lip of the oil seal with MP grease.

5. INSTALL PROPELLER SHAFT (See page PR–5)

6. CHECK FLUID LEVEL (See page DI–524)

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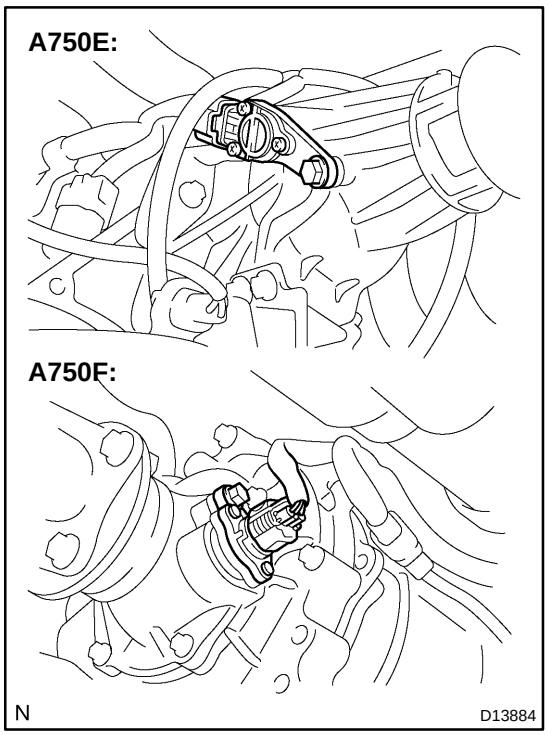
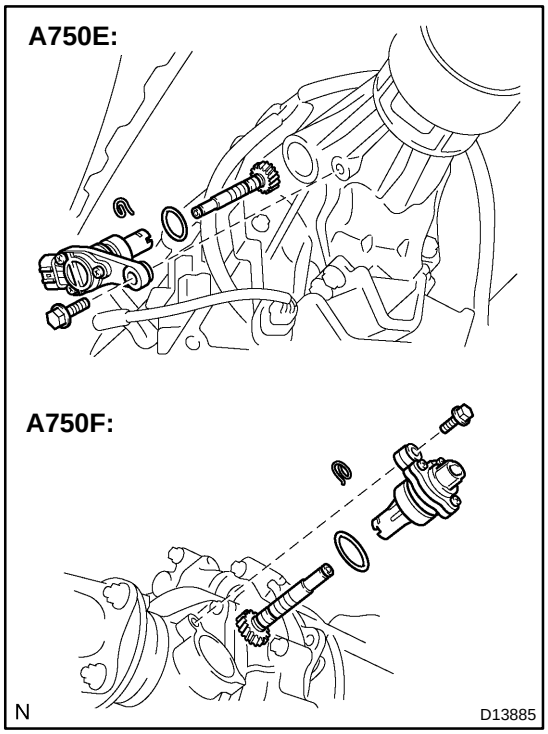


SPEED SENSOR

AT133–01

ON–VEHICLE REPAIR

1. DISCONNECT NO. 1 VEHICLE SPEED SENSOR CONNECTOR



2. REMOVE NO. 1 VEHICLE SPEED SENSOR

Remove the bolt and No.1 vehicle speed sensor.

3. DISASSEMBLE NO. 1 VEHICLE SPEED SENSOR

(a) Remove the O–ring from the speedometer driven gear assembly.

(b) Remove the clip and speedometer driven gear from the speedometer driven gear sleeve.

4. ASSEMBLE NO. 1 VEHICLE SPEED SENSOR

(a) Install the speedometer driven gear and clip to the speedometer driven gear sleeve.

(b) Coat a new O–ring with ATF.

(c) Install the O–ring to the speedometer driven gear assembly.

5. INSTALL NO. 1 VEHICLE SPEED SENSOR

Install the No.1 vehicle speed sensor with the bolt.

Torque:
A750E: 9.8 N·m (100 kgf·cm, 86 in.·lbf)
A750F: 11.5 N·m (117 kgf·cm, 8 ft·lbf)

6. CONNECT NO. 1 VEHICLE SPEED SENSOR CONNECTOR

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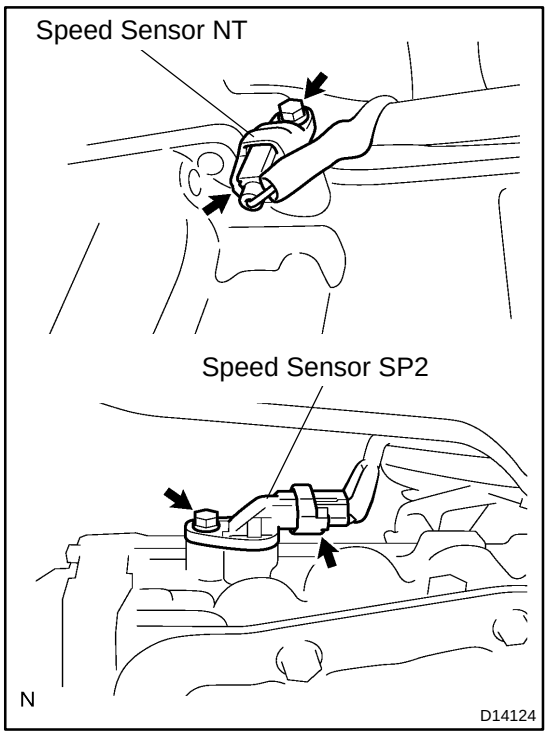
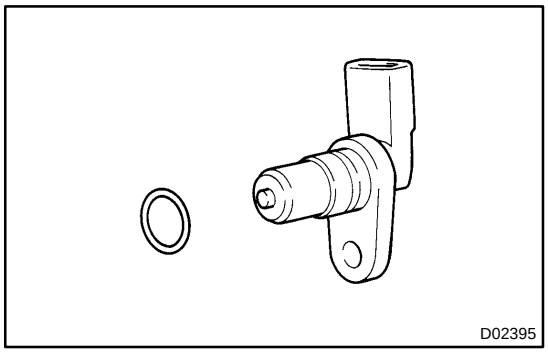


7. DISCONNECT SPEED SENSOR NT AND SP2 CONNECTOR

8. REMOVE SPEED SENSOR NT AND SP2

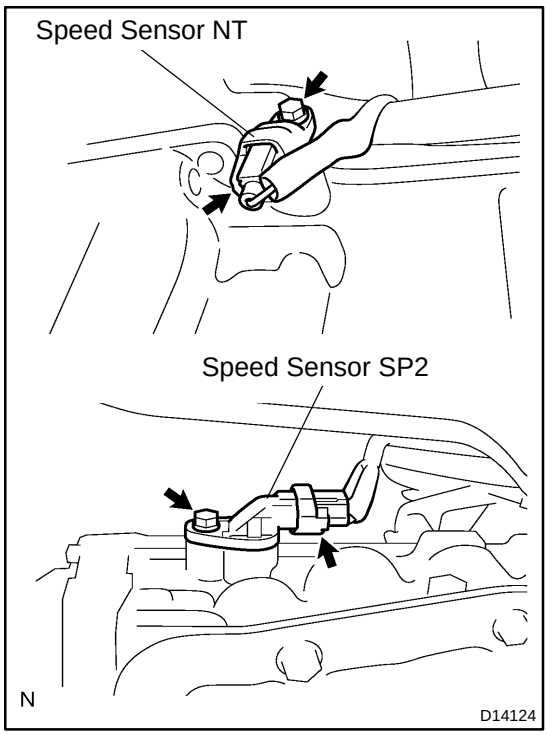
(a) Remove the 2 bolts, speed sensors NT and SP2.



(b) Remove 2 O–rings from the speed sensors NT and SP2.

9. INSTALL SPEED SENSOR NT AND SP2

(a) Coat 2 new O–rings with ATF and install them to the speed sensors NT and SP2.



(b) Install the speed sensors NT and SP2 with the 2 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

10. CONNECT SPEED SENSOR NT AND SP2 CONNECTOR

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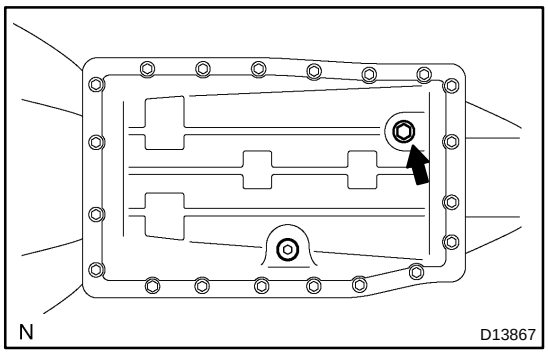


ATF TEMPERATURE SENSOR

AT134–01

ON–VEHICLE REPAIR

1. DRAIN AUTOMATIC TRANSMISSION FLUID

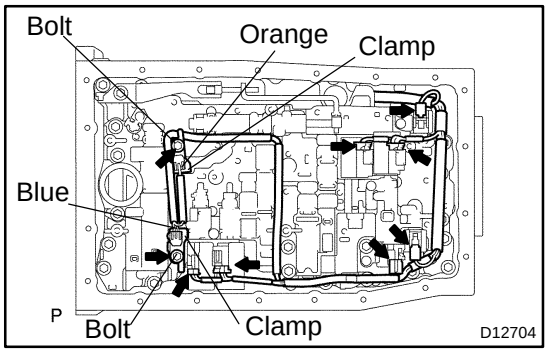
(a) Remove the drain plug and gasket, and drain the ATF.

(b) Install a new gasket and the drain plug.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

2. REMOVE OIL PAN (See page AT–10)

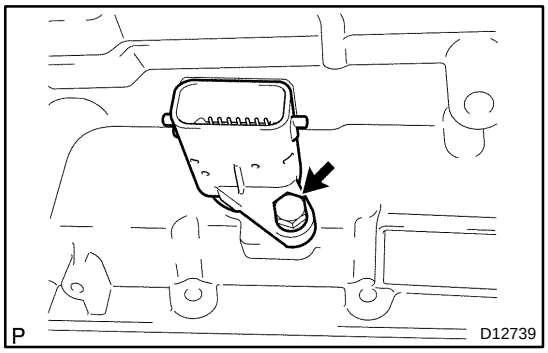
3. REMOVE OIL STRAINER (See page AT–10)



4. REMOVE ATF TEMPERATURE SENSOR

(a) Disconnect the 7 solenoid valve connectors.

(b) Remove the 2 bolts, clamps and ATF temperature sensors.



(c) Disconnect the transmission wire connector.

(d) Remove the bolt and the transmission wire harness.

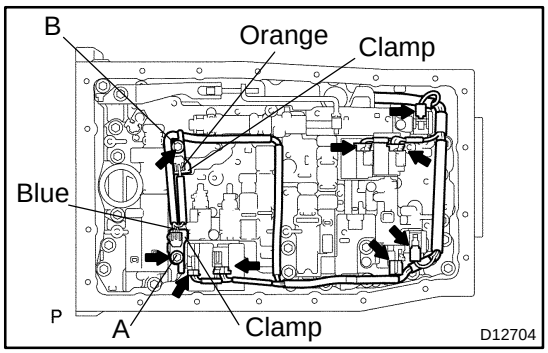
5. INSTALL ATF TEMPERATURE SENSOR

(a) Install the transmission wire harness.

(b) Install the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(c) Connect the transmission wire connector.



(d) Connect the 7 solenoid valve connectors.

(e) Install the 2 ATF temperature sensors and clamps to the valve body with the 2 bolts.

HINT:

In order to install the ATF temperature sensors properly, check the wire harness color prior to installation.

Torque:

A: 11 N·m (112 kgf·cm, 8 ft·lbf)

B: 10 N·m (100 kgf·cm, 7 ft·lbf)

Bolt length:

Bolt A: 36 mm (1.42 in.)

Bolt B: 12 mm (0.47 in.)

Sensor wire harness:

Wire harness	Color
for linear control	Orange
for oil temp. warning lamp	Blue

6. INSTALL OIL STRAINER (See page AT–10)

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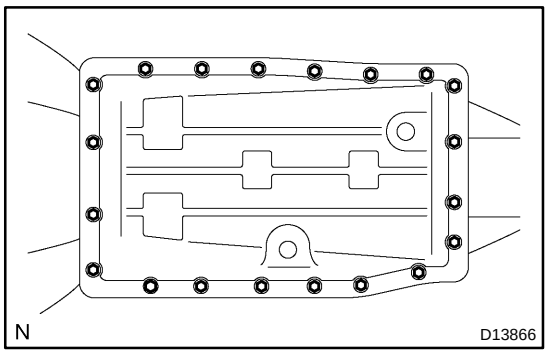

7. INSTALL OIL PAN

HINT:

Remove any packing material, and be careful not to spill oil on the contacting surfaces of the transmission case and the oil pan.

Using a new gasket, install the oil pan with the 20 bolts.

Torque: 4.4 N·m (45 kgf·cm, 39 in·lbf)

8. FILL WITH ATF AND CHECK ATF LEVEL

(a) Remove the refill plug (See page DI–524).

(b) Fill with new fluid through the refill hole.

Fluid type: Toyota genuine ATF WS

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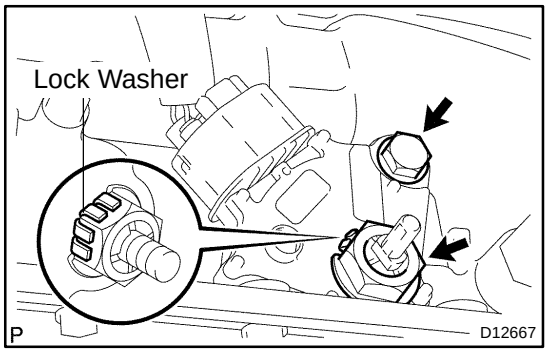
PARK/NEUTRAL POSITION (PNP) SWITCH

AT135–01

ON–VEHICLE REPAIR

1. DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR



2. REMOVE PARK/NEUTRAL POSITION SWITCH

(a) Pry off the lock washer and remove the nut.

(b) Remove the bolt and park/neutral position switch.

3. INSTALL PARK/NEUTRAL POSITION SWITCH

(a) Install the park/neutral position switch with the bolt.
Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

(b) Install a new lock washer and the nut.
Torque: 6.9 N·m (70 kgf·cm, 61 in.·lbf)

(c) Bend the claws on the lock washer to stake the nut.

(d) Adjust the park/neutral position switch
(See page DI–524).

4. CONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR

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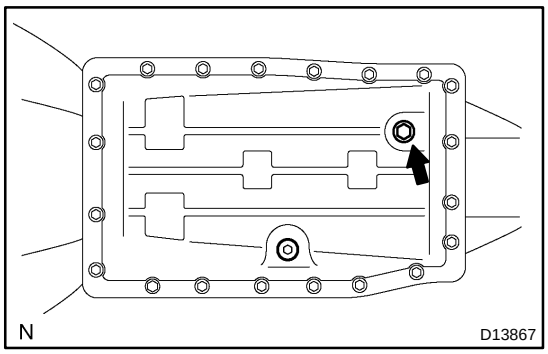


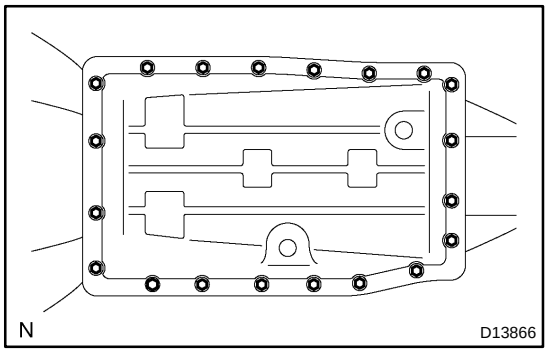
VALVE BODY ASSEMBLY

AT136–01

ON–VEHICLE REPAIR

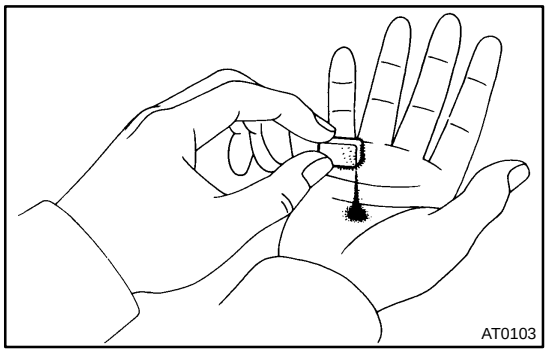
1. DRAIN AUTOMATIC TRANSMISSION FLUID

(a) Remove the drain plug and gasket, and drain the ATF.
(b) Install a new gasket and the drain plug.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)



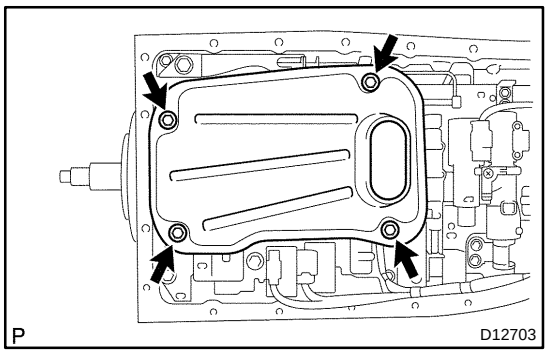
2. REMOVE OIL PAN

NOTICE:
Some fluid will remain in the oil pan.
(a) Remove the 20 bolts.
(b) Remove the oil pan gasket.



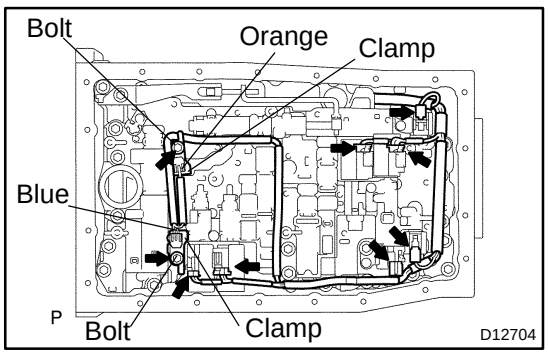
3. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect any steel particles. Carefully look at the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.
Steel (magnetic) ... bearing, gear and clutch plate wear
Brass (non–magnetic) ... bushing wear



4. REMOVE OIL STRAINER

Remove the 4 bolts, the oil strainer and the O–ring.
NOTICE:
Be careful as some fluid will come out with the oil strainer.



5. REMOVE ATF TEMPERATURE SENSOR

(a) Disconnect the 7 solenoid valve connectors.
(b) Remove the 2 bolts, clamps and ATF temperature sensors.

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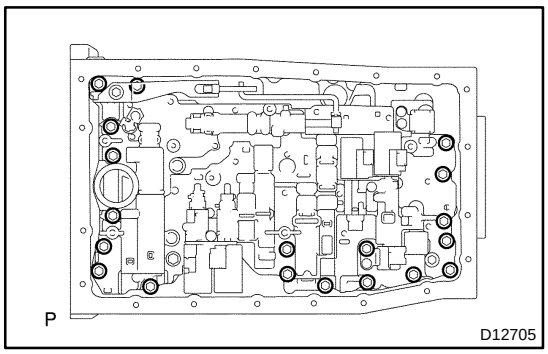
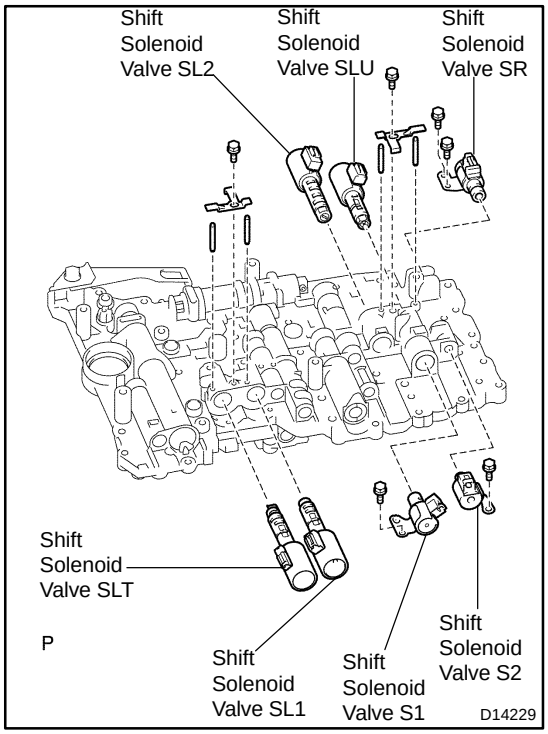


6. REMOVE VALVE BODY

(a) Remove the 19 bolts and the valve body.

(b) Remove the 3 drum seal gaskets.



7. REMOVE SOLENOID VALVE

(a) Remove the 2 bolts and the shift solenoid valve SR.

(b) Remove the 3 bolts and the shift solenoid valves S1 and S2.

(c) Remove the 2 bolts, 2 solenoid lock plates and the 4 straight pins.

(d) Remove the shift solenoid valves SL2 and SLU.

(e) Remove the shift solenoid valves SL1 and SLT.

(f) Remove the O–ring from the solenoid valve S2.

8. INSTALL SOLENOID VALVE

(a) Install a new O–ring to the shift solenoid valve S2.

(b) Install the shift solenoid valves SL1 and SLT.

(c) Install the shift solenoid valves SL2 and SLU.

(d) Install the 4 straight pins and the 2 solenoid lock plates with the 2 bolts.

Torque: 6.4 N·m (65 kgf·cm, 57 in·lbf)

(e) Install the shift solenoid valve S1 with the bolt.

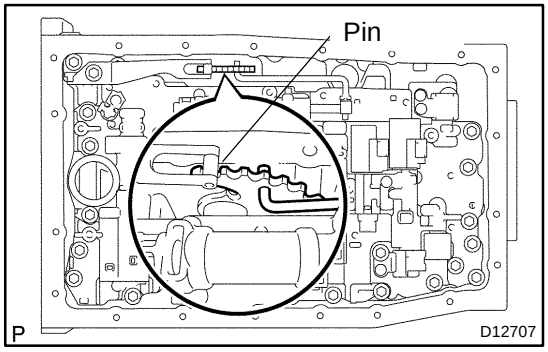
Torque: 6.4 N·m (65 kgf·cm, 57 in·lbf)

(f) Install the shift solenoid valve S2 with the bolt.

Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

(g) Install the shift solenoid valve SR with the 2 bolts.

Torque: 6.4 N·m (65 kgf·cm, 57 in·lbf)



9. INSTALL VALVE BODY

HINT:

Align the groove of the manual valve with the pin of the lever.

(a) Install 3 new drum seal gaskets to the transmission case.

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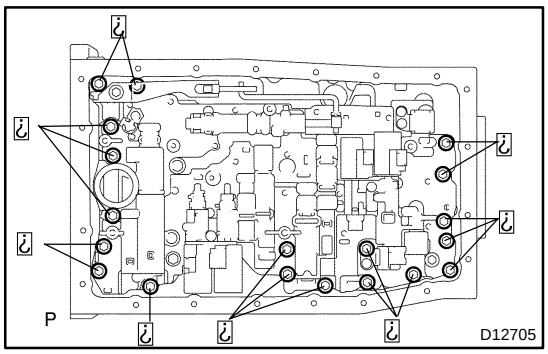
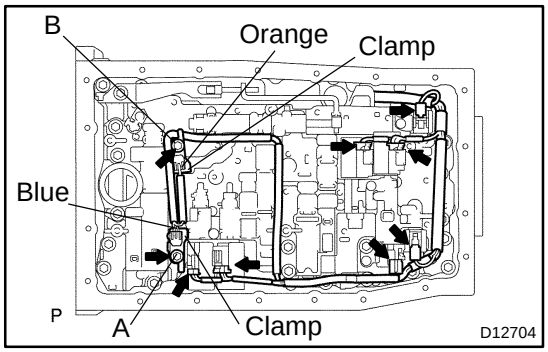


(b) Install the 19 bolts and the valve body.
Torque: 11 N·m (112 kgf·cm, 8 ft·lbf)
Bolt length:
Bolt A: 25 mm (0.98 in.)
Bolt B: 36 mm (1.42 in.)



10. INSTALL TEMPERATURE SENSOR

(a) Connect the 7 solenoid valve connectors.

(b) Install the 2 temperature sensors and clamps to the valve body with the 2 bolts.

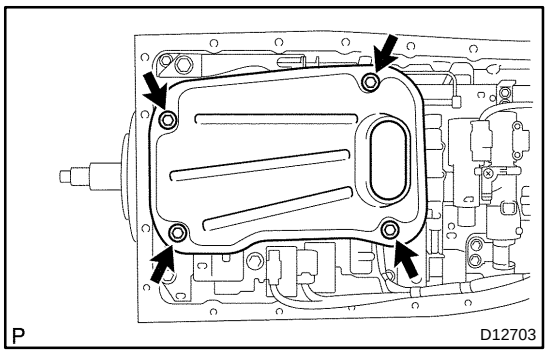
HINT:

In order to install the ATF temperature sensors properly, check the wire harness color prior to installation.

Torque:
A: 11 N·m (112 kgf·cm, 8 ft·lbf)
B: 10 N·m (100 kgf·cm, 7 ft·lbf)
Bolt length:
Bolt A: 36 mm (1.42 in.)
Bolt B: 12 mm (0.47 in.)

Sensor wire harness:

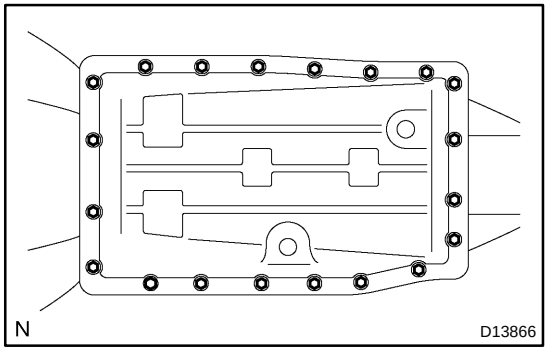
Wire harness	Color
for linear control	Orange
for oil temp. warning lamp	Blue



11. INSTALL OIL STRAINER

(a) Install a new O–ring.

(b) Install the oil strainer with the 4 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)



12. INSTALL OIL PAN

HINT:

Remove any packing material, and be careful not to spill oil on the contacting surfaces of the transmission case and the oil pan.

Using a new gasket, install the oil pan with the 20 bolts.

Torque: 4.4 N·m (45 kgf·cm, 39 in·lbf)

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13. FILL WITH ATF AND CHECK ATF LEVEL

(a) Remove the refill plug (See page DI–524).

(b) Fill with new fluid through the refill hole.
Fluid type: Toyota genuine ATF WS

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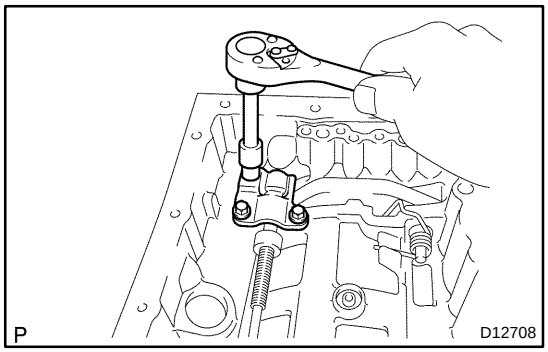
PARKING LOCK PAWL

AT137–01

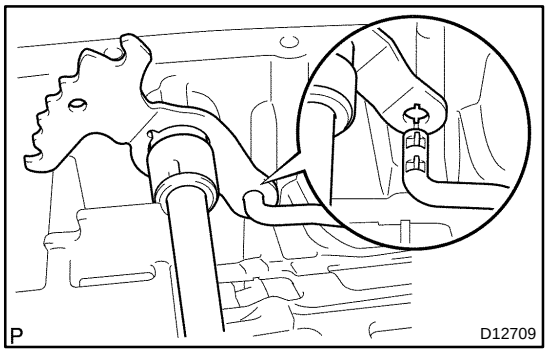
ON–VEHICLE REPAIR

1. REMOVE VALVE BODY (See page AT–10)

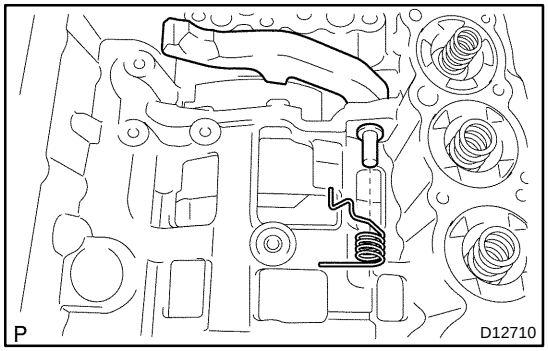


2. REMOVE PARKING LOCK PAWL BRACKET

Remove the 3 bolts and parking lock pawl bracket.



3. REMOVE PARKING LOCK ROD

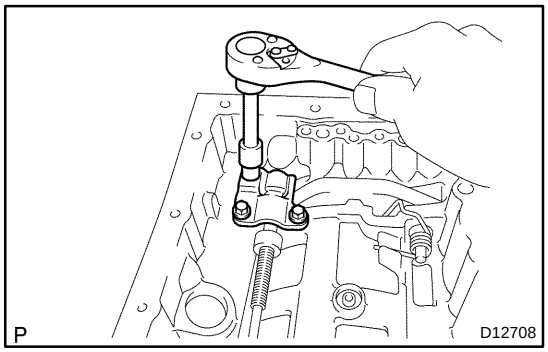


4. REMOVE SPRING FROM PARKING LOCK PAWL SHAFT

5. REMOVE PARKING LOCK PAWL AND SHAFT

6. INSTALL PARKING LOCK PAWL AND SHAFT

7. INSTALL SPRING TO PARKING LOCK PAWL SHAFT



8. INSTALL PARKING LOCK PAWL BRACKET

Install the parking lock pawl bracket with the 3 bolts.

HINT:

- ▶ Push the lock rod fully forward.
- ▶ Check that the parking lock pawl operates smoothly.

Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

9. INSTALL VALVE BODY (See page AT–10)

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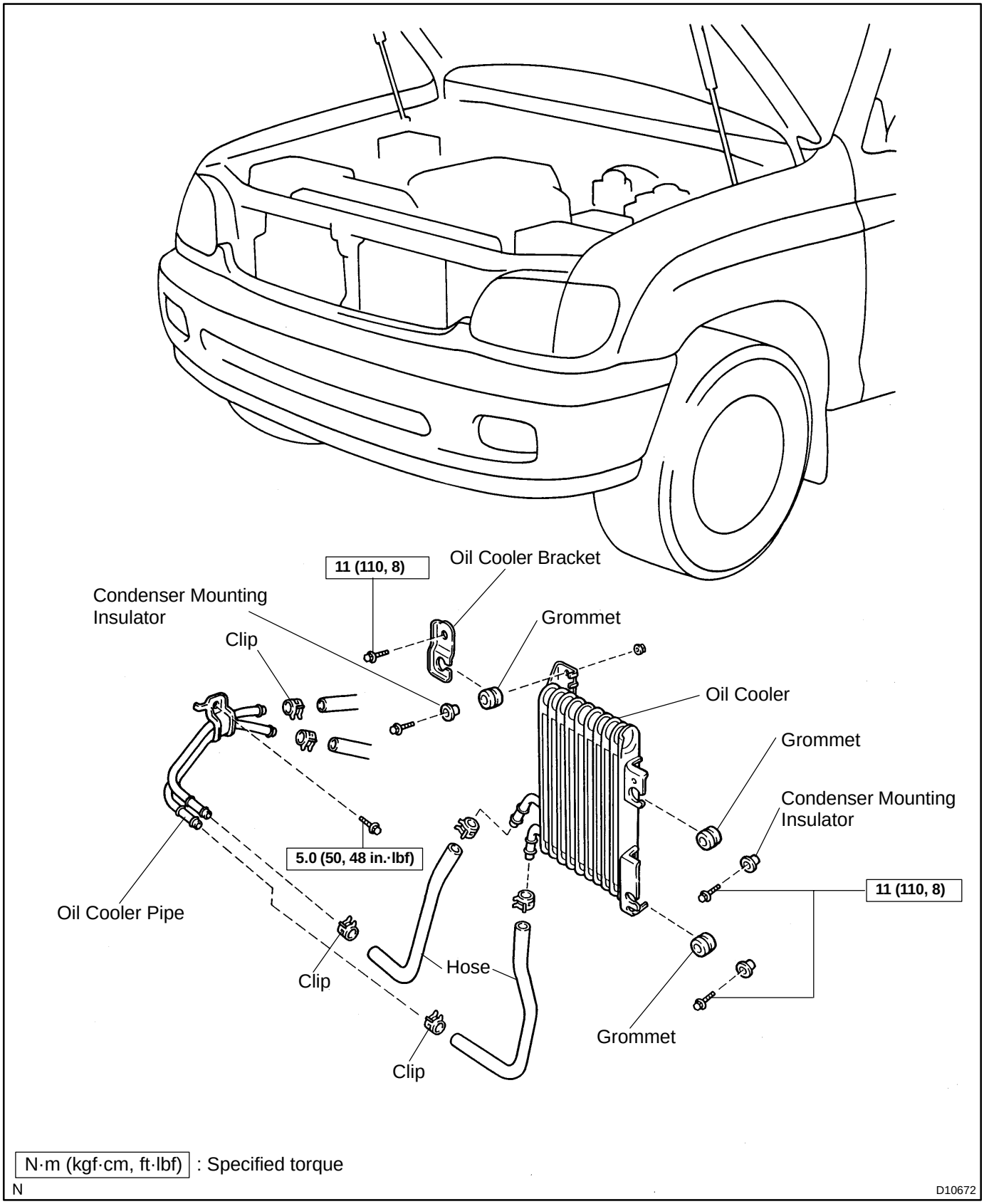
AIR COOLED OIL COOLER

COMPONENTS

AT138–01



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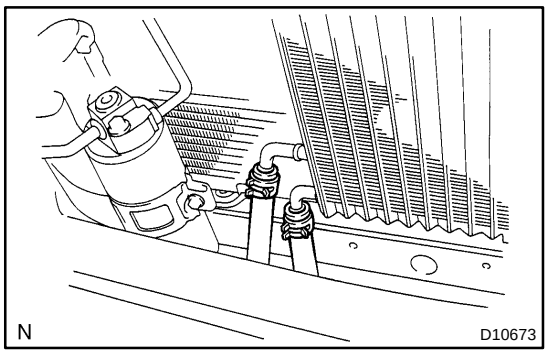
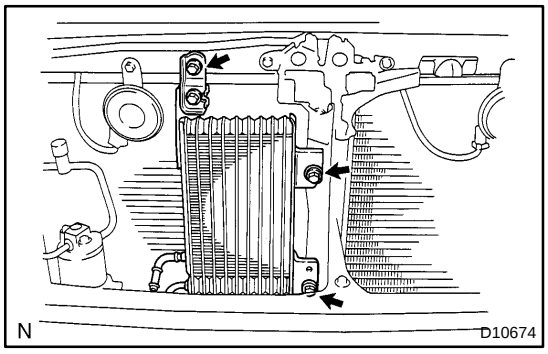
AT139–01

REMOVAL



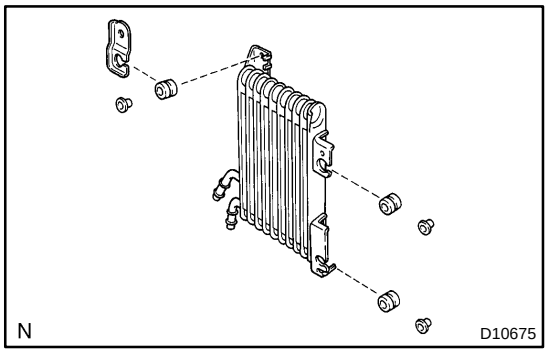
1. REMOVE PIPE

Loosen the 2 clips and disconnect the 2 hoses.



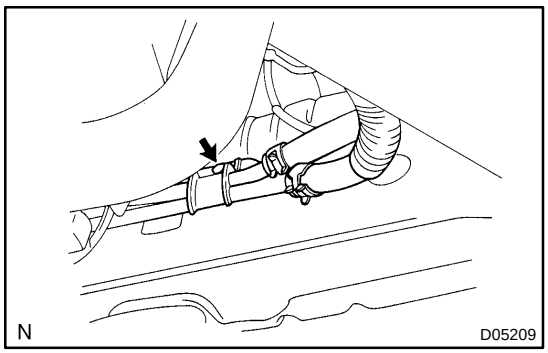
2. REMOVE OIL COOLER

(a) Remove the 3 bolts and oil cooler.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)



(b) Remove the bolt, transmission oil cooler bracket and grommet.
Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)

(c) Remove the 2 grommets and condenser mounting insulators.



3. REMOVE OIL COOLER TUBE

(a) Loosen the 2 clips and disconnect the 2 hoses.
(b) Remove the bolt and oil cooler tube with the 2 hoses.
Torque: 5.0 N·m (50 kgf·cm, 48 in.·lbf)
(c) Loosen the 2 clips and disconnect the 2 hoses.

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AT13A–01

INSTALLATION

Installation is in the reverse order of removal (See page AT–16).

HINT:

After installation, check fluid level (See page DI–524).

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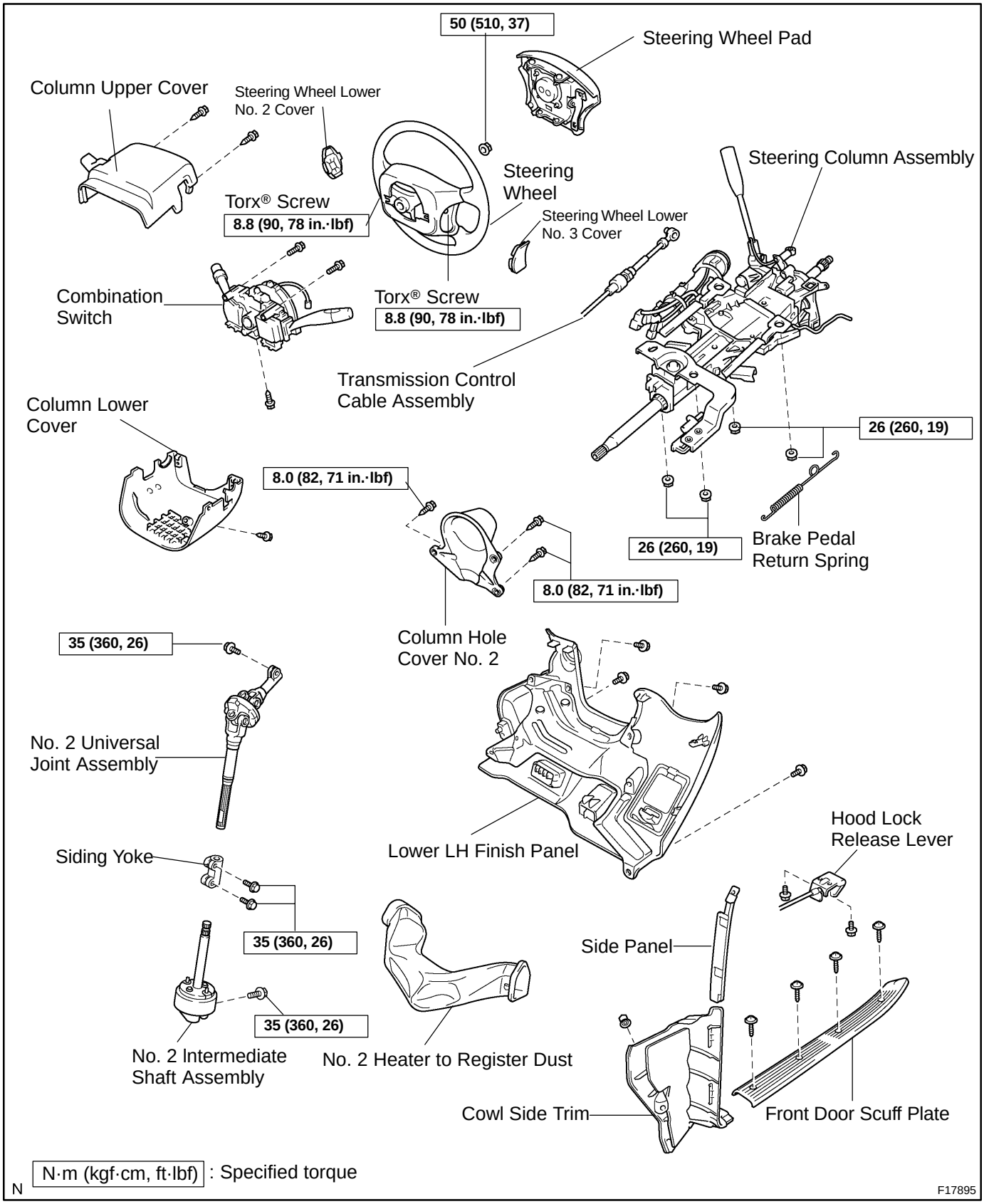
COLUMN SHIFT ASSEMBLY

COMPONENTS

AT13B–01



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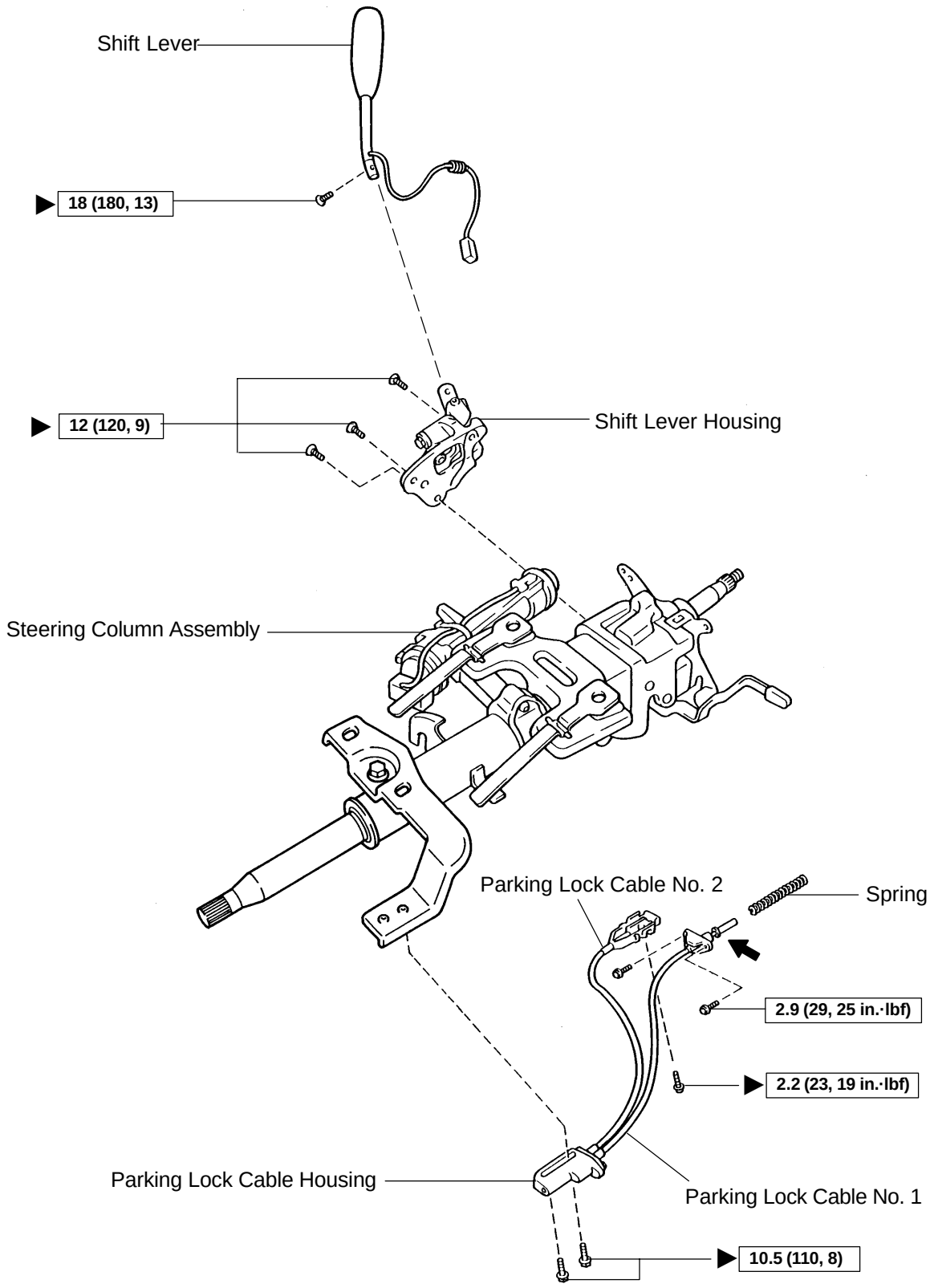

N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
➡ MP grease

N

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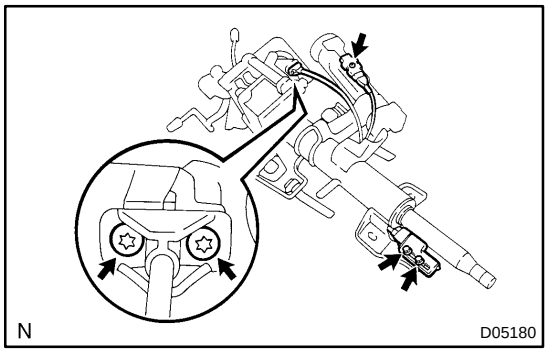
AT13C–01

REMOVAL

1. REMOVE STEERING COLUMN ASSEMBLY
(See page SR–14)



2. REMOVE PARKING LOCK CABLE ASSEMBLY

(a) Remove the screw and parking lock cable No. 2.
(b) Using a torx® socket wrench, remove the 2 screws and parking lock cable No. 1.
(c) Remove the spring.
(d) Remove the 2 bolts and parking lock cable housing.

3. REMOVE SHIFT LEVER

(a) Disconnect the connector.
(b) Using a torx® socket wrench, remove the torx® screw and shift lever.

4. REMOVE SHIFT LEVER HOUSING

Using a torx® socket wrench, remove the 3 torx® screws and shift lever housing.

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AT13D–01

INSTALLATION

1. INSTALL SHIFT LEVER HOUSING

Using a torx® socket wrench, install the shift lever housing with 3 new screws.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

2. INSTALL SHIFT LEVER

(a) Using a torx® socket wrench, install the shift lever with a new screw.

Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

(b) Connect the connector.

3. INSTALL PARKING LOCK CABLE NO. 1 AND NO. 2

(a) Apply MP grease on the lock pin and internal surface of shift lever housing.

(b) Install the spring and parking lock cable No. 1 into the shift lever housing.

NOTICE:

Be careful not to bend or twist the cable abnormally.

(c) Using a torx® socket wrench, install 2 new screws.

Torque: 2.9 N·m (29 kgf·cm, 25 in.·lbf)

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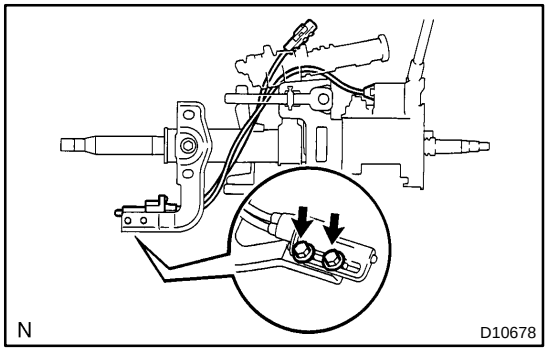
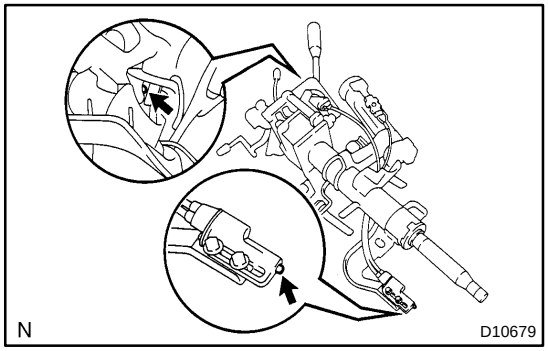


(d) Wire the cable No. 1 and No. 2, as shown in the illustration.

(e) Temporarily install the cable housing to steering column assembly with 2 new bolts.

NOTICE:

Be careful not to bend or twist the cable abnormally.



(f) After installation, confirm the following items.

(1) When the shift lever is in P position and the pedal button is pushed in by 7 mm (0.28 in.), shift lever should be locked by lock pin.

(2) When the pedal button is released, the shift lever should be able to be shifted from P position to other positions.

(3) When the shift lever is in the N or D position and the pedal button is pushed in by 7 mm (0.28 in.), the shift lever should be able to be shifted.

(g) Install the parking lock cable No. 2 to column upper bracket with the clip.

(h) Install the cable end to the sliding block of the column upper bracket with the screw.

Torque: 2.2 N·m (23 kgf·cm, 19 in.·lbf)

(i) After installation, check the following items.

(1) When the pedal button is pushed, shift lever should be locked.

(2) When the pedal button is released, shift lever should be unlocked.

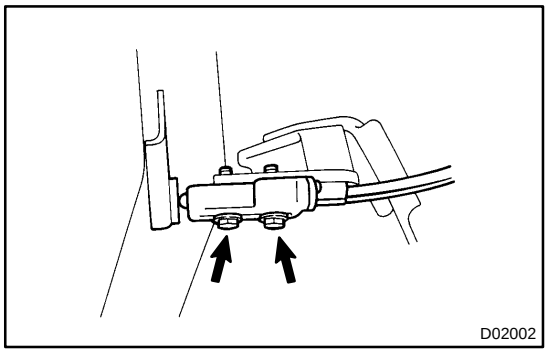
4. INSTALL STEERING COLUMN ASSEMBLY

(See page SR–23)

5. ADJUST CABLE HOUSING

(a) Shift the shift lever to the P position.

(b) Turn the ignition key to the LOCK position.



(c) Loosen the 2 bolts and adjust the cable housing.

HINT:

- Pedal button should touch the pedal plate cushion.
- Brake pedal should not be moved by the pedal button.
- Cable housing should not be toughed the brake pedal and the brake pedal plate cushion.

(d) Torque the 2 bolts.

Torque: 10.5 N·m (110 kgf·cm, 8 ft·lbf)

6. CONFIRM SHIFT LOCK SYSTEM OPERATION

(a) Only when the brake pedal is engaged and the ignition key is not in the LOCK position, the shift lever can be shifted from the P position to other positions.

When the shift lever is in the P position and the brake pedal is released, the shift lever cannot be shifted from P position to other positions.

(b) When the shift lever is not in the P position, the ignition key cannot be turned to the LOCK position.

Only when the shift lever is in the P position, the ignition key can be removed.

(c) Cable No. 1 and No. 2 should not be deformed by other parts located around the steering column.

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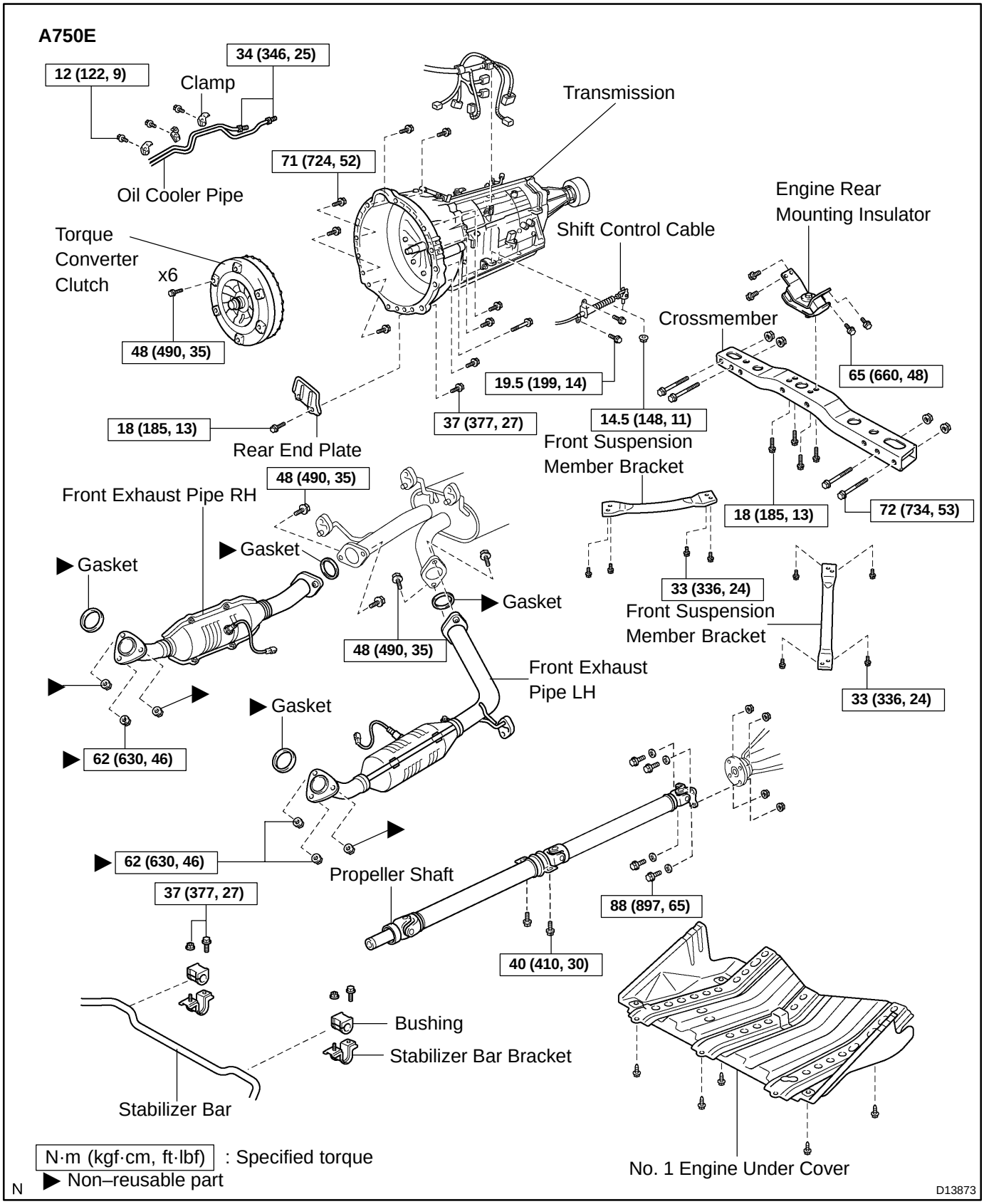
AUTOMATIC TRANSMISSION UNIT

COMPONENTS

AT13E–01



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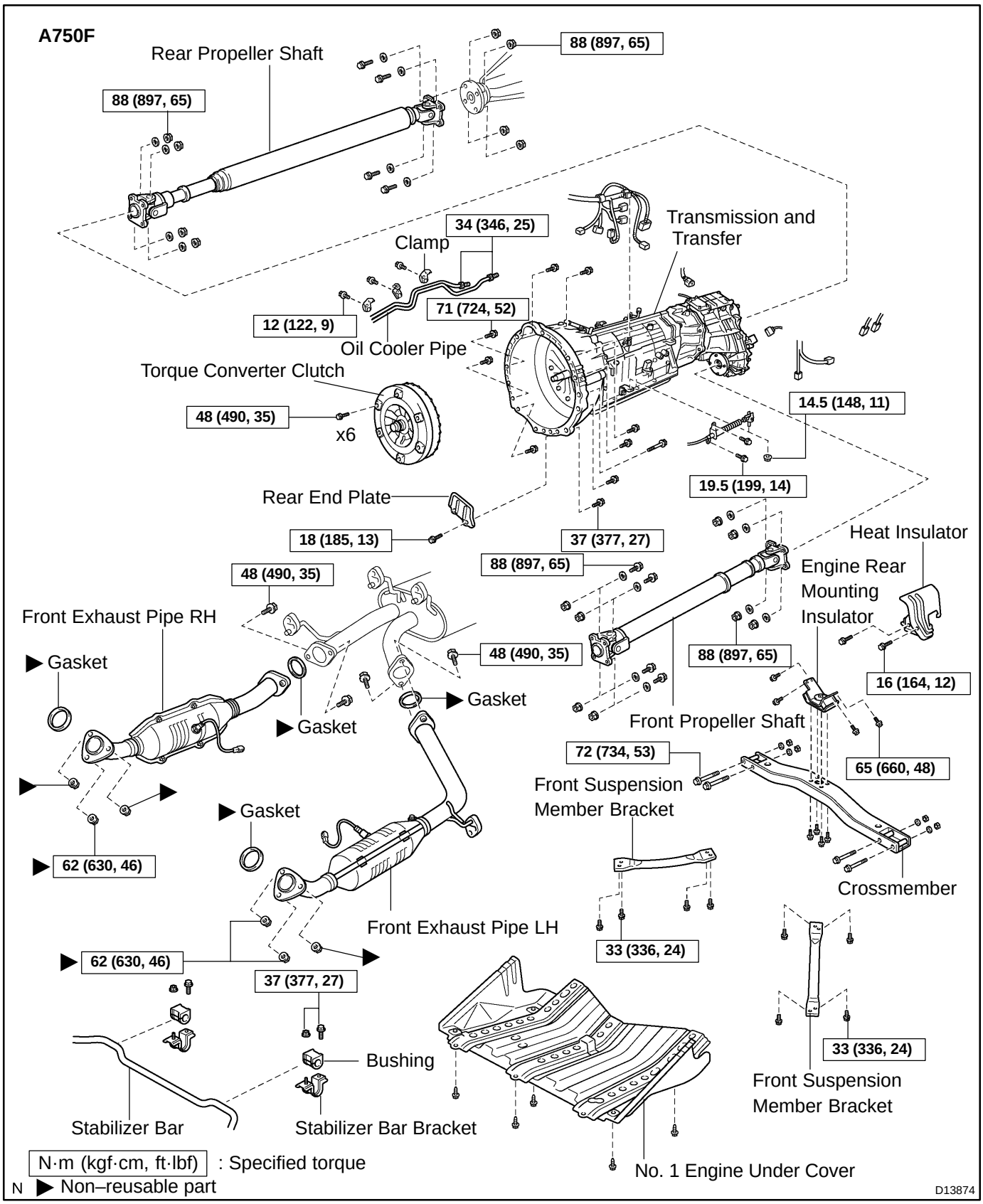
A750F
Rear Propeller Shaft
88 (897, 65)
88 (897, 65)
34 (346, 25)
Clamp
Transmission and Transfer
71 (724, 52)
12 (122, 9)
Oil Cooler Pipe
Torque Converter Clutch
48 (490, 35)
x6
14.5 (148, 11)
19.5 (199, 14)
Rear End Plate
18 (185, 13)
37 (377, 27)
88 (897, 65)
Heat Insulator
Engine Rear Mounting Insulator
48 (490, 35)
Front Exhaust Pipe RH
Gasket
48 (490, 35)
88 (897, 65)
16 (164, 12)
Gasket
Gasket
Front Propeller Shaft
72 (734, 53)
65 (660, 48)
Front Suspension Member Bracket
Gasket
62 (630, 46)
Crossmember
Front Exhaust Pipe LH
33 (336, 24)
62 (630, 46)
37 (377, 27)
33 (336, 24)
Bushing
Front Suspension Member Bracket
Stabilizer Bar
Stabilizer Bar Bracket
No. 1 Engine Under Cover
N·m (kgf·cm, ft·lbf) : Specified torque
N ▶ Non–reusable part
D13874

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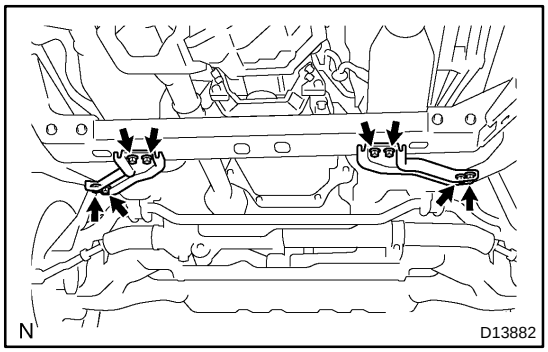
AT13F–01

REMOVAL

1. JACK UP VEHICLE

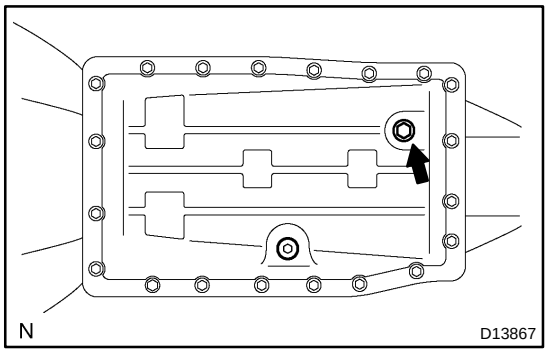
2. REMOVE NO. 1 ENGINE UNDER COVER



3. REMOVE FRONT SUSPENSION MEMBER BRACKET

Remove the 4 bolts and 2 front suspension member brackets.

Torque: 33 N·m (336 kgf·cm, 24 ft·lbf)



4. DRAIN AUTOMATIC TRANSMISSION FLUID

(a) Remove the drain plug and gasket, and drain the ATF.

(b) Install a new gasket and the drain plug.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

5. REMOVE RH AND LH FRONT EXHAUST PIPE

(See page EM–127)

6. A750E:

REMOVE PROPELLER SHAFT (See page PR–3)

7. A750F:

REMOVE HEAT INSULATOR

Remove the 2 bolts and heat insulator.

Torque: 16 N·m (164 kgf·cm, 12 ft·lbf)

8. A750F:

REMOVE FRONT AND REAR PROPELLER SHAFT

(See page PR–7)

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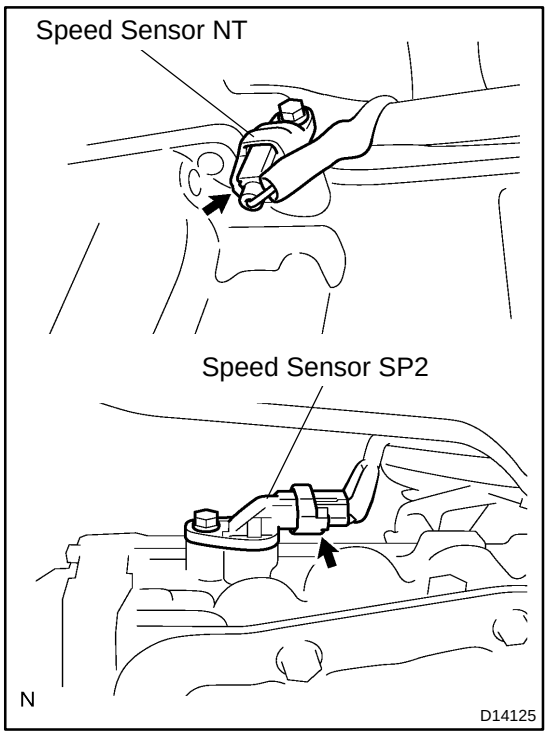
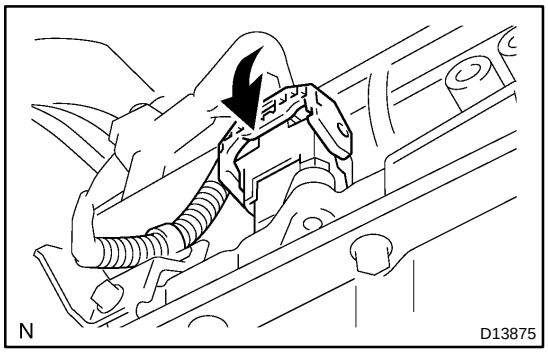
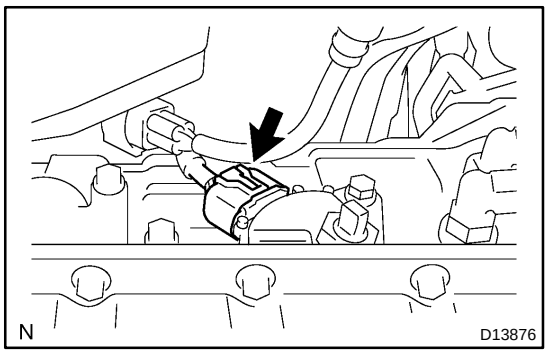


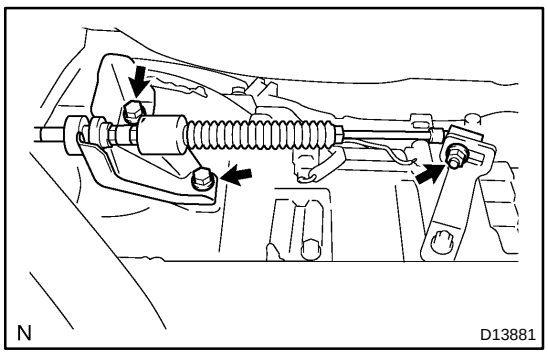
9. DISCONNECT SPEED SENSOR NT AND SP2 CONNECTOR



10. DISCONNECT TRANSMISSION WIRE CONNECTOR



11. DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR



12. SEPARATE SHIFT CONTROL CABLE FROM TRANSMISSION

(a) Remove the nut and disconnect the shift control cable.
Torque: 14.5 N·m (148 kgf·cm, 11 ft·lbf)

(b) Remove the 2 bolts and shift control cable bracket from the transmission.
Torque: 19.5 N·m (199 kgf·cm, 14 ft·lbf)

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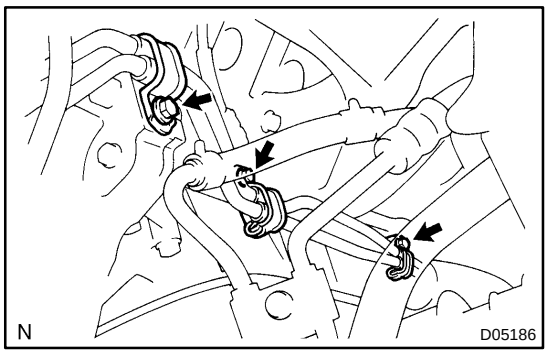
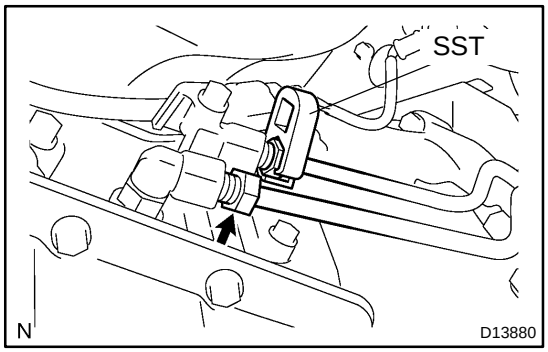
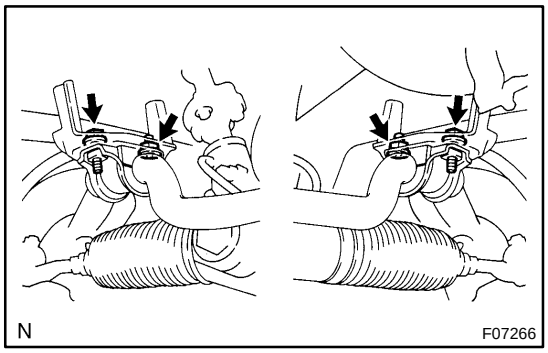


13. DISCONNECT OIL COOLER PIPE

(a) Remove the 3 bolts and clamps.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



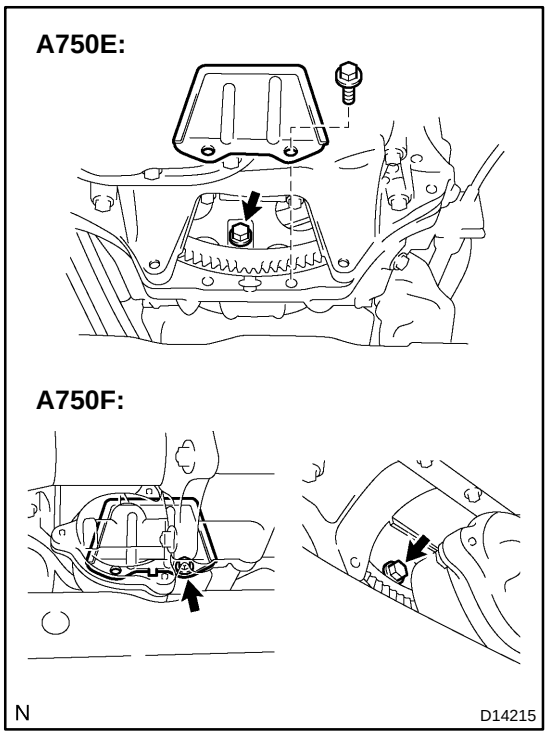
(b) Disconnect the 2 oil cooler pipes.
SST 09023–12701
Torque: 34 N·m (346 kgf·cm, 25 ft·lbf)



14. DISCONNECT STABILIZER BAR

(a) Remove the 2 bolts, nuts and stabilizer bar with the bushings and brackets.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

(b) Disconnect the stabilizer bar.



15. REMOVE REAR END PLATE AND TORQUE CONVERTER CLUTCH MOUNTING BOLT

(a) Remove the bolt and rear end plate.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Turn the crankshaft to gain access and remove the 6 bolts while holding the crankshaft pulley set bolt with a wrench.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

HINT:
At the time of installation, refer to the following:
First install the green colored bolt and then the remaining 5 bolts.

16. JACK UP TRANSMISSION SLIGHTLY

Securely support the transmission on a transmission jack.
Lift the transmission slightly from the crossmember.

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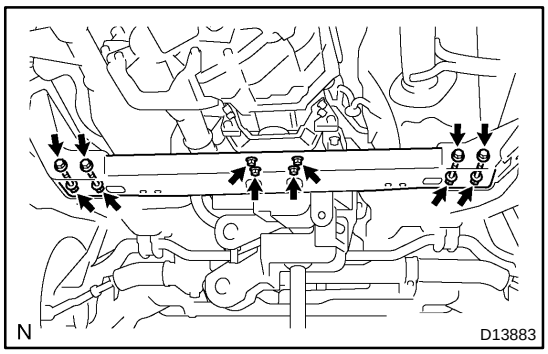
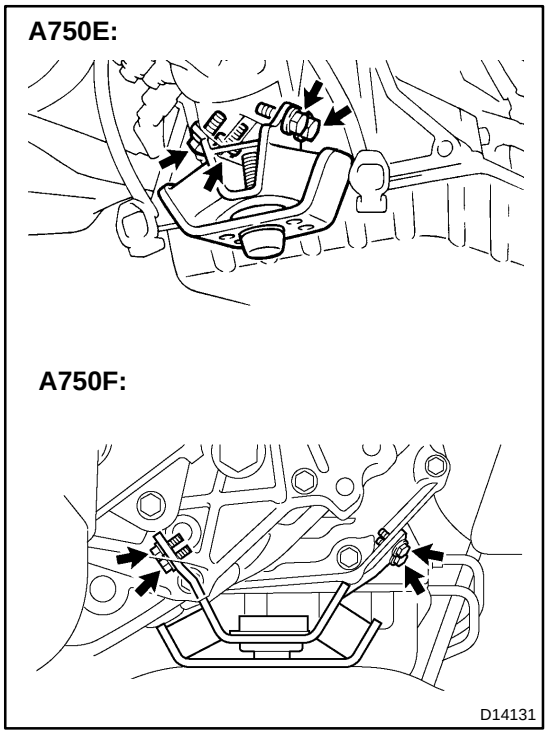


17. REMOVE CROSSMEMBER

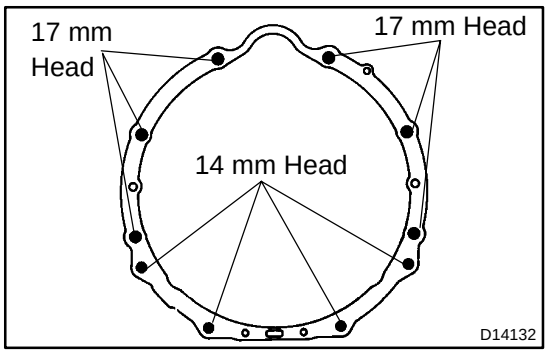
(a) Remove the 4 bolts of the engine rear mounting on the crossmember.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Remove the 4 nuts, bolts, washers and crossmember.
Torque: 72 N·m (734 kgf·cm, 53 ft·lbf)



18. REMOVE ENGINE REAR MOUNTING INSULATOR

Remove the 4 bolts and engine rear mounting insulator.
Torque: 65 N·m (660 kgf·cm, 48 ft·lbf)



19. REMOVE TRANSMISSION

(a) A750E:
Separate the wire harness from the transmission.

(b) A750F:
Separate the wire harness from the transmission and transfer.

(c) Lower the rear end of the transmission.

(d) Remove the 10 bolts and transmission.
Torque:
17 mm head: 71 N·m (720 kgf·cm, 53 ft·lbf)
14 mm head: 37 N·m (380 kgf·cm, 27 ft·lbf)

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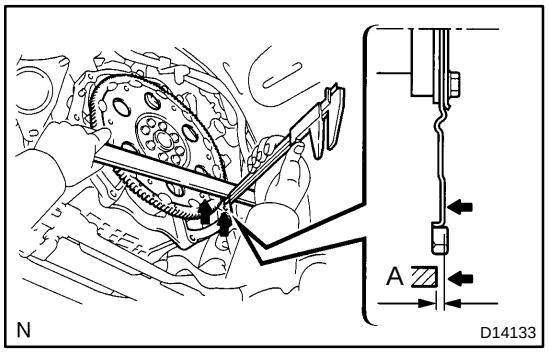
AT13G–01

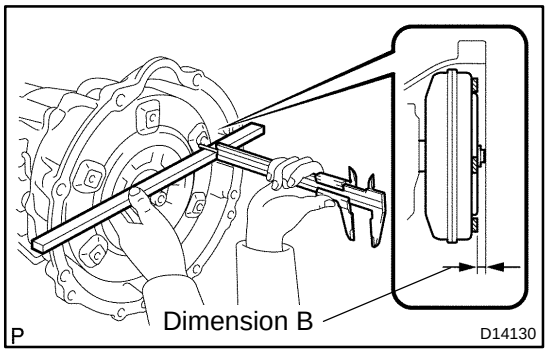
INSTALLATION

1. CHECK TORQUE CONVERTER INSTALLATION

(a) Install the torque converter to the transmission housing.



(b) Using vernier calipers and a straight edge, measure dimension A between the transmission fitting part and the converter fitting part of the drive plate.



(c) Using vernier calipers and a straight edge, measure the dimension B shown in the illustration and check that B is greater than A measured in step (b).

Standard distance: A + 1 mm (0.04 in.) or more

2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR (See page AT–30)

3. TRANSMISSION INSTALLATION

Installation is in the reverse order of removal (See page AT–25).

HINT:

- ▶ After installation, adjust the shift lever position (See page DI–524).
- ▶ Fill with ATF and check the fluid level (See page DI–524).

  Fluid type: Toyota genuine ATF WS
- ▶ Conduct the road test of the vehicle (See page DI–535).

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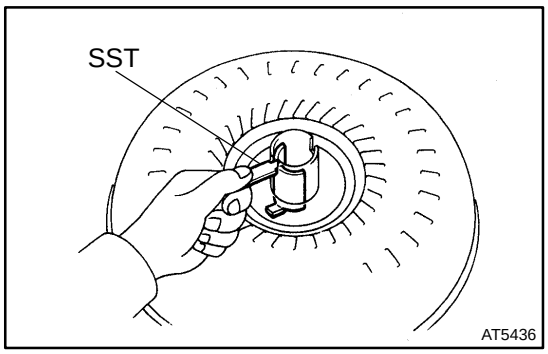


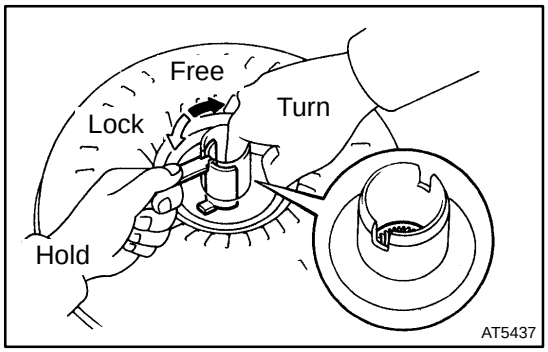
TORQUE CONVERTER CLUTCH AND DRIVE PLATE

AT13H–01

INSPECTION

1. INSPECT ONE–WAY CLUTCH

(a) Install SST so that it fits in the notch of the converter hub and outer race of the one–way clutch.
SST 09350–30020 (09351–32020)

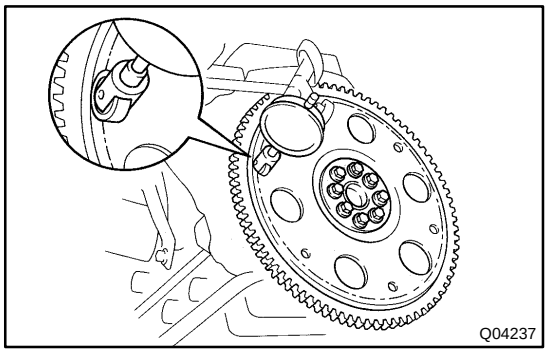


(b) Press on the serrations of the stator with a finger and rotate it.

(c) Check if it rotates smoothly when turned clockwise and locks when turned counterclockwise.

If necessary, clean the converter clutch and retest the one–way clutch.

Replace the converter clutch if the clutch still fails the test.



2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

(a) Set up a dial indicator and measure the drive plate runout.
Maximum runout: 0.20 mm (0.0079 in.)

(b) Check for damage to the ring gear.

If runout is not within the specification or if the ring gear is damaged, replace the drive plate. If installing a new drive plate, note the orientation of the spacers and tighten the bolts (See page EM–83 or EM–95).

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TRANSFER SYSTEM

TR04G–02

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

When working with FIPG material, you must observe the following:

- **Using a razor blade and gasket scraper, remove all the old FIPG material from gasket surfaces.**
- **Thoroughly clean all components to remove any loose material.**
- **Clean both sealing surfaces with a non–residue solvent.**
- **Apply FIPG in an approx. 1.2 mm (0.047 in.) wide bead along the sealing surface.**
- **Parts must be assembled within 10 minutes of FIPG application. Otherwise, the FIPG material must be removed and reapplied.**

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TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

TR04H–04

Use the table below to help find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspected Area	See page
Noise	1. Oil (Level low) 2. Oil (Wrong) 3. Transfer faulty	TR–5 TR–5 TR–7
Oil leakage	1. Oil (Level too high) 2. Gasket (Damaged) 3. Oil seal (Worn or damaged) 4. O–ring (Worn or damaged)	TR–5 TR–7 TR–16 TR–7
Tight corner braking	Center differential or transfer faulty	TR–7
Shift from 2WD (H) to 4WD (H) impossible	1. 4WD fuse 2. Wire harness 3. Vehicle speed sensor 4. 2WD/4HI switch 5. 4WD indicator light 6. Actuator assembly 7. A.D.D. control system 8. 4WD control ECU 9. Transfer assembly	– – BE–55 TR–39 TR–39 TR–39 SA–61 TR–39 TR–3
Shift from 2WD (H) to 4WD (L4) impossible	1. 4LO switch 2. Wire harness 3. 4WD control ECU	TR–39 – TR–39
Shift from 4WD (H) to 4WD (L4) impossible	1. 4LO switch 2. Wire harness 3. 4WD control ECU	TR–9 – TR–39
Shift from 4WD (H) to 2WD (H) impossible	1. 4WD fuse 2. Wire harness 3. 4WD indicator light 4. Actuator assembly 5. A.D.D. control system 6. 4WD control ECU 7. Transfer assembly	– – TR–39 TR–39 SA–61 TR–39 TR–3
Shift from 4WD (L4) to 2WD (H) impossible	1. 2WD/4HI switch 2. Wire harness 3. 4WD control ECU	TR–39 – TR–39
Shift from 4WD (L4) to 4WD (H) impossible	1. 2WD/4HI switch 2. Wire harness 3. 4WD control ECU	TR–39 – TR–39

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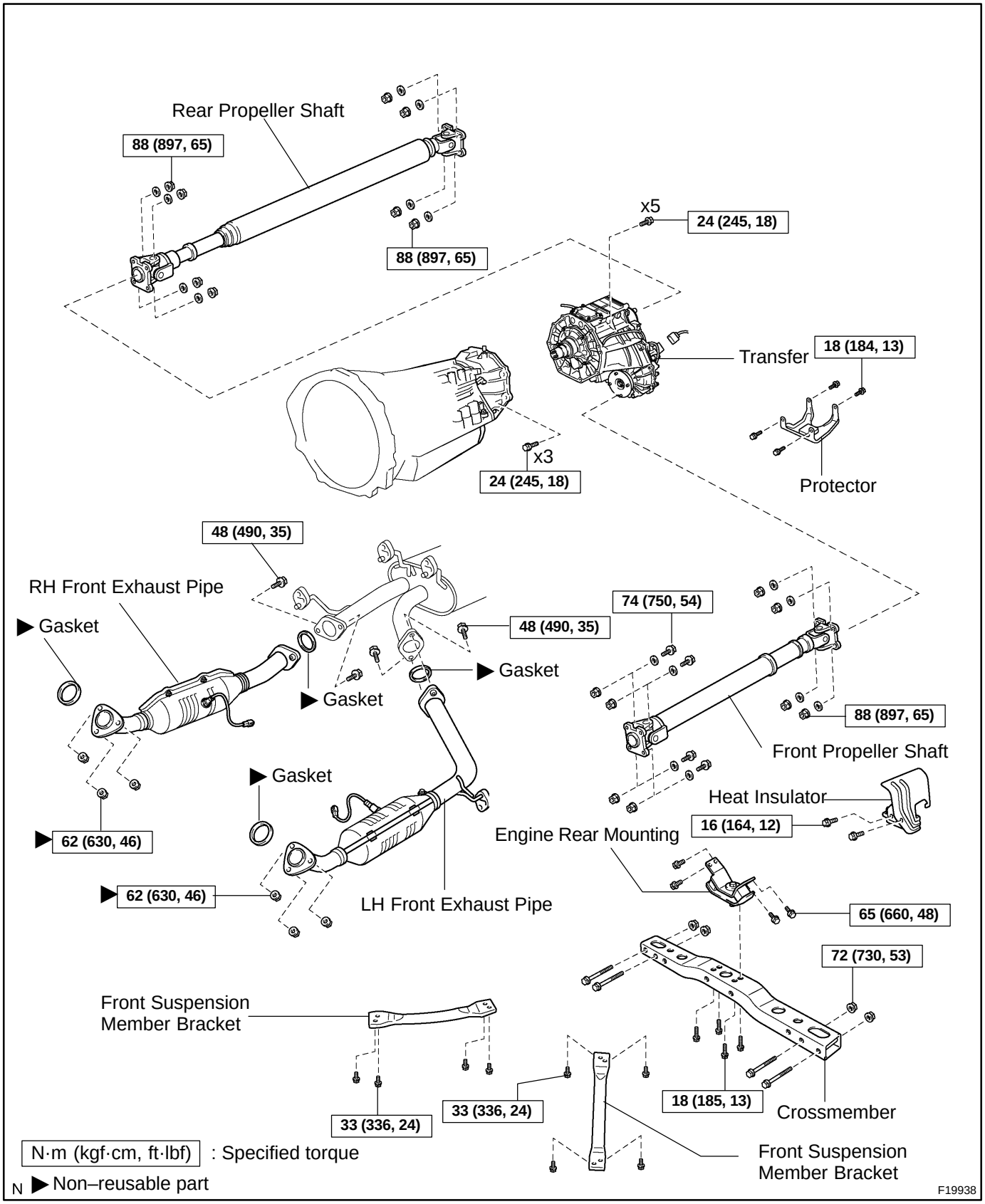
TRANSFER UNIT

COMPONENTS

TR04I–06



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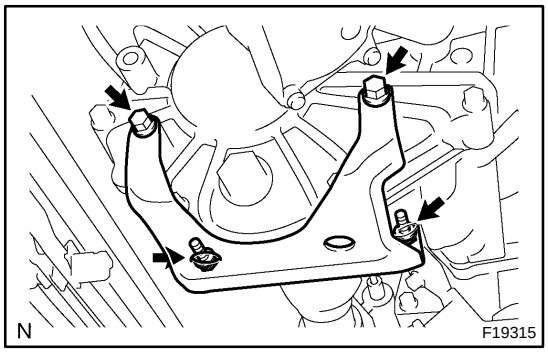
TR0DD–01

REMOVAL

1. SWITCH TRANSFER TO 2WD



2. REMOVE PROTECTOR

Remove the 4 bolts and protector.

3. DRAIN TRANSFER OIL

4. REMOVE FRONT SUSPENSION MEMBER BRACKET

Remove the 8 bolts and 2 front suspension member brackets.

5. REMOVE LH AND RH FRONT EXHAUST PIPES
(See page EM–126)

6. REMOVE FRONT AND REAR PROPELLER SHAFT
(See page PR–7)

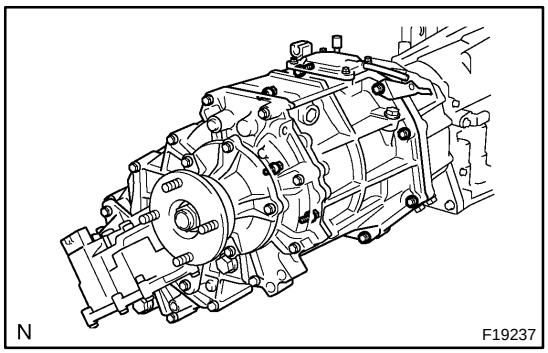
7. REMOVE CROSS MEMBER

(a) Remove the 2 bolts and heat insulator.
(b) Support the rear side of the transmission with a transmission jack.
(c) Remove the 4 set bolts of the engine rear mounting.
(d) Remove the 4 bolts, nuts and cross member.

8. REMOVE ENGINE REAR MOUNTING

Remove the 4 bolts and engine rear mounting from the transfer.

9. DISCONNECT VEHICLE SPEED SENSOR AND TRANSFER ACTUATOR CONNECTORS



10. REMOVE TRANSFER

(a) Support the transfer with another transmission jack.
(b) Remove the 8 transfer mounting bolts.
(c) Pull the transfer out from the transmission down and toward the rear.

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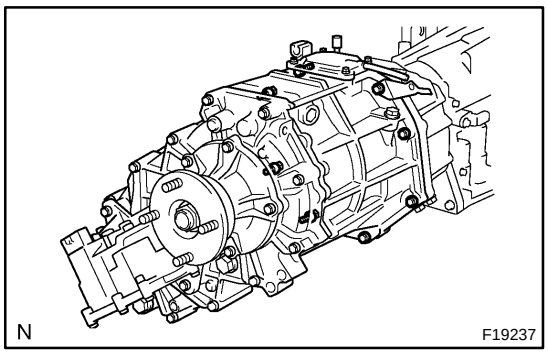
TR0DE–01



INSTALLATION

1. INSTALL TRANSFER

Raise the transfer and install it to the transmission with the 8 transfer mounting bolts.

Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)

NOTICE:

Take care not to damage the lip of the transfer rear oil seal with the transfer input shaft.

2. CONNECT VEHICLE SPEED SENSOR AND TRANSFER ACTUATOR CONNECTORS

3. INSTALL ENGINE REAR MOUNTING

Install the engine rear mounting to the transfer with the 4 bolts.

Torque: 65 N·m (660 kgf·cm, 48 ft·lbf)

4. INSTALL CROSS MEMBER

(a) Install the cross member with the 4 bolts and nuts.

Torque: 72 N·m (730 kgf·cm, 53 ft·lbf)

(b) Install the 4 set bolts of the engine rear mounting.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(c) Remove the transmission jacks.

(d) Install the heat insulator with the 2 bolts.

Torque: 16 N·m (164 kgf·cm, 12 ft·lbf)

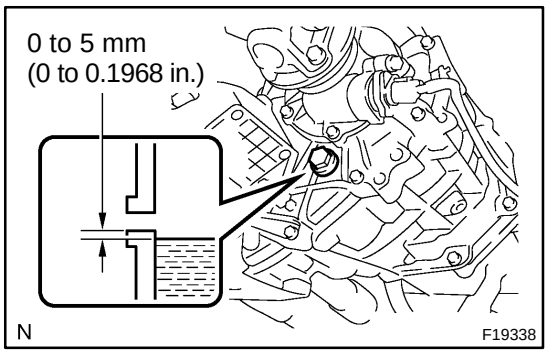
5. INSTALL FRONT AND REAR PROPELLER SHAFTS
(See page PR–9)

6. INSTALL LH AND RH FRONT EXHAUST PIPES
(See page EM–128)

7. INSTALL FRONT SUSPENSION MEMBER BRACKET

Install the 2 front suspension member brackets with the 8 bolts.

Torque: 33 N·m (336 kgf·cm, 24 ft·lbf)



8. FILL WITH TRANSFER OIL

(a) Remove the filler plug and gasket.

(b) Fill with transfer oil.

Oil grade: API GL–4 or GL–5

Viscosity: SAE 75W–90

Capacity: 1.4 liters (1.5 US qts, 1.2 lmp.qts)

NOTICE:

- **When supplying oil, pour it slowly.**
- **Supply oil several times at several minute intervals.**

HINT:

The oil level must be within 0 to 5 mm (0 to 0.1968 in.) down from the lowest end of the hole for the filler plug.

(c) After leaving it for 5 minutes, check the oil level again.

(d) Install the filler plug with a new gasket.

Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

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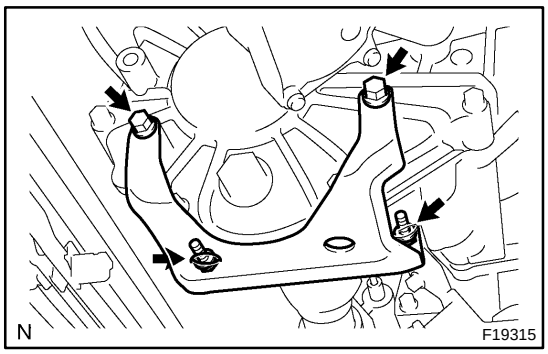

9. INSTALL PROTECTOR

Install the protector with the 4 bolts.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

10. DO ROAD TEST

Check for abnormal noise and smooth shifting.

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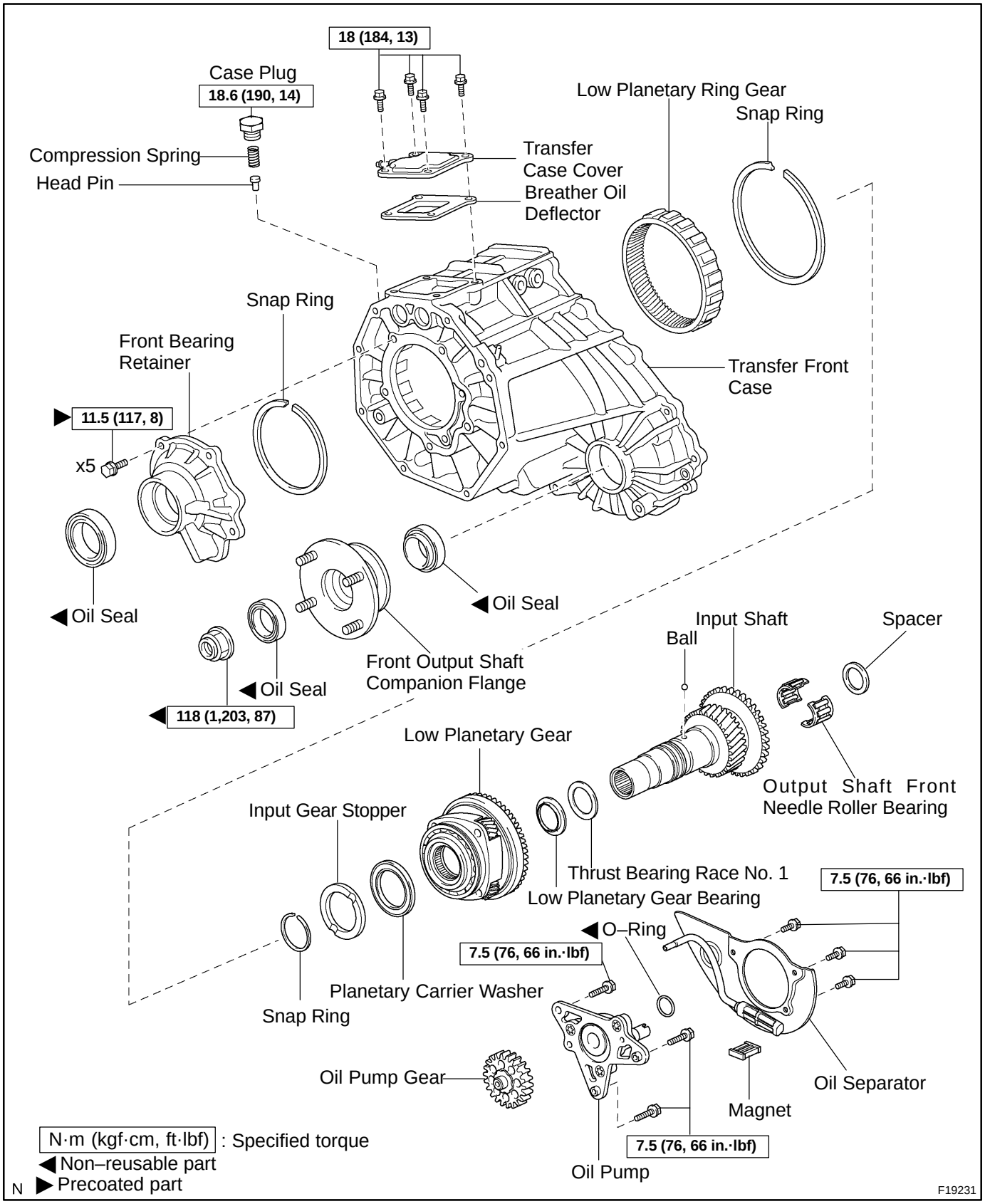
TRANSFER ASSEMBLY

COMPONENTS

TR0CI–02



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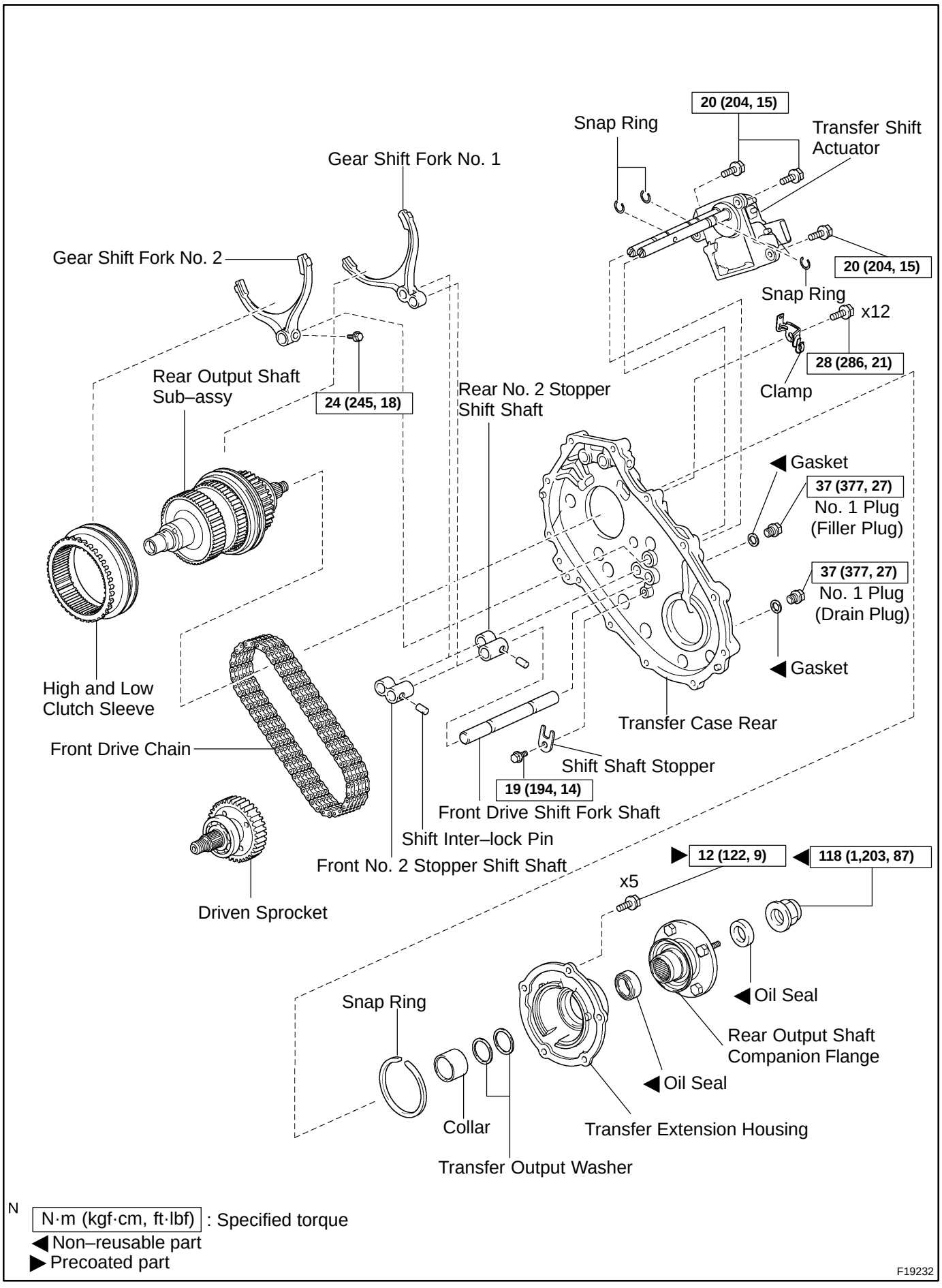
20 (204, 15)
Snap Ring
Transfer Shift Actuator
Gear Shift Fork No. 1
Gear Shift Fork No. 2
20 (204, 15)
Snap Ring
x12
28 (286, 21)
Clamp
Rear Output Shaft Sub–assy
24 (245, 18)
Rear No. 2 Stopper Shift Shaft
Gasket
37 (377, 27)
No. 1 Plug (Filler Plug)
37 (377, 27)
No. 1 Plug (Drain Plug)
Gasket
High and Low Clutch Sleeve
Front Drive Chain
Transfer Case Rear
Shift Shaft Stopper
19 (194, 14)
Front Drive Shift Fork Shaft
Shift Inter–lock Pin
Front No. 2 Stopper Shift Shaft
Driven Sprocket
12 (122, 9)
118 (1,203, 87)
x5
Oil Seal
Snap Ring
Rear Output Shaft Companion Flange
Oil Seal
Collar
Transfer Extension Housing
Transfer Output Washer
N
N·m (kgf·cm, ft·lbf) : Specified torque
◀ Non–reusable part
▶ Precoated part
F19232

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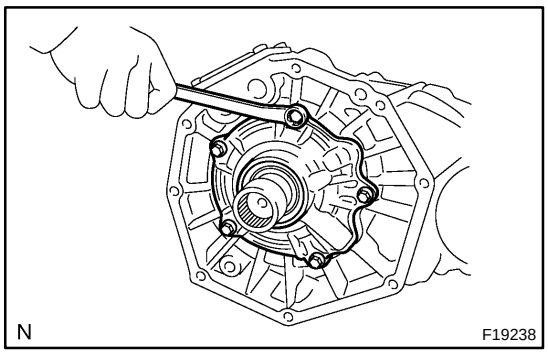
TR0DF–01

DISASSEMBLY



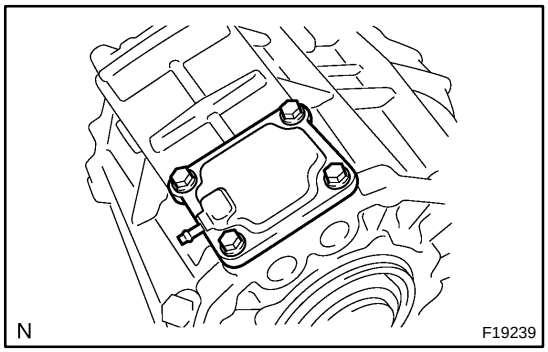
1. REMOVE FRONT BEARING RETAINER

(a) Remove the 5 bolts and front bearing retainer.

HINT:

If necessary, tap on the front bearing retainer with a plastic hammer to remove it.

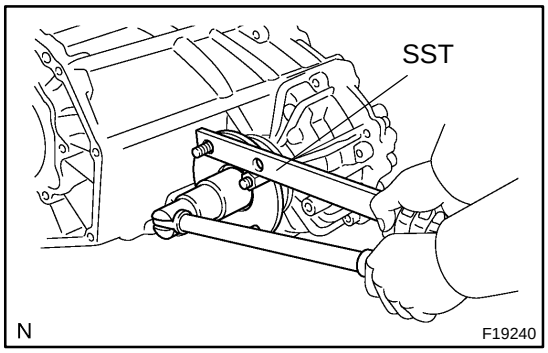
(b) Using a screwdriver and hammer, remove the oil seal from the front bearing retainer.



2. REMOVE TRANSFER CASE COVER

Remove the 4 bolts and transfer case cover.

3. REMOVE BREATHER OIL DEFLECTOR

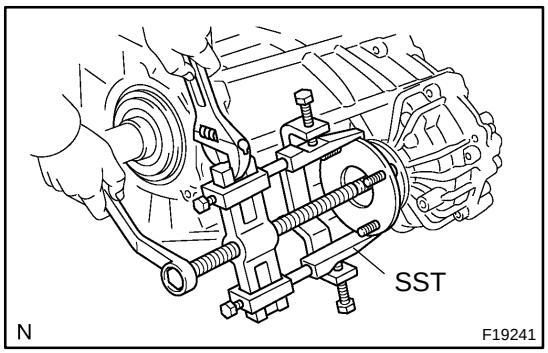


4. REMOVE FRONT OUTPUT SHAFT COMPANION FLANGE

(a) Using a chisel and hammer, loosen the staked part of the front output shaft companion flange lock nut.

(b) Using SST to hold the front output shaft companion flange, remove the output shaft companion flange lock nut.

SST 09330–00021



(c) Using SST, remove the front output shaft companion flange.

SST 09950–40011 (09951–04020, 09952–04010, 09953–04030, 09954–04010, 09955–04051, 09957–04010, 09958–04011)

(d) Using a screwdriver and hammer, remove the oil seal from the front output shaft companion flange.

5. REMOVE REAR OUTPUT SHAFT COMPANION FLANGE

Remove the rear output shaft companion flange in the same way as the front output shaft companion flange.

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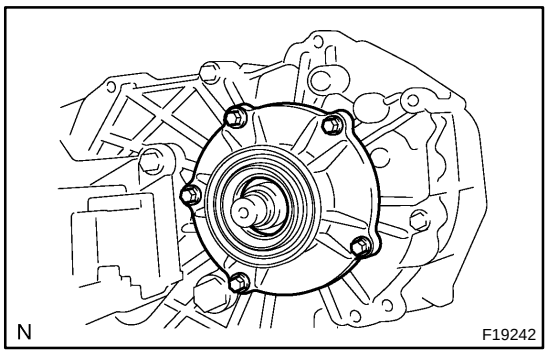


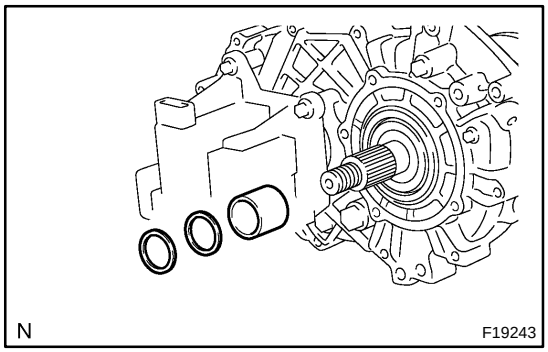
6. REMOVE TRANSFER EXTENSION HOUSING

(a) Remove the 5 bolts and transfer extension housing.

HINT:

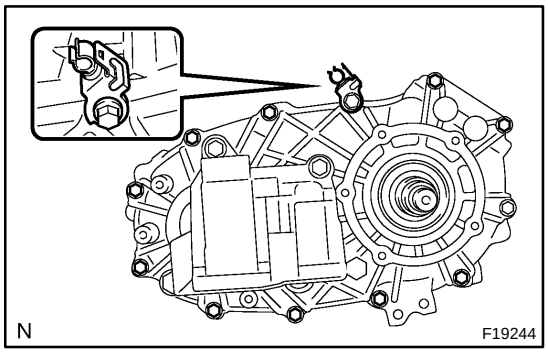
If necessary, tap on the transfer extension housing with a plastic hammer to remove it.

(b) Using a screwdriver and hammer, remove the oil seal from the transfer extension housing.



(c) Remove the 2 transfer output washers.

(d) Remove the collar.



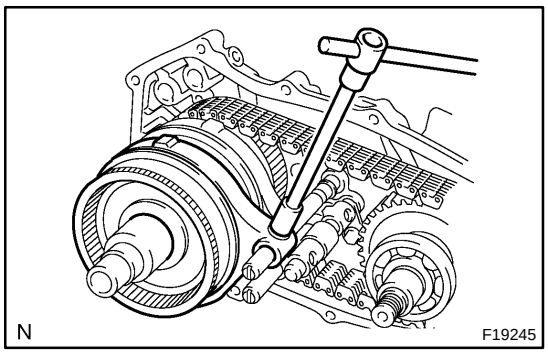
7. REMOVE TRANSFER CASE REAR

(a) Remove the 12 bolts and clamp.

(b) Remove the transfer case rear.

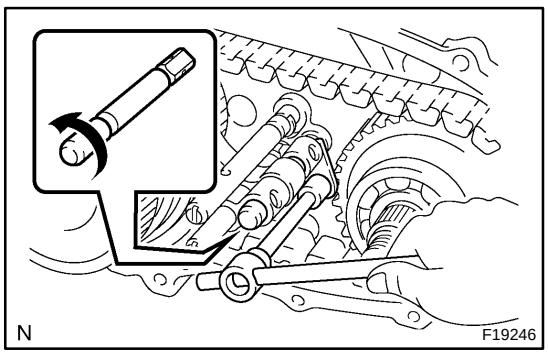
HINT:

If necessary, tap on the transfer case rear with a plastic hammer to remove it.



8. REMOVE GEAR SHIFT FORK NO. 2 AND HIGH AND LOW CLUTCH SLEEVE

Remove the bolt, gear shift fork No.2 and high and low clutch sleeve.



9. REMOVE SHIFT SHAFT STOPPER

Remove the bolt and shift shaft stopper.

10. REMOVE FRONT DRIVE SHIFT FORK SHAFT

(a) Turn the front drive shift fork shaft.

(b) Remove the front drive shift fork shaft from the rear case aligning the cutout with the shift inter–lock pin.

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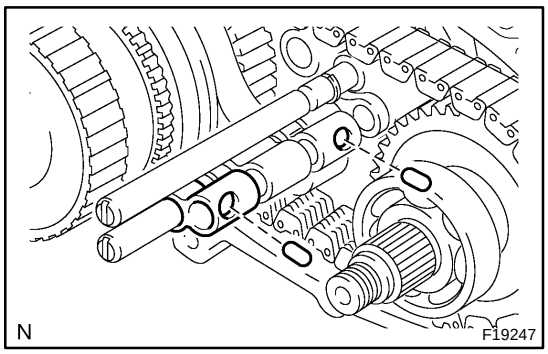
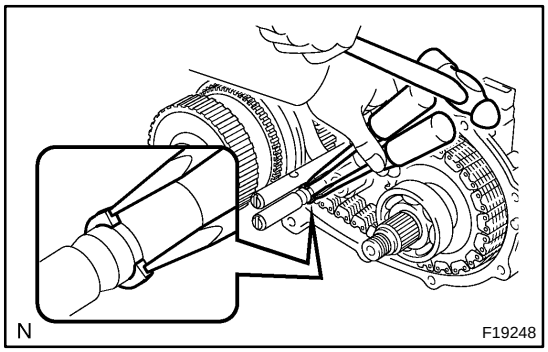


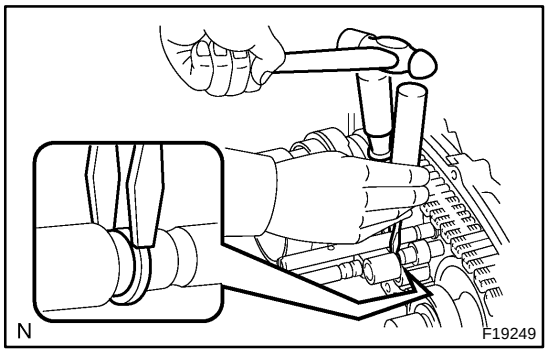
(c) Using a magnetic finger, remove the 2 shift inter–lock pins.

11. REMOVE FRONT NO. 2 STOPPER SHIFT SHAFT

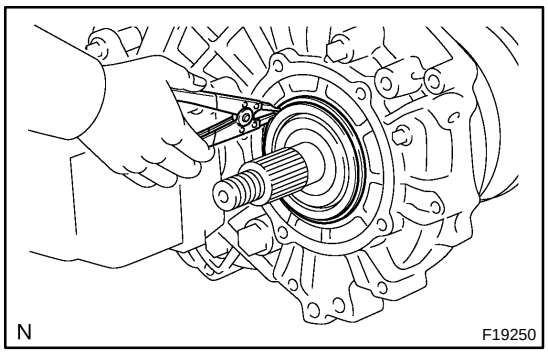


12. REMOVE REAR OUTPUT SHAFT ASSEMBLY, GEAR SHIFT FORK NO. 1, FRONT DRIVE CHAIN AND DRIVEN SPROCKET

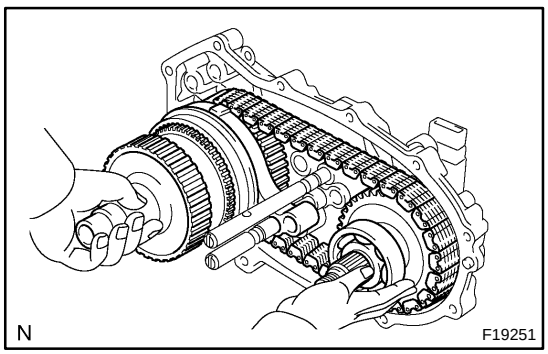
(a) Using 2 screwdrivers and a hammer, tap out the snap ring.



(b) Using 2 screwdrivers and a hammer, tap out the snap ring.



(c) Using a snap ring expander, remove the snap ring.



(d) Mount the transfer case rear in a vise.

(e) Using a plastic hammer, carefully tap the transfer case rear, and remove the rear output shaft assembly together with the gear shift fork No. 1, front drive chain and driven sprocket.

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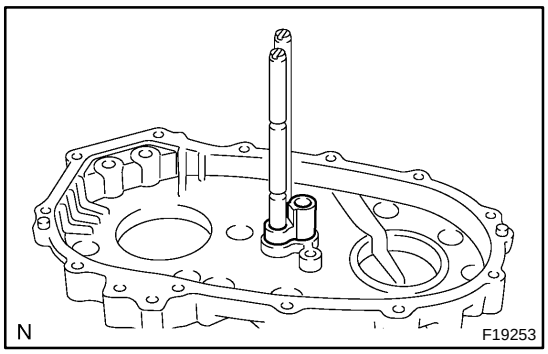
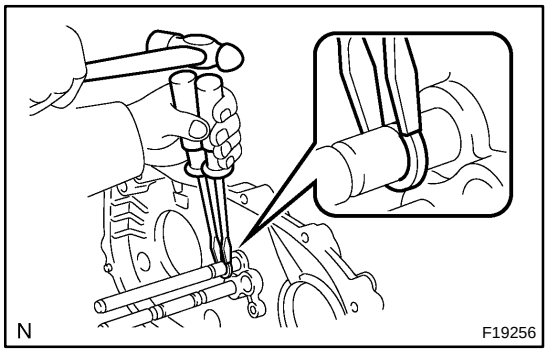
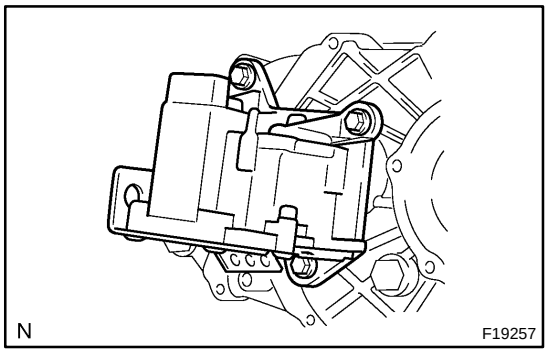


13. REMOVE REAR NO. 2 STOPPER TRANSFER SHIFT SHAFT

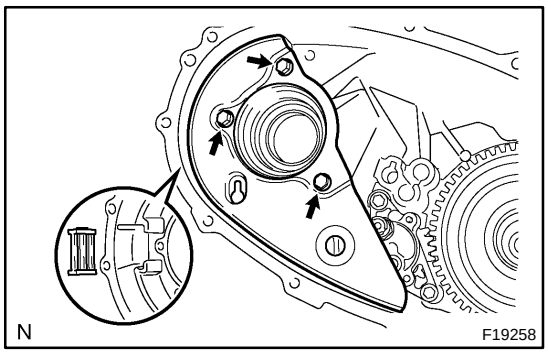


14. REMOVE TRANSFER SHIFT ACTUATOR

(a) Using 2 screwdrivers and a hammer, tap out the snap ring.



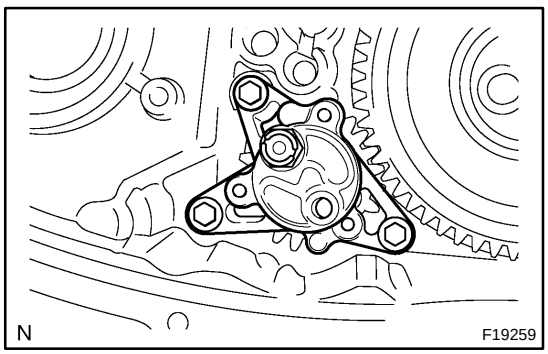
(b) Remove the 3 bolts and transfer shift actuator.



15. REMOVE OIL SEPARATOR

(a) Remove the 3 bolts and oil separator.

(b) Remove the magnet from the transfer front case.



16. REMOVE OIL PUMP

(a) Remove the 3 bolts and oil pump.

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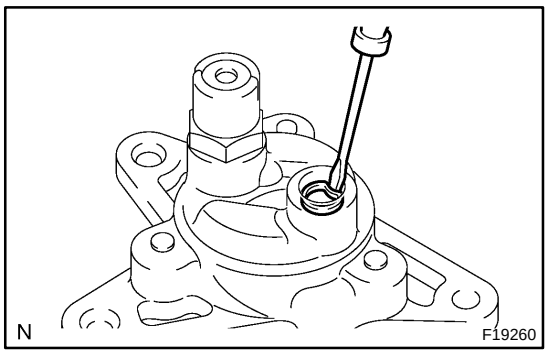
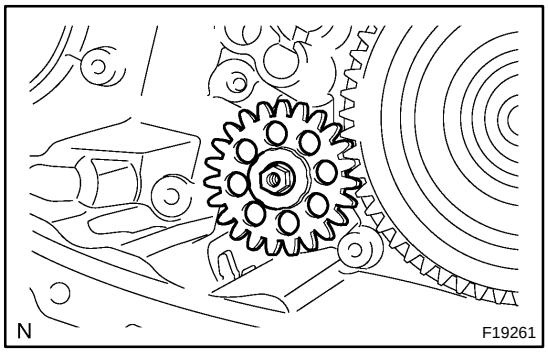
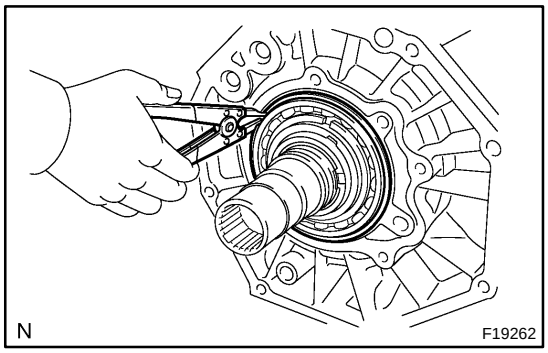


(b) Using a screwdriver, remove the O–ring from the oil pump.

NOTICE:
Be careful not to damage the oil pump.

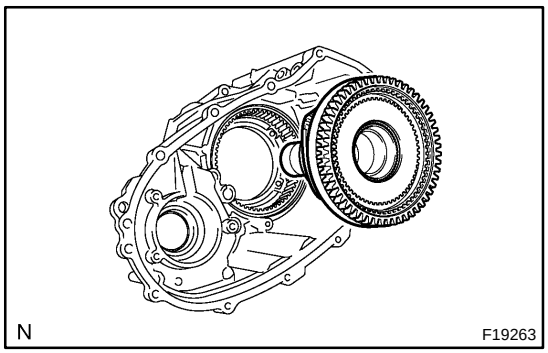


17. REMOVE OIL PUMP GEAR

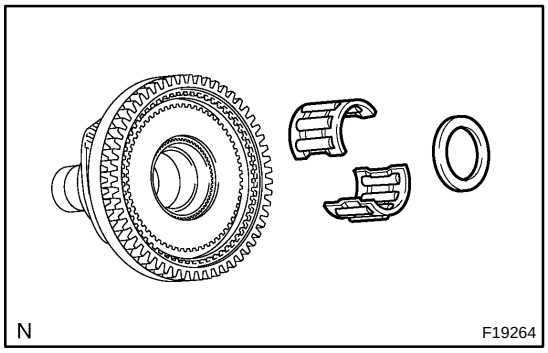


18. REMOVE LOW PLANETARY GEAR WITH INPUT SHAFT

(a) Using a snap ring expander, remove the snap ring.



(b) Remove the low planetary gear with the input shaft from the transfer front case.



(c) Remove the spacer and output shaft front needle roller bearing from the input shaft.

(d) Using a screwdriver and hammer, remove the oil seal from the transfer front case.

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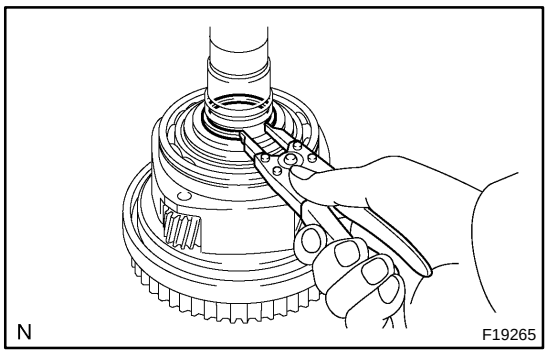
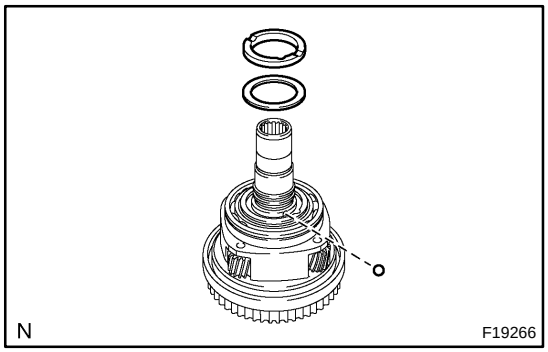
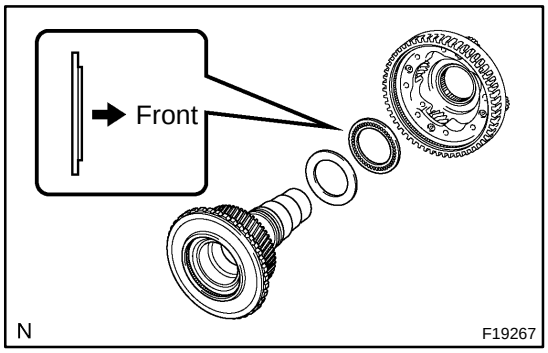


19. REMOVE LOW PLANETARY GEAR

(a) Using a snap ring expander, remove the snap ring.

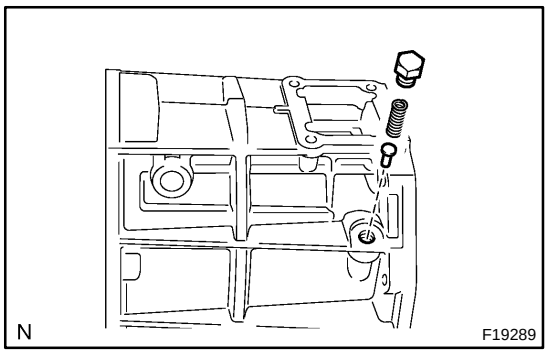


(b) Remove the input gear stopper, ball and planetary carrier washer.



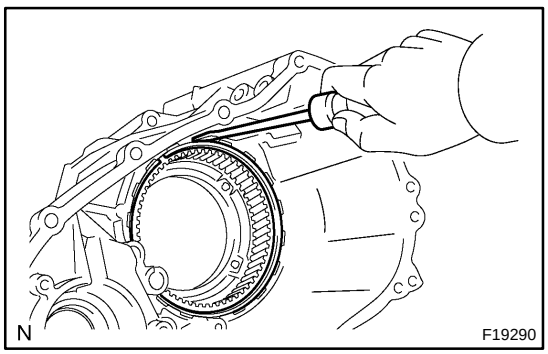
(c) Remove the input shaft from the low planetary gear.

(d) Remove the thrust bearing race No. 1 and low planetary gear bearing.



20. REMOVE CASE PLUG

Remove the case plug, compression spring and head pin from the transfer front case.



21. REMOVE LOW PLANETARY RING GEAR

(a) Using a screwdriver, remove the snap ring.

NOTICE:

Be careful not to damage the transfer front case.

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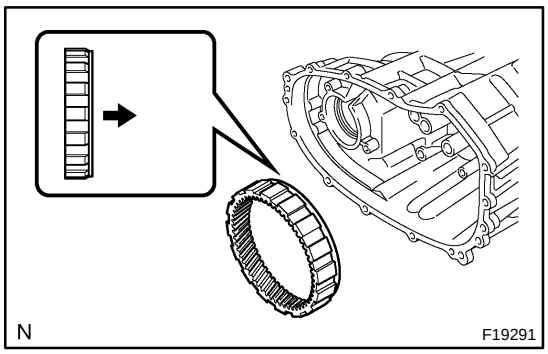

(b) Remove the low planetary ring gear from the transfer front case.

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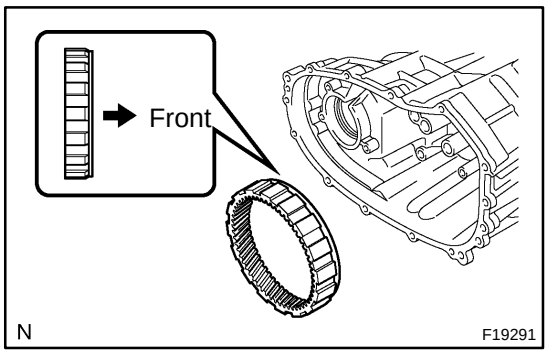
TR0DG–01

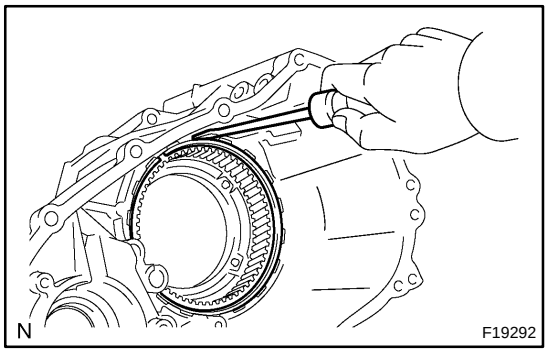
REASSEMBLY

1. INSTALL LOW PLANETARY RING GEAR

(a) Install the low planetary ring gear to the front case.



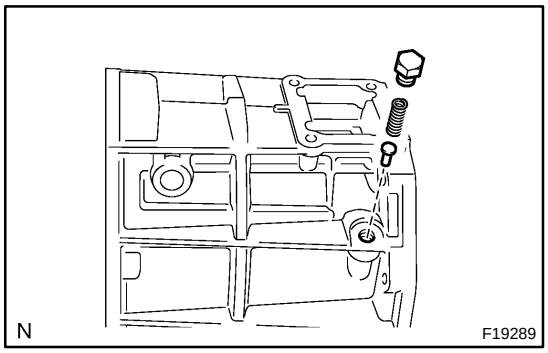
(b) Using a screwdriver, install the snap ring.



2. INSTALL CASE PLUG

Install the head pin, compression spring and case plug to the transfer front case.

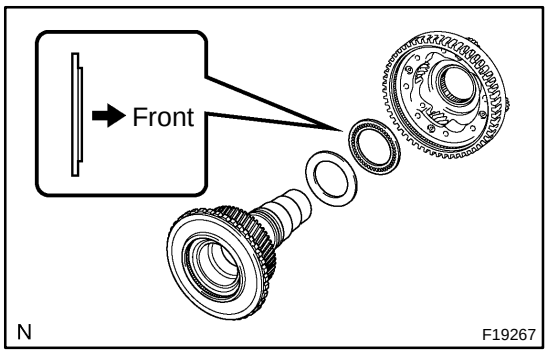
Torque: 18.6 N·m (190 kgf·cm, 14 ft·lbf)



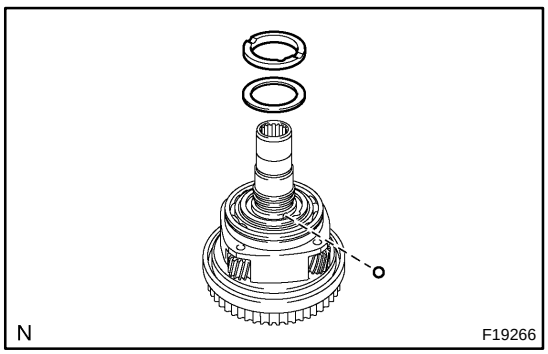
3. INSTALL LOW PLANETARY GEAR

(a) Install the thrust bearing race No. 1 and low planetary gear bearing to the input shaft.

(b) Install the input shaft to the low planetary gear.



(c) Install the ball, planetary carrier washer and input gear stopper.



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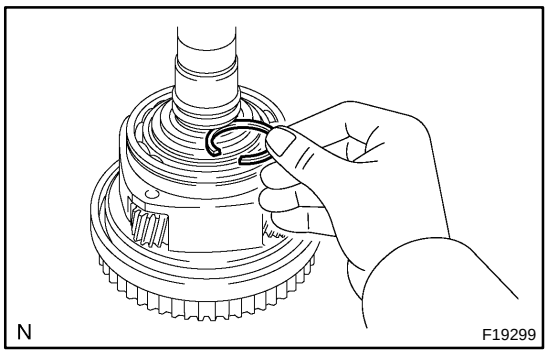
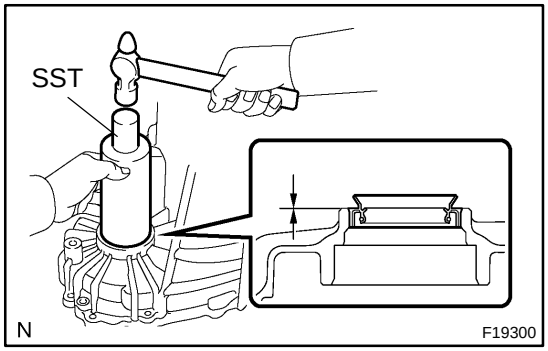


(d) Select a snap ring that allows for 0.05 to 0.15 mm (0.0020 to 0.0059 in.) axial play.

Mark	Thickness mm (in.)
A	2.10 to 2.15 (0.0827 to 0.0846)
B	2.15 to 2.20 (0.0846 to 0.0866)
C	2.20 to 2.25 (0.0866 to 0.0886)
D	2.25 to 2.30 (0.0886 to 0.0906)
E	2.30 to 2.35 (0.0906 to 0.0925)
F	2.35 to 2.40 (0.0925 to 0.0945)
G	2.40 to 2.45 (0.0945 to 0.0965)
H	2.45 to 2.50 (0.0965 to 0.0984)
J	2.50 to 2.55 (0.0984 to 0.1004)
K	2.55 to 2.60 (0.1004 to 0.1024)
L	2.60 to 2.65 (0.1024 to 0.1043)
M	2.65 to 2.70 (0.1043 to 0.1063)
N	2.70 to 2.75 (0.1063 to 0.1083)
P	2.75 to 2.80 (0.1083 to 0.1102)
Q	2.80 to 2.85 (0.1102 to 0.1122)
R	2.85 to 2.90 (0.1122 to 0.1142)
S	2.90 to 2.95 (0.1142 to 0.1161)
T	2.95 to 3.00 (0.1161 to 0.1181)
U	3.00 to 3.05 (0.1181 to 0.1201)

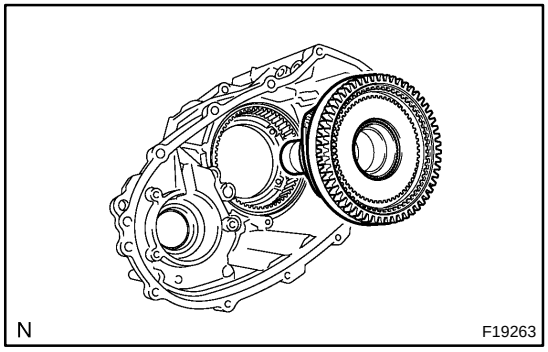
(e) Using a snap ring expander, install a new snap ring.



4. INSTALL OIL SEAL

(a) Using SST and a hammer, drive in a new oil seal until its surface is flush with the case upper surface.
SST 09316 – 60011 (09316 – 00011)

(b) Coat the lip of the oil seal with MP grease.



5. INSTALL LOW PLANETARY GEAR WITH INPUT SHAFT

(a) Install the low planetary gear with the input shaft to the transfer front case.

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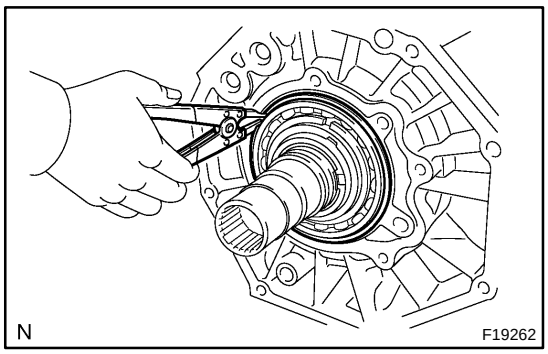
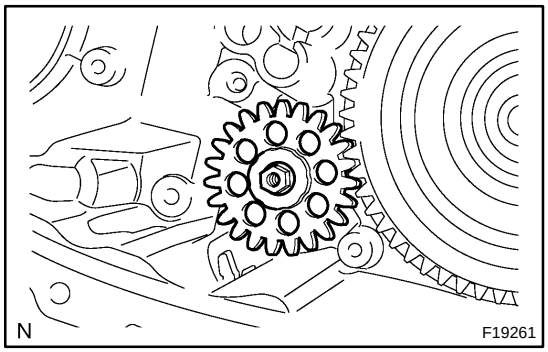
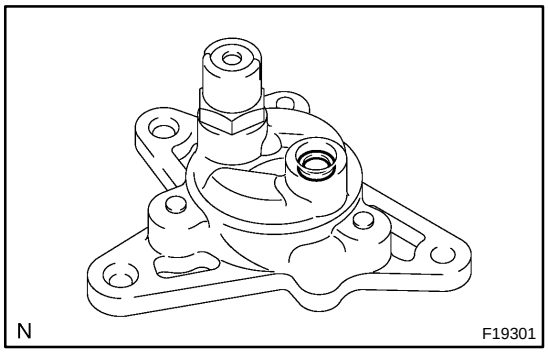


(b) Using a snap ring expander, install the snap ring.

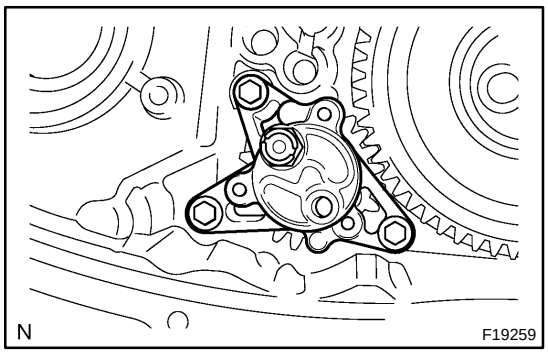


6. INSTALL OIL PUMP GEAR

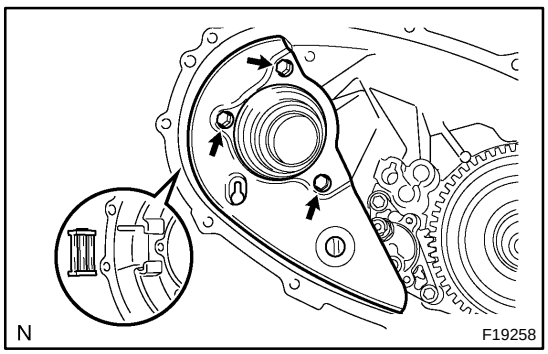


7. INSTALL OIL PUMP

(a) Coat a new O–ring with gear oil and install it to the oil pump.



(b) Install the oil pump with the 3 bolts.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



8. INSTALL OIL SEPARATOR

(a) Install the magnet to the transfer front case.
(b) Install the oil separator with the 3 bolts.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

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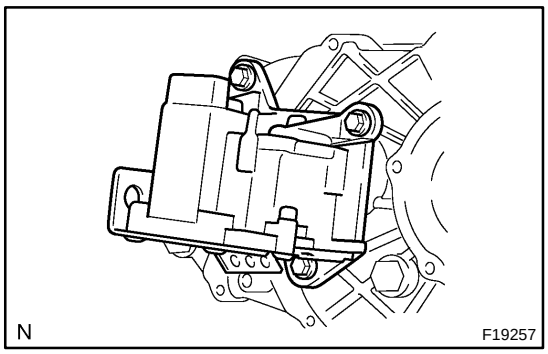
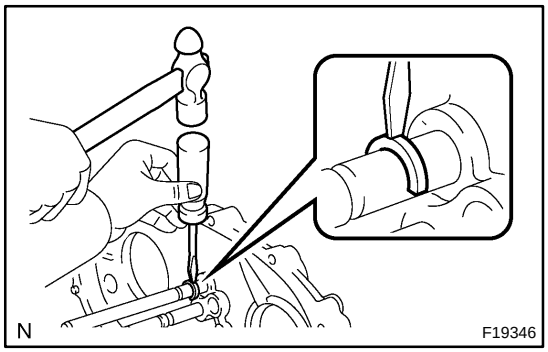
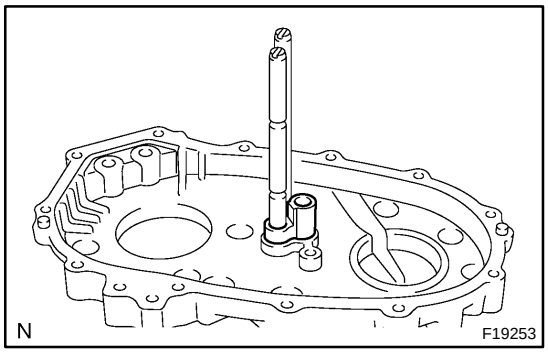


9. INSTALL TRANSFER SHIFT ACTUATOR

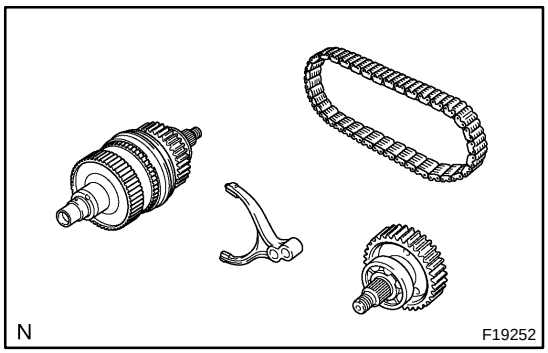
(a) Install the transfer shift actuator with the 3 bolts.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)



(b) Using a screwdriver and hammer, drive in the snap ring.

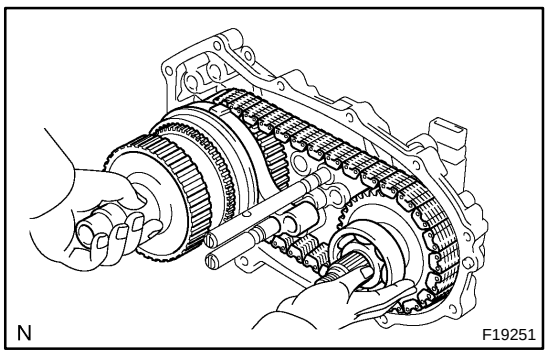


10. INSTALL REAR NO. 2 STOPPER TRANSFER SHIFT SHAFT



11. INSTALL REAR OUTPUT SHAFT ASSEMBLY, GEAR SHIFT FORK NO. 1, FRONT DRIVE CHAIN AND DRIVEN SPROCKET

(a) Install the rear output shaft assembly, gear shift fork No. 1 and driven sprocket to the front drive chain.



(b) Install the rear output shaft assembly, gear shift fork No. 1, driven sprocket and front drive chain to the transfer case rear.

HINT:
Check that the rear output shaft and driven sprocket turn slightly.

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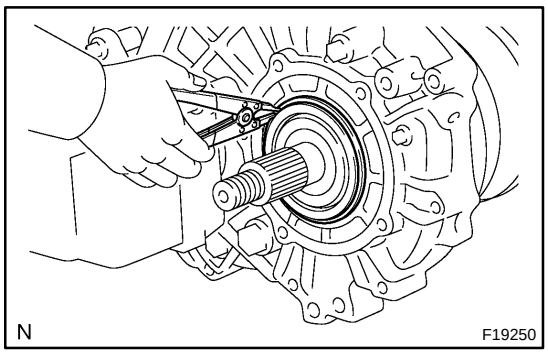
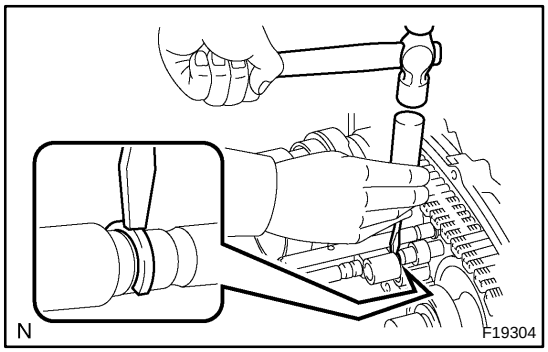
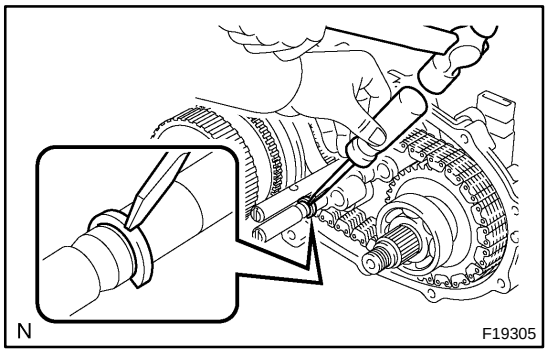


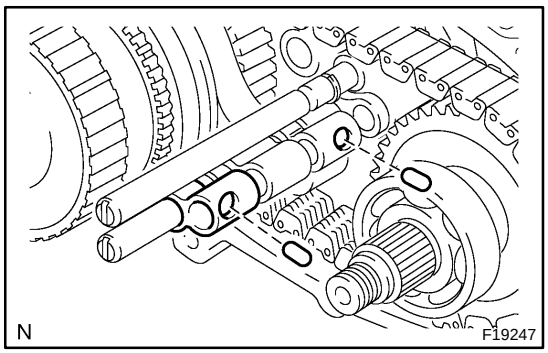
(c) Using a snap ring expander, install the snap ring.



(d) Using a screwdriver and hammer, drive in the snap ring.



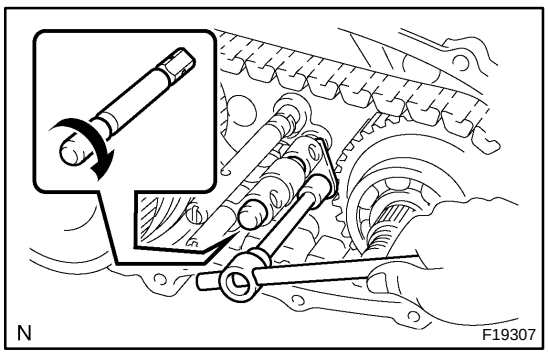
(e) Using a screwdriver and hammer, drive in the snap ring.



12. INSTALL FRONT NO. 2 STOPPER SHIFT SHAFT

13. INSTALL FRONT DRIVE SHIFT FORK SHAFT

(a) Install the 2 shift inter–lock pins.



(b) Turn the front drive shift fork shaft, and install it on the rear case aligning the cutout with the inter–lock pin.

14. INSTALL SHIFT SHAFT STOPPER

Install the shift shaft stopper with the bolt.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

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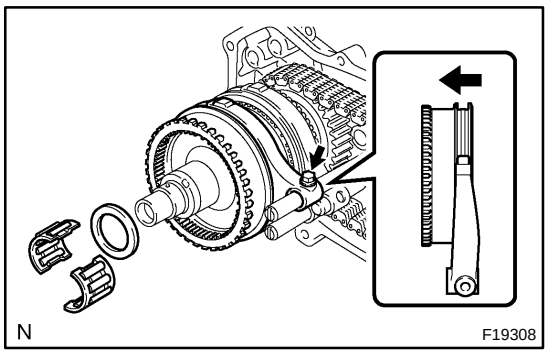
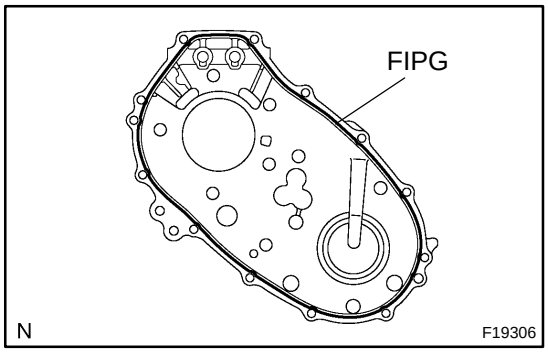


15. INSTALL GEAR SHIFT FORK NO. 2 AND HIGH AND LOW CLUTCH SLEEVE

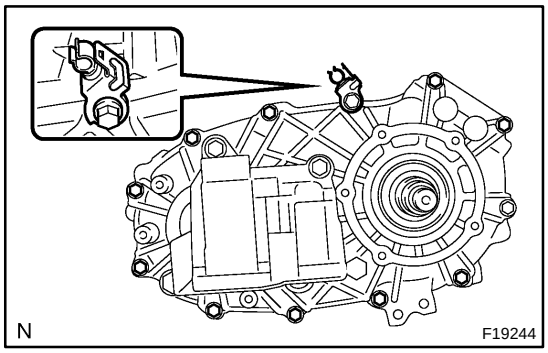
(a) Install the gear shift fork No. 2 and high and low clutch sleeve with the bolt.
Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)

(b) Install the spacer and output shaft front needle roller bearing.

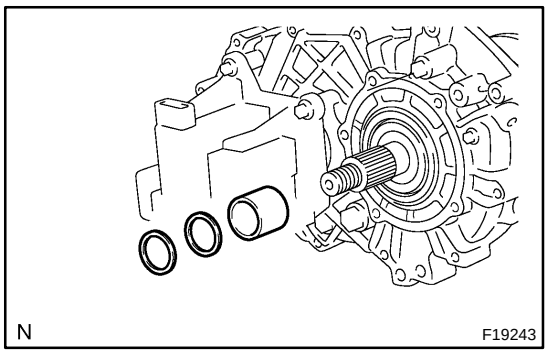


16. INSTALL TRANSFER CASE REAR

(a) Apply FIPG to the transfer case rear, as shown.
FIPG:
Part No. 08826–00090, THREE BOND 1281 or equivalent

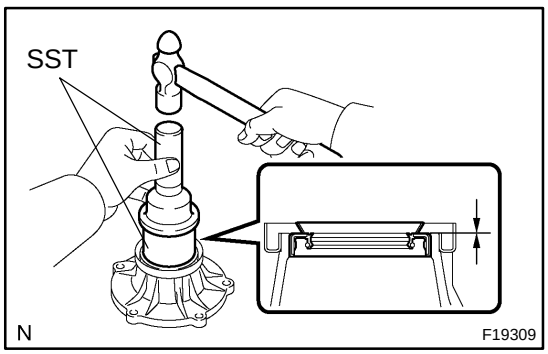


(b) Install the clamp and transfer case rear with the 12 bolts.
Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)



17. INSTALL TRANSFER EXTENSION HOUSING

(a) Install the collar and 2 transfer output washers.



(b) Using SST and a hammer, drive in a new oil seal until its surface is flush with the housing upper surface.
SST 09223–46011, 09631–32020

(c) Coat the lip of the oil seal with MP grease.

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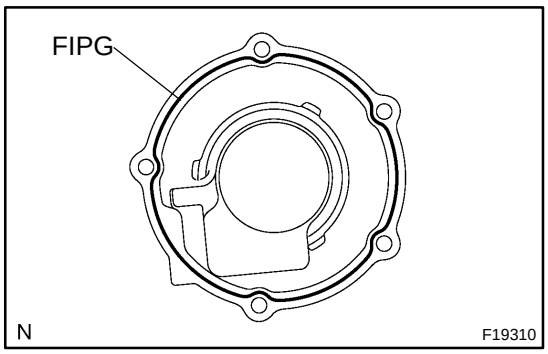
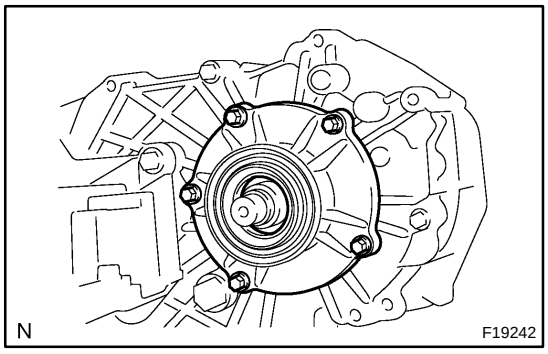
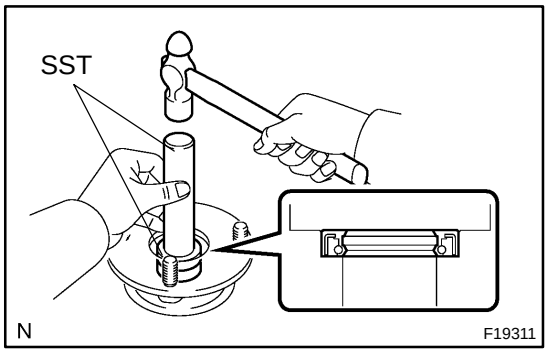


(d) Apply FIPG to the transfer extension housing, as shown.
FIPG:
Part No. 08826–00090, THREE BOND 1281 or equivalent

(e) Apply sealant to the bolt threads.
FIPG:
Part No. 08826–00080, THREE BOND 1334, LOCTITE 242 or equivalent



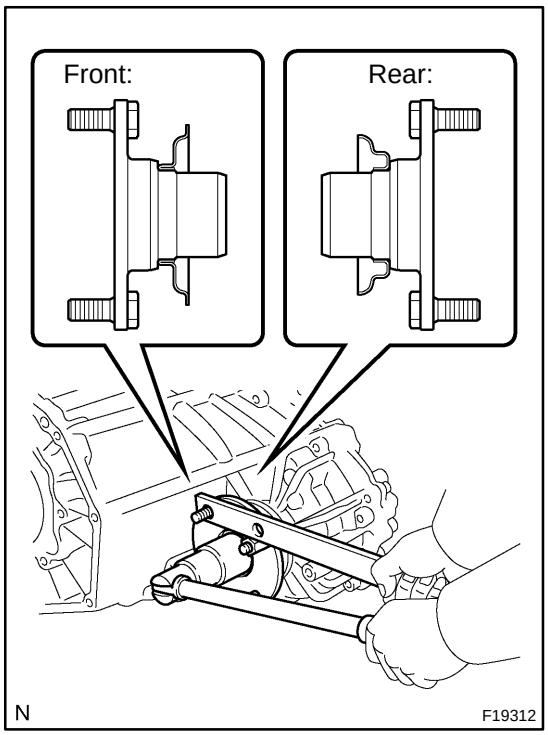
(f) Install the transfer extension housing with the 5 bolts.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



18. INSTALL FRONT OUTPUT SHAFT COMPANION FLANGE

(a) Using SST and a hammer, drive in a new oil seal.
SST 09950–60010 (09951–00320), 09950–70010 (09951–07100)

(b) Coat the lip of the oil seal with MP grease.



(c) Install the front output shaft companion flange to the driven sprocket.

(d) Using SST to hold the front output shaft companion flange, install a new companion flange lock nut.
Torque: 118 N·m (1,203 kgf·cm, 87 ft·lbf)
SST 09330–00021

(e) Using a chisel and hammer, stake the companion flange lock nut.

19. INSTALL REAR OUTPUT SHAFT COMPANION FLANGE

Using SST, install the rear output shaft companion flange in the same way as the front output shaft companion flange.
Torque: 118 N·m (1,203 kgf·cm, 87 ft·lbf)
SST 09330–00021

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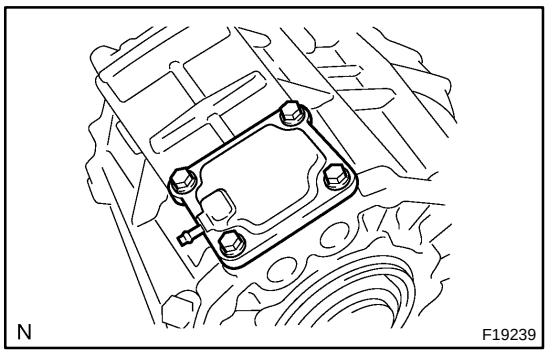
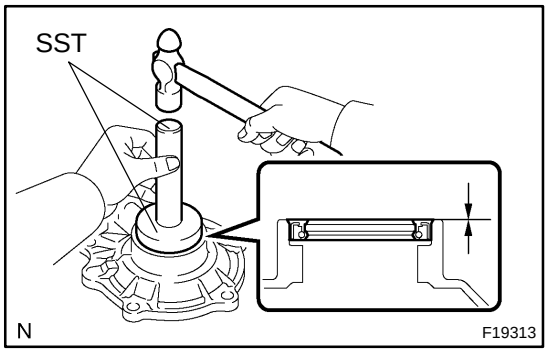


20. INSTALL BREATHER OIL DEFLECTOR

21. INSTALL TRANSFER CASE COVER

Install the transfer case cover with the 4 bolts.

Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)

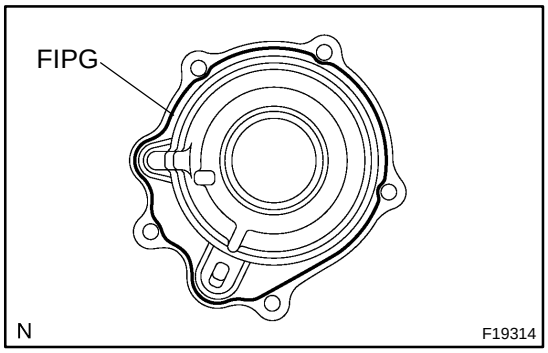


22. INSTALL FRONT BEARING RETAINER

(a) Using SST and a hammer, drive in a new oil seal until its surface is flush with the retainer upper surface.

SST 09950–60010 (09951–00590), 09950–70010 (09951–07100)

(b) Coat the lip of the oil seal with MP grease.



(c) Apply FIPG to the front bearing retainer, as shown.

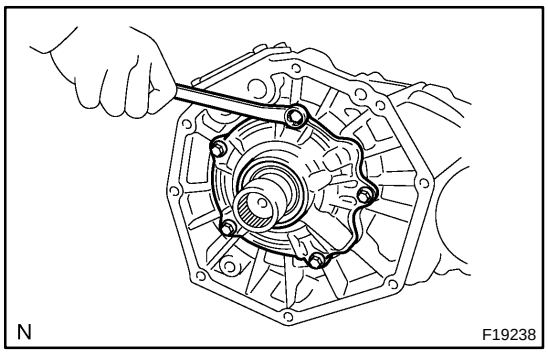
FIPG:

Part No. 08826–00090, THREE BOND 1281 or equivalent

(d) Apply sealant to the bolt threads.

FIPG:

Part No. 08826–00080, THREE BOND 1334, LOCTITE 242 or equivalent



(e) Install the front bearing retainer with the 5 bolts.

Torque: 11.5 N·m (117 kgf·cm, 8 ft·lbf)

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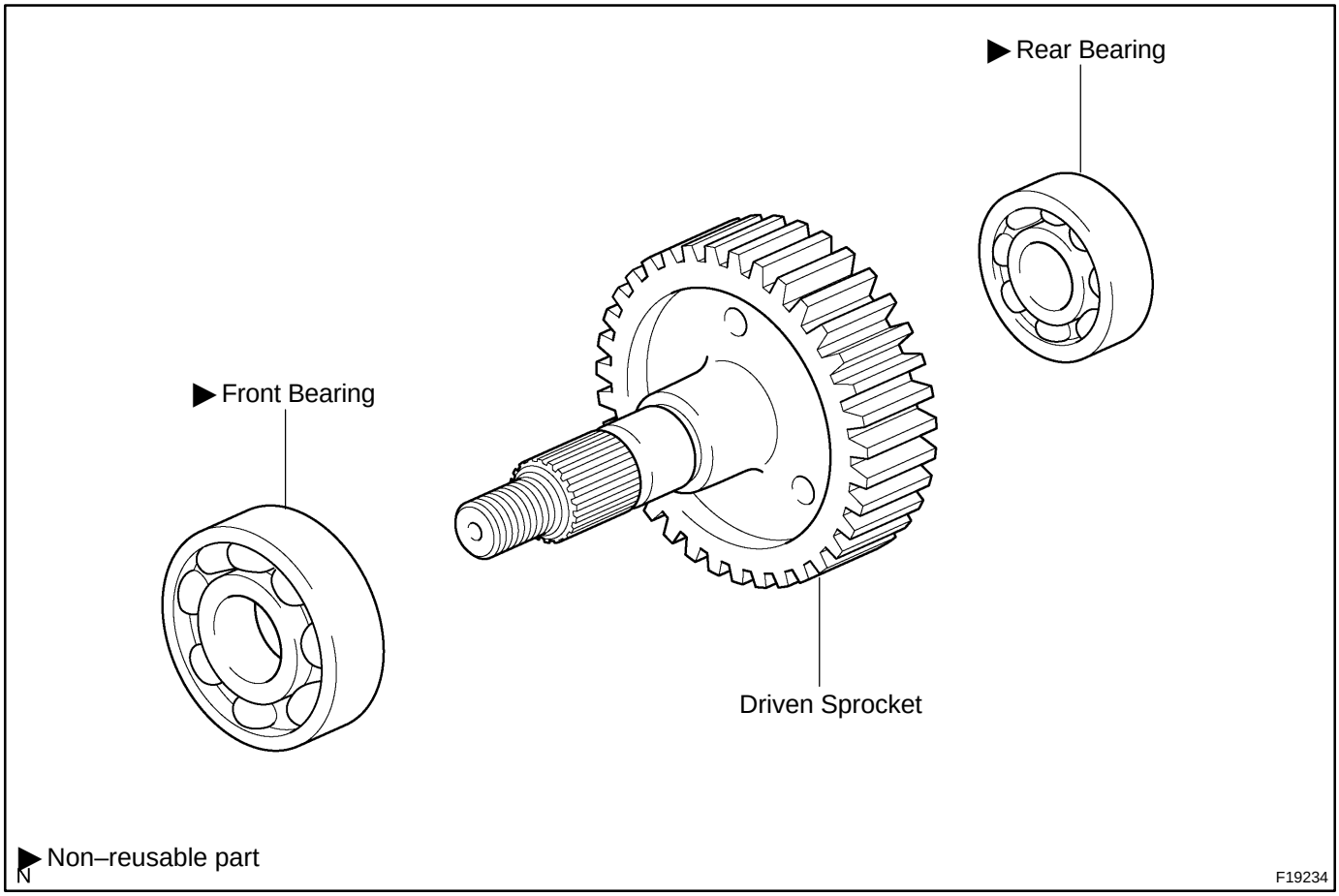
DRIVEN SPROCKET

COMPONENTS

TR00F–08



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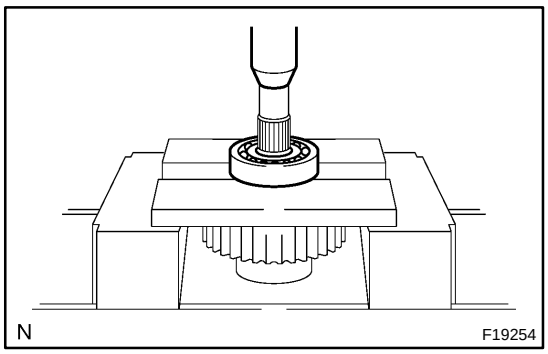
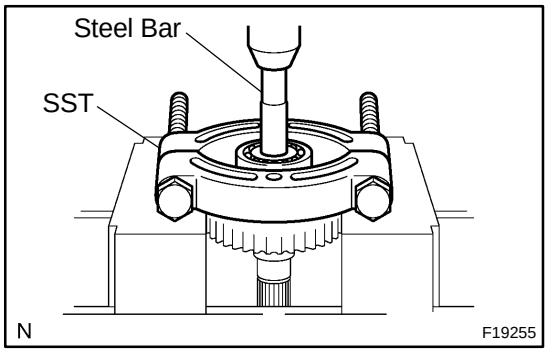
TR00G–08

REPLACEMENT



1. REMOVE FRONT BEARING

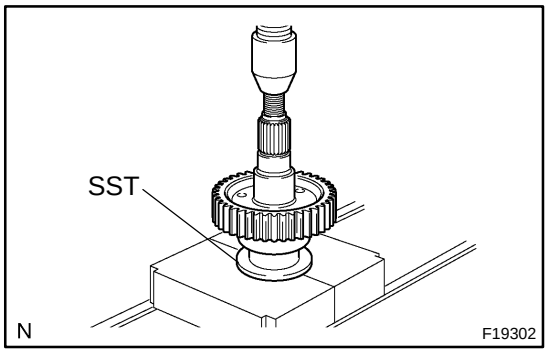
Using a press, remove the front bearing.



2. REMOVE REAR BEARING

Using SST, a press and steel bar, remove the rear bearing.

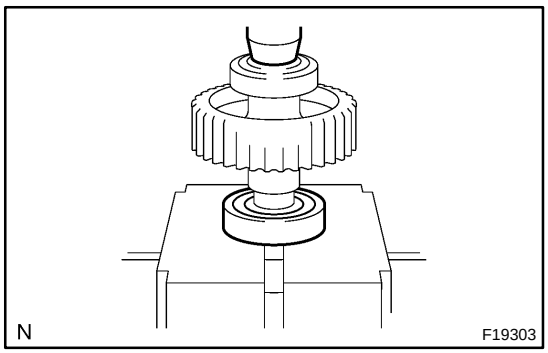
SST 09555–55010



3. INSTALL REAR BEARING

Using SST and a press, install a new rear bearing.

SST 09316–60011 (09316–00031)



4. INSTALL FRONT BEARING

Using a press, install a new front bearing.

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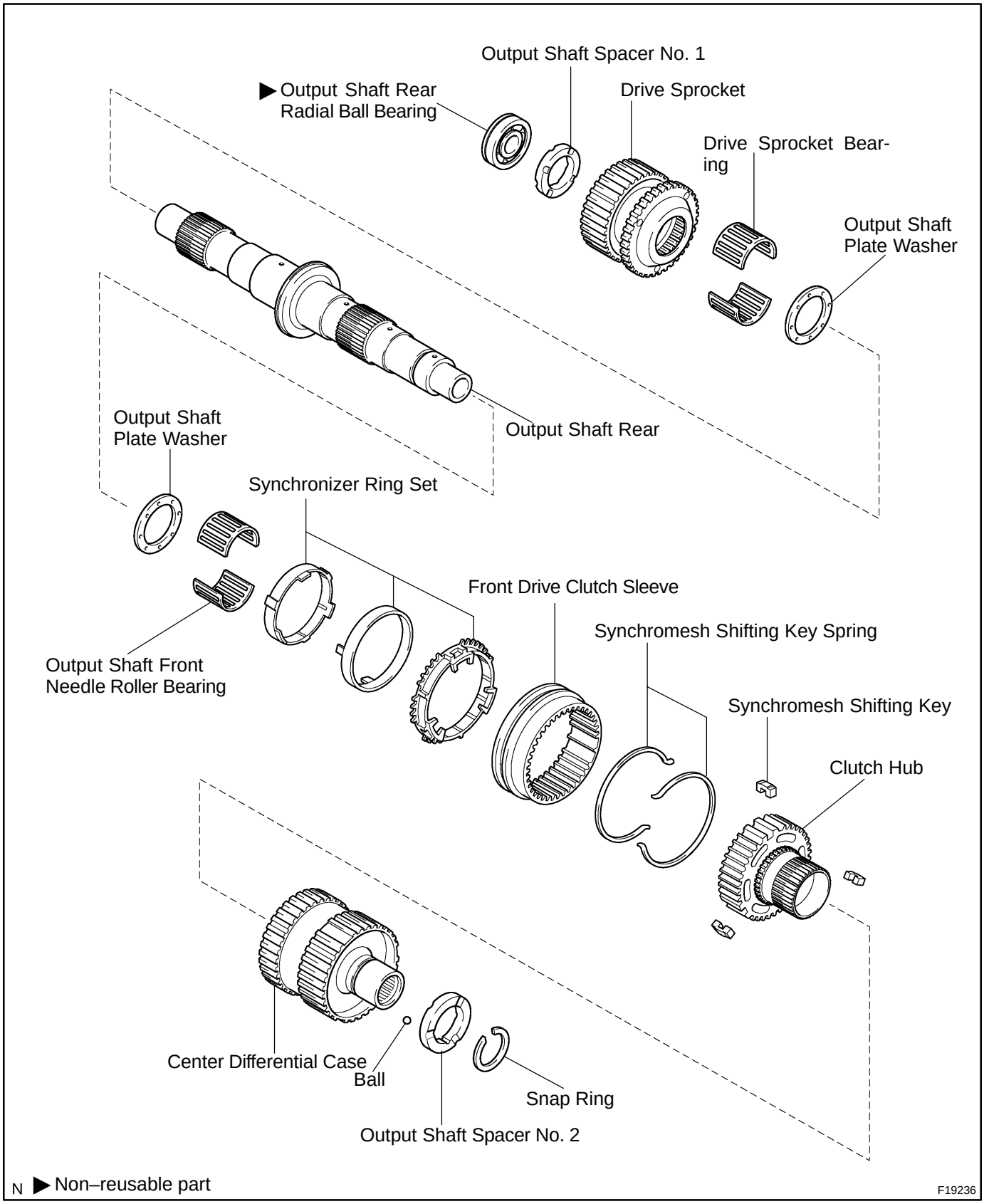
REAR OUTPUT SHAFT

COMPONENTS

TR083–03



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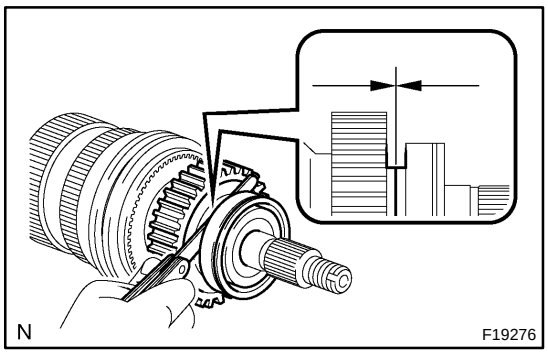
TR0DH–01

DISASSEMBLY

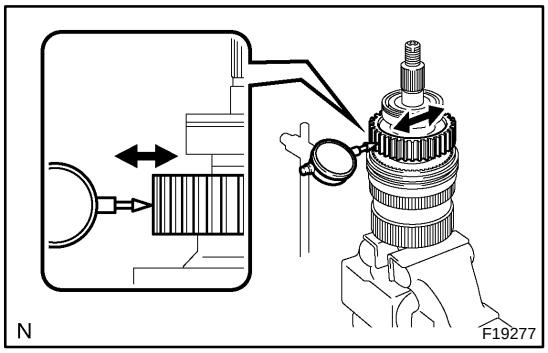


1. INSPECT DRIVE SPROCKET THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance of the drive sprocket.

Standard clearance:
0.15 to 0.24 mm (0.0059 to 0.0094 in.)
Maximum clearance:
0.24 mm (0.0094 in.)

If the clearance exceeds the maximum, replace the drive sprocket.

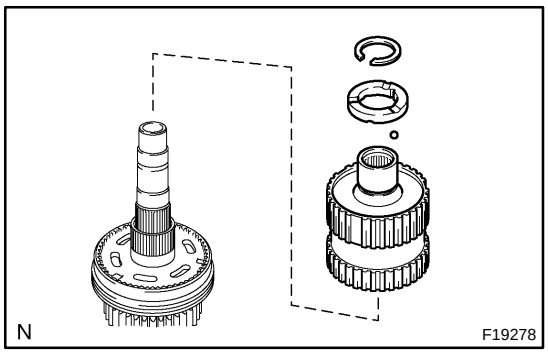


2. INSPECT DRIVE SPROCKET RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance of the drive sprocket.

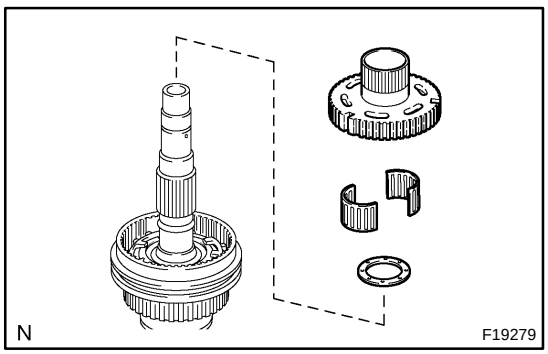
Standard clearance:
0.01 to 0.06 mm (0.0004 to 0.0024 in.)
Maximum clearance:
0.06 mm (0.0024 in.)

If the clearance exceeds the maximum, replace the drive sprocket, output shaft rear or needle roller bearing.



3. REMOVE CENTER DIFFERENTIAL CASE

(a) Using a snap ring expander, remove the snap ring.
(b) Remove the output shaft spacer No. 2 and ball.
(c) Remove the center differential case.



4. REMOVE CLUTCH HUB

Remove the clutch hub, output shaft front needle roller bearing and output shaft plate washer.

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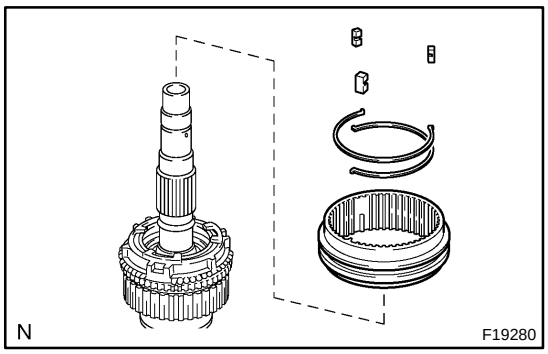
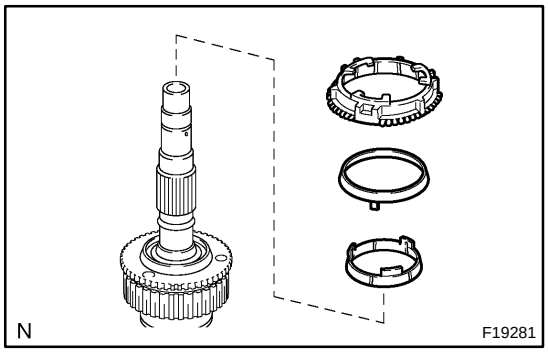
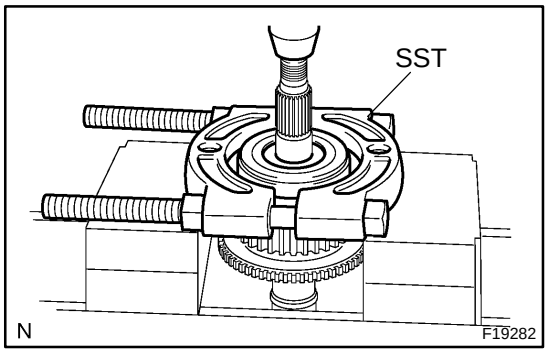


5. REMOVE FRONT DRIVE CLUTCH SLEEVE

(a) Using a screwdriver, remove the 2 shifting key springs.
(b) Remove the 3 shifting keys.
(c) Remove the front drive clutch sleeve.

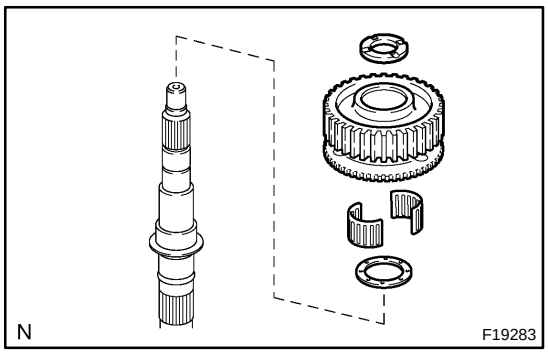


6. REMOVE SYNCHRONIZER RING SET



7. REMOVE DRIVE SPROCKET

(a) Using SST and a press, remove the output shaft rear radial ball bearing.
SST 09555–55010



(b) Remove the output shaft spacer No. 1 and drive sprocket.
(c) Remove the output shaft plate washer and drive sprocket bearing.

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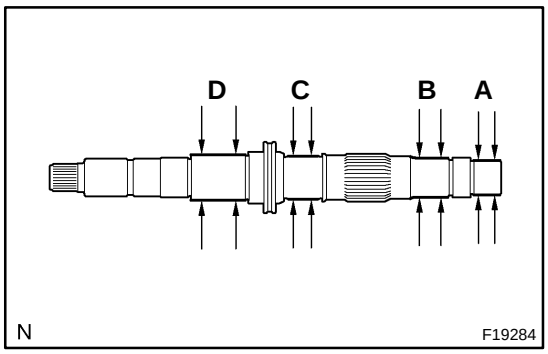
TR0DI–01

INSPECTION

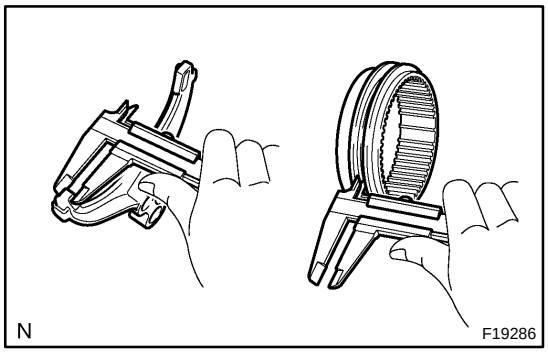


1. INSPECT OUTPUT SHAFT REAR

Using a micrometer, measure the outer diameter of the output shaft rear journal surface.

Standard diameter:
Part A: 27.98 to 27.99 mm (1.1016 to 1.1020 in.)
Part B: 31.98 to 32.00 mm (1.2591 to 1.2598 in.)
Part C: 34.98 to 35.00 mm (1.3772 to 1.3780 in.)
Part D: 36.98 to 37.00 mm (1.4559 to 1.4567 in.)
Minimum diameter:
Part A: 27.98 mm (1.1016 in.)
Part B: 31.98 mm (1.2591 in.)
Part C: 34.98 mm (1.3772 in.)
Part D: 36.98 mm (1.4559 in.)

If the outer diameter is less than the minimum, replace the output shaft rear.



2. INSPECT FRONT DRIVE CLUTCH SLEEVE AND GEAR SHIFT FORK NO. 1 CLEARANCE

(a) Using vernier calipers, measure the thickness of the gear shift fork No. 1 claw.
Thickness: 10 mm (0.3937 in.)

(b) Using vernier calipers, measure the width of the groove of the front drive clutch sleeve.
Width: 10.5 mm (0.4134 in.)

(c) Calculate the clearance between the front drive clutch sleeve and gear shift fork No. 1.
Standard clearance:
0.26 to 0.84 mm (0.0102 to 0.0331 in.)
Maximum clearance:
0.84 mm (0.0331 in.)

If the clearance exceeds the maximum, replace the front drive clutch sleeve or gear shift fork No. 1.

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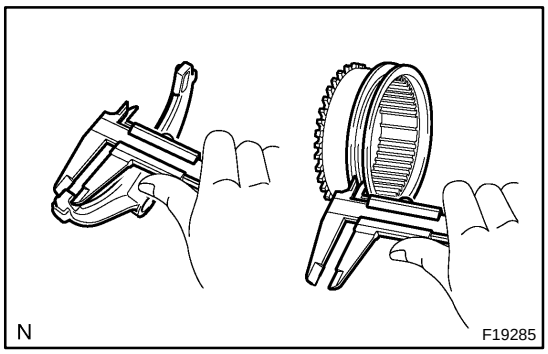


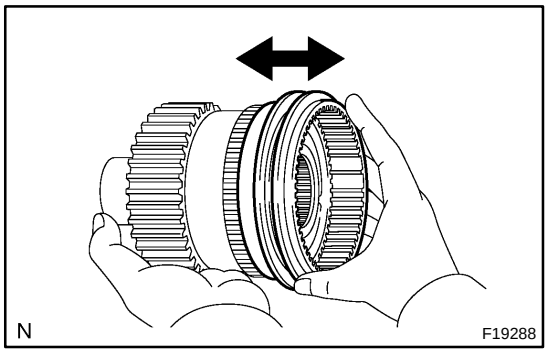
3. INSPECT HIGH AND LOW CLUTCH SLEEVE AND GEAR SHIFT FORK NO. 2 CLEARANCE

(a) Using vernier calipers, measure the thickness of the gear shift fork No. 2 claw.
Thickness: 10 mm (0.3937 in.)

(b) Using vernier calipers, measure the width of the groove of the high and low clutch sleeve.
Width: 10.5 mm (0.4134 in.)

(c) Calculate the clearance between the high and low clutch sleeve and gear shift fork No. 1.
Standard clearance:
0.26 to 0.84 mm (0.0102 to 0.0331 in.)
Maximum clearance:
0.84 mm (0.0331 in.)

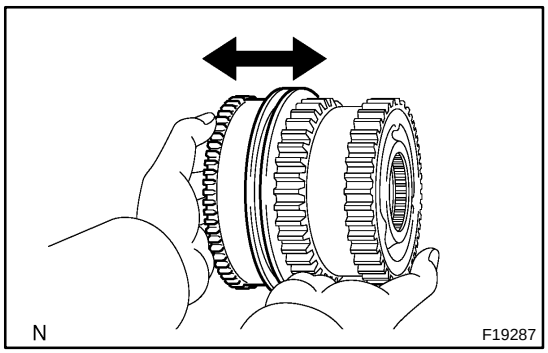
If the clearance exceeds the maximum, replace the high and low clutch sleeve or gear shift fork No. 2.



4. INSPECT CENTER DIFFERENTIAL CASE AND FRONT DRIVE CLUTCH SLEEVE

(a) Check that the tip of the spline gear of the front drive clutch sleeve is not worn.

(b) Install the front drive clutch sleeve to the center differential case and check that the front drive clutch sleeve moves smoothly.



5. INSPECT CENTER DIFFERENTIAL CASE AND HIGH AND LOW CLUTCH SLEEVE

(a) Check that the tip of the spline gear of the front drive clutch sleeve is not worn.

(b) Install the front drive clutch sleeve to the center differential case and check that the front drive clutch sleeve moves smoothly.

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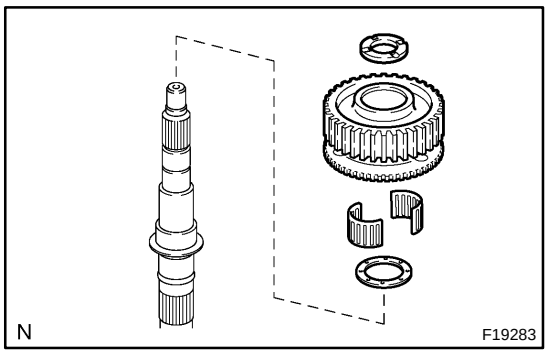
TR0DJ–01

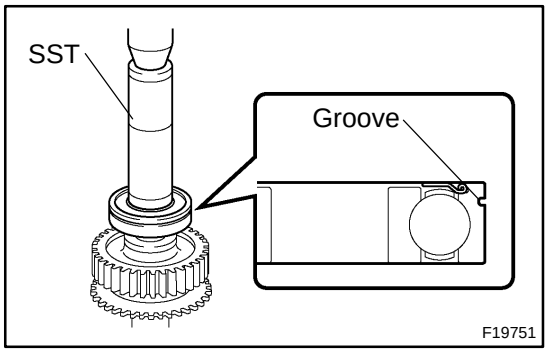
REASSEMBLY



1. INSTALL DRIVE SPROCKET

(a) Install the output shaft plate washer and drive sprocket bearing to the output shaft rear.

(b) Install the drive sprocket and output shaft spacer No. 1 to the output shaft rear.

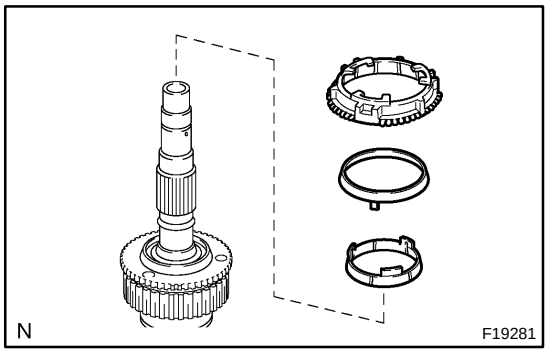


(c) Using SST and a press, install a new output shaft rear radial ball bearing.

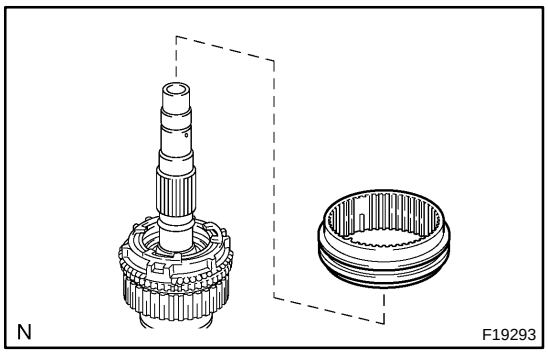
SST 09316–60011 (09316–00011, 09316–00071)

NOTICE:

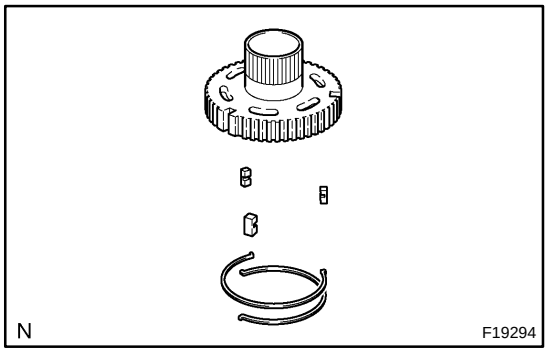
Install the output shaft rear radial ball bearing so that the groove for the snap ring does not face the drive sprocket.



2. INSTALL SYNCHRONIZER RING SET



3. INSTALL FRONT DRIVE CLUTCH SLEEVE



4. INSTALL CLUTCH HUB

(a) Install the 3 shifting keys to the clutch hub.

(b) Install the 2 shifting key springs to the clutch hub.

NOTICE:

Position the shifting key springs so that their end gaps are not aligned.

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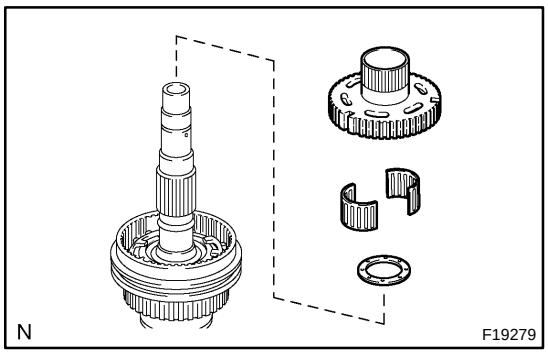
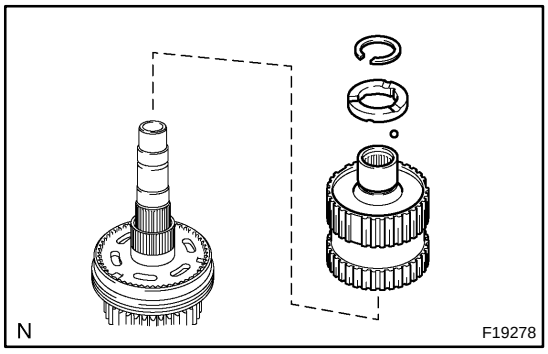
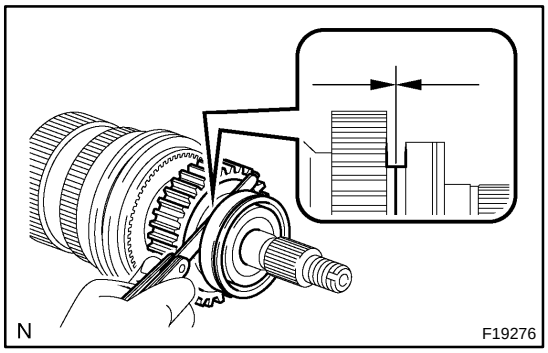


(c) Install the output shaft plate washer and output shaft front needle roller bearing to the output shaft rear.
(d) Install the clutch hub to the output shaft rear.



5. INSTALL CENTER DIFFERENTIAL CASE

(a) Install the center differential case to the output shaft rear.
(b) Install the ball and output shaft spacer No. 2 to the center differential case.
(c) Using a snap ring expander, install the snap ring.

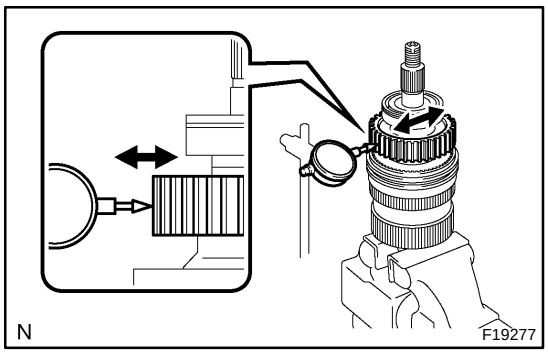


6. INSPECT DRIVE SPROCKET THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance of the drive sprocket.

Standard clearance:
0.15 to 0.24 mm (0.0059 to 0.0094 in.)
Maximum clearance:
0.24 mm (0.0094 in.)

If the clearance exceeds the maximum, replace the drive sprocket.



7. INSPECT DRIVE SPROCKET RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance of the drive sprocket.

Standard clearance:
0.01 to 0.06 mm (0.0004 to 0.0024 in.)
Maximum clearance:
0.06 mm (0.0024 in.)

If the clearance exceeds the maximum, replace the drive sprocket, output shaft rear or needle roller bearing.

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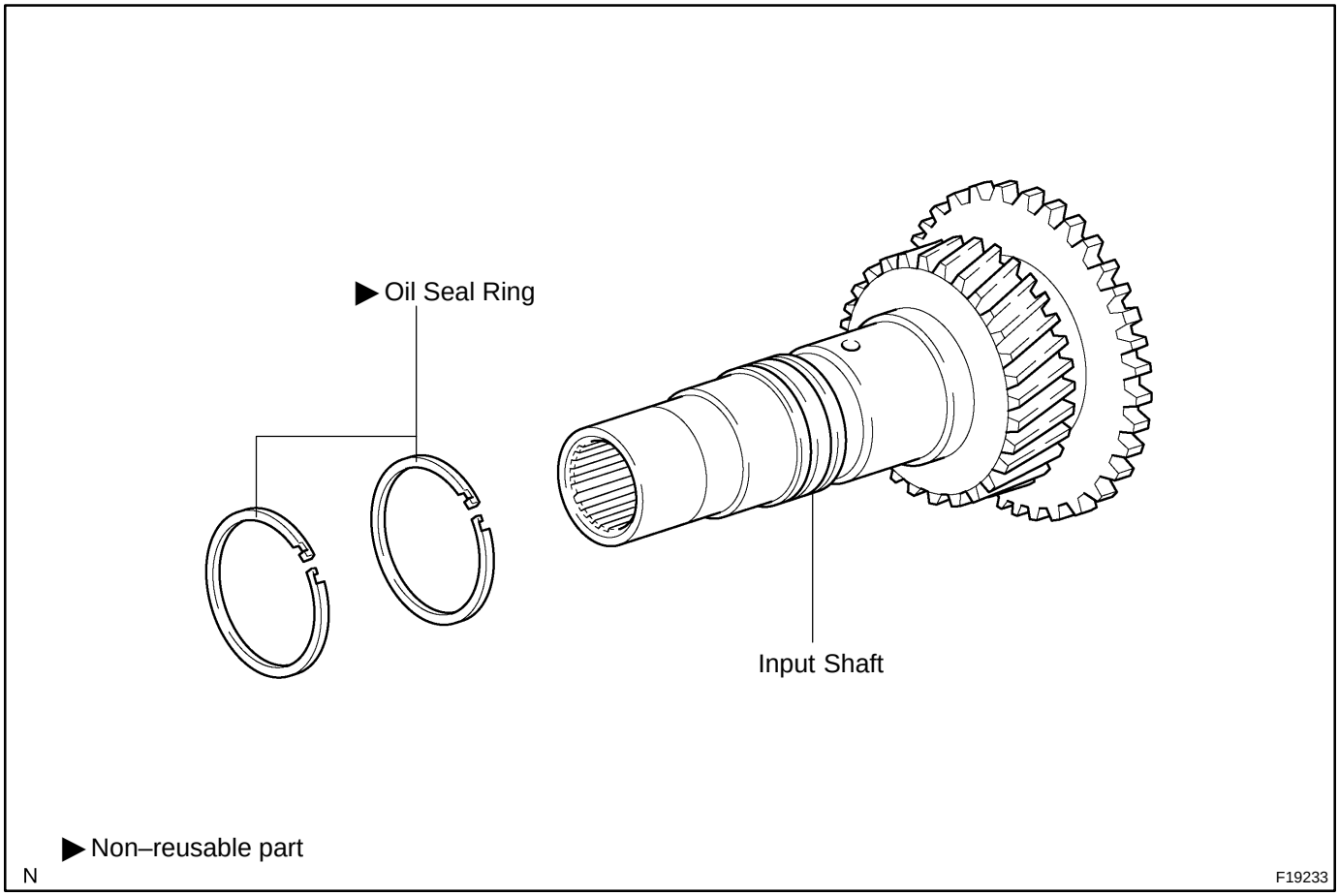
INPUT SHAFT

COMPONENTS

TR04O–04



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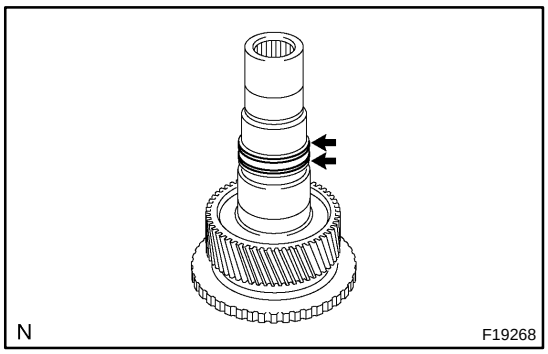
TR0DK–01

INSPECTION

1. REMOVE 2 OIL SEAL RINGS

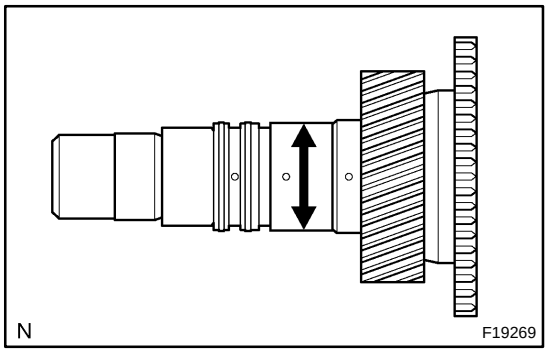


2. INSPECT INPUT SHAFT

(a) Using a micrometer, measure the outer diameter of the input shaft journal surface.

Minimum diameter: 47.59 mm (1.8736 in.)

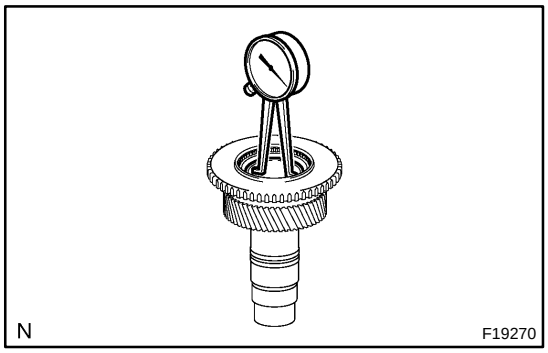
If the outer diameter is less than the minimum, replace the input shaft.



(b) Using a dial indicator, measure the inside diameter of the input shaft bushing.

Maximum diameter: 48.14 mm (1.8953 in.)

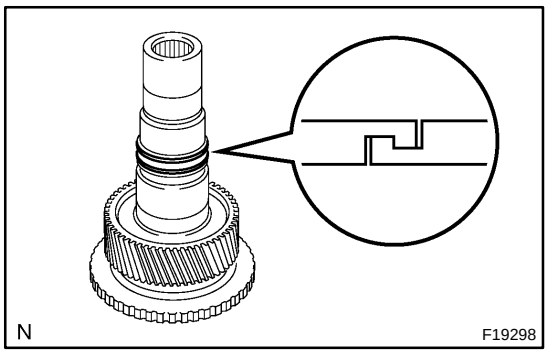
If the inside diameter exceeds the maximum, replace the input shaft.



3. INSTALL 2 OIL SEAL RINGS

HINT:

- ▶ Apply gear oil to the oil seal ring.
- ▶ Engage securely to eliminate clearance as shown in the illustration.



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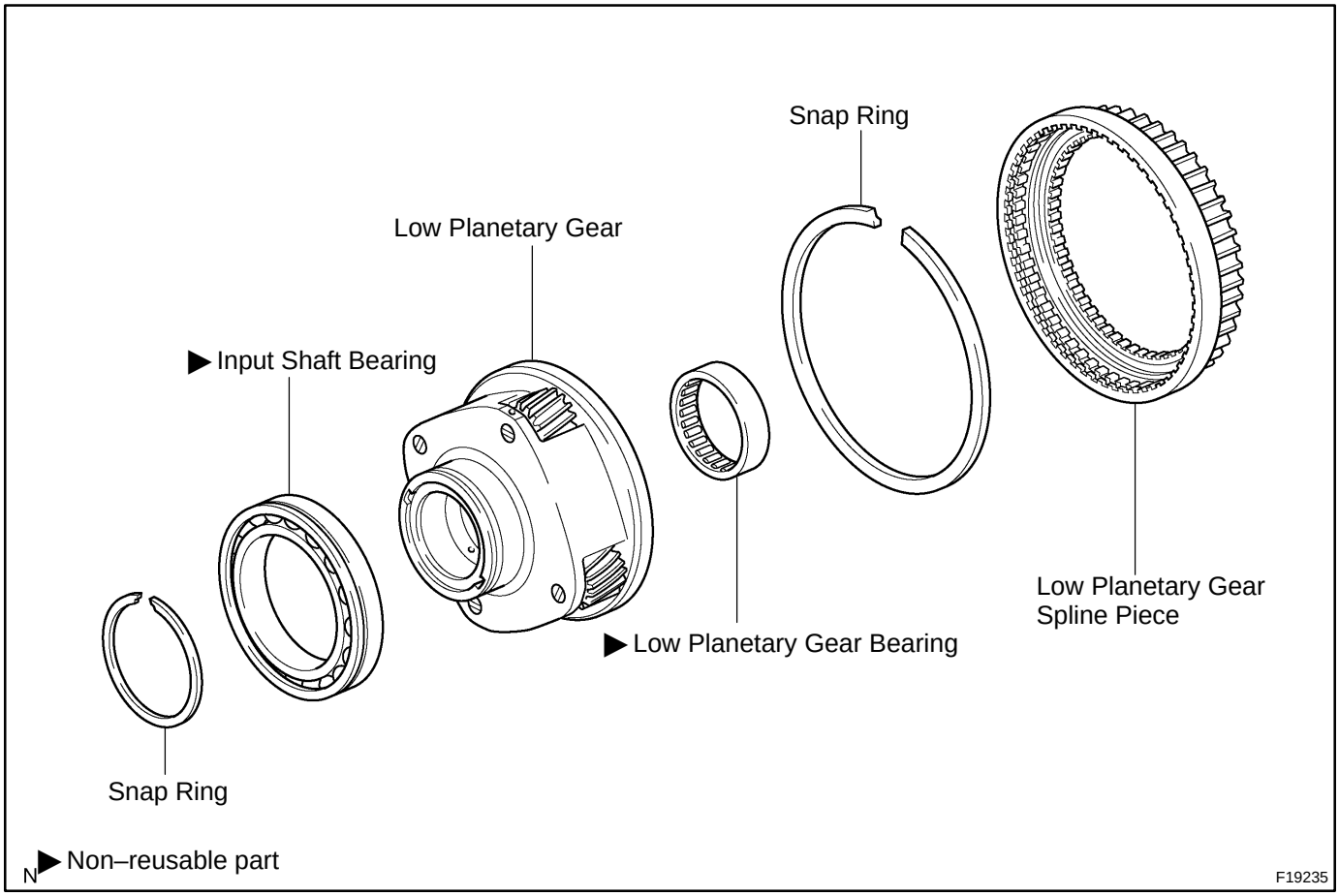
PLANETARY GEAR

COMPONENTS

TR00N–08



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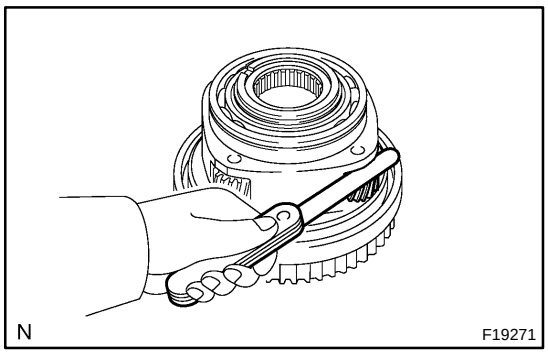
TR0DL–01

INSPECTION

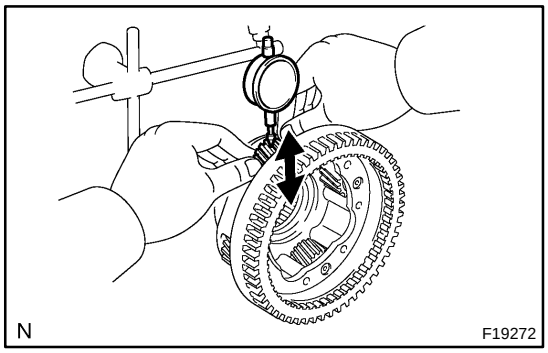


1. INSPECT PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance of the planetary pinion gear.

Standard clearance:
0.11 to 0.84 mm (0.0043 to 0.0331 in.)
Maximum clearance:
0.84 mm (0.0331 in.)

If the clearance exceeds the maximum, replace the planetary gear.

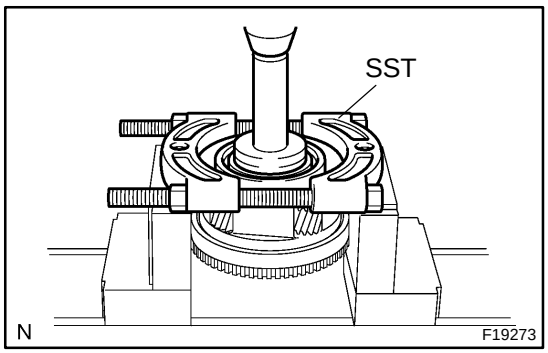


2. INSPECT PLANETARY PINION GEAR RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance of the planetary pinion gear.

Standard clearance:
0.009 to 0.038 mm (0.0004 to 0.0015 in.)
Maximum clearance:
0.038 mm (0.0015 in.)

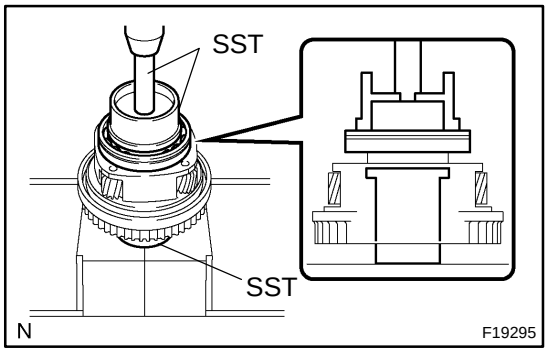
If the clearance exceeds the maximum, replace the planetary gear.



3. IF NECESSARY, REPLACE INPUT SHAFT BEARING

(a) Using a snap ring expander, remove the snap ring.

(b) Using SST and a press, remove the input shaft bearing.
SST 09554–30011, 09555–55010



(c) Using SST and a press, install a new bearing so that the groove does not face the low planetary gear.
SST 09223–15020, 09515–30010, 09950–70010 (09951–07100)

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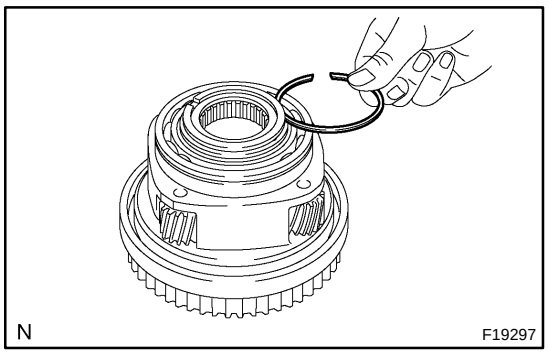
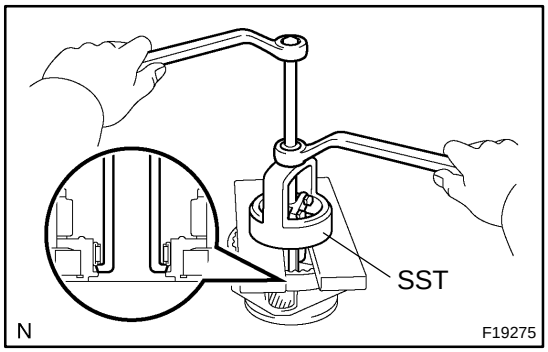


(d) Select a snap ring that allows for the minimum axial play.

Mark	Thickness mm (in.)
1	1.45 to 1.50 (0.0571 to 0.0591)
2	1.50 to 1.55 (0.0591 to 0.0610)
3	1.55 to 1.60 (0.0610 to 0.0630)
4	1.60 to 1.65 (0.0630 to 0.0650)
5	1.65 to 1.70 (0.0650 to 0.0669)

(e) Using a snap ring expander, install a new snap ring.



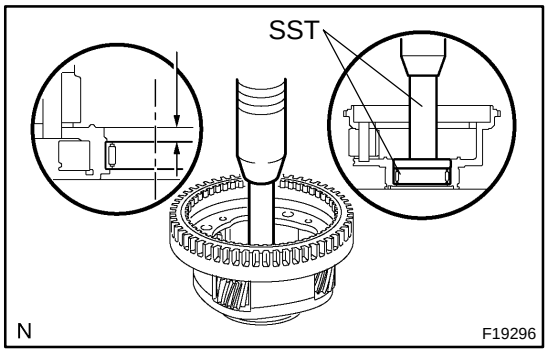
4. IF NECESSARY, REPLACE LOW PLANETARY GEAR BEARING

(a) Using SST, remove the low planetary gear bearing.

NOTICE:

Engage the claws of the SST securely so that there is no clearance between the bearing and low planetary gear.

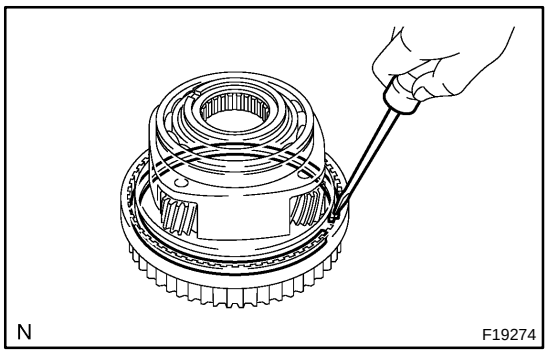
SST 09612–65014 (09612–01030, 09612–01050)



(b) Using SST and a press, drive in a new bearing.

SST 09950–60010 (09951–00570), 09950–70010 (09951–07100)

Bearing press in depth:
7.7 to 8.3 mm (0.303 to 0.327 in.)



5. REMOVE LOW PLANETARY GEAR SPLINE PIECE

(a) Using a screwdriver, remove the snap ring.

(b) Remove the low planetary gear spline piece to the low planetary gear.

6. INSTALL LOW PLANETARY GEAR SPLINE PIECE

(a) Install the low planetary gear spline piece to the low planetary gear.

(b) Using a screwdriver, install the snap ring.

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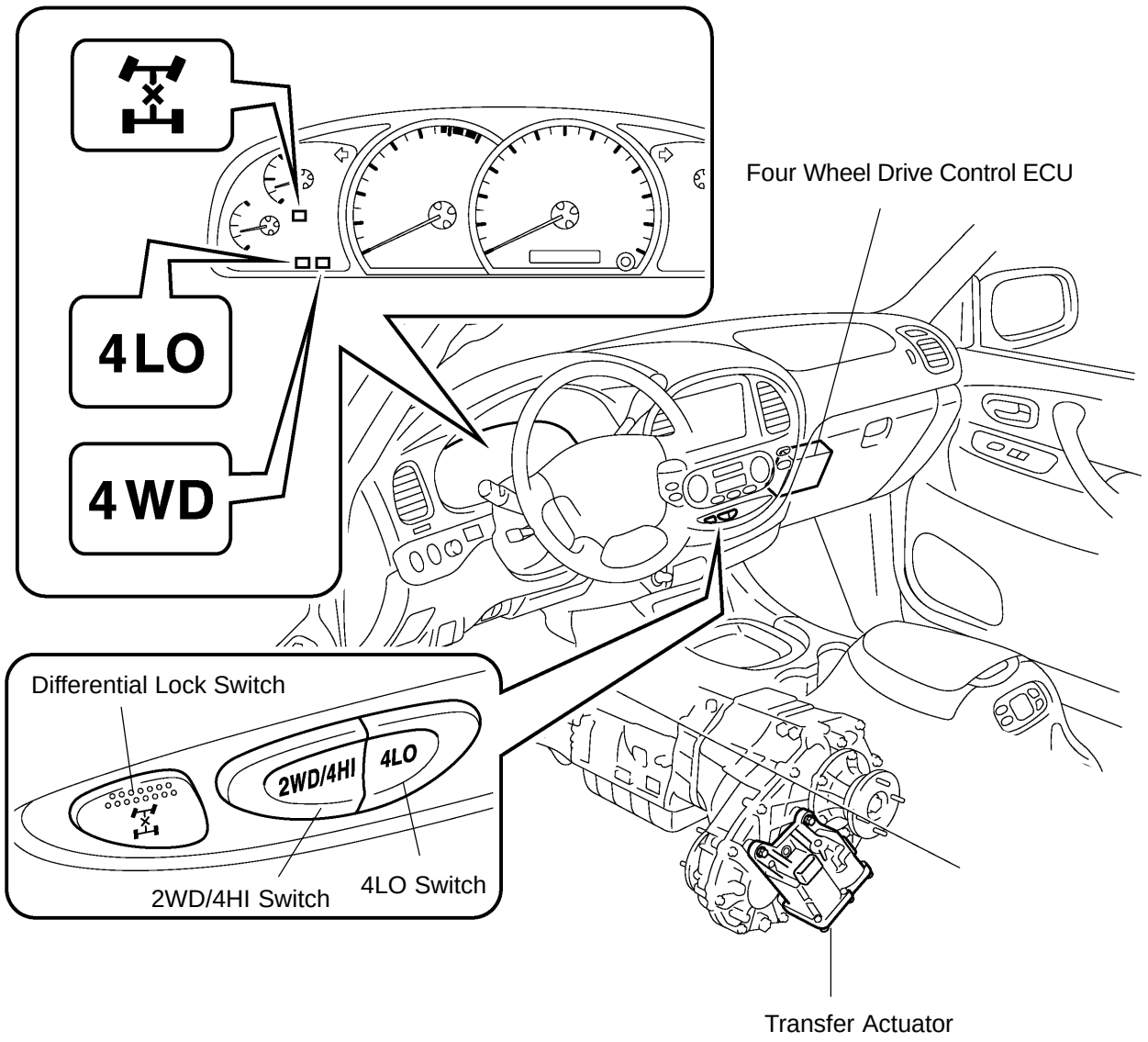
ONE TOUCH 2–4 SELECTOR SYSTEM

LOCATION

TR0CL–02



N

F19803

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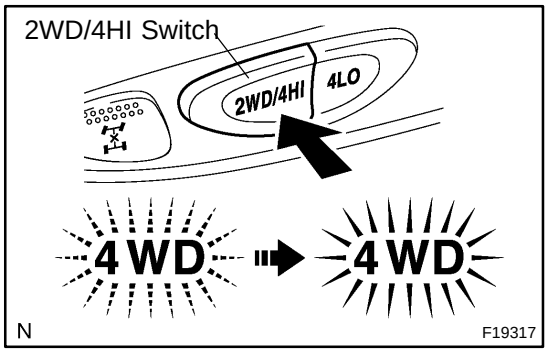
TR09T–04

INSPECTION

NOTICE:

- **4HI ↔ 4LO: Stop the vehicle and apply the brake, then first shift the transmission shift lever into the "N" position.**
- **Do not operate the four wheel drive control switch and the differential lock switch at the same time.**
- **Do not change from 2WD to 4WD when vehicle speed is 62 mph (100 km/h) or more.**

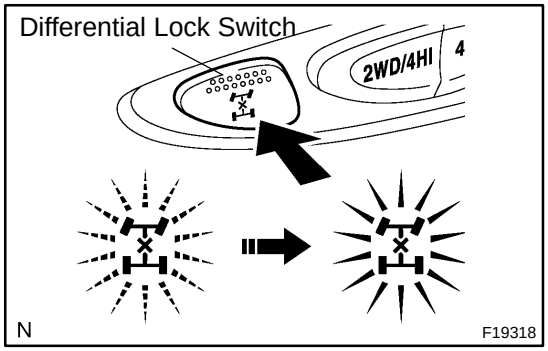


1. INSPECT 2WD ↔ 4HI (4WD and differential lock "FREE") SHIFT

(a) Start the engine.
(b) Push the 2WD/4HI switch once.
(c) Check that the 4WD indicator light stays lit after blinking. (The center differential lock indicator light blinks while being shifted.)
(d) Push the 2WD/4HI switch once again.
(e) Check that the 4WD indicator light goes off after blinking. (The center differential lock indicator light blinks while being shifted.)

2. INSPECT 4HI (4WD and differential lock "FREE") ↔ 4HI (4WD and differential lock "LOCK") SHIFT

(a) Start the engine.
(b) Push the 2WD/4HI switch once.
(c) Check that the 4WD indicator light stays lit after blinking.



(d) Push the differential lock switch once.
(e) Check that the center differential lock indicator light stays lit after blinking.
(f) Push the differential lock switch once again.
(g) Check that the center differential lock indicator light goes off after blinking.

3. INSPECT 4HI (4WD and differential lock "LOCK") ↔ 2WD

(a) Start the engine.
(b) Push the 2WD/4HI once.
(c) Check that the 4WD indicator light stays lit after blinking.
(d) Push the differential lock switch once.
(e) Check that the center differential lock indicator light stays lit after blinking.

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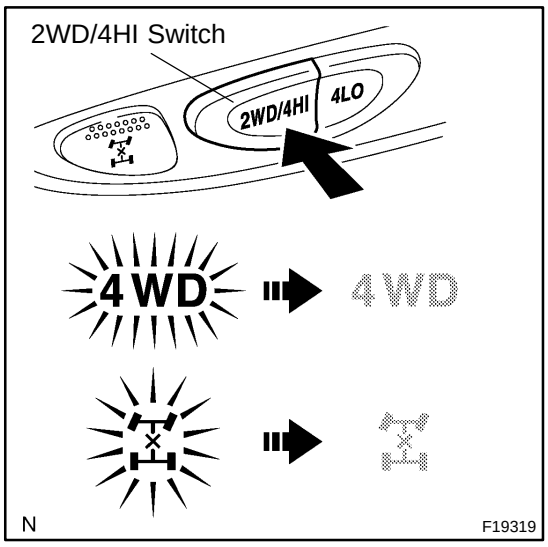
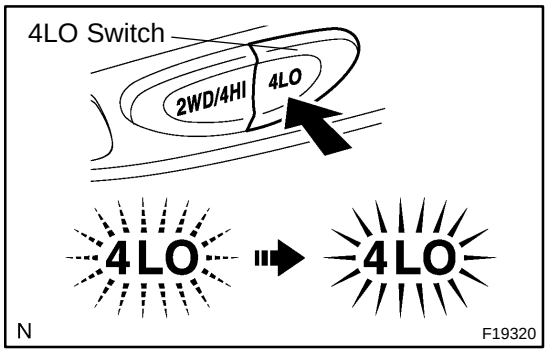


(f) Push the 2WD/4HI switch once again.
(g) Check that the 4WD and center differential lock indicator lights go off after blinking.

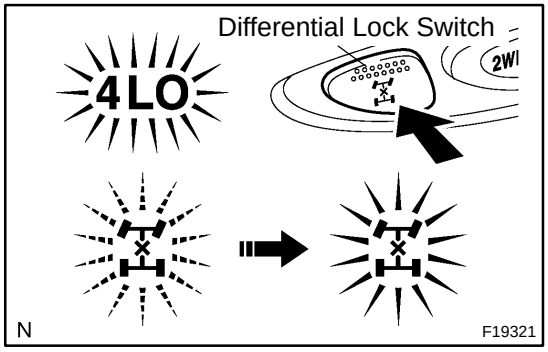


4. INSPECT 2WD ↔ 4LO (4WD and differential lock "FREE")

(a) Start the engine.
(b) Push the 4LO switch once.
(c) Check that the 4LO indicator light stays lit after blinking. (The 4WD and center differential lock indicator lights blink while shifting.)
(d) Push the 2WD/4HI switch once.
Check that the 4LO indicator light goes off after blinking. (The 4WD and center differential lock indicator lights blink while shifting.)

5. INSPECT 4LO (4WD and differential lock "FREE") ↔ 4LO (4WD and differential lock "LOCK")

(a) Start the engine.
(b) Push the 4LO switch once.
(c) Check that the 4LO indicator light stays lit after blinking.
(d) Push the differential lock switch once.
(e) Check that the center differential lock indicator light stays lit after blinking.



(f) Push the differential lock switch once again.
(g) Check that the center differential lock indicator light goes off after blinking.

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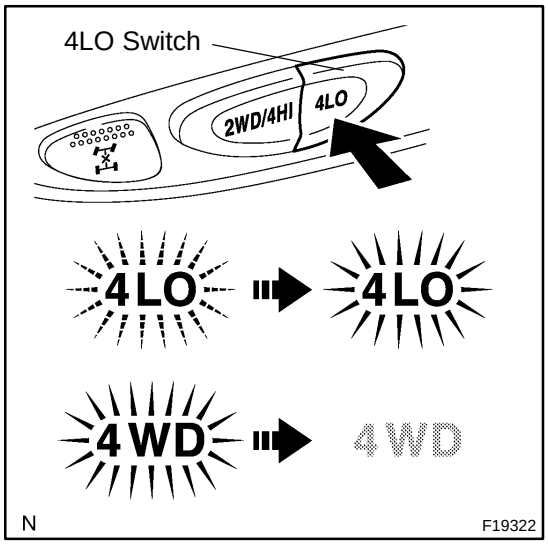
6. INSPECT 4HI (4WD and differential lock ”FREE”) ↔ 4LO (4WD and differential lock ”FREE”)

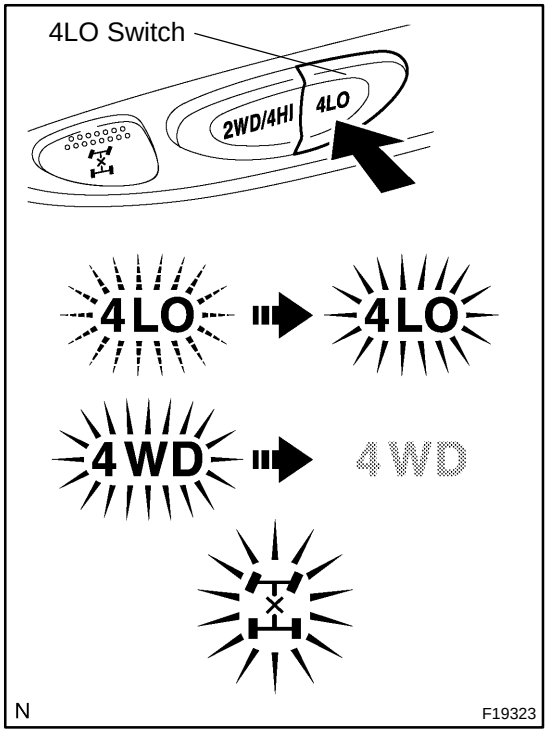
(a) Start the engine.
(b) Push the 2WD/4HI switch once.
(c) Check that the 4WD indicator light stays lit after blinking.



(d) Push the 4LO switch once.
(e) Check that the 4WD indicator light goes off and the 4LO indicator light stays lit after blinking.
(f) Push the 4LO switch once again.
(g) Check that the 4LO indicator light goes off after blinking and the 4WD indicator light comes on.

7. INSPECT 4HI (4WD and differential lock ”LOCK”) ↔ 4LO (4WD and differential lock ”LOCK”)

(a) Start the engine.
(b) Push the 2WD/4HI switch once.
(c) Check that the 4WD indicator light stays lit after blinking.
(d) Push the differential lock switch once.
(e) Check that the center differential lock indicator light stays lit after blinking.



(f) Push the 4LO switch once.
(g) Check that the 4WD indicator light goes off and the 4LO indicator light stays lit after blinking.
(h) Push the 4LO switch once again.
(i) Check that the 4LO indicator light goes off after blinking and the 4WD indicator light comes on.

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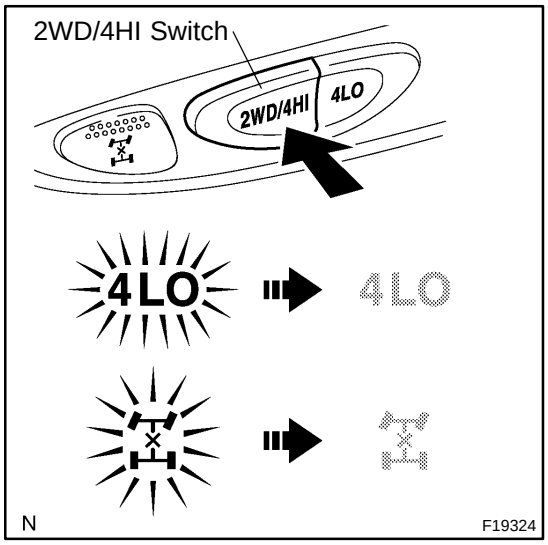
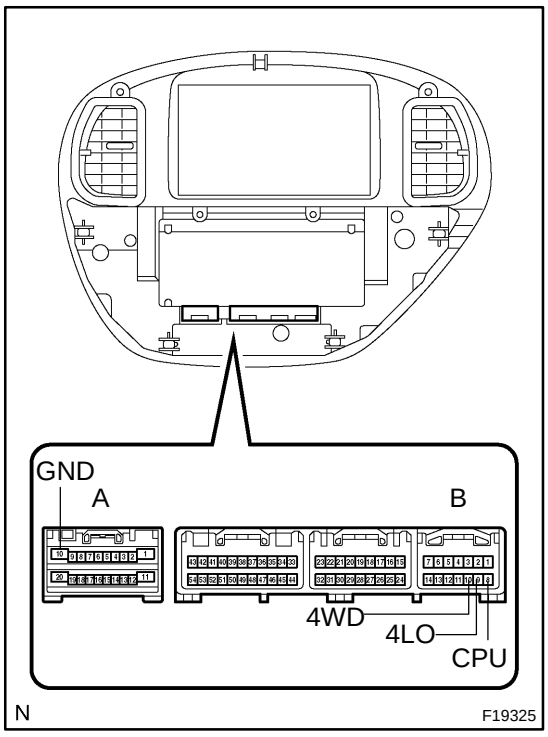
8. INSPECT 4LO (4WD and differential lock "LOCK") → 2WD

(a) Start the engine.
(b) Push the 4LO switch once.
(c) Check that the 4LO indicator light stays lit after blinking.
(d) Push the differential lock switch once.
(e) Check that the center differential lock indicator light stays lit after blinking.



(f) Push the 2WD/4HI switch once.
(g) Check that the 4LO and center differential lock indicator lights go off after the 4LO and 4WD indicators are blinking.



9. INSPECT 2WD/4HI, 4LO AND DIFFERENTIAL LOCK SWITCH CONTINUITY

(a) Remove the instrument panel finish lower panel.
(b) Inspect the continuity between each terminal.

Switch position	Tester connection	Specified condition
Diff. Lock OFF	B–8 – A–10	No continuity
Diff. Lock Hold ON	B–8 – A–10	Continuity
4LO OFF	B–9 – A–10	No continuity
4LO Hold ON	B–9 – A–10	Continuity
2WD/4HI OFF	B–10 – A–10	No continuity
2WD/4HI Hold ON	B–10 – A–10	Continuity

If continuity is not as specified, replace the instrument panel finish lower panel.

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10. INSPECT ACTUATOR

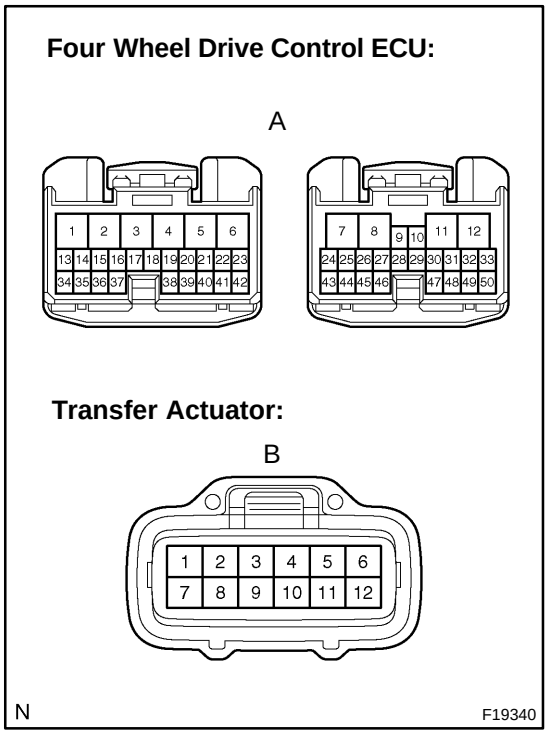
NOTICE:

Inspect the actuator with the transfer removed from the vehicle.

(a) Turn the ignition switch to ON.

(b) Check the operating sound produced by four wheel drive control switch operation and the differential lock switch operation.

If the operating sound cannot be heard, check the four wheel control ECU and the wire harness in the next step. When the wire harness and four wheel drive control ECU are normal, replace the actuator.



11. INSPECT WIRE HARNESS

(a) Disconnect the actuator connector and four wheel drive control ECU connector.

(b) Check continuity of the wire harness between the four wheel drive control ECU and the actuator.

Tester connection	Specified condition
TM1 (A–2) – TM1 (B–2)	Continuity
TM2 (A–1) – TM2 (B–1)	Continuity
TL1 (A–41) – TL1 (B–3)	Continuity
TL2 (A–40) – TL2 (B–4)	Continuity
TL3 (A–39) – TL3 (B–5)	Continuity
HM2 (A–4) – HM2 (B–7)	Continuity
HM1 (A–3) – HM1 (B–8)	Continuity
P1 (A–10) – CDL (B–9)	Continuity
HL2 (A–42) – HL2 (B–11)	Continuity
HL1 (A–23) – HL1 (B–12)	Continuity
GND (A–7) – GND (B–6)	Continuity
GND (A–7) – GND (B–10)	Continuity

If continuity is not as specified, repair or replace the wire harness.

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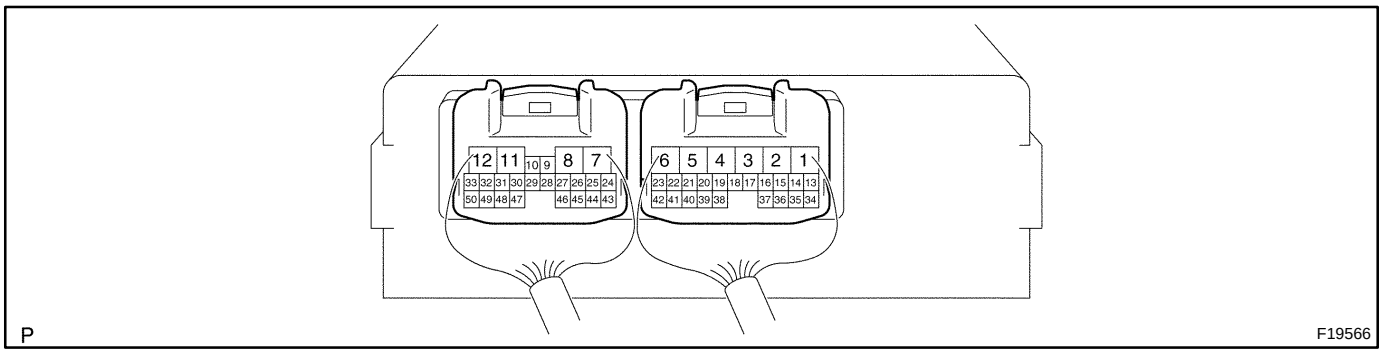
12. INSPECT FOUR WHEEL DRIVE CONTROL ECU

(a) Connect the wire harness side connector to the four wheel drive control ECU and inspect the wire harness side connector from the back, as shown.



STANDARD VALUE OF ECU TERMINAL

Terminals (Symbols)	Condition	STD Voltage (V)
3 (HM1) – 4 (HM2)	▶Ignition switch ON ▶Four wheel drive control switch ”H4” position → Four wheel drive control switch ”L4” position	10 to 14 → 2 or less or 0 (0.5 s) to 14 (50 ms) pulse generation
4 (HM2) – 3 (HM1)	▶Ignition switch ON ▶Four wheel drive control switch ”L4” position → Four wheel drive control switch ”H4” position	
2 (TM1) – 1 (TM2)	▶Ignition switch ON ▶Differential lock switch is in ”OFF” position ▶Four wheel drive control switch ”H2” position → Four wheel drive control switch ”H4” position	10 to 14 → 2 or less or 0 (0.5 s) to 14 (50 ms) pulse generation
1 (TM2) – 2 (TM1)	▶Ignition switch ON ▶Keep pressing the differential lock switch for approx. 2 seconds to turn it ON ▶Four wheel drive control switch ”H4”or ”L4” position → Four wheel drive control switch ”H2” position	
5 (DM1) – 6 (DM2)	▶Ignition switch ON ▶A.D.D. FREE →A.D.D. LOCK	10 to 14 → 2 or less or 0 (0.5 s) to 14 (50 ms) pulse generation
6 (DM2) – 5 (DM2)	▶Ignition switch ON ▶A.D.D. LOCK →A.D.D. FREE	
4 (HM2) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch ”H4” position → Four wheel drive control switch ”L4” position	2 or less → 10 to 14
7 (GND) – Body ground	▶Ignition switch OFF	Continuity
12 (IG) – 7 (GND)	▶Ignition switch ON	10 to 14
18 (DL2) – 7 (GND)	▶Ignition switch ON ▶A.D.D. LOCK →A.D.D. FREE	0.88 or less → 10 to 14
19 (DL1) – 7 (GND)	▶Ignition switch ON ▶A.D.D. FREE →A.D.D. LOCK	0.88 or less → 10 to 14
23 (HL1) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch ”H4” position → Four wheel drive control switch ”L4” position	10 to 14 → 1.5 or less
25 (2–4) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch ”L4” position → Four wheel drive control switch ”H2” or ”H4” position	10 to 14 → 1.5 or less
26 (SPD) – 7 (GND)	▶During driving	Pulse generation

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28 (IND3) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H2" position → Four wheel drive control switch "L4" position	10 to 14 → 0 to 3.5
32 (LO) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H2" position → Four wheel drive control switch "L4" position	10 to 14 → 1.5 or less
33 (DL) – 7 (GND)	▶Ignition switch ON ▶Differential lock switch is in "OFF" position → Keep pressing the differential lock switch for approx. 2 seconds to turn it ON	10 to 14 → 1.5 or less
9 (ADD) – 7 (GND)	▶Ignition switch ON ▶A.D.D. FREE → A.D.D. LOCK	10 to 14 → 1.5 or less
39 (TL3) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H2" position → Four wheel drive control switch "L4" position ▶Differential lock switch is in "OFF" position → Keep pressing the differential lock switch for approx. 2 seconds to turn it ON	1.5 or less → 10 to 14
40 (TL2) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H2" position → Four wheel drive control switch "H4" position ▶Differential lock switch is in "OFF" position → Keep pressing the differential lock switch for approx. 2 seconds to turn it ON	10 to 14 → 1.5 or less
41 (TL1) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H2" position → Four wheel drive control switch "H4" or "L4" position ▶Differential lock switch is in "OFF" position → "ON" position	1.5 or less → 10 to 14
42 (HL2) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H4" position → Four wheel drive control switch "L4" position	1.5 or less → 10 to 14
45 (IND1) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H2" position → Four wheel drive control switch "H4" or "L4" position	10 to 14 → 0 to 3.5
46 (IND2) – 7 (GND)	▶Ignition switch ON ▶Differential lock switch is in "OFF" position → Keep pressing the differential lock switch for approx. 2 seconds to turn it ON	10 to 14 → 0 to 3.5
48 (N) – 7 (GND)	▶Ignition switch ON ▶Transmission shift lever: positions other than N → N	1.5 or less → 10 to 14
50 (L4) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H4" position → Four wheel drive control switch "L4" position	10 to 14 → 2 or less
10 (P1) – 7 (GND)	▶Ignition switch ON ▶Four wheel drive control switch "H2" position → Four wheel drive control switch "H4" or "L4" position ▶Differential lock switch is in "OFF" position → "ON" position	10 to 14 → 1.5 or less

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TROUBLESHOOTING

PR01F–04

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

2WD:

Symptom	Suspected Area	See page
Noise	3. Sleeve yoke spline (Worn) 4. Spider bearing (Worn or stuck)	– PR–4
Vibration	1. Transmission extension housing rear bushing (Runout) 2. Sleeve yoke spline (Stuck) 3. Propeller shaft (Runout) 4. Propeller shaft (Imbalance)	– – PR–4 PR–4

4WD:

Symptom	Suspected Area	See page
Noise	1. Sleeve yoke spline (Worn) 2. Spider bearing (Worn or stuck)	– PR–8
Vibration	1. Transmission extension housing rear bushing (Runout) 2. Sleeve yoke spline (Stuck) 3. Propeller shaft (Runout) 4. Propeller shaft (Imbalance)	– – PR–8 PR–8

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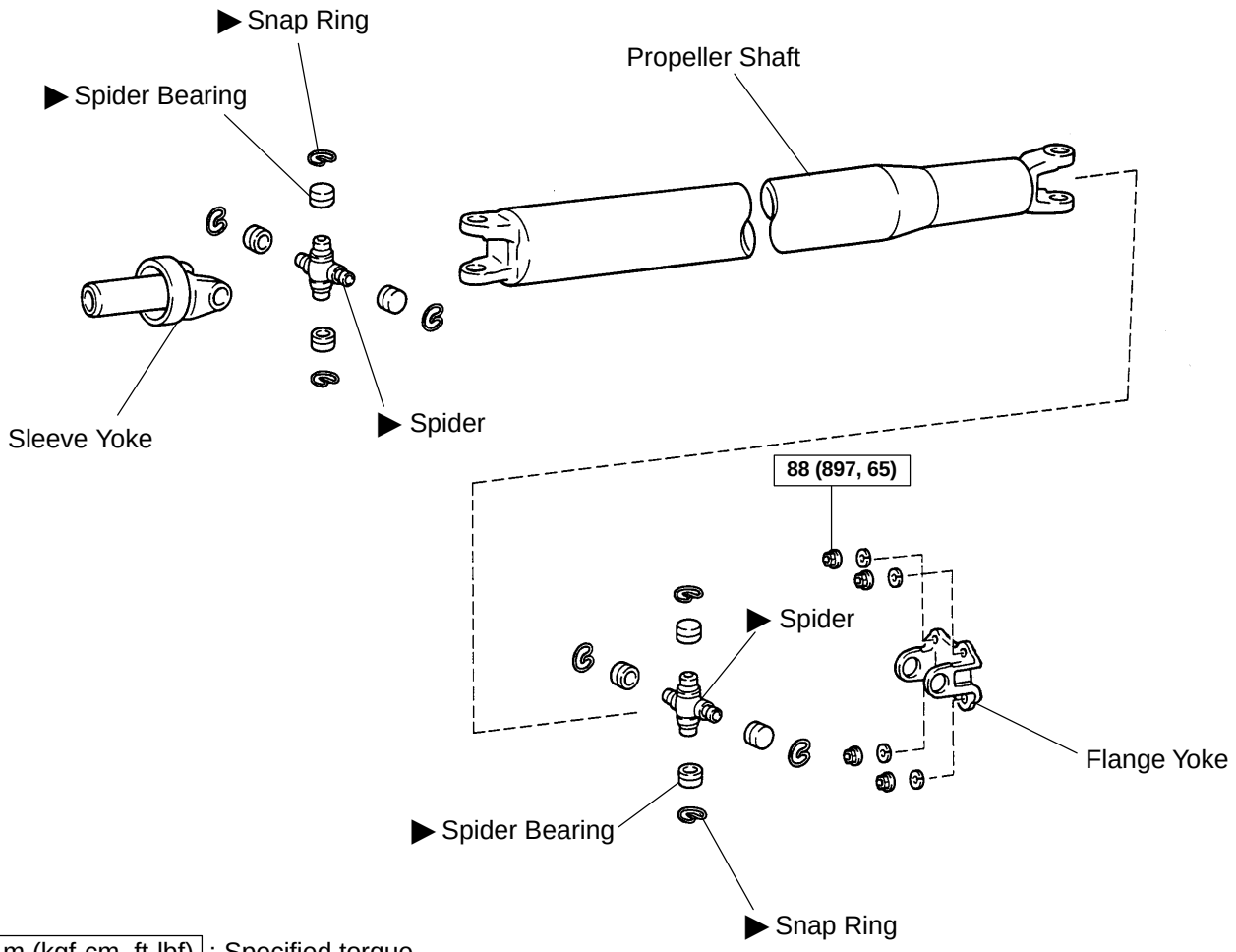
PROPELLER SHAFT ASSEMBLY (2WD)

PR01G–06

COMPONENTS



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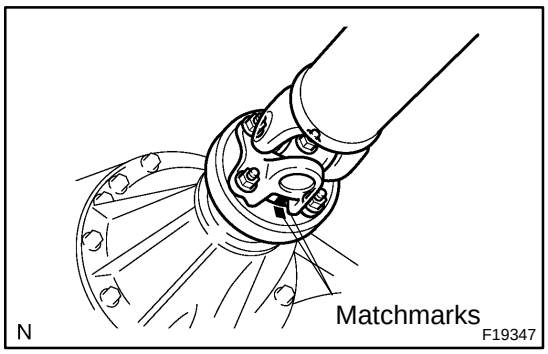
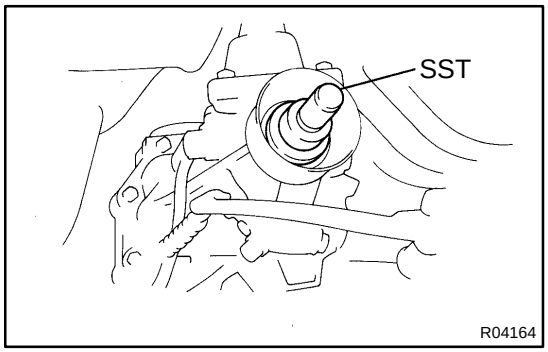
PR01H–04

REMOVAL

REMOVE PROPELLER SHAFT



(a) Place matchmarks on the differential and propeller shaft flanges.
(b) Remove the 4 nuts and washers.
(c) Pull out the propeller shaft yoke from the transmission.



(d) Insert SST in the transmission to prevent oil leakage.
SST 09325–40010

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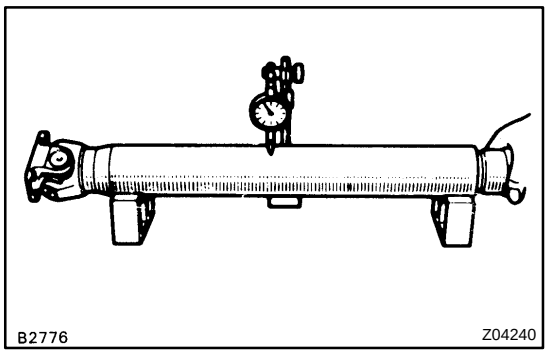
PR07K–02

INSPECTION



NOTICE:

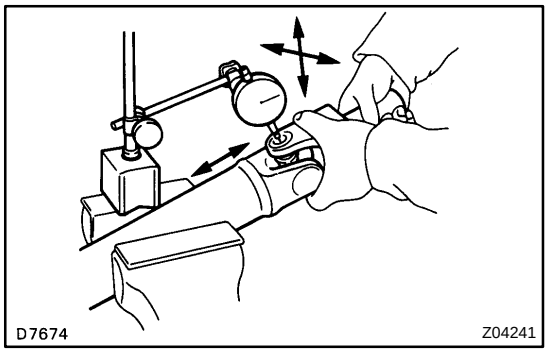
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

1. INSPECT PROPELLER SHAFT AND INTERMEDIATE SHAFT FOR DAMAGE OR RUNOUT

Using a dial indicator, check the runout of each shaft.

Maximum runout: 0.8 mm (0.031 in.)

If shaft runout is greater than the maximum, replace the shaft.



2. INSPECT SPIDER BEARING

(a) Inspect the spider bearing for wear or damage.

(b) Using a dial indicator, check the spider bearing axial play by turning the yoke of flange while holding the shaft tightly.

Maximum bearing axial play: 0.05 mm (0.0020 in.)

If the spider bearing axial play exceeds the maximum, replace the spider bearing (See page PR–10).

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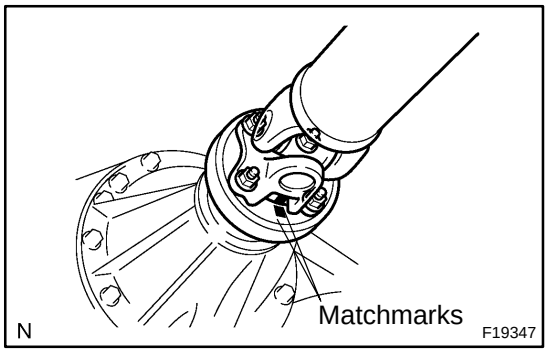
PR07L–02

INSTALLATION

INSTALL PROPELLER SHAFT

(a) Remove the SST from the transmission.
SST 09325–40010

(b) Insert the yoke into the transmission.



(c) Align the matchmarks on the flanges and connect the flanges with the washers and nuts.

(d) Torque the 4 nuts.
Torque: 88 N·m (897 kgf·cm, 65 ft·lbf)

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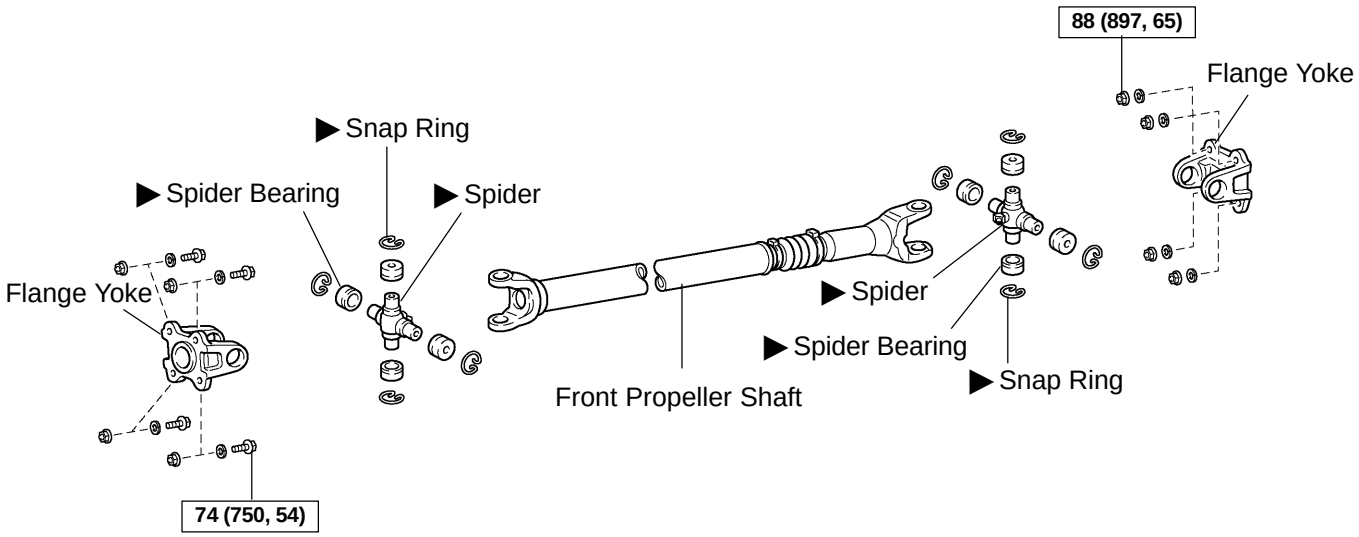
PROPELLER SHAFT ASSEMBLY (4WD)

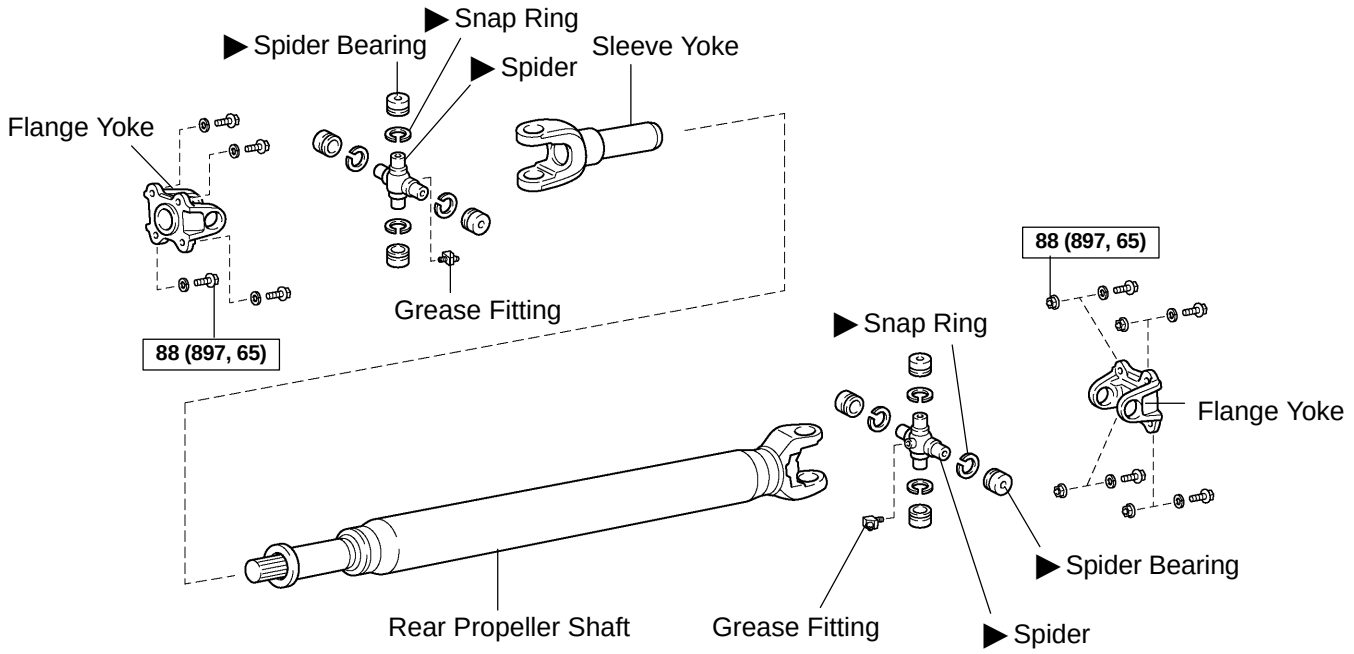
COMPONENTS

PR01M–05

Front propeller shaft:



Rear propeller shaft:



N·m (kgf·cm, ft·lbf): Specified torque

N ▶ Non–reusable part

F19351

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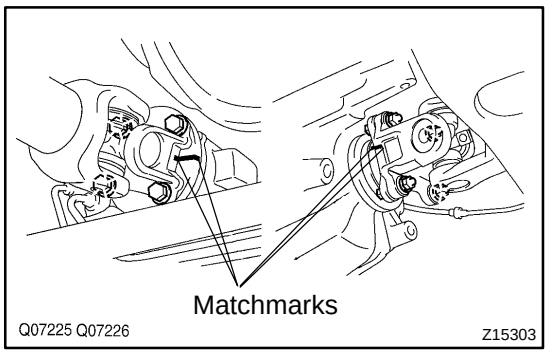
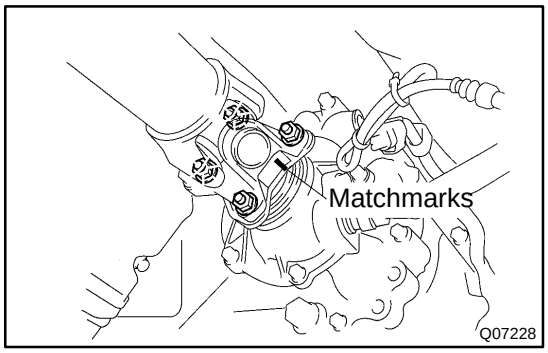
PR05N–04

REMOVAL



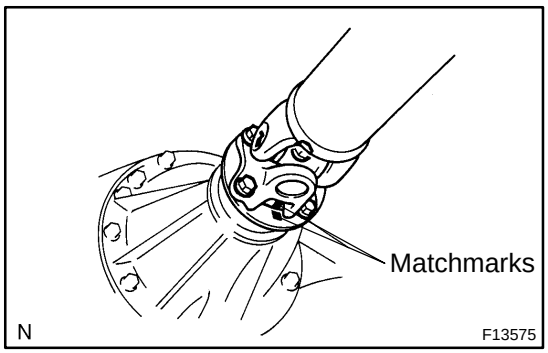
1. REMOVE FRONT PROPELLER SHAFT

(a) Place matchmarks on the differential and propeller shaft flange.
(b) Remove the 4 nuts, washers and bolts, and disconnect the propeller shaft from the differential.
(c) Suspend the front side of the propeller shaft.
(d) Place matchmarks on the transfer and propeller shaft flanges.
(e) Remove the 4 nuts and washers.
(f) Remove the propeller shaft from the transfer.



2. REMOVE REAR PROPELLER SHAFT

(a) Place matchmarks on the transfer and propeller shaft flanges.
(b) Remove the 4 nuts and washers, and disconnect the propeller shaft from the transfer.
(c) Suspend the front side of the propeller shaft.



(d) Place matchmarks on the differential and propeller shaft flanges.
(e) Remove the 4 nuts, washers and bolts.
(f) Remove the propeller shaft from the differential.

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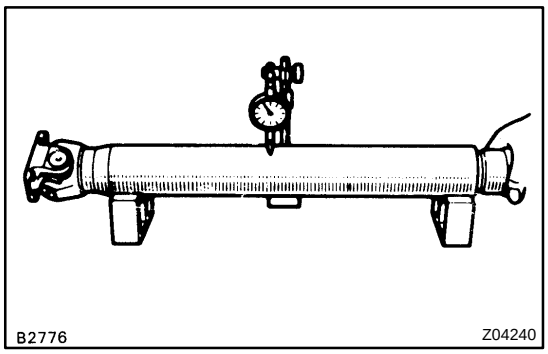
PR07M–02



INSPECTION

NOTICE:

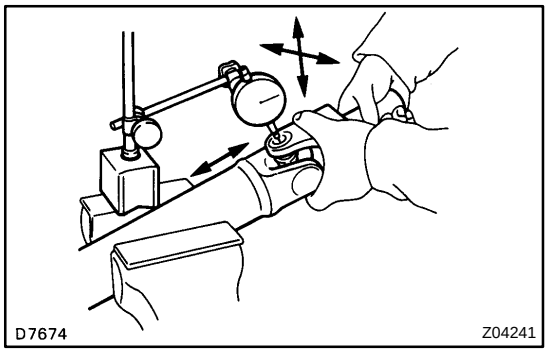
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

1. INSPECT PROPELLER SHAFT AND INTERMEDIATE SHAFT FOR DAMAGE OR RUNOUT

Using a dial indicator, check the runout of each shaft.

Maximum runout: 0.8 mm (0.031 in.)

If shaft runout is greater than the maximum, replace the shaft.



2. INSPECT SPIDER BEARING

(a) Inspect the spider bearing for wear or damage.

(b) Using a dial indicator, check the spider bearing axial play by turning the yoke of flange while holding the shaft tightly.

Maximum bearing axial play: 0.05 mm (0.0020 in.)

If the spider bearing axial play exceeds the maximum, replace the spider bearing (See page PR–10).

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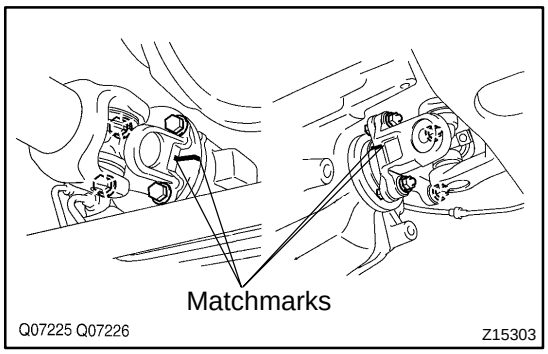
PR07N–02

INSTALLATION



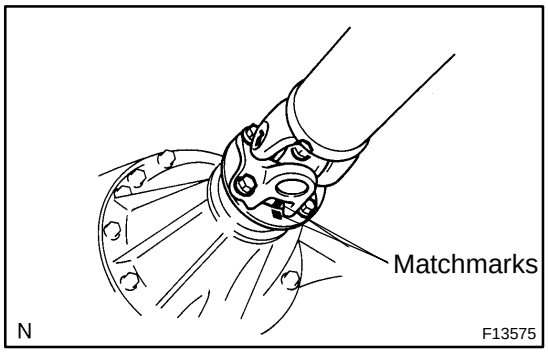
1. INSTALL FRONT PROPELLER SHAFT

(a) Align the matchmarks on the propeller shaft flanges and differential, and connect the flanges with the 4 bolts, washers and nuts.

(b) Torque the 4 bolts.
Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

(c) Align the matchmarks on the propeller shaft flanges and transfer, and connect the flanges with the 4 washers and nuts.

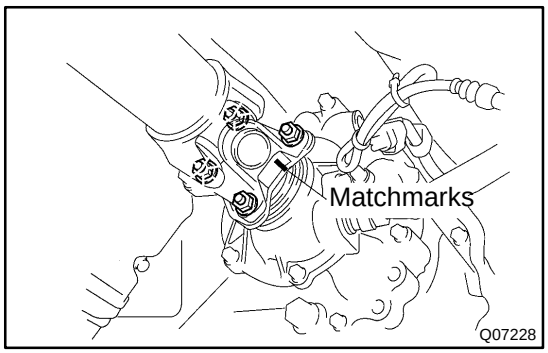
(d) Torque the 4 nuts.
Torque: 88 N·m (897 kgf·cm, 65 ft·lbf)



2. INSTALL REAR PROPELLER SHAFT

(a) Align the matchmarks on the propeller shaft flanges and differential, and connect the flanges with the 4 bolts, washers and nuts.

(b) Torque the 4 bolts.
Torque: 88 N·m (897 kgf·cm, 65 ft·lbf)



(c) Align the matchmarks on the propeller shaft flanges and transfer, and connect the flanges with the 4 washers and nuts.

(d) Torque the 4 nuts.
Torque: 88 N·m (897 kgf·cm, 65 ft·lbf)

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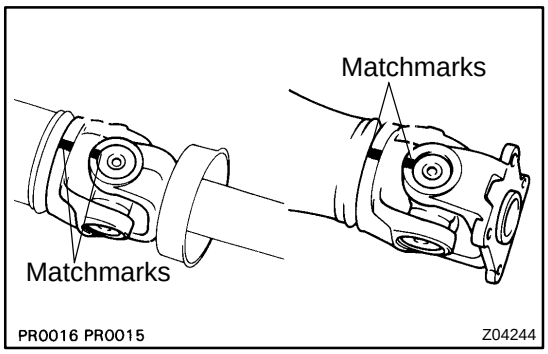
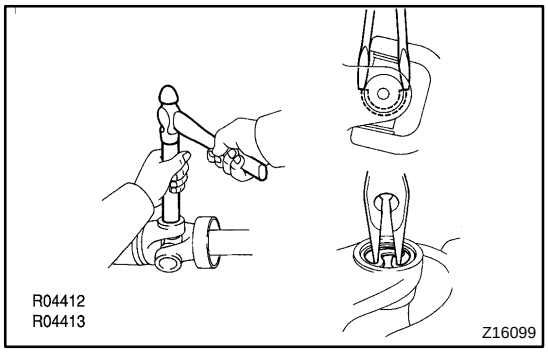
SPIDER BEARING

PR07O–02

REPLACEMENT



1. PLACE MATCHMARKS ON SHAFT AND YOKE

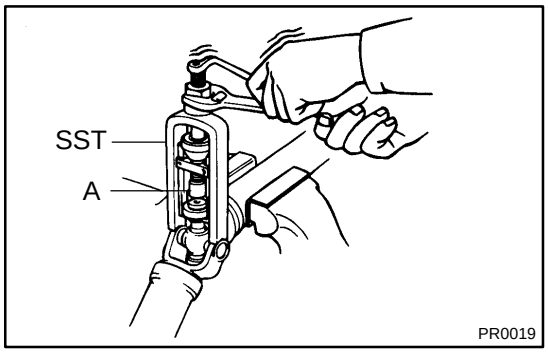


2. REMOVE SNAP RING

(a) Using a brass bar and a hammer, slightly tap in the bearing outer race.

(b) 4WD rear propeller shaft:
Using 2 screwdrivers, remove the 4 snap rings from the grooves.

(c) 2WD and 4WD front propeller shaft:
Using needle nose pliers, remove the 4 snap rings from the grooves.



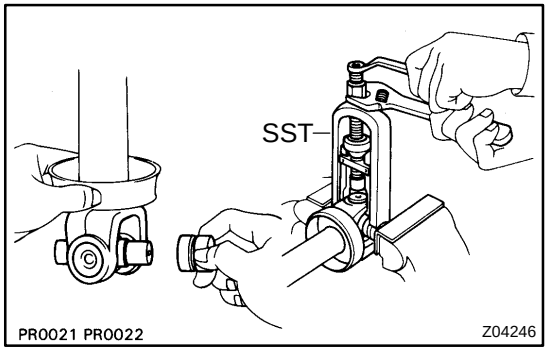
3. REMOVE SPIDER BEARING

(a) Using SST, push out the bearing from the flange yoke.
SST 09332–25010

HINT:
Sufficiently raise the part indicated by ”A” so that it does not come into contact with the bearing.

(b) Clamp the bearing outer race in a vise and tap off the flange with a hammer.

HINT:
Remove the bearing on the opposite side in the same procedure.



(c) Install the 2 removed bearing outer races to the spider, and clamp them in a vise.

(d) Using SST, push out the bearing from the sleeve yoke.
SST 09332–25010

(e) Clamp the outer bearing race in a vise and tap off the yoke with a hammer.

HINT:
Remove the bearing on the opposite side in the same procedure.

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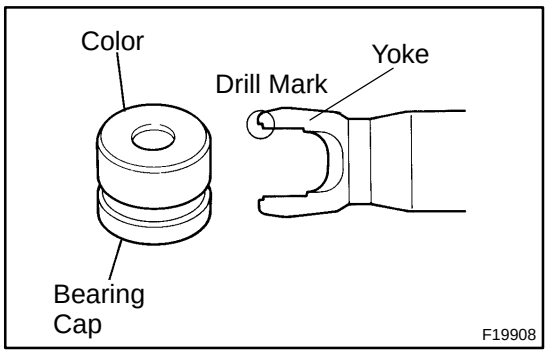
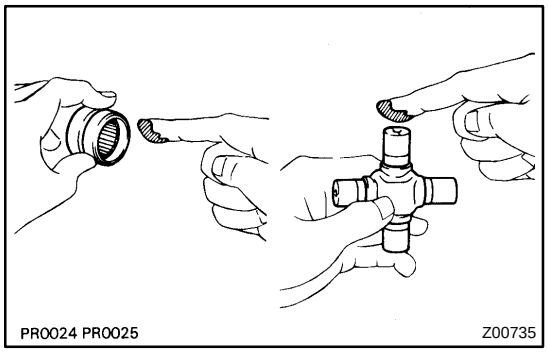


4. 4WD, REAR PROPELLER SHAFT: SELECT SPIDER BEARING

Select an appropriate bearing according to the drill mark on the yoke.

Yoke	Bearing
With drill mark	With color mark (White)
No drill mark	No color mark



5. INSTALL SPIDER BEARING

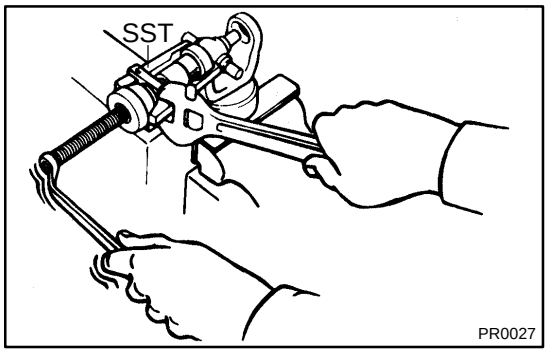
(a) Apply MP grease to a new spider and bearings.

HINT:

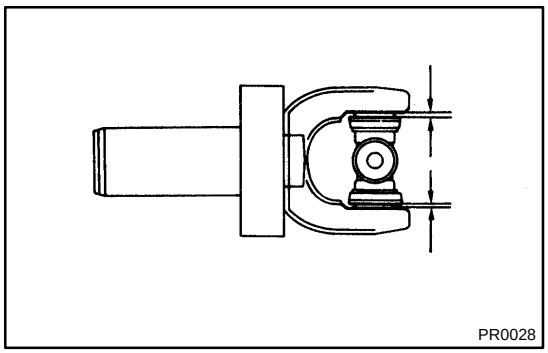
Be careful not to apply too much grease.

(b) Align the matchmarks on the yoke and shaft.

(c) Fit the spider into the yoke.



(d) Using SST, install the bearing on the spider.
SST 09332–25010



(e) Using SST, adjust both bearings so that the snap ring grooves are at maximum and equal in width.

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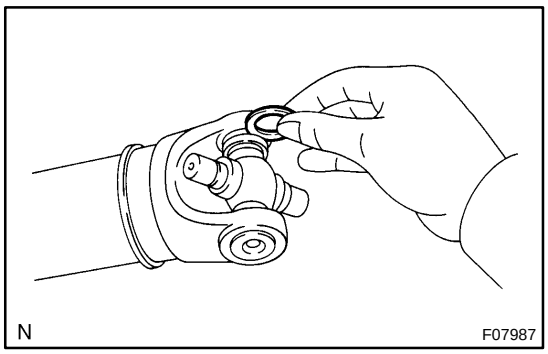


6. INSTALL SNAP RINGS

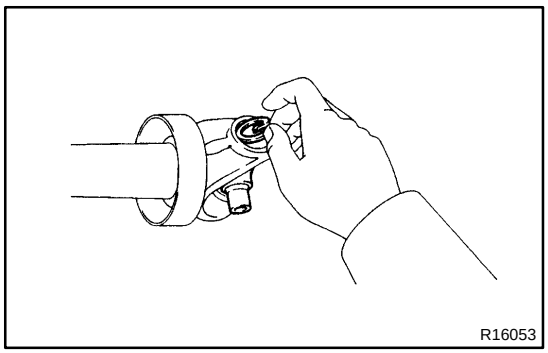
(a) Install 2 new snap rings of equal thickness which will allow for 0 to 0.05 mm (0 to 0.0020 in.) axial play.

HINT:

Do not reuse the snap rings.

4WD rear propeller shaft:

Color	Mark	Thickness mm (in.)
None	–	2.00 (0.0784)
Light brown	–	2.03 (0.0799)
Blue	–	2.06 (0.0811)
None	–	2.09 (0.0823)
–	1	1.99 (0.0783)
–	2	2.01 (0.0791)
–	3	2.03 (0.0799)
–	4	2.05 (0.0807)
–	5	2.07 (0.0815)
–	6	2.09 (0.0823)
–	7	2.11 (0.0831)
–	8	2.13 (0.0839)
–	9	2.15 (0.0846)
–	10	2.17 (0.0854)



2WD and 4WD front propeller shaft:

Color	Thickness mm (in.)
Blue	1.638 (0.0645)
Yellow	1.588 (0.0625)
Silver	1.537 (0.0605)
Copper	1.511 (0.0595)
Black	1.486 (0.0585)
Red	1.435 (0.0565)
Green	1.384 (0.0545)

(b) Using a hammer, tap the yoke until there is no clearance between the bearing outer race and snap ring.

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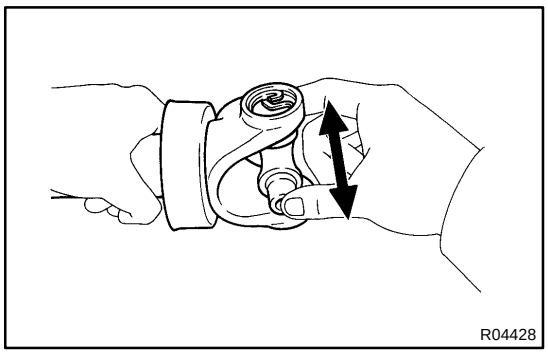


7. CHECK SPIDER BEARING

(a) Check that the spider bearing moves smoothly.

(b) Check the spider bearing axial play.

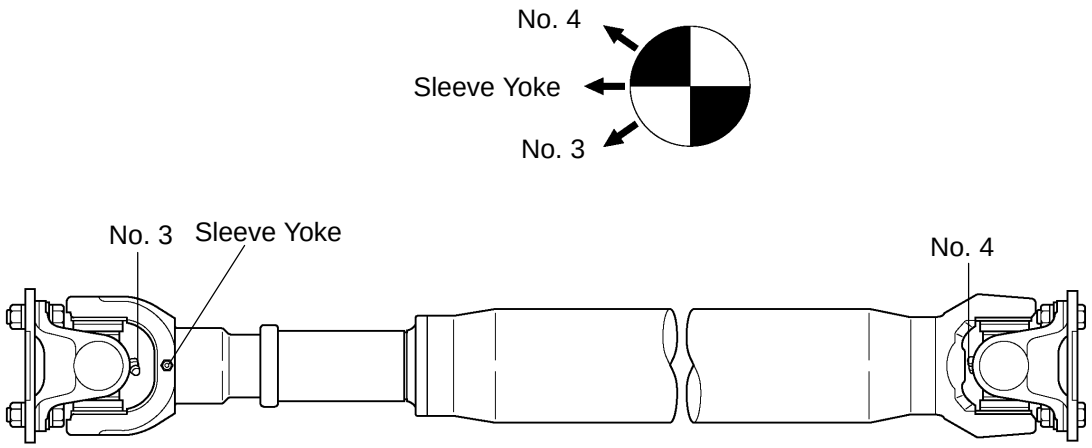
Maximum bearing axial play: 0.05 mm (0.0020 in.)

HINT:

- Install new spider bearings on the flange side in the procedure described above.
- When replacing the rear propeller shaft spider on 4WD vehicle, be sure that the grease fitting assembly hole is facing in the direction shown in the illustration below.

SPIDER GREASE FITTING ASSEMBLY DIRECTION FOR 4WD REAR PROPELLER SHAFT

The figure on the left shows the locations of the grease fittings from the front.



Fill up the No. 3, 4 and sleeve yoke grease fittings with MP grease.

N

F19333

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TROUBLESHOOTING

SA140–10

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Bottoming	1. Vehicle (Overloaded)	–
	2. Spring (Weak)	SA–63
		SA–135
	3. Shock absorber (Worn)	SA–66
		SA–135
Sways/pitches	1. Tire (Worn or improperly inflated)	SA–3
	2. Stabilizer bar (Bent or broken)	SA–90
		SA–149
	3. Shock absorber (Worn)	SA–66
		SA–135
Front wheel shimmy	1. Tire (Worn or improperly inflated)	SA–3
	2. Wheel (Out of balance)	SA–3
	3. Shock absorber (Worn)	SA–66
	4. Wheel alignment (Incorrect)	SA–4
	5. Ball joints (Worn)	SA–83
		SA–88
	6. Hub bearing (Loose or worn)	SA–21
	7. Steering linkage (Loose or worn)	–
	8. Steering gear (Out of adjustment or broken)	SR–37
Abnormal tire wear	1. Tire (Improperly inflated)	SA–3
	2. Wheel alignment (Incorrect)	SA–4
	3. Shock absorber (Worn)	SA–66
		SA–139
	4. Suspension parts (Worn)	–
Noise in front differential	1. Oil level (Low or wrong grade)	SA–38
	2. Excessive backlash between pinion and ring gear	SA–50
	3. Ring, pinion or side gear (Worn or chipped)	SA–50
	4. Pinion shaft bearing (Worn)	SA–50
	5. Side bearing (Worn)	SA–50
	6. Differential bearing (Loose or worn)	SA–50
Oil leak from front differential	1. Oil level (Too high or wrong grade)	SA–38
	2. Front differential rear oil seal (Worn or damaged)	SA–38
	3. Side gear oil seal (Worn or damaged)	SA–50
	4. Companion flange (Loose or damaged)	SA–50
	5. Side gear shaft (Damaged)	SA–50
Noise in rear axle	1. Oil level (Low or wrong grade)	SA–105
	2. Excessive backlash between pinion and ring gear	SA–109
	3. Ring, pinion or side gear (Worn or chipped)	SA–109
	4. Pinion shaft bearing (Worn)	SA–109
	5. Axle shaft bearing (Worn)	SA–94
	6. Differential bearing (Loose or worn)	SA–109
Oil leak from rear axle	1. Oil seal (Worn or damaged)	SA–94
	2. Rear axle housing (Cracked)	–
Oil leak from rear differential	1. Oil level (Too high or wrong grade)	SA–105
	2. Oil seal (Worn or damaged)	SA–105
	3. Companion flange (Loose or damaged)	SA–109

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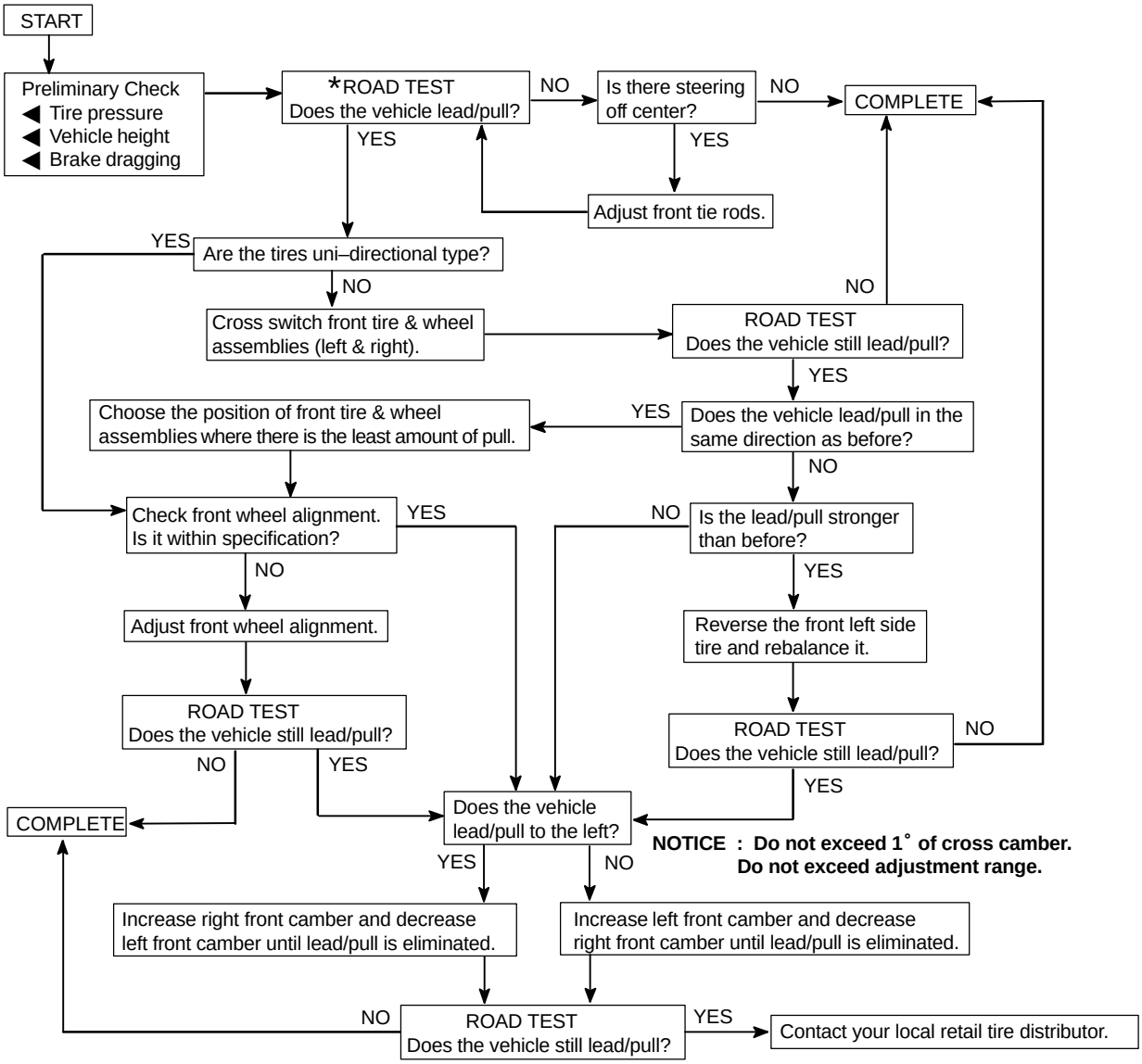
SA28F–08

REPAIR PROCEDURES

HINT:

This is a flow chart for vehicle pull.



* Select a flat road where the vehicle can be driven in a straight line for 100 meters at a constant speed of 35mph. Please confirm safety and set the steering wheel to its straight position. Drive the vehicle in a straight line for 100 meters at a constant speed of 35mph without holding the steering wheel.

(1) The vehicle can keep straight but the steering wheel has some angle.
→ STEERING OFF CENTER (See page SR–10)

(2) The vehicle cannot keep straight.
→ STEERING PULL

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TIRE AND WHEEL

SA17H–11

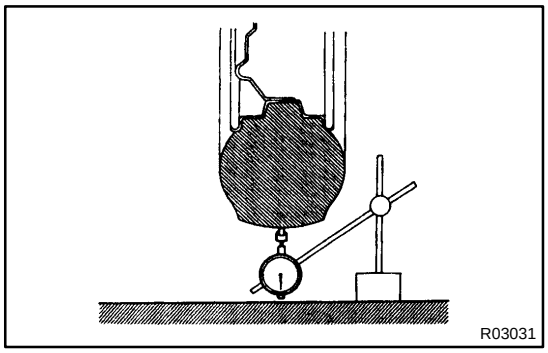
INSPECTION

1. INSPECT TIRE

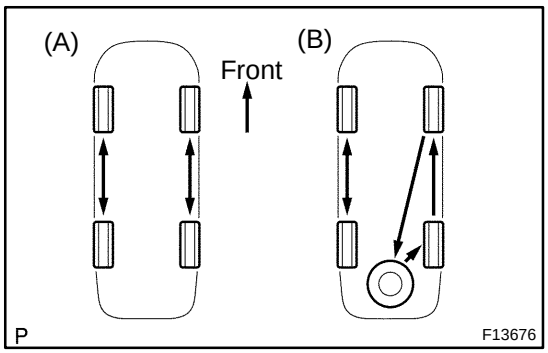
(a) Check the tires for wear and proper inflation pressure.

Cold tire inflation pressure:

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P245/70R16	220 (2.2, 32)	240 (2.4, 35)
P265/70R16	220 (2.2, 32)	220 (2.2, 32)
P265/65R17	220 (2.2, 32)	220 (2.2, 32)



(b) Using a dial indicator, check the tire runout.
Tire runout: 3.0 mm (0.118 in.) or less

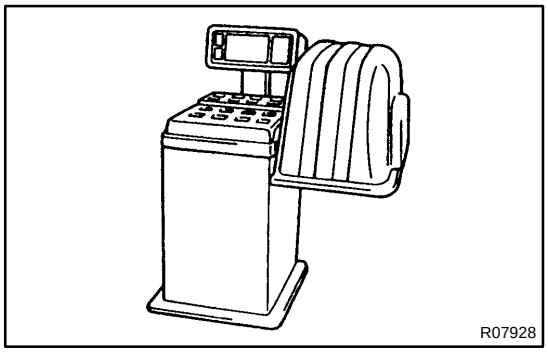


2. ROTATING TIRE

HINT:

- ▶ Rotate tires as shown in the illustration.
- ▶ Rotate as shown in (B) if the spare tire is included in the rotation.

3. INSPECT WHEEL BALANCE



(a) Check and adjust the Off–the–car balance.
(b) If necessary, check and adjust the On–the–car balance.
Imbalance after adjustment: 14.0 g (0.031 lb) or less

4. CHECK FRONT SUSPENSION FOR LOOSENESS

5. CHECK STEERING LINKAGE FOR LOOSENESS

6. CHECK BALL JOINT FOR LOOSENESS

7. CHECK SHOCK ABSORBER WORKS PROPERLY

- ▶ Check if oil leaks.
- ▶ Check the mounting bushings for wear.
- ▶ Bounce front and rear of the vehicle.

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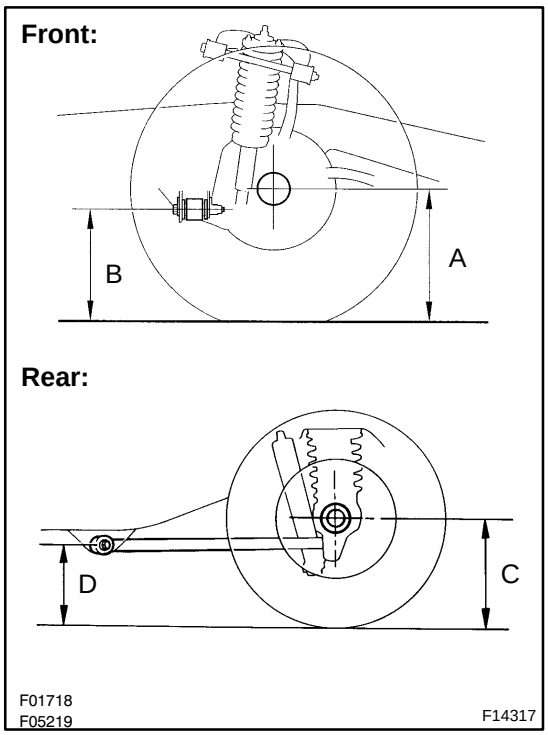

FRONT WHEEL ALIGNMENT

SA23H–05

INSPECTION

NOTICE:

Be sure to perform the zero point calibration of the steering angle, master cylinder pressure, yaw rate and deceleration sensors (See page DI–897).

1. MEASURE VEHICLE HEIGHT

Measuring points:

A: Ground clearance of the front drive shaft center

B: Ground clearance of the front adjusting cam bolt center

C: Ground clearance of the rear axle shaft center

D: Ground clearance of the rear lower control arm front bolt center

Vehicle height (Except air suspension models):

UCK35L–GKBSKA	
Tire size: P245/70R16	
Front	A – B: 69.7 mm (2.74 in.)
Rear	C – D: 76.2 mm (3.00 in.)
Tire size: P265/70R16 and P265/65R17	
Front	A – B: 69.5 mm (2.74 in.)
Rear	C – D: 75.5 mm (2.97 in.)
UCK35L–GKBLKA	
Front	A – B: 71.6 mm (2.82 in.)
Rear	C – D: 77.3 mm (3.04 in.)
UCK45L–GKBSKA	
Front	A – B: 61.6 mm (2.43 in.)
Rear	C – D: 63.8 mm (2.51 in.)
UCK45L–GKBLKA	
Front	A – B: 62.8 mm (2.47 in.)
Rear	C – D: 65.2 mm (2.57 in.)

Vehicle height (Air suspension models):

UCK35L–GKBSKA	
Tire size: P245/70R16	
Front	A – B: 68.5 mm (2.69 in.)
Rear	C – D: 74.8 – 104.8 mm (2.94 – 4.13 in.)
Tire size: P265/70R16 and P265/65R17	
Front	A – B: 68.3 mm (2.69 in.)
Rear	C – D: 74.1 – 104.1 mm (2.92 – 4.10 in.)
UCK35L–GKBLKA	
Front	A – B: 70.3 mm (2.77 in.)
Rear	C – D: 74.6 – 104.6 mm (2.94 – 4.12 in.)
UCK45L–GKBSKA	
Front	A – B: 60.5 mm (2.38 in.)
Rear	C – D: 61.0 – 91.0 mm (2.40 – 3.58 in.)
UCK45L–GKBLKA	
Front	A – B: 61.8 mm (2.43 in.)
Rear	C – D: 61.3 – 91.3 mm (2.41 – 3.59 in.)

NOTICE:

Before inspecting the wheel alignment, adjust the vehicle height to the specified value.

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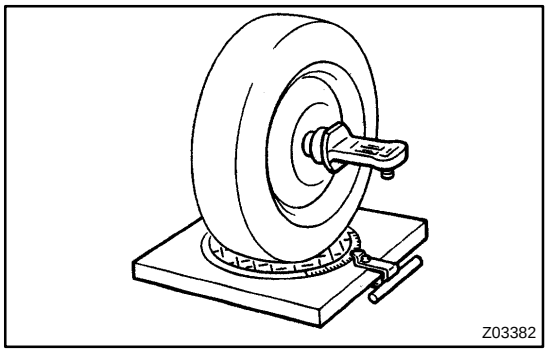
If the vehicle height is not as specified, try to adjust it by pushing down on or lifting the body.



2. INSTALL CAMBER–CASTER–KINGPIN GAUGE OR POSITION VEHICLE ON WHEEL ALIGNMENT TESTER

Follow the specific instructions of the equipment manufacturer.

3. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION

Camber, caster and steering axis inclination:

▶Camber	
UCK35L–GKBSKA	0°08' ± 45' (0.14° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK35L–GKBLKA	0°06' ± 45' (0.10° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK45L–GKBSKA	0°17' ± 45' (0.28° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK45L–GKBLKA	0°16' ± 45' (0.26° ± 0.75°)
Right–left error	30' (0.5°) or less
▶Caster (Except air suspension models)	
UCK35L–GKBSKA	
Tire size: P245/70R16	2°56' ± 45' (2.93° ± 0.75°)
Tire size: P265/70R16 and P265/65R17	2°59' ± 45' (2.98° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK35L–GKBLKA	3°02' ± 45' (3.04° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK45L–GKBSKA	2°36' ± 45' (2.60° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK45L–GKBLKA	2°38' ± 45' (2.64° ± 0.75°)
Right–left error	30' (0.5°) or less

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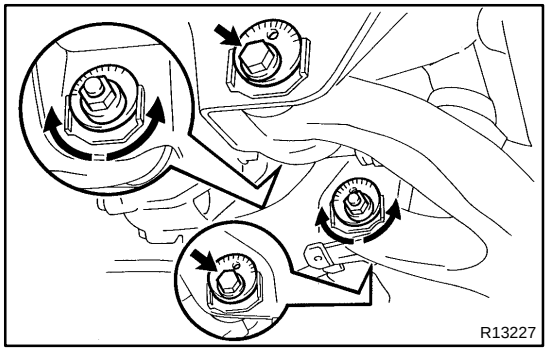
▶Caster (Air suspension models)	
UCK35L–GKBSKA	
Tire size: P245/70R16	3°17' ± 45' (3.28° ± 0.75°)
Tire size: P265/70R16 and P265/65R17	3°20' ± 45' (3.33° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK35L–GKBLKA	3°21' ± 45' (3.35° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK45L–GKBSKA	2°55' ± 45' (2.91° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK45L–GKBLKA	2°56' ± 45' (2.93° ± 0.75°)
Right–left error	30' (0.5°) or less
▶Steering axis inclination	
UCK35L–GKBSKA	10°14' ± 45' (10.24° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK35L–GKBLKA	10°16' ± 45' (10.27° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK45L–GKBSKA	10°05' ± 45' (10.09° ± 0.75°)
Right–left error	30' (0.5°) or less
UCK45L–GKBLKA	10°07' ± 45' (10.11° ± 0.75°)
Right–left error	30' (0.5°) or less

If the steering axis inclination is not within the specified values, after the camber and caster have been correctly adjusted, re-check the steering knuckle and front wheel bearing for looseness.



4. ADJUST CAMBER AND CASTER

(a) Loosen the front and/or rear adjusting cam set bolts.

(b) Adjust the camber and caster by turning the front and/or rear adjusting cams (See adjustment chart).

HINT:

Try to adjust the camber and caster to the center of the specified values.

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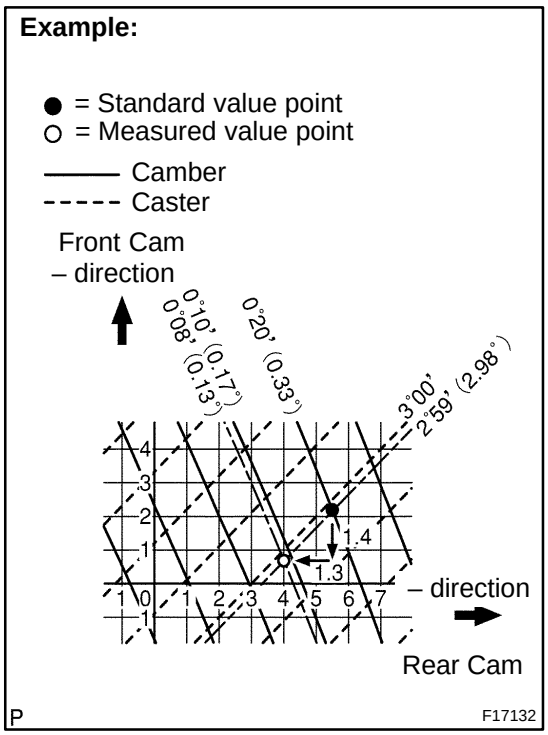


(c) How to read the adjustment chart (Example).

(1) Find the applicable wheel alignment standard value for the particular model.

(2) Mark the selected standard value on the adjustment chart.

Example:
Camber: 0˚08' (0.13˚)
Caster: 2˚59' (2.98˚)

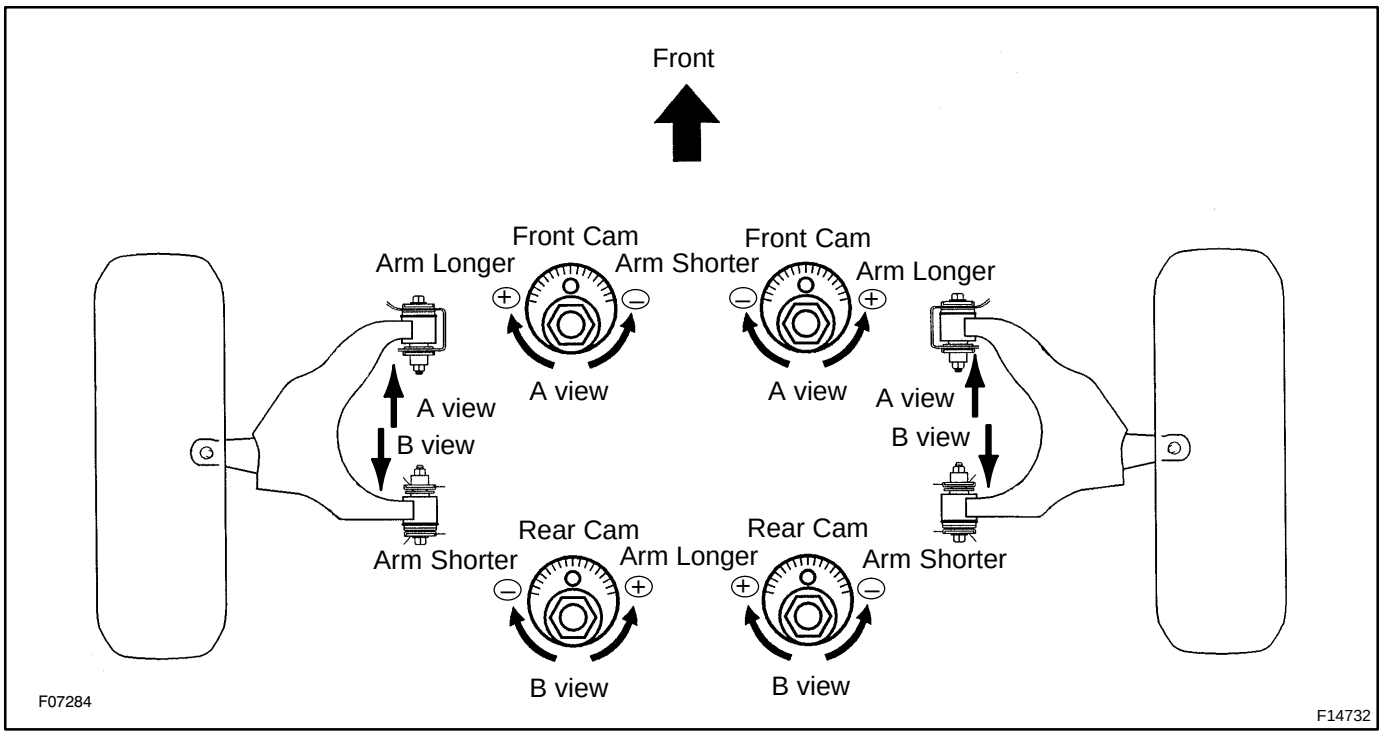
(3) Measure the present wheel alignment value with the vehicle unloaded.

(4) Mark the measured present value on the adjustment chart.

Example:
Camber: 0˚20' (0.33˚)
Caster: 2˚59' (2.98˚)

(5) As shown in the example chart, read the distance from the measured value to the standard value, and adjust the front and/or rear adjusting cams accordingly.

Amount to turn the adjusting cams (by graduation):
Example:
Front cam: 1.4 (+ direction)
Rear cam: 1.3 (+ direction)



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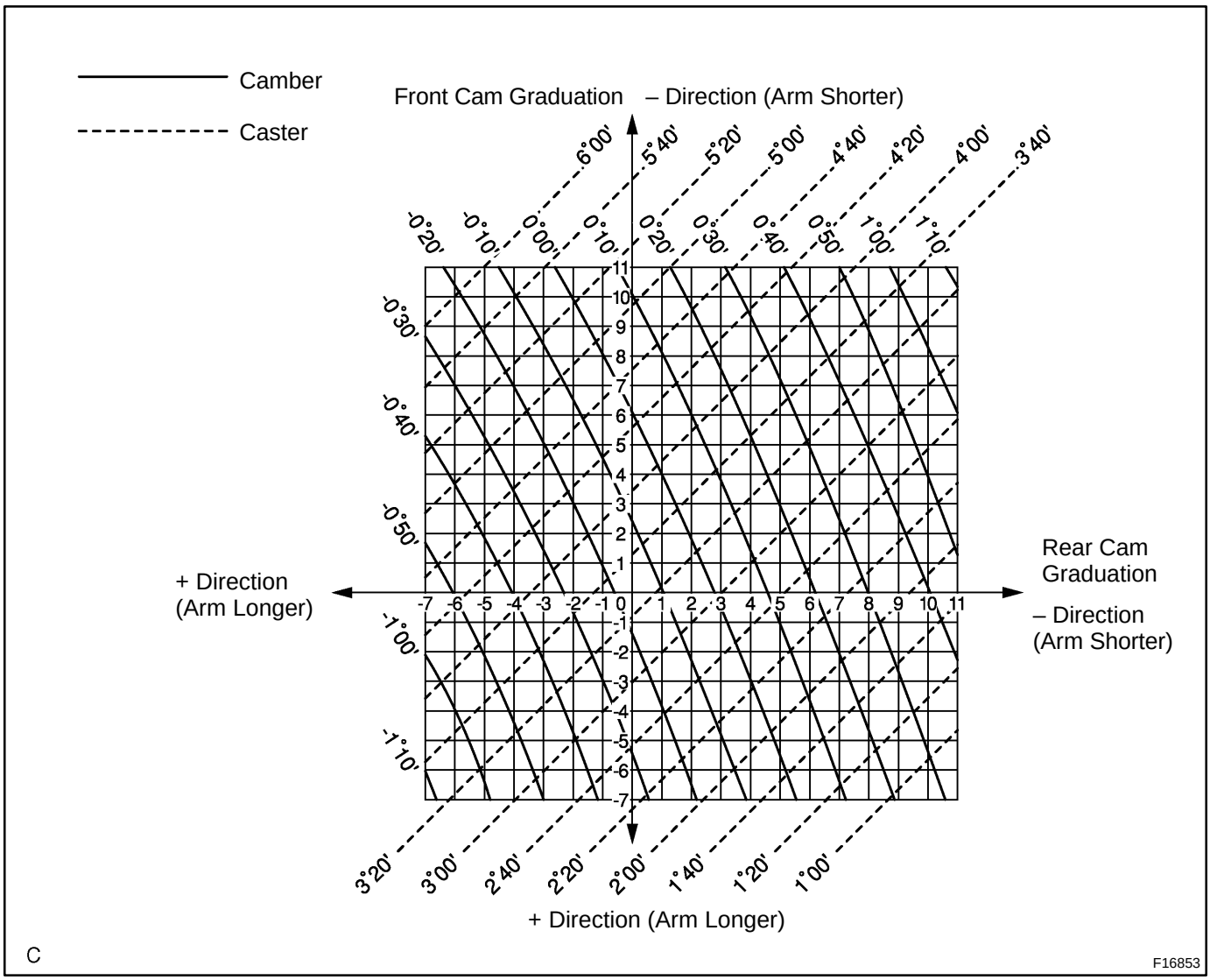

(d) Torque the front and/or rear adjusting cam set bolts.
Torque: 130 N·m (1,325 kgf·cm, 96 ft·lbf)

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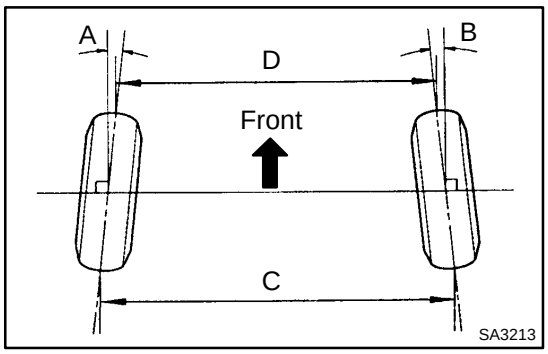


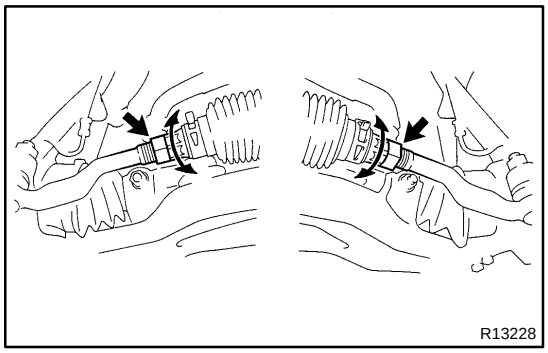
5. INSPECT TOE–IN

Toe–in (total):

UCK35L–GKBSKA	
Tire size: P245/70R16	A + B: 0°05' ± 0°09' (0.09° ± 0.15°)
	C – D: 1.19 ± 2 mm (0.05 ± 0.08 in.)
Tire size: P265/70R16 and P265/65R17	A + B: 0°05' ± 0°09' (0.09° ± 0.15°)
	C – D: 1.29 ± 2 mm (0.05 ± 0.08 in.)
Tire size: P265/65R17 (*1)	A + B: 0°05' ± 0°09' (0.09° ± 0.15°)
	C – D: 1.28 ± 2 mm (0.05 ± 0.08 in.)
UCK35L–GKBLKA	A + B: 0°05' ± 0°09' (0.08° ± 0.15°)
	C – D: 1.15 ± 2 mm (0.05 ± 0.08 in.)
UCK45L–GKBSKA	A + B: 0°05' ± 0°09' (0.08° ± 0.15°)
	C – D: 1.08 ± 2 mm (0.04 ± 0.08 in.)
Tire size: P265/70R16 (*1)	A + B: 0°05' ± 0°09' (0.08° ± 0.15°)
	C – D: 1.07 ± 2 mm (0.04 ± 0.08 in.)
UCK45L–GKBLKA	A + B: 0°04' ± 0°09' (0.07° ± 0.15°)
	C – D: 0.99 ± 2 mm (0.04 ± 0.08 in.)

(*1): Air suspension models only

If the toe–in is not within the specified values, adjust the rack ends.



6. ADJUST TOE–IN AND WHEEL ANGLE

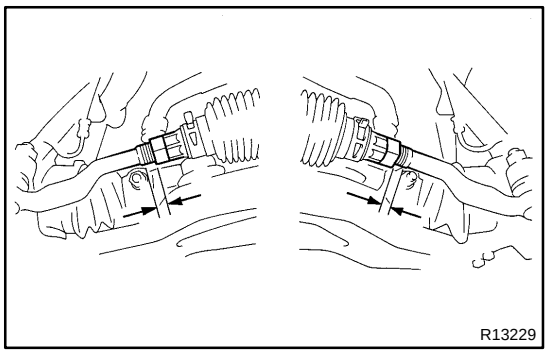
(a) Remove the 2 clips.

(b) Loosen the tie rod end lock nuts.

(c) Turn the right and left rack ends by an equal amount to adjust the toe–in.

HINT:

Try to adjust the toe–in to the center of the specified values.



(d) Make sure that the lengths of the right and left rack ends are the same.

Rack end length difference: 1.5 mm (0.059 in.) or less

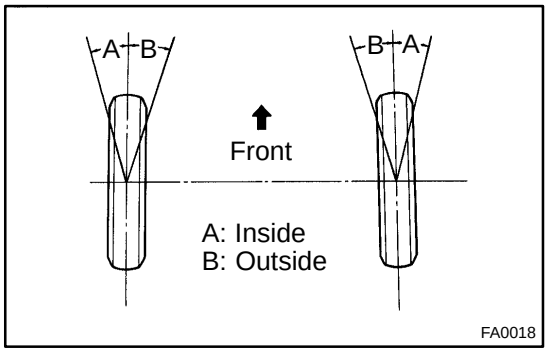
(e) Tighten the tie rod end lock nuts.

Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

(f) Place the boots on the seats and install the clips.

HINT:

Make sure that the boots are not twisted.



(g) Inspect the wheel angle.

Turn the steering wheel fully and measure the turning angle.

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Wheel turning angle:

Model	Inside wheel	Outside wheel: Reference
UCK35L–GKBSKA	–35˚24' (–35.40˚)	32˚10' (32.16˚) 31˚54' (31.90˚) (*1)
UCK35L–GKBLKA	–35˚22' (–35.36˚)	32˚07' (32.12˚)
UCK45L–GKBSKA	–35˚37' (–35.61˚)	32˚17' (32.28˚)
UCK45L–GKBLKA	–35˚35' (–35.59˚)	32˚16' (32.26˚)

(*1): Air suspension model with P265/65R17 tire only.

If the right and left wheel turning angles differ from the specified values, readjust the toe–in and wheel angle to within the specified values. At this time, make sure that the lengths of the right and left rack ends are the same.

Rack end length difference: 1.5 mm (0.059 in.) or less

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WHEEL AND TIRE SYSTEM

SA2CO–01

PRECAUTION

1. REMOVAL AND INSTALLATION OF TIRE PRESSURE MONITOR VALVE SUB–ASSY

(a) When installing a tire, make sure that the tire pressure monitor valve does not interfere with the tire bead in order to prevent damage to the sensor.

(b) After completing the operation, remove the valve core to rapidly release air and check that the warning light comes on. If not, the system may have a defect.

(c) If there is air leakage, tighten the nut with a force of 4.0 N·m (41 kgf·cm, 35 in.·lbf) and push the valve core 2 or 3 times to remove any dirt attached to the valve core.
If there is still air leakage, replace the grommet, the washer and the nut all together.

(d) When installing the tire pressure monitor valve, check whether the rim, grommet, washer and nut are clean. Use a manufacturer–specified cap.

(e) When putting air into the tire, first install the tire pressure valve straight onto the stem of the tire pressure monitor valve.

2. TIRE AND WHEEL REPLACEMENT OR TIRE ROTATION

(a) When replacing tires, be sure to check if the grommet of the tire valve is damaged. If so, replace the grommet together with the washer and nut.

(b) When tires and wheels are replaced, make sure to register the transmitter ID.

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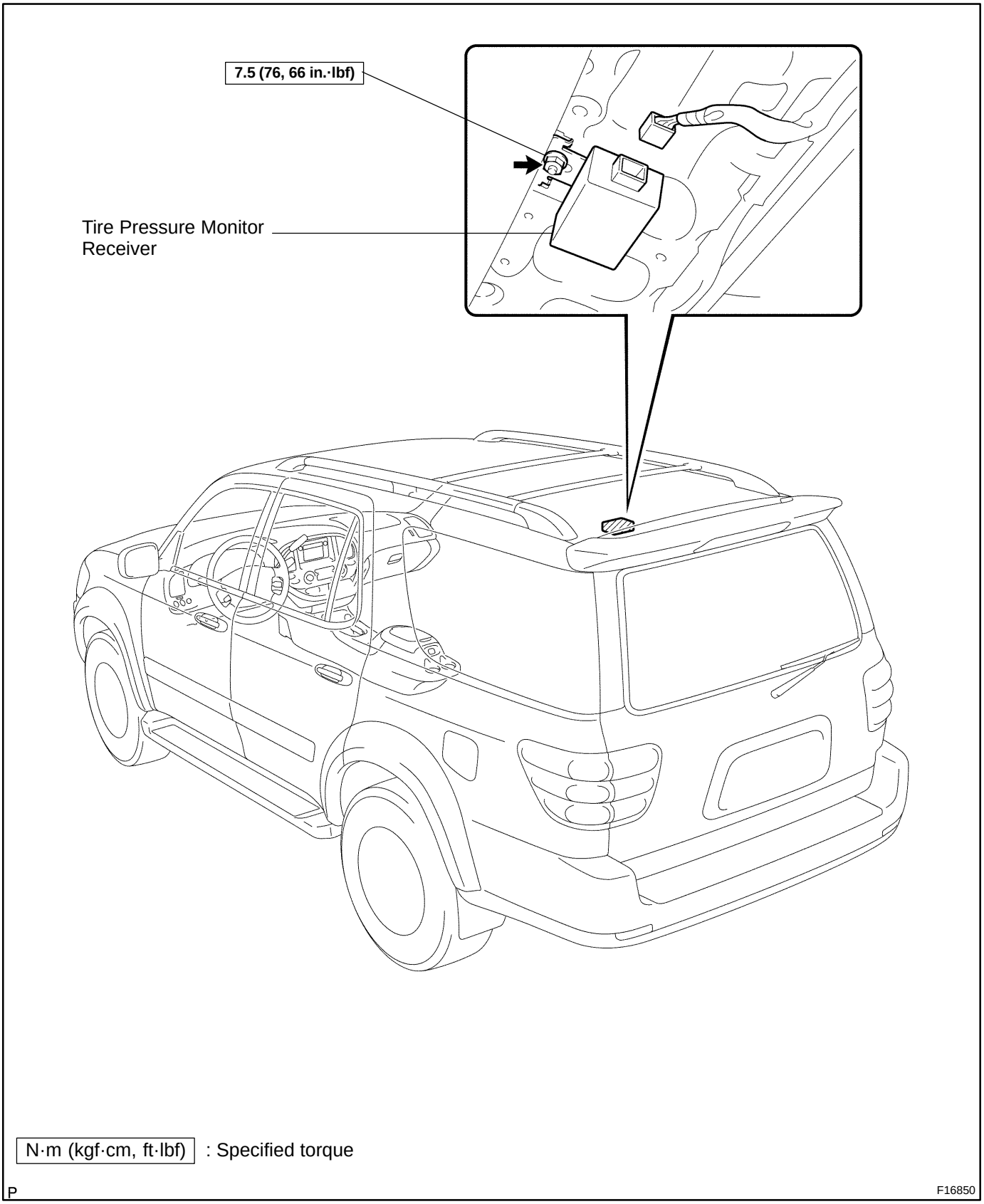
TIRE PRESSURE MONITOR RECEIVER

COMPONENTS

SA2CP–01



N·m (kgf·cm, ft·lbf) : Specified torque

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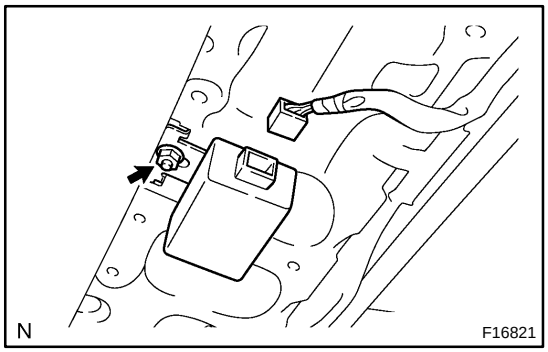
SA2CQ–01

REPLACEMENT

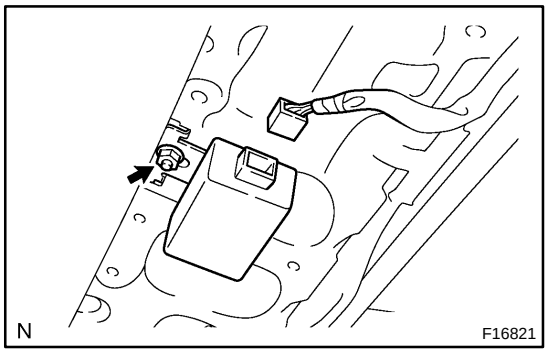
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE REAR TRIM (See page BO–101)**



3. **REMOVE TIRE PRESSURE MONITOR RECEIVER**

(a) Disconnect the connector.

(b) Remove the nut and tire pressure monitor receiver.



4. **INSTALL TIRE PRESSURE MONITOR RECEIVER**

(a) Install the tire pressure monitor receiver with the nut.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(b) Connect the connector.

5. **INSTALL REAR TRIM (See page BO–108)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION (See page IN–20)**

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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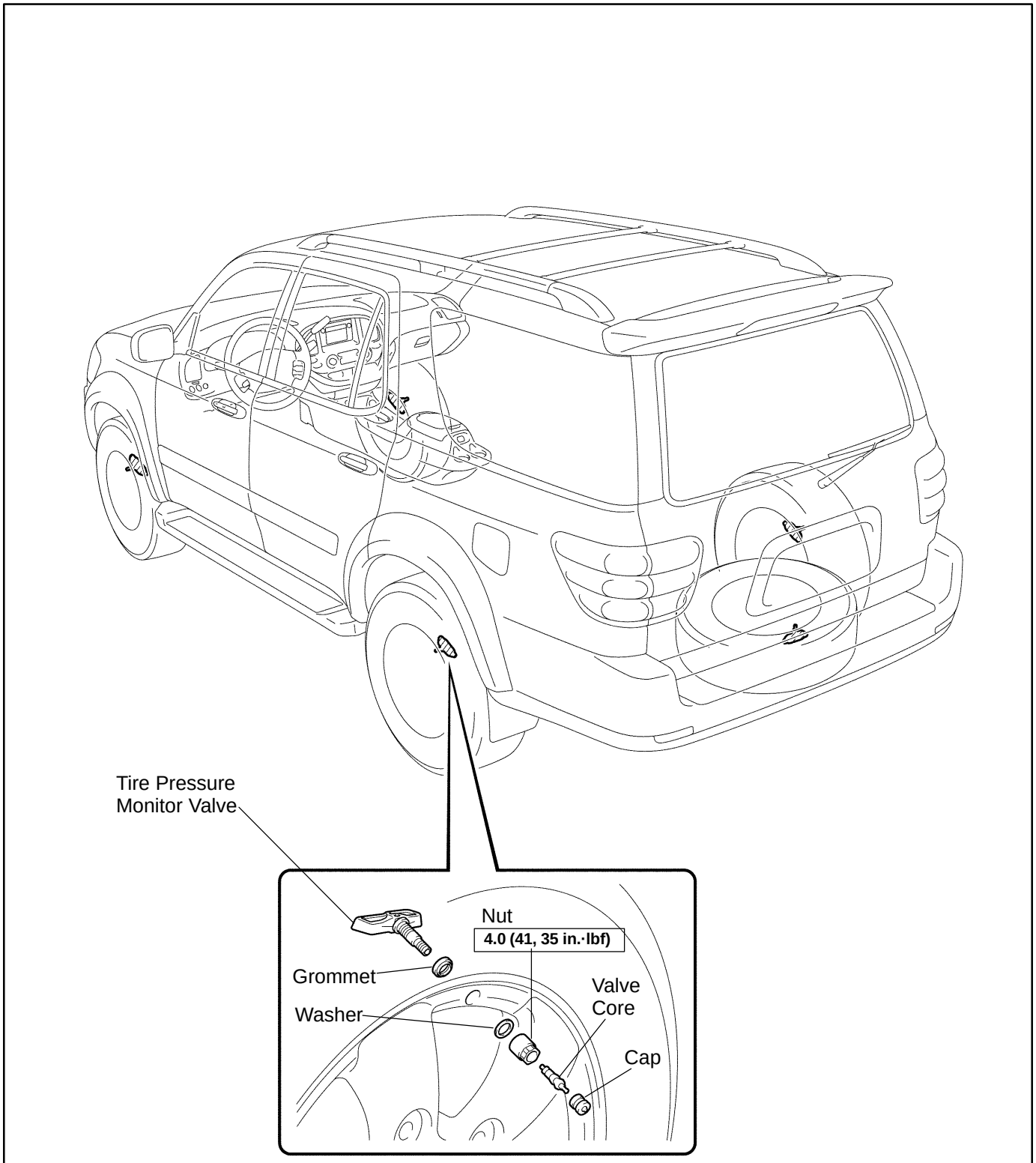
TIRE PRESSURE MONITOR VALVE

COMPONENTS

SA2CR–01



N·m (kgf·cm, ft·lbf) : Specified torque

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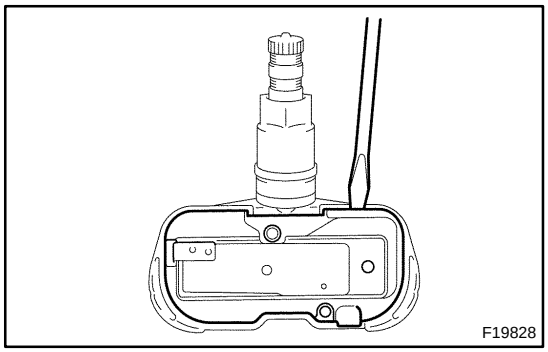
SA2CS–01

DISPOSAL

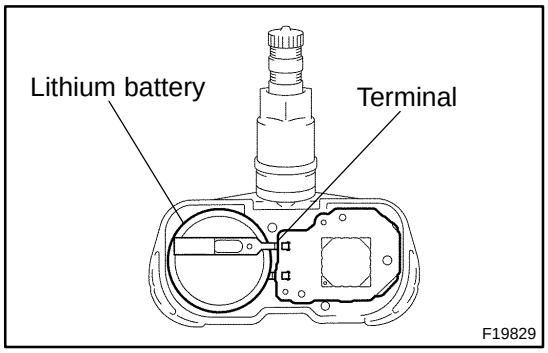
HINT:

The tire pressure monitor valve sub–assy is powered by a lithium battery. When disposing of the tire pressure monitor valve sub–assy, remove the battery and dispose of it correctly.



DISPOSE OF TIRE PRESSURE MONITOR VALVE

(a) Insert the tip of a screwdriver into the clearance and pry off the cover. Remove the back cover.



(b) The battery and base board covered with silicone resin are exposed. While taking out the battery, cut off the 2 terminals which connect the battery and base board.

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SA2CT–01

REPLACEMENT

1. REMOVE FRONT TIRE

2. REMOVE REAR TIRE

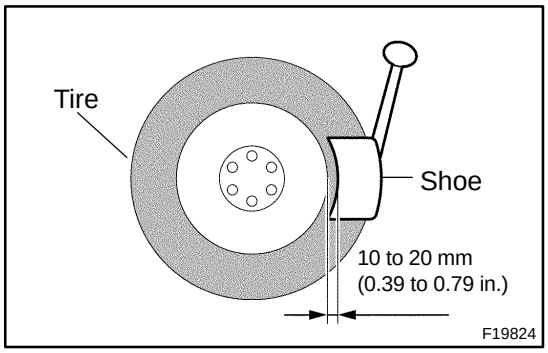
3. REMOVE TIRE PRESSURE MONITOR VALVE

(a) Remove the valve core and cap, and release air from the tire.

(b) After ensuring that air is sufficiently released, remove the nut and washer that are used to fix the tire pressure monitor valve sub–assy and drop the sensor inside the tire.

HINT:

Keep the removed cap, valve core, nut and washer.



(c) After dropping the tire pressure monitor valve sub–assy into the tire, disengage the bead using the shoe of the tire remover.

NOTICE:

Be careful not to damage the tire pressure monitor valve because of interference between the sensor and tire bead.

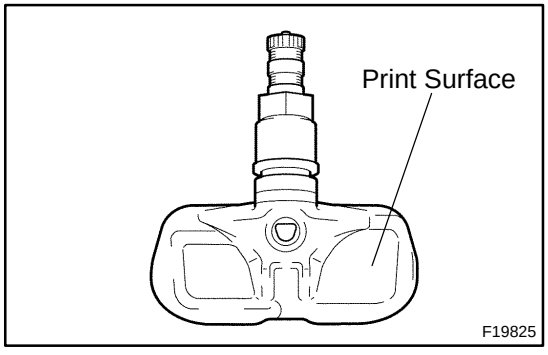
(d) Remove the bead on the upper side.

(e) Take out the sensor from the tire and remove the bead on the lower side.

(f) Remove the inner grommet from the tire pressure monitor valve sub–assy.

HINT:

Check that there are no cracks or damage to the grommet. If any damage is found, replace the grommet together with the washer and nut.



4. INSTALL TIRE PRESSURE MONITOR VALVE

(a) Insert the tire pressure monitor valve into the valve installation hole. Insert from the inside of the rim so that the print surface can be seen.

NOTICE:

- **Check that there is no visible deformation, damage or other abnormalities on the transmitter.**
- **Check that there is no foreign matter on the inner grommet and around the rim hole.**

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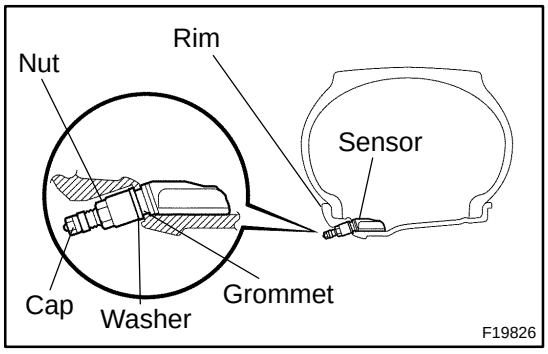
- **If installed in the reverse direction, the tire pressure monitor valve may be damaged or fail to transmit signals when running at high speed.**
- **If installing a new tire pressure monitor valve, write down the ID number before installation.**
- **It is necessary to registor an ID in the ECU after installation (See page DI–805).**

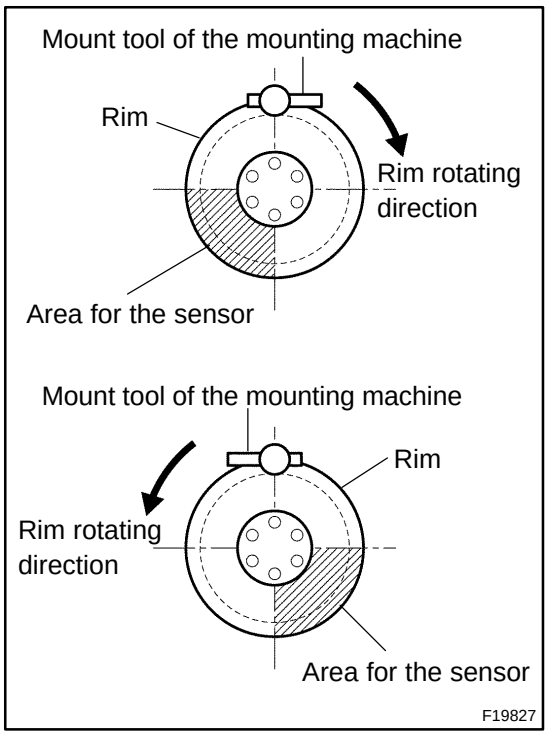


(b) Install the washer on the tire pressure monitor valve from the rim side and tighten with a nut.
Torque: 4.0 N·m (41 kgf·cm, 35 in.·lbf)

NOTICE:

- **Check that there is no foreign matter on the washer and nut.**
- **If the tire pressure monitor valve is removed when the tire is removed for replacement, check that there is no damage or cuts, and no foreign matter such as mud, dirt or sand attached to the grommet. Replace the grommet with a new one if any of the defects mentioned above are found.**
- **Check that there is no oil, water or lubricant around the rim hole, tire pressure monitor valve, washer and nut. Failing to do so may result in improper installation.**

(c) After the tire is inflated, the valve nut may be loose. Retighten the nut to the specified torque and then check for air leaks with soapy water.
Torque: 4.0 N·m (41 kgf·cm, 35 in.·lbf)



(d) Set the wheel disc to the mounting machine and install the lower tire bead. Position the main body of the sensor as in the shaded area shown in the illustration.

NOTICE:
If the sensor is positioned outside this area, it generates interference with the tire bead, causing possible damage to the sensor.

(e) Install the upper bead.

NOTICE:
Make sure that the tire bead and tool do not interfere with the main body of the sensor and that the sensor is not clamped by the bead.

5. **INSTALL FRONT WHEEL**
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)
6. **INSTALL REAR WHEEL**
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)
7. **INSPECT TIRE (See page SA–3)**
8. **REGISTRATION OF TRANSMITTED ID (See page DI–805)**

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9. INSPECT TIRE PRESSURE WARNING SYSTEM
(See page DI–802)
SST 09843–18040

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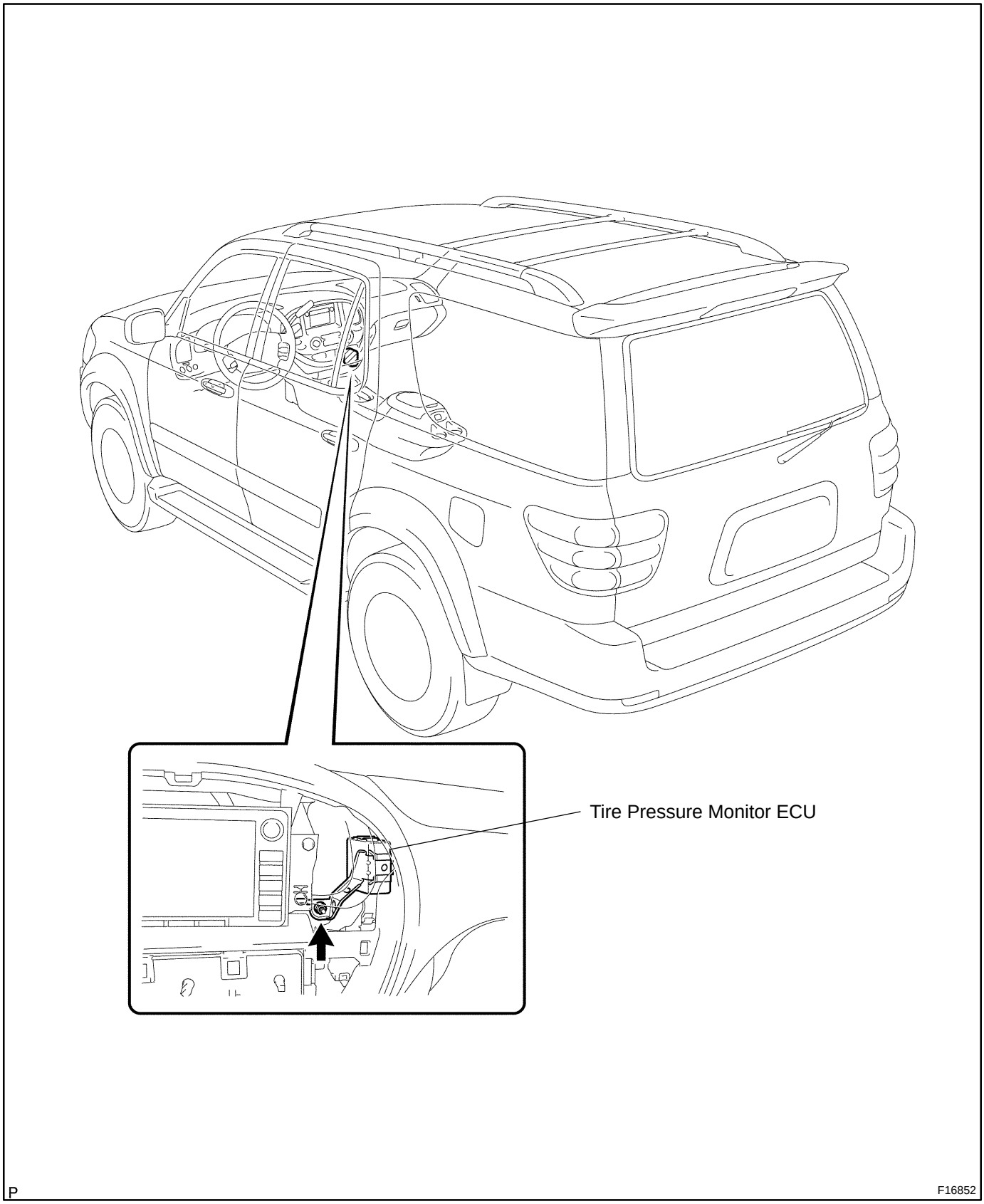
TIRE PRESSURE MONITOR ECU

COMPONENTS

SA2CU–01



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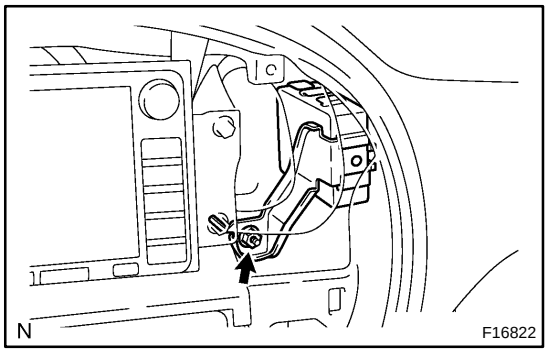
SA2CV–01

REPLACEMENT

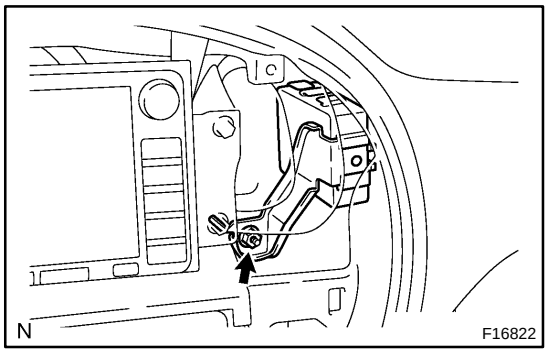
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE INTEGRATION CONTROL PANEL
   (See page BO–89)
3. REMOVE GLOVE COMPARTMENT
   (See page BO–89)



4. REMOVE TIRE PRESSURE MONITOR ECU

(a) Disconnect the connector.

(b) Remove the nut and tire pressure monitor ECU.



5. INSTALL TIRE PRESSURE MONITOR ECU

(a) Install the tire pressure monitor ECU with the nut.

(b) Connect the connector.

6. INSTALL GLOVE COMPARTMENT
   (See page BO–97)
7. INSTALL INTEGRATION CONTROL PANEL
   (See page BO–97)
8. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
9. REGISTRATION OF TRANSMITTED ID
   (See page DI–805)
10. INSPECT TIRE PRESSURE WARNING SYSTEM
    (See page DI–802)
    SST 09843–18040
11. PERFORM INITIALIZATION (See page IN–20)

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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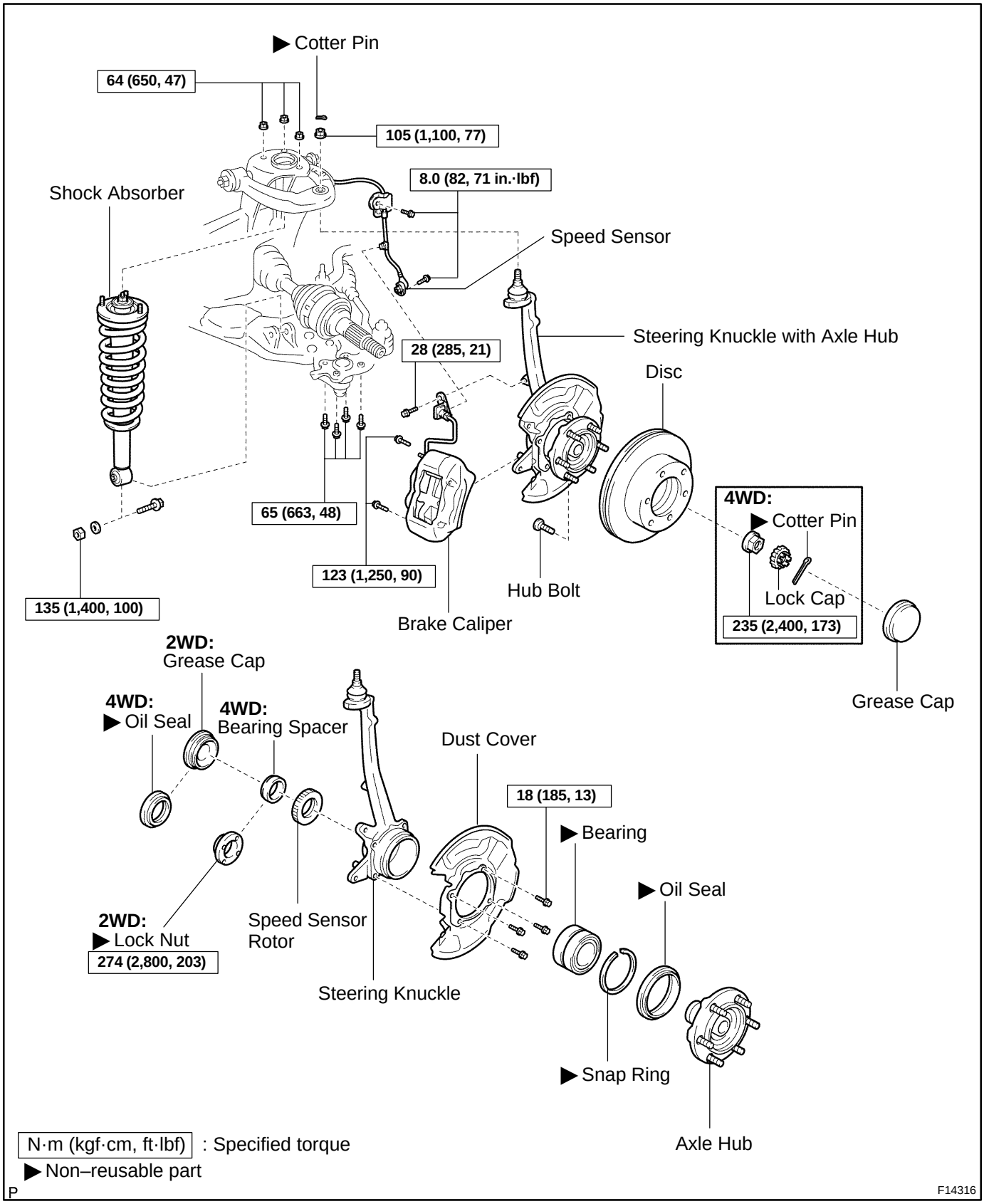
FRONT AXLE HUB

COMPONENTS

SA143–10



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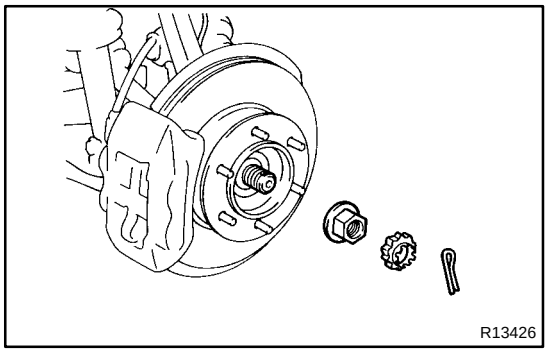
SA23I–04

REMOVAL

1. REMOVE FRONT WHEEL

2. REMOVE GREASE CAP

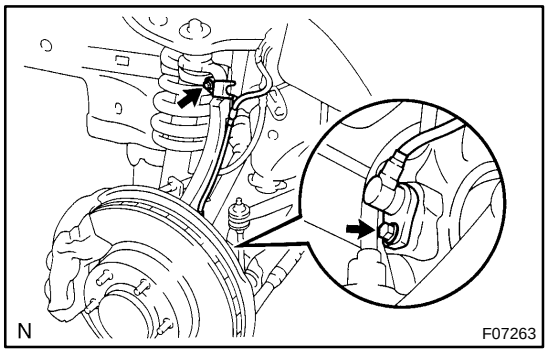
Using a screwdriver and hammer, remove the grease cap.



3. 4WD:
DISCONNECT DRIVE SHAFT

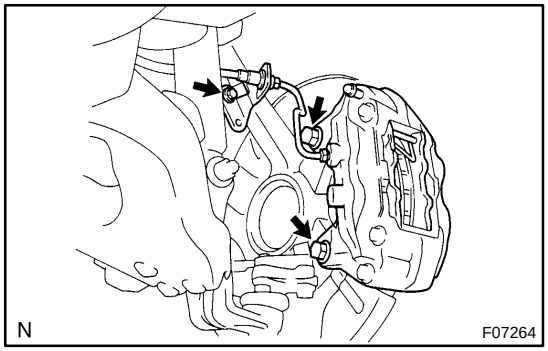
(a) Remove the cotter pin and lock cap.

(b) While applying the brakes, remove the lock nut.



4. DISCONNECT SPEED SENSOR AND WIRE HARNESS CLAMP FROM STEERING KNUCKLE

Remove the 2 bolts and disconnect the speed sensor and wire harness clamp from the steering knuckle.



5. REMOVE BRAKE CALIPER AND DISC

(a) Remove the bolt and brake line clamp from the steering knuckle.

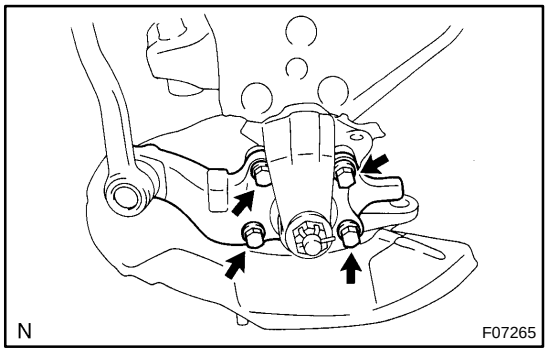
(b) Remove the 2 bolts, brake caliper and disc.

NOTICE:

Do not damage the brake tube.

(c) Support the brake caliper securely.

6. REMOVE SHOCK ABSORBER (See page SA–64)



7. DISCONNECT LOWER BALL JOINT

Remove the 4 bolts and disconnect the lower ball joint.

8. REMOVE STEERING KNUCKLE

(a) Remove the cotter pin and loosen the nut.

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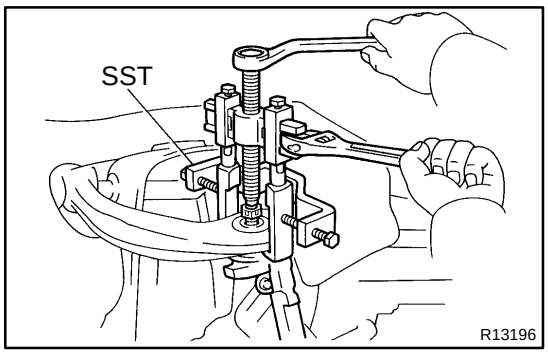

(b) Using SST, disconnect the steering knuckle.
SST 09950–40011 (09951–04010, 09952–04010, 09553–04020, 09554–04010, 09955–04031, 09958–04011)

(c) Remove the nut and steering knuckle.

NOTICE:

4WD:

Be careful not to damage the oil seal and drive shaft boot.

HINT:

4WD:

When it is difficult to disconnect the drive shaft, tap the tip of the drive shaft with a plastic hammer.

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SA145–08

DISASSEMBLY

1. 2WD:

REMOVE GREASE CAP

(a) Mount the axle hub in a soft jaw vise.

HINT:

Close the vise until it holds hub bolts. Do not tighten further.

(b) Using a screwdriver, remove the grease cap.

2. 4WD:

REMOVE OIL SEAL (INSIDE)

(a) Mount the axle hub in a soft jaw vise.

HINT:

Close the vise until it holds hub bolts. Do not tighten further.

(b) Using a screwdriver, remove the oil seal (inside).

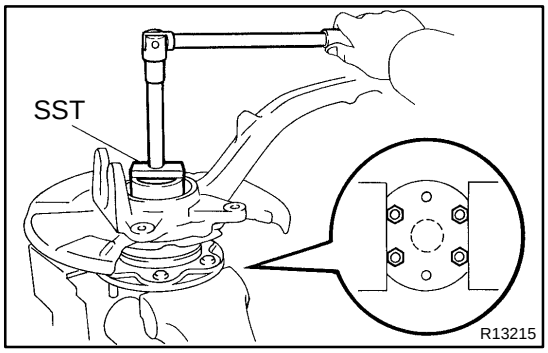
3. 2WD:

REMOVE LOCK NUT AND SPEED SENSOR ROTOR

(a) Using a chisel and hammer, loosen the staked part of the lock nut.

NOTICE:

Be careful not to damage the bushing.



(b) Using SST, remove the lock nut.

SST 09318–12010

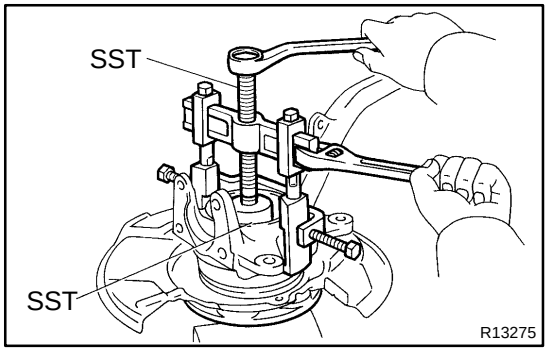
(c) Remove the speed sensor rotor.

NOTICE:

Take care not to scratch the serration of the speed sensor rotor.

4. REMOVE AXLE HUB FROM STEERING KNUCKLE

(a) Remove the 4 bolts and shift the dust cover towards the hub side (outside).



(b) Using SST, remove the axle hub from the steering knuckle.

SST 09710–30021 (09710–03051), 09950–40011 (09951–04020, 09952–04010, 09953–04020, 09954–04010, 09955–04031, 09957–04010, 09958–04011)

(c) Remove the dust cover from the steering knuckle.

(d) 4WD:

Remove the bearing spacer and speed sensor rotor.

NOTICE:

Take care not to scratch the serration of the speed sensor rotor.

5. REMOVE OIL SEAL (OUTSIDE)

Using a screwdriver, remove the oil seal (outside) from the steering knuckle.

6. REMOVE BEARING FROM STEERING KNUCKLE

(a) Using snap ring pliers, remove the snap ring.

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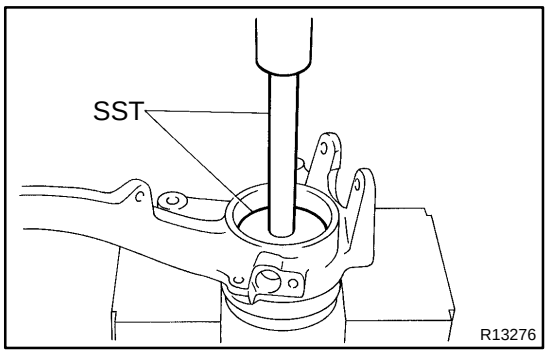

(b) Using SST and a press, remove the bearing from the steering knuckle.
SST 09950–60020 (09951–00810),
09950–70010 (09951–07150)

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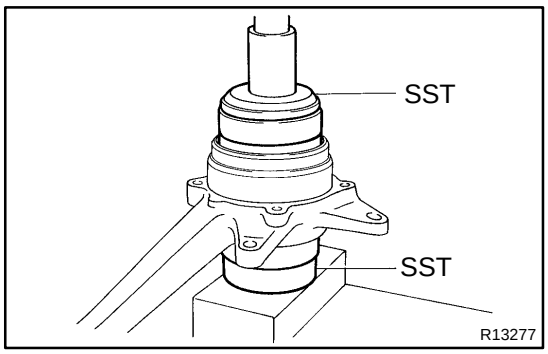
SA146–08

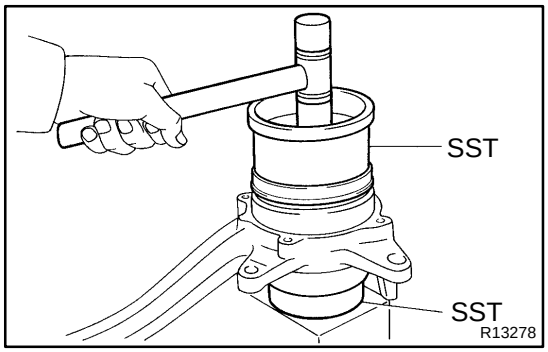
REASSEMBLY



1. INSTALL NEW BEARING

(a) Using SST and a press, install a new bearing to the steering knuckle.
SST 09527–17011, 09950–60020 (09951–00910)

(b) Using snap ring pliers, install a new snap ring.



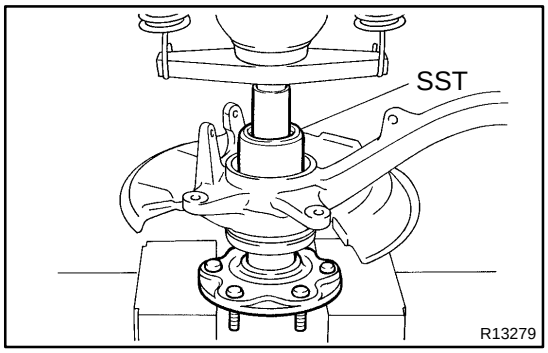
2. INSTALL NEW OIL SEAL (OUTSIDE)

(a) Using SST and a plastic hammer, install a new oil seal (outside).
SST 09223–15030, 09527–17011

(b) Coat MP grease to the oil seal lip.

3. INSTALL AXLE HUB TO STEERING KNUCKLE

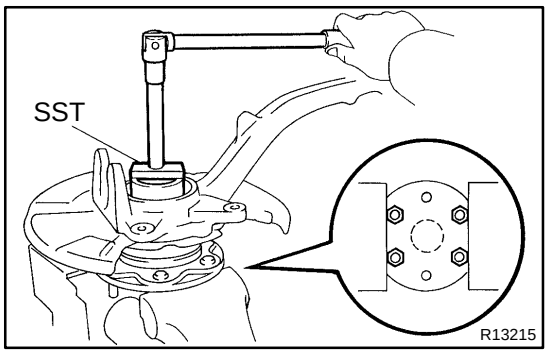
(a) Install the dust cover to the steering knuckle with the 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



(b) Using SST and a press, install the axle hub to the steering knuckle.
SST 09649–17010

4. INSTALL SPEED SENSOR ROTOR

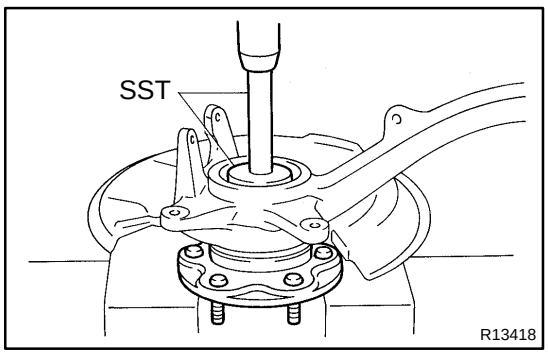
NOTICE:
Do not scratch the serration of the speed sensor rotor.



5. 2WD:
INSTALL NEW LOCK NUT

(a) Using SST, install and torque a new lock nut to the axle hub.
SST 09318–12010
Torque: 274 N·m (2,800 kgf·cm, 203 ft·lbf)

(b) Using a chisel and hammer, stake the lock nut.



6. 4WD:
INSTALL BEARING SPACER

Using SST and a press, install the bearing spacer.
SST 09950–60010 (09951–00650),
09950–70010 (09951–07150)

7. 2WD:
INSTALL GREASE CAP

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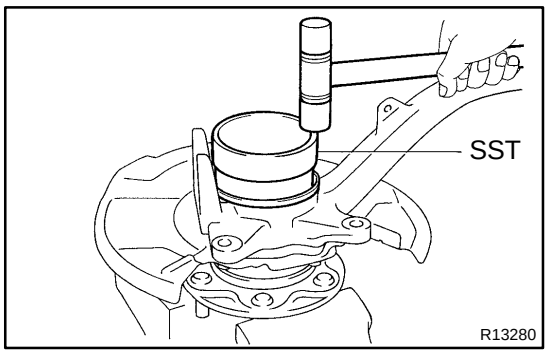

8. 4WD:

INSTALL NEW OIL SEAL (INSIDE)

(a) Using SST and a plastic hammer, install a new oil seal (inside).

SST 09527–17011

HINT:

Lightly strike the SST on its circumference evenly.

(b) Coat MP grease to the oil seal lip.

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SA23J–05

INSTALLATION

1. INSTALL STEERING KNUCKLE

(a) 4WD:

Insert the drive shaft into the axle hub and temporarily tighten the nut.

NOTICE:

Be careful not to damage the oil seal and drive shaft boot.

(b) Connect the steering knuckle to the upper suspension arm.

(c) Install the nut and a new cotter pin.

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

Torque: 105 N·m (1,100 kgf·cm, 77 ft·lbf)

2. CONNECT LOWER BALL JOINT

Connect the lower ball joint to the steering knuckle with the 4 bolts.

Torque: 65 N·m (663 kgf·cm, 48 ft·lbf)

3. INSTALL SHOCK ABSORBER (See page SA–70)

4. INSTALL BRAKE CALIPER

(a) Install the disc, brake caliper and 2 bolts.

Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Install the brake line clamp to the steering knuckle with the bolt.

Torque: 28 N·m (285 kgf·cm, 21 ft·lbf)

5. CONNECT SPEED SENSOR AND WIRE HARNESS CLAMP

Connect the speed sensor and wire harness clamp to the steering knuckle with the 2 bolts.

Torque: 8.0 N·m (82 kgf·cm, 71 ft·lbf)

6. 4WD:

INSTALL DRIVE SHAFT LOCK NUT

(a) While applying the brakes, tighten the nut.

Torque: 235 N·m (2,400 kgf·cm, 173 ft·lbf)

(b) Install the lock cap and a new cotter pin.

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

7. INSTALL GREASE CAP

8. INSTALL FRONT WHEEL

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

9. DEPRESS BRAKE PEDAL SEVERAL TIMES

10. CHECK FRONT WHEEL ALIGNMENT (See page SA–4)

11. CHECK SPEED SENSOR SIGNAL (See page DI–899)

12. PERFORM ZERO POINT CALIBRATION OF STEERING ANGLE, MASTER CYLINDER PRESSURE, YAW RATE AND DECELERATION SENSORS (See page DI–897)

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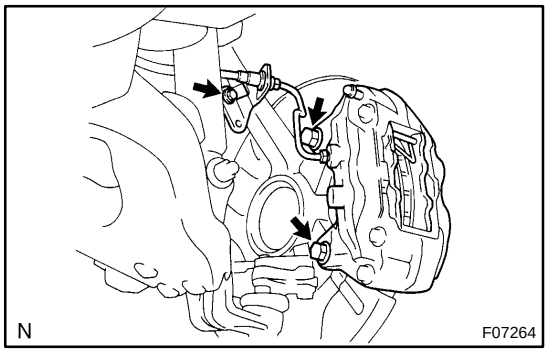
FRONT WHEEL HUB BOLT

SA24P–03

REPLACEMENT

1. REMOVE FRONT WHEEL

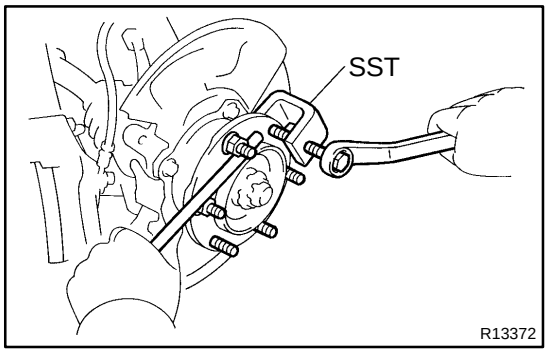


2. REMOVE BRAKE CALIPER AND DISC

(a) Remove the bolt and brake line clamp from the steering knuckle.

(b) Remove the 2 bolts, brake caliper and disc.

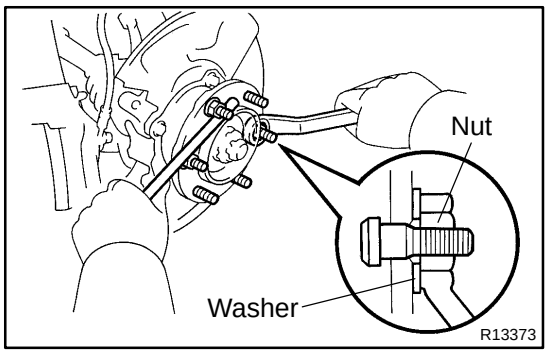
(c) Support the brake caliper securely.



3. REMOVE HUB BOLT

Using SST and a screwdriver or an equivalent, remove the hub bolt.

SST 09650–17011



4. INSTALL HUB BOLT

(a) Install a washer and nut to a new hub bolt as shown in the illustration.

(b) Using a screwdriver or an equivalent to hold, install the hub bolt by torquing the nut.

(c) Remove the nut and washer.

5. INSTALL BRAKE DISC AND CALIPER

(a) Install the brake disc, caliper and 2 bolts.

Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Install the brake line clamp to the steering knuckle with the bolt.

Torque: 28 N·m (285 kgf·cm, 21 ft·lbf)

6. INSTALL FRONT WHEEL

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

7. DEPRESS BRAKE PEDAL SEVERAL TIMES

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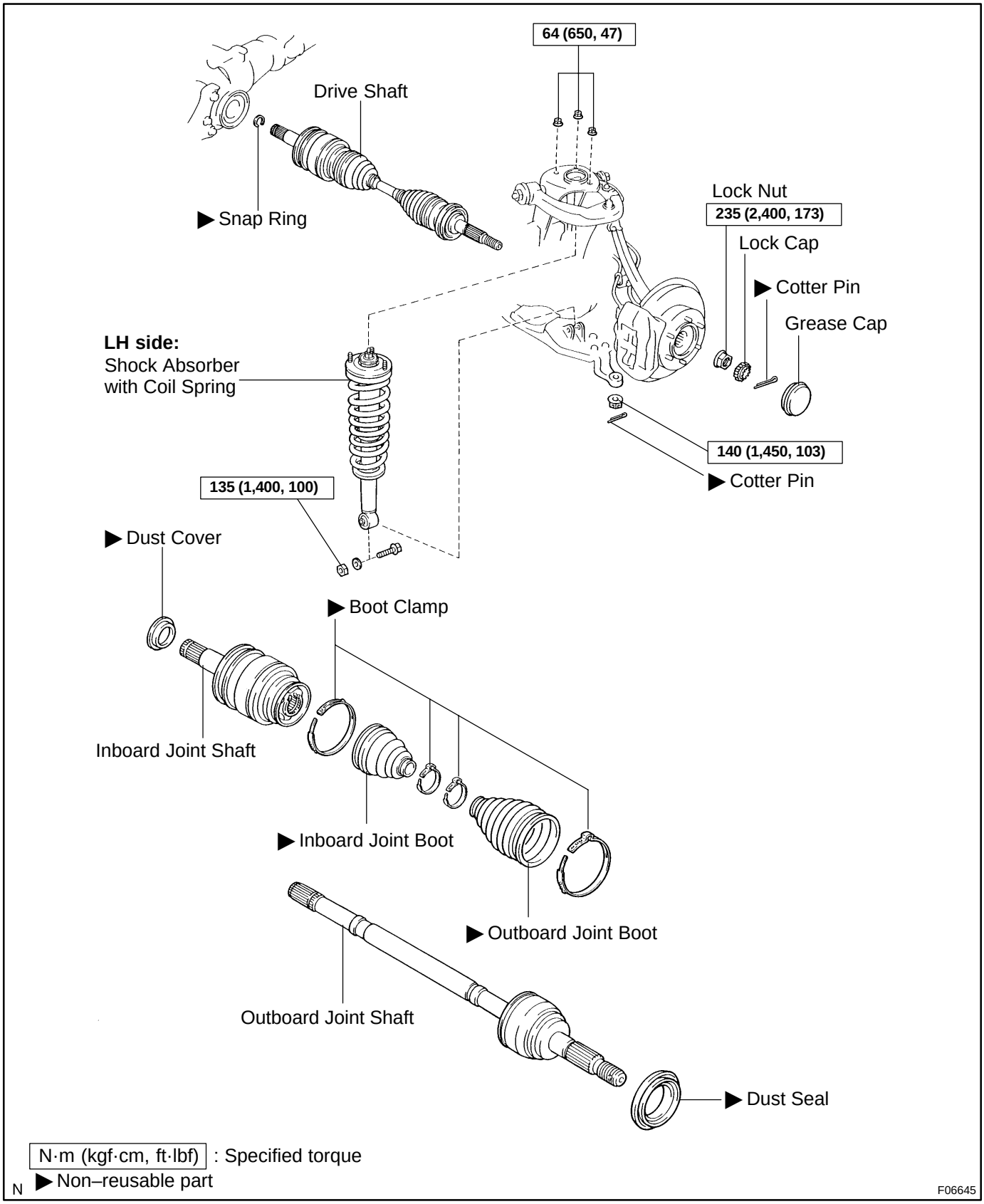
FRONT DRIVE SHAFT

COMPONENTS

SA14E–08



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SA24L–03

REMOVAL

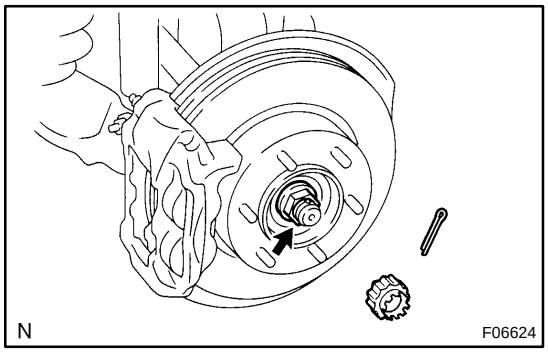
1. REMOVE FRONT WHEEL

2. REMOVE ENGINE UNDER COVER

3. DRAIN DIFFERENTIAL OIL

4. REMOVE DRIVE SHAFT LOCK NUT

(a) Using a screwdriver and hammer, remove the grease cap.

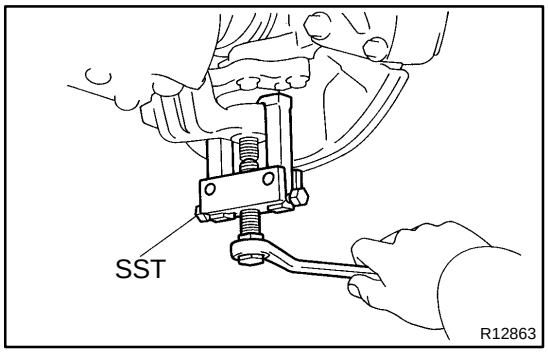


(b) Remove the cotter pin and lock cap.

(c) While applying the brakes, remove the lock nut.

5. DISCONNECT LOWER SUSPENSION ARM FROM LOWER BALL JOINT

(a) Remove the cotter pin and nut.

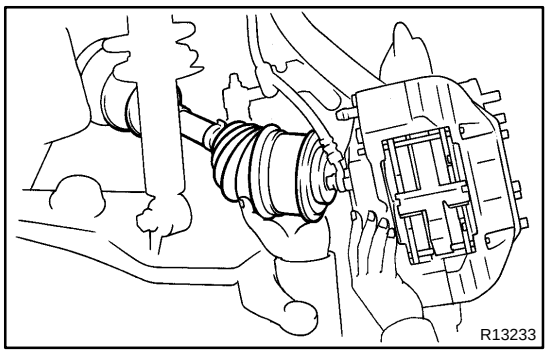


(b) Using SST, disconnect the lower suspension arm from the lower ball joint.

SST 09628–62011

6. DISCONNECT DRIVE SHAFT FROM STEERING KNUCKLE

(a) Using a plastic hammer, disengage the drive shaft from the axle hub.



(b) Push the steering knuckle outward and disconnect the drive shaft from the steering knuckle.

NOTICE:

Be careful not to damage the oil seal, boots and dust seal.

7. LH drive shaft:

REMOVE LH SHOCK ABSORBER (See page SA–64)

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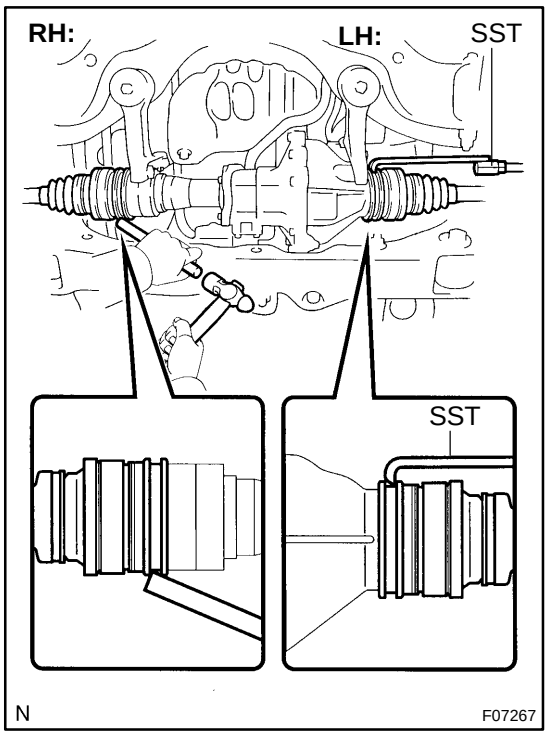

8. REMOVE DRIVE SHAFT

(a) RH drive shaft:
Using a brass bar and hammer, remove the RH drive shaft.

NOTICE:

Be careful not to damage the dust cover and oil seal.

(b) LH drive shaft:
Using SST, remove the LH drive shaft.
SST 09520–01010, 09520–24010 (09520–32040)

NOTICE:

Be careful not to damage the dust cover and oil seal.

(c) Using a screwdriver, remove the snap ring from the inboard joint shaft.

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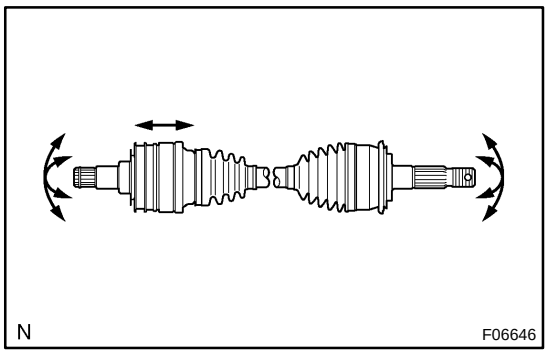
SA24M–03

DISASSEMBLY



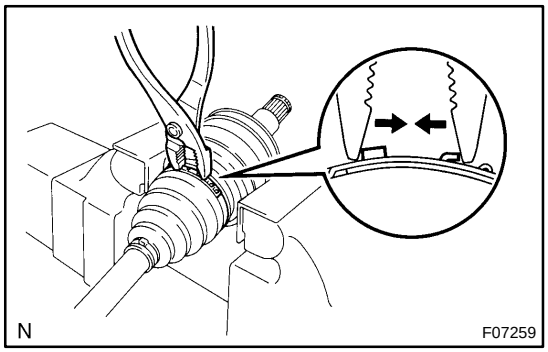
1. CHECK DRIVE SHAFT

(a) Check to see that there is no remarkable play in the outboard joint.

(b) Check to see that the inboard joint slides smoothly in the thrust direction.

(c) Check to see that there is no remarkable play in the radial direction of the inboard joint.

(d) Check the boots for damage.

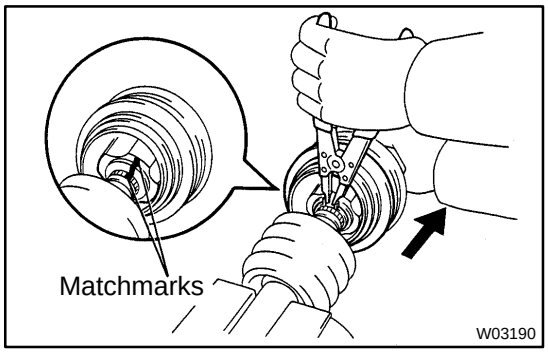


2. REMOVE INBOARD AND OUTBOARD JOINT BOOT CLAMPS

(a) Using pliers, pinch the claws to compress the large inboard joint boot clamp and remove it.

(b) Using a side cutter, cut the small inboard joint boot clamp and remove it.

(c) Using a side cutter, cut the 2 outboard joint boot clamps and remove them.



3. REMOVE INBOARD JOINT SHAFT FROM OUTBOARD JOINT SHAFT

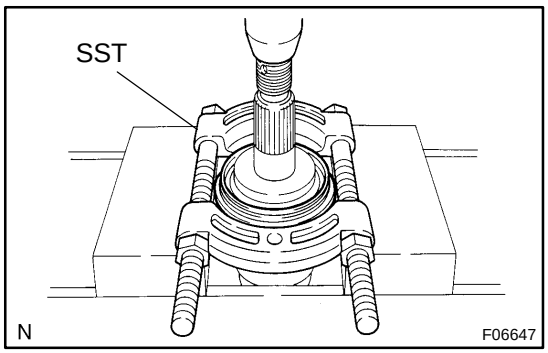
(a) Place matchmarks on the inboard and outboard joint shafts.

NOTICE:

Do not punch the marks.

(b) Using a snap ring expander, pull out the outboard joint shaft while expanding the snap ring.

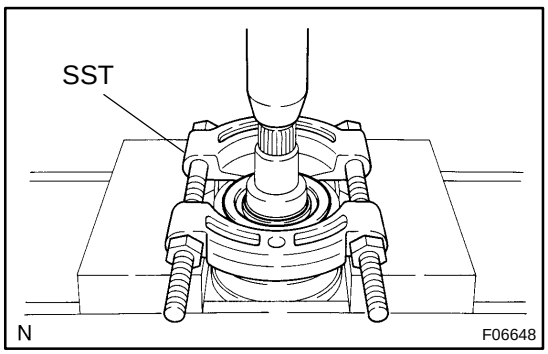
4. REMOVE INBOARD AND OUTBOARD JOINT BOOTS



5. REMOVE DUST SEAL

Using SST and a press, remove the dust seal.

SST 09950–00020



6. REMOVE DUST COVER

Using SST and a press, remove the dust cover.

SST 09950–00020

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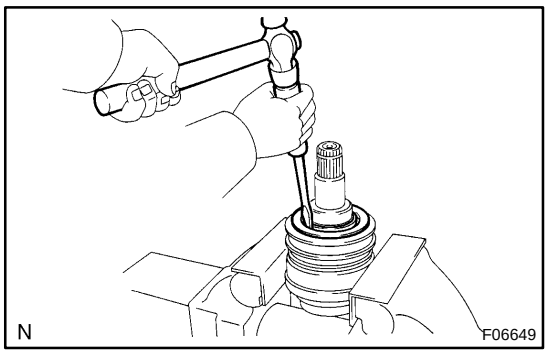
SA14H–06

REASSEMBLY

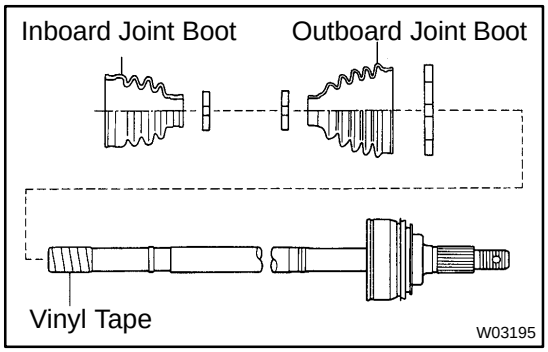


1. INSTALL DUST COVER

Using a screwdriver and hammer, install a new dust cover.

2. INSTALL DUST SEAL

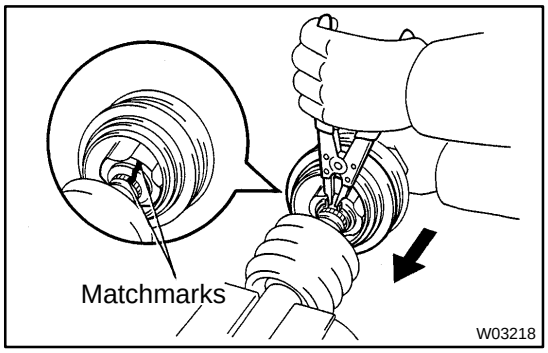
Using a screwdriver and hammer, install a new dust seal.



3. TEMPORARILY INSTALL OUTBOARD AND INBOARD JOINT BOOTS AND NEW BOOT CLAMPS

HINT:

- ▶ Before installing the boots, wrap the spline of the outboard joint shaft with vinyl tape to prevent the boots from bearing damaged.
- ▶ Before installing the boots, place 3 new clamps to the small boot ends and large boot end (outboard joint side).



4. INSTALL INBOARD JOINT SHAFT TO OUTBOARD JOINT SHAFT

Align the matchmarks placed before disassembly, and using a snap ring expander, put in the inboard joint shaft while expanding the snap ring.

5. INSTALL BOOT TO OUTBOARD JOINT

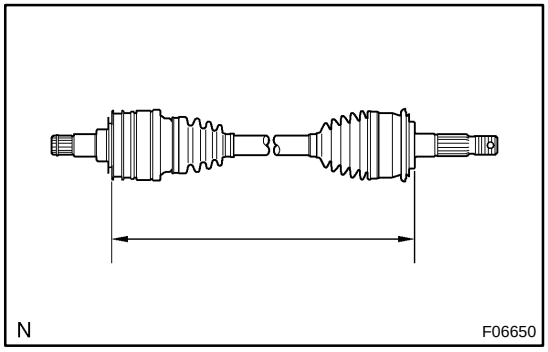
Before assembling the boot, pack the outboard joint and boot with grease in the boot kit.

Grease capacity (Color = Black):
205 – 225 g (7.23 – 7.94 oz.)

6. INSTALL BOOT TO INBOARD JOINT SHAFT

(a) Pack the inboard joint and boot with grease in the boot kit.
Grease capacity (Color = Black):
190 – 210 g (6.70 – 7.41 oz.)

(b) Temporarily install the boot to the inboard joint shaft.



7. CHECK DRIVE SHAFT LENGTH

(a) Make sure that the 2 boots are on the shaft groove.

(b) Make sure that the 2 boots are not stretched or contracted when the drive shaft is at standard length.
Drive shaft standard length:
523.5 ± 2.0 mm (20.610 ± 0.079 in.)

8. INSTALL LARGE INBOARD JOINT BOOT CLAMP TO INBOARD JOINT SHAFT BOOT

(a) Place the large inboard joint boot clamp.

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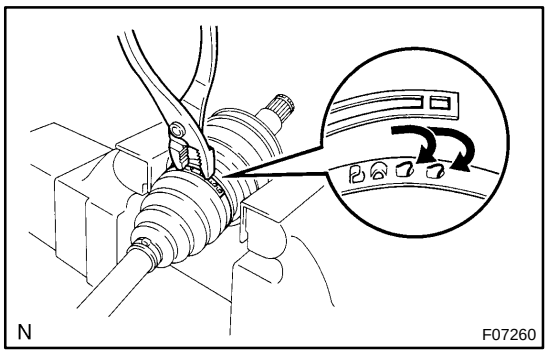
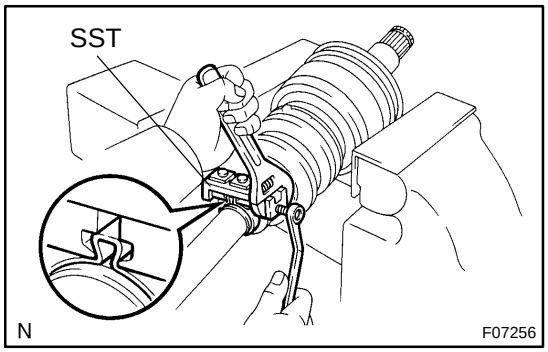


(b) Using pliers, compress the clamp and attach the claws.



9. INSTALL OTHER BOOT CLAMPS TO BOTH BOOTS

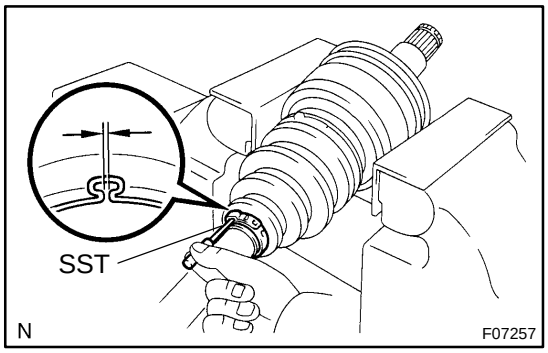
(a) Secure the clamp onto the boot.

(b) Place SST onto the clamp.
SST 09521–24010

(c) Tighten the SST so that the clamp is pinched.

NOTICE:

Do not overtighten the SST.



(d) Using SST, adjust the clearance of the clamp.
SST 09240–00020
Clearance: 1.0 – 1.5 mm (0.039 – 0.059 in.)

10. CHECK DRIVE SHAFT (See page SA–33)

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SA14I–10

INSTALLATION

1. INSTALL DRIVE SHAFT TO DIFFERENTIAL

(a) Install a new snap ring to the inboard joint shaft.

(b) Apply gear oil to the inboard joint shaft and differential case sliding surface.

(c) Set the snap ring with opening side facing downward.

(d) Using a brass bar and hammer, install the drive shaft.

NOTICE:

Be careful not to damage the dust cover and oil seal.

HINT:

Whether the inboard joint shaft is in contact with the pinion shaft or not can be known from the sound or feeling when driving.

(e) Check that there is 2 – 3 mm (0.08 – 0.12 in.) of play in the axial direction.

(f) Check that the drive shaft cannot be removed by hand.

2. LH drive shaft:

INSTALL LH SHOCK ABSORBER (See page SA–70)

3. CONNECT DRIVE SHAFT TO STEERING KNUCKLE

NOTICE:

Be careful not to damage the oil seal, boots and dust seal.

4. CONNECT LOWER SUSPENSION ARM TO LOWER BALL JOINT

(a) Connect the lower suspension arm to the lower ball joint.

(b) Install the nut and a new cotter pin.

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

HINT:

Face the hole for the cotter pin forward.

Torque: 140 N·m (1,450 kgf·cm, 103 ft·lbf)

5. INSTALL DRIVE SHAFT LOCK NUT

(a) While applying brakes, install the nut.

Torque: 235 N·m (2,400 kgf·cm, 173 ft·lbf)

(b) Install the lock cap and a new cotter pin.

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

6. FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA–38)

7. INSTALL ENGINE UNDER COVER

8. INSTALL FRONT WHEEL

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

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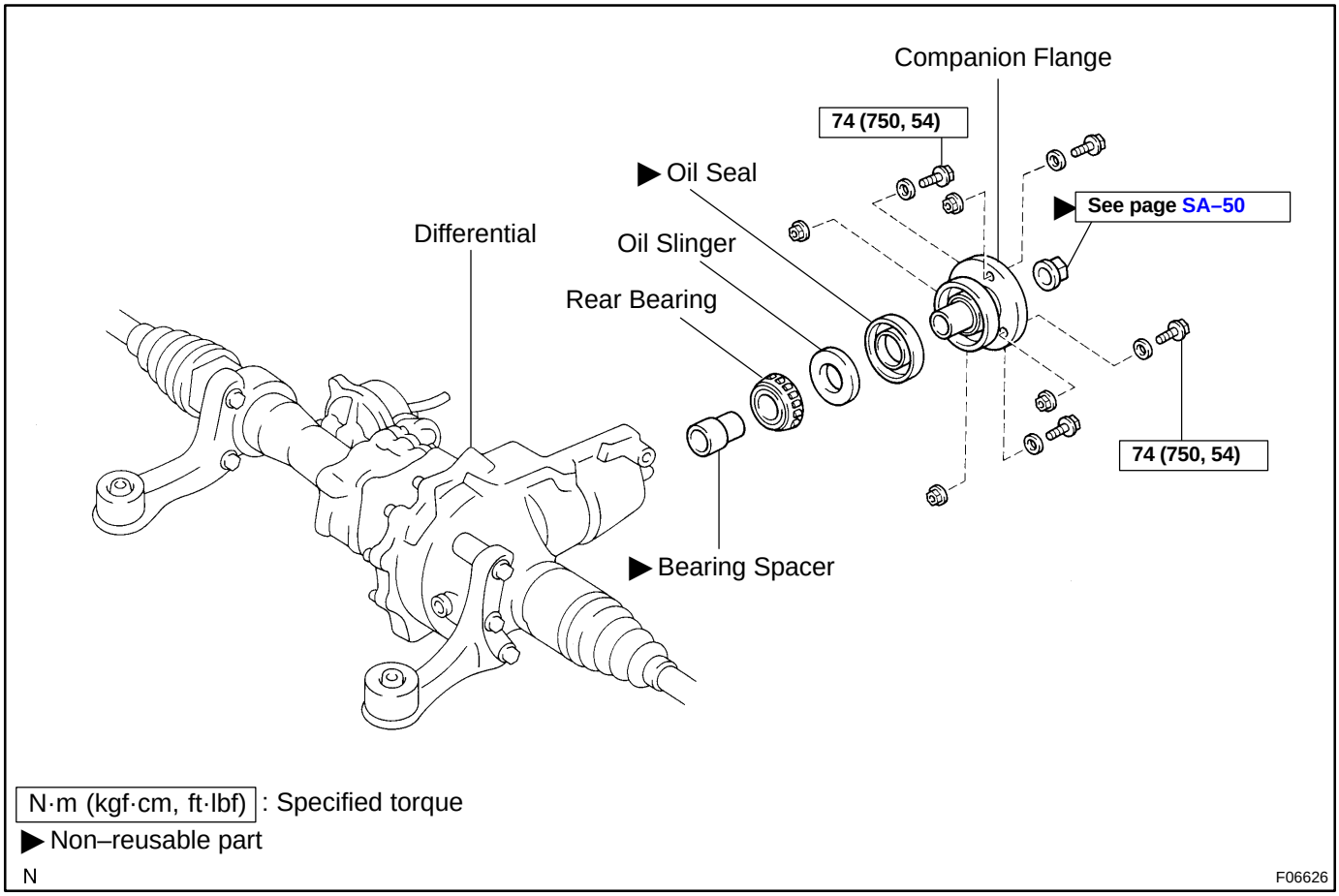
FRONT DIFFERENTIAL REAR OIL SEAL

COMPONENTS

SA23K–03



N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part

N

F06626

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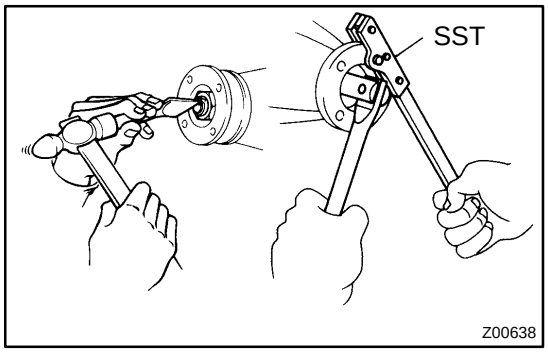
SA23L–04

REPLACEMENT

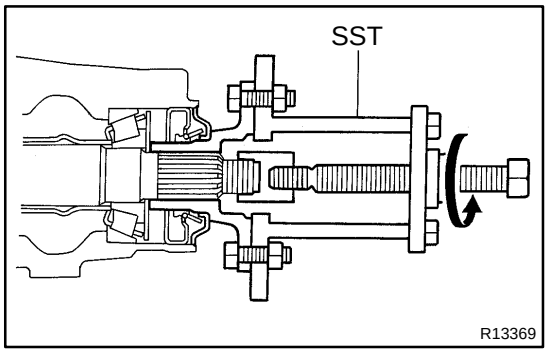
1. **REMOVE ENGINE UNDER COVER**
2. **DRAIN DIFFERENTIAL OIL**
3. **REMOVE FRONT PROPELLER SHAFT**
   (See page PR–7)



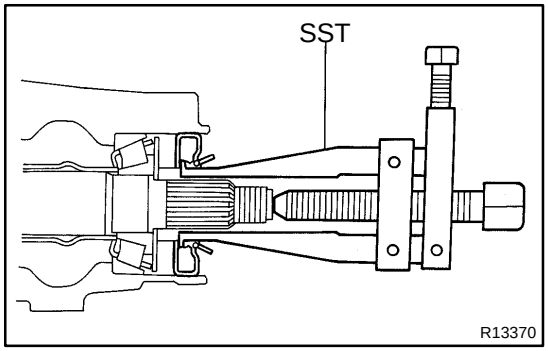
4. **REMOVE COMPANION FLANGE**

(a) Using a chisel and hammer, loosen the staked part of the nut.

(b) Using SST to hold the flange, remove the nut.
SST 09330–00021



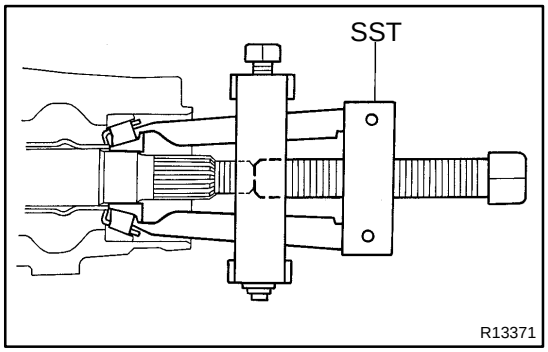
(c) Using SST, remove the companion flange.
SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03020)



5. **REMOVE OIL SEAL AND OIL SLINGER**

(a) Using SST, remove the oil seal.
SST 09308–10010

(b) Remove the oil slinger.



6. **REMOVE REAR BEARING AND BEARING SPACER**

(a) Using SST, remove the rear bearing from the drive pinion.
SST 09556–22010

(b) Remove the bearing spacer.

7. **INSTALL BEARING SPACER, REAR BEARING AND OIL SLINGER**

(a) Install a new bearing spacer and place the rear bearing and oil slinger.

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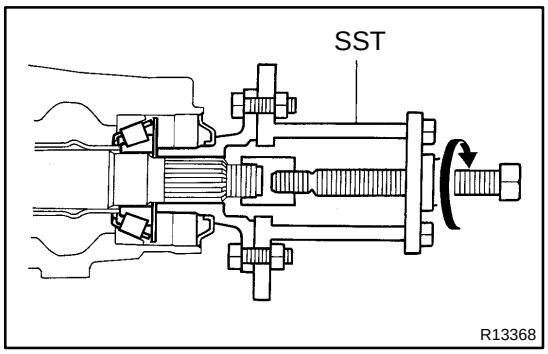
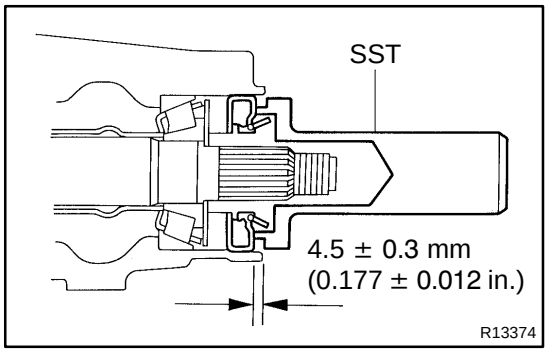


(b) Using SST and the companion flange, install the rear bearing, then remove the companion flange.
SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03020)



8. INSTALL OIL SEAL

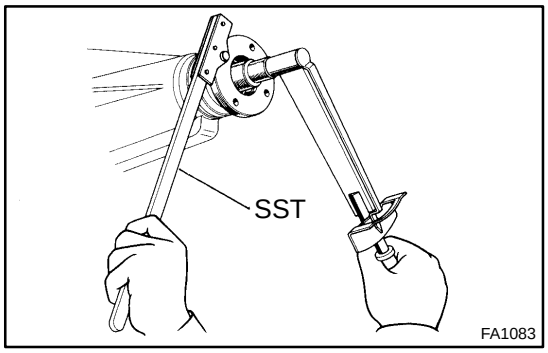
(a) Coat a new oil seal lip with MP grease.

(b) Using SST and a hammer, install the oil seal.
SST 09554–22010
Oil seal drive in depth: 4.5 ± 0.3 mm (0.177 ± 0.012 in.)

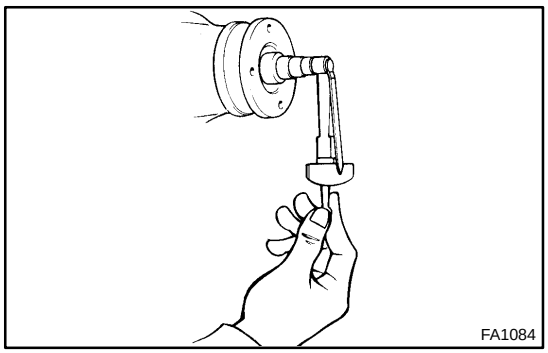
9. INSTALL COMPANION FLANGE

(a) Place the companion flange on the drive pinion.

(b) Coat the threads of a new nut with hypoid gear oil.



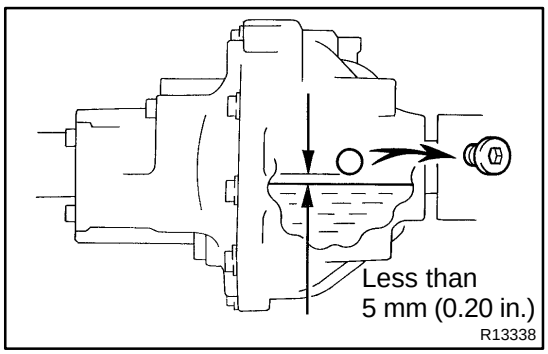
(c) Using SST to hold the flange, torque the nut.
SST 09330–00021
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)



10. ADJUST DRIVE PINION PRELOAD
(See page SA–50)

11. STAKE DRIVE PINION NUT

12. INSTALL FRONT PROPELLER SHAFT
(See page PR–9)



13. FILL DIFFERENTIAL WITH HYPOID GEAR OIL
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
Oil type: Hypoid gear oil API GL–5
Recommended oil viscosity: SAE 75W–90
Capacity: 1.15 liters (1.22 US qts, 1.01 Imp. qts)

14. INSTALL ENGINE UNDER COVER

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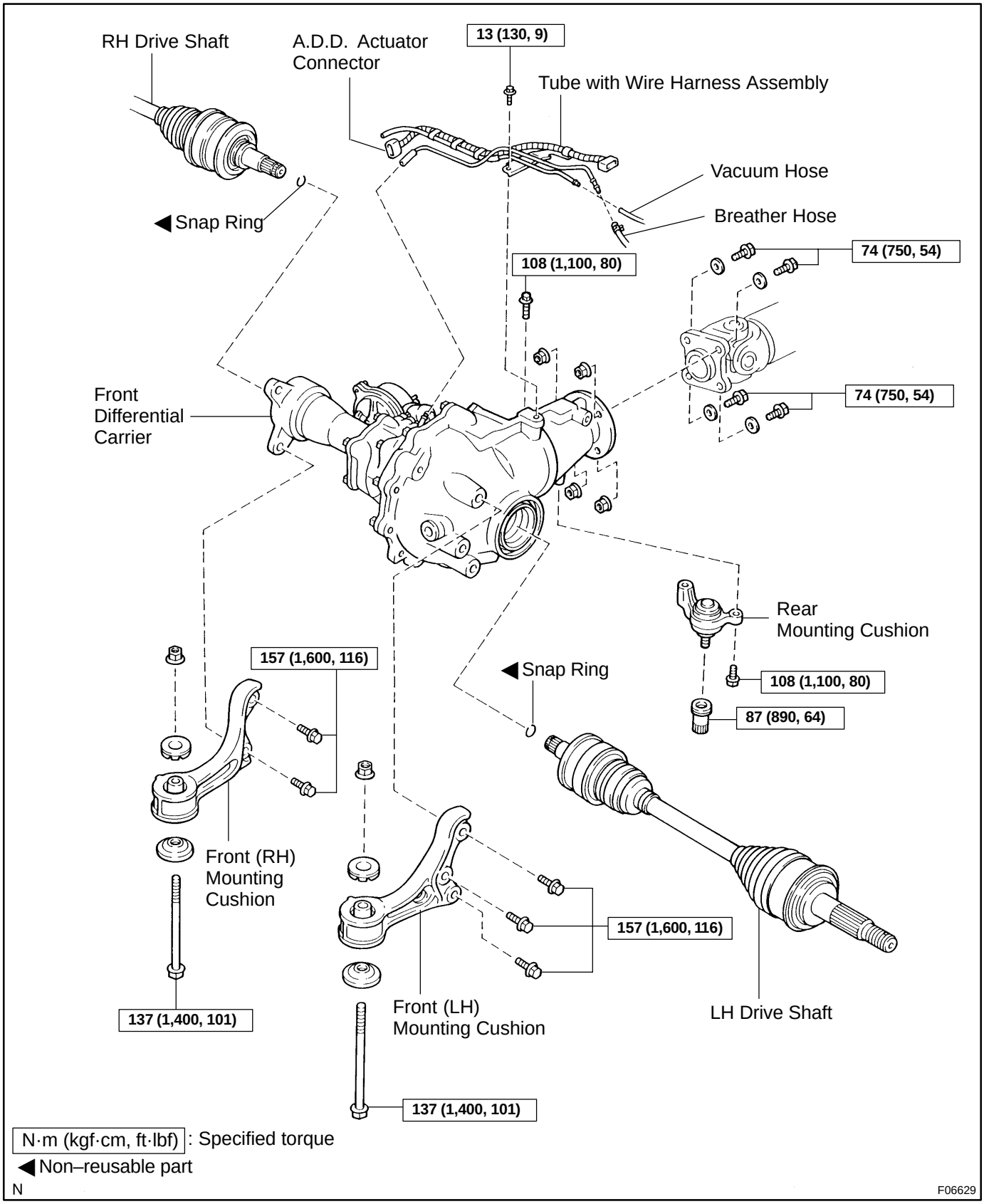
FRONT DIFFERENTIAL CARRIER

SA23M–03

COMPONENTS



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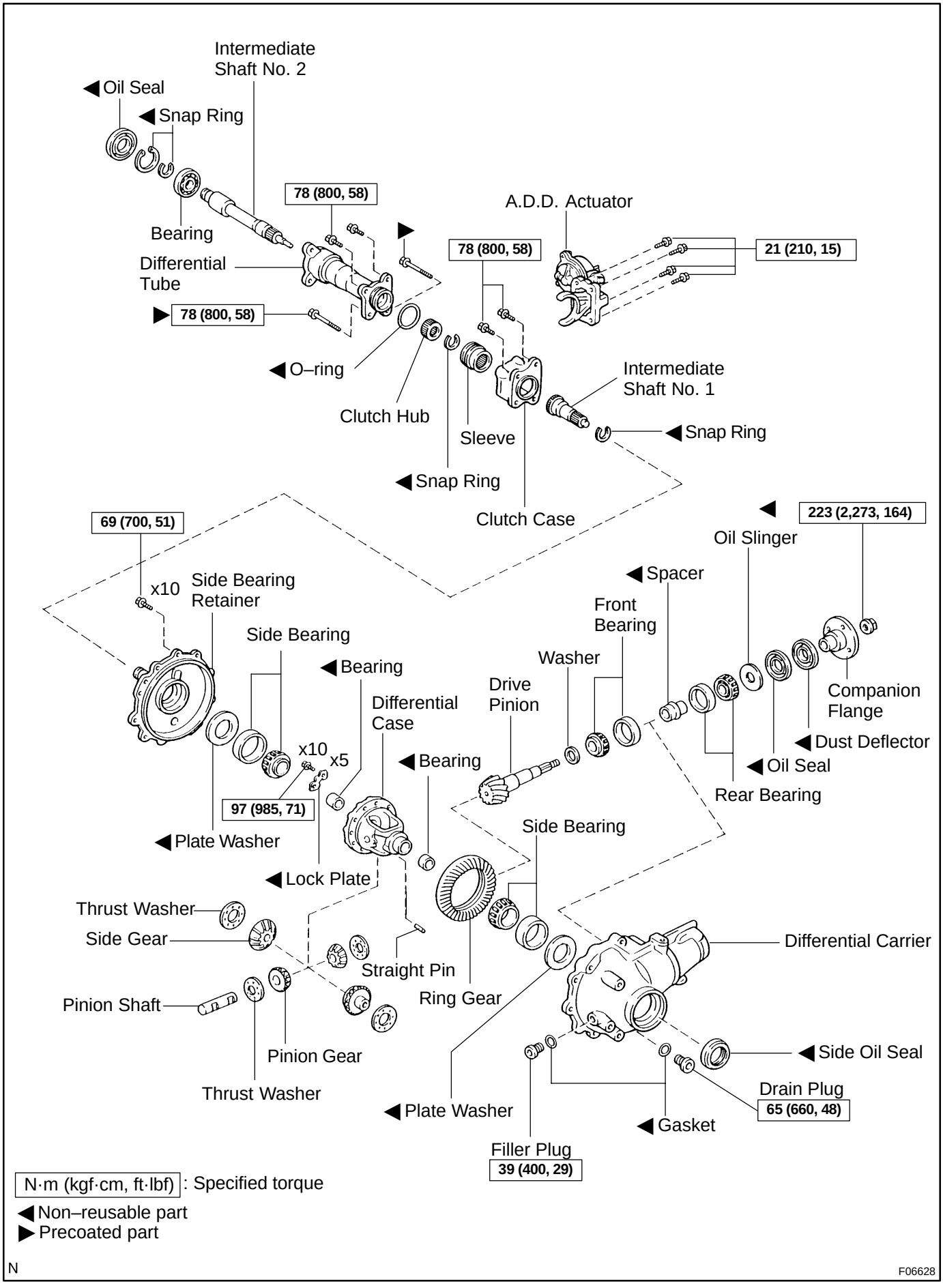
Intermediate Shaft No. 2
◀ Oil Seal
◀ Snap Ring
Bearing
78 (800, 58)
A.D.D. Actuator
78 (800, 58)
21 (210, 15)
Differential Tube
▶ 78 (800, 58)
◀ O–ring
Clutch Hub
Sleeve
Intermediate Shaft No. 1
◀ Snap Ring
◀ Snap Ring
Clutch Case
69 (700, 51)
x10
Side Bearing Retainer
Side Bearing
◀ Bearing
Differential Case
x10
x5
97 (985, 71)
◀ Plate Washer
◀ Lock Plate
Bearing
Drive Pinion
Washer
Front Bearing
◀ Spacer
Oil Slinger
◀ 223 (2,273, 164)
Companion Flange
◀ Dust Deflector
◀ Oil Seal
Rear Bearing
Side Bearing
Thrust Washer
Side Gear
Straight Pin
Ring Gear
Differential Carrier
Pinion Shaft
Pinion Gear
Thrust Washer
◀ Side Oil Seal
Drain Plug
65 (660, 48)
◀ Plate Washer
◀ Gasket
Filler Plug
39 (400, 29)
N·m (kgf·cm, ft·lbf) : Specified torque
◀ Non–reusable part
▶ Precoated part
N
F06628

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SA24Q–02

REMOVAL

1. DRAIN DIFFERENTIAL OIL

2. REMOVE DRIVE SHAFTS (See page SA–31)

3. DISCONNECT FRONT PROPELLER SHAFT (See page PR–7)

HINT:

Support the front propeller shaft securely.

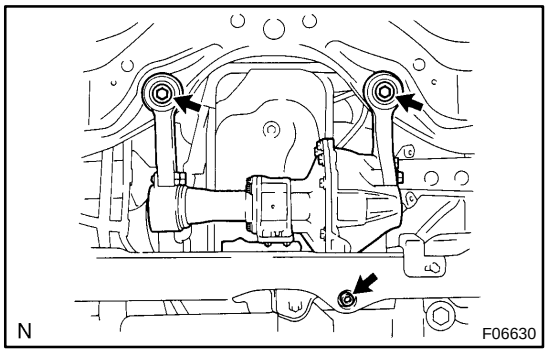
4. REMOVE TUBE WITH WIRE HARNESS ASSEMBLY

(a) Disconnect the breather hose, vacuum hose and actuator connector.

(b) Remove the bolt and tube with wire harness assembly.

5. REMOVE FRONT DIFFERENTIAL CARRIER

(a) Support the front differential with a jack.



(b) Using a hexagon (12 mm) wrench, remove the rear mounting nut.

(c) Remove the 2 front mounting bolts.

(d) Lower the jack and remove the front differential carrier.

6. REMOVE DIFFERENTIAL MOUNTING CUSHIONS

(a) Remove the 2 bolts and rear mounting cushion.

(b) Remove the 5 bolts and 2 front mounting cushions.

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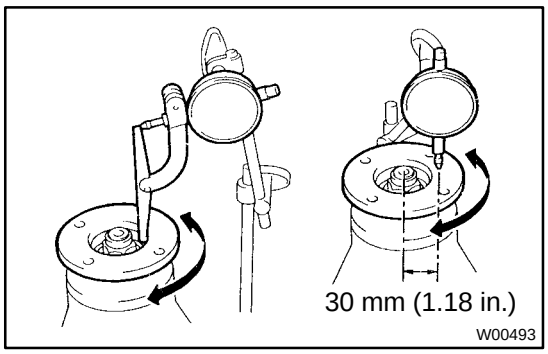
SA23N–04

DISASSEMBLY

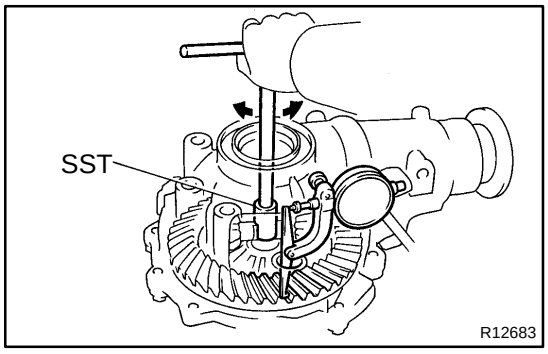


1. CHECK COMPANION FLANGE RUNOUT

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout exceeds the maximum, replace the companion flange.



2. CHECK RING GEAR BACKLASH

Using SST and a dial indicator, measure the ring gear backlash.

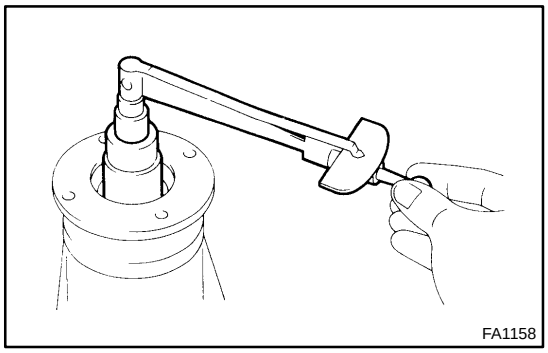
SST 09564–32011

Backlash: 0.1 – 0.18 mm (0.0039 – 0.0071 in.)

HINT:

Measure at 3 or more points on the circumference of the ring gear.

If the backlash is not within the specified value, adjust the side bearing preload or repair as necessary.



3. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the preload using the backlash between the drive pinion and ring gear.

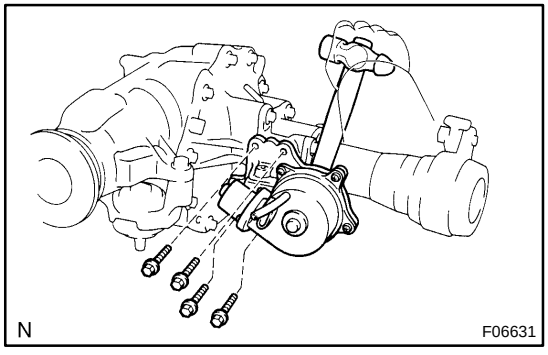
Preload (at starting):
0.6 – 1.0 N·m (6 – 10 kgf·cm, 5.2 – 8.7 in.·lbf)

4. CHECK TOTAL PRELOAD

Using a torque wrench, measure the total preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):
Drive pinion preload plus 0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)

If necessary, disassemble and inspect the differential.



5. REMOVE A.D.D. ACTUATOR

(a) Remove the 4 bolts.

(b) Using a hammer handle, remove the actuator.

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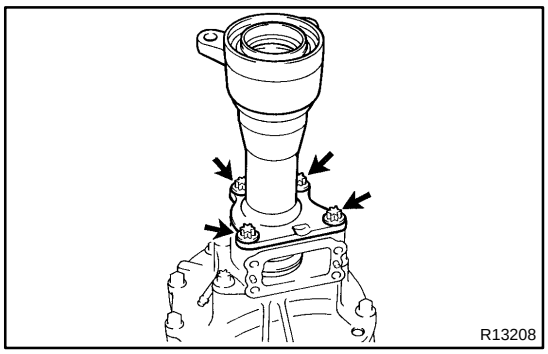


6. REMOVE DIFFERENTIAL TUBE

(a) Using a torx socket (E14), remove the 4 torx bolts.

(b) Using a plastic hammer, tap on the differential tube to remove it.

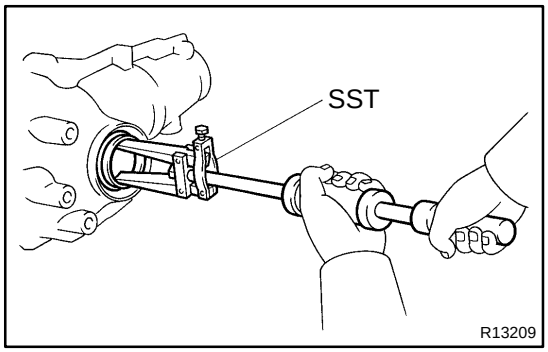
(c) Remove the sleeve.

(d) Remove the O–ring from the differential tube.

7. REMOVE CLUTCH CASE

(a) Using a torx socket (E14), remove the 2 torx bolts.

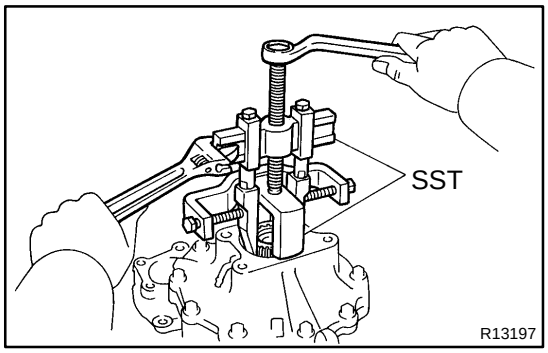
(b) Using a plastic hammer, tap on the clutch case to remove it.



8. REMOVE SIDE OIL SEAL

Using SST, remove the side oil seal.

SST 09308–00010



9. REMOVE INTERMEDIATE SHAFT NO. 1

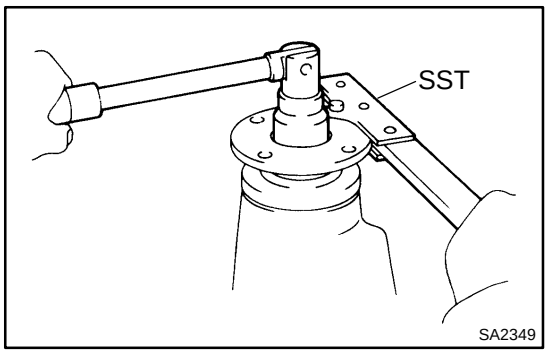
(a) Using SST, remove the intermediate shaft No. 1.

SST 09350–20015 (09369–20040), 09950–40011 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04011, 09957–04010, 09958–04011)

(b) Remove the snap ring.

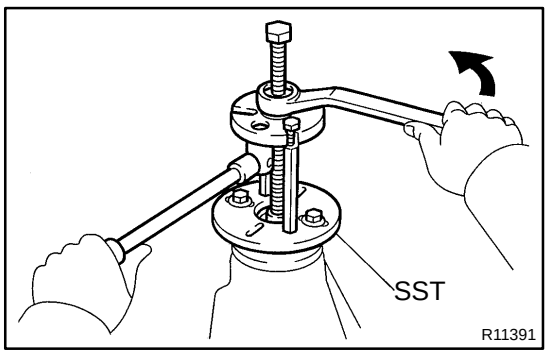
10. REMOVE COMPANION FLANGE

(a) Using a chisel and hammer, unstake the nut.



(b) Using SST to hold the flange, remove the nut.

SST 09330–00021



(c) Using SST, remove the companion flange.

SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03020)

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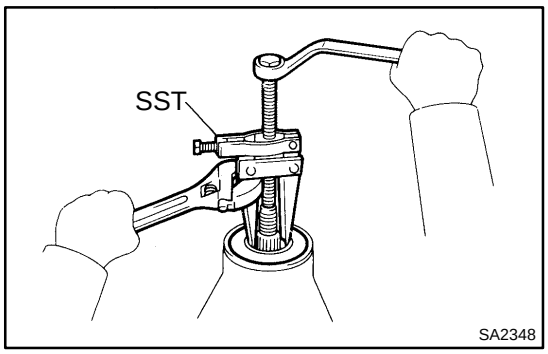
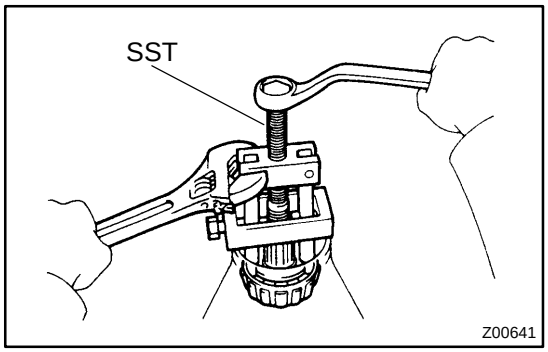


11. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal.
SST 09308–10010

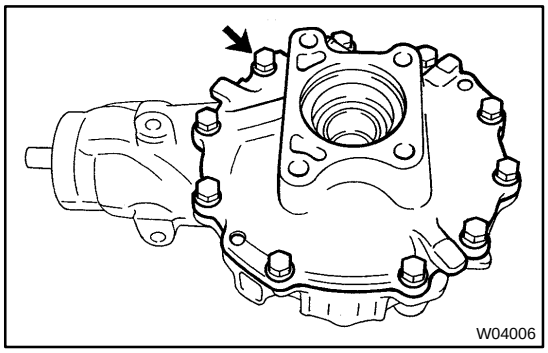
(b) Remove the oil slinger.



12. REMOVE REAR BEARING AND BEARING SPACER

(a) Using SST, remove the rear bearing from the drive pinion.
SST 09556–22010

(b) Remove the bearing spacer.

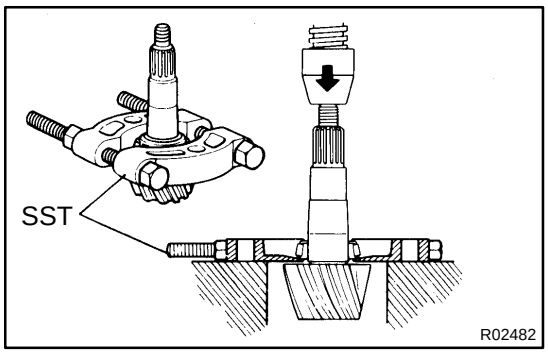


13. REMOVE SIDE BEARING RETAINER

Remove the 10 bolts and tap out the retainer with a plastic hammer.

14. REMOVE DIFFERENTIAL CASE ASSEMBLY

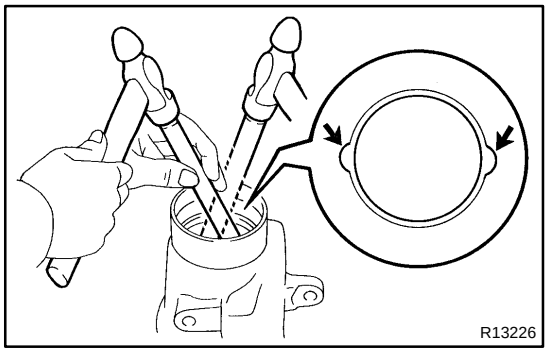
15. REMOVE DRIVE PINION FROM DIFFERENTIAL CARRIER



16. REMOVE DRIVE PINION FRONT BEARING

Using SST and a press, remove the bearing and washer from the drive pinion.
SST 09950–00020

HINT:
If the drive pinion or ring gear is damaged, replace them as a set.



17. REMOVE DRIVE PINION BEARING OUTER RACES

(a) Using a brass bar and hammer, remove the front bearing outer race.

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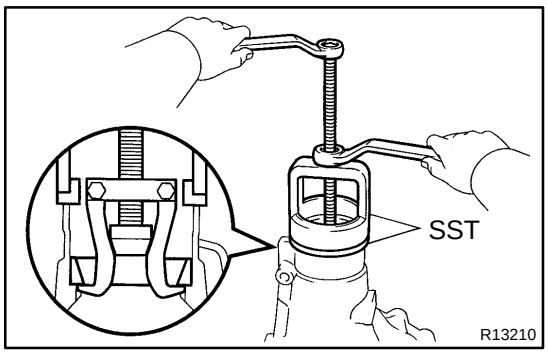
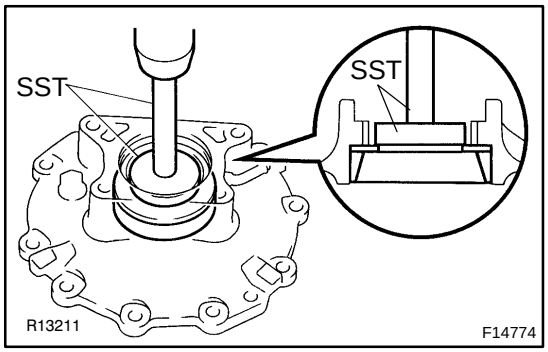


(b) Using SST, remove the rear bearing outer race.
SST 09502–12010, 09612–65014 (09612–01020, 09612–01050)

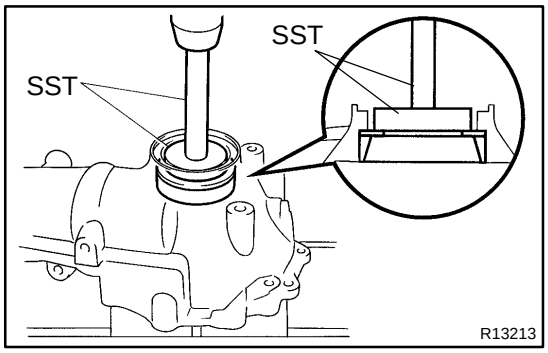
18. REMOVE SIDE BEARING OUTER RACES

HINT:

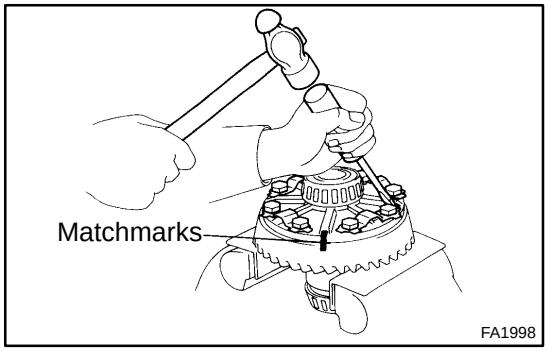
- ▶ Measure the plate washer thickness and note it down.
- ▶ Tag the bearing outer races to show the location for reassembling.



(a) Using SST and a press, remove the plate washer and outer race from the bearing retainer.
SST 09950–60010 (09951–00650), 09950–70010 (09951–07150)

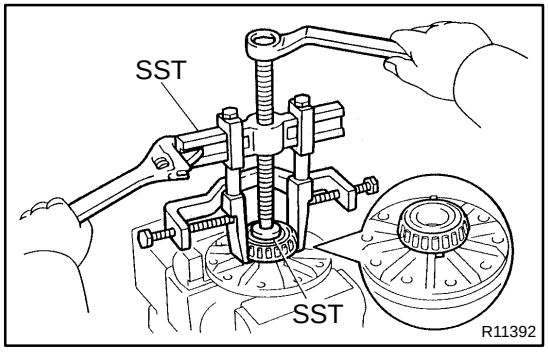


(b) Using SST and a press, remove the plate washer and outer race from the differential carrier.
SST 09950–60010 (09951–00650), 09950–70010 (09951–07150)



19. REMOVE RING GEAR

(a) Place matchmarks on the ring gear and differential case.
(b) Using a screwdriver and hammer, unstake the 5 lock plates.
(c) Remove the 10 bolts and 5 lock plates.
(d) Using a plastic hammer, tap on the ring gear to separate it from the differential case.



20. REMOVE SIDE BEARINGS

Using SST, remove the 2 side bearings from the differential case.
SST 09950–40011 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04061, 09957–04010, 09958–04011), 09950–60010 (09951–00480)

HINT:

Fix the claws of SST to the notch in the differential case.

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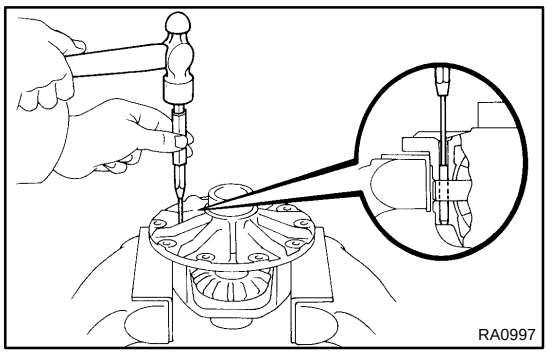
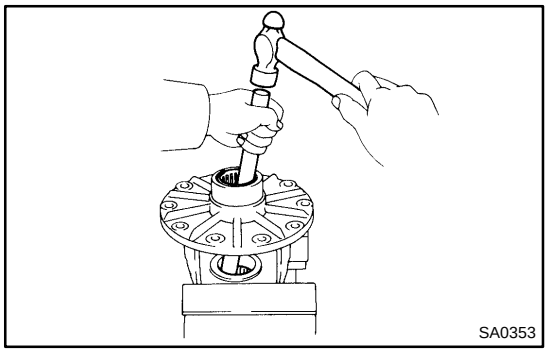


21. DISASSEMBLE DIFFERENTIAL CASE ASSEMBLY

(a) Using a pin punch and hammer, remove the straight pin.

(b) Remove the pinion shaft, 2 pinion gears, pinion gear thrust washers, side gears and side gear thrust washers from the differential case.



22. REMOVE BEARINGS

Using a brass bar and hammer, remove the 2 bearings.

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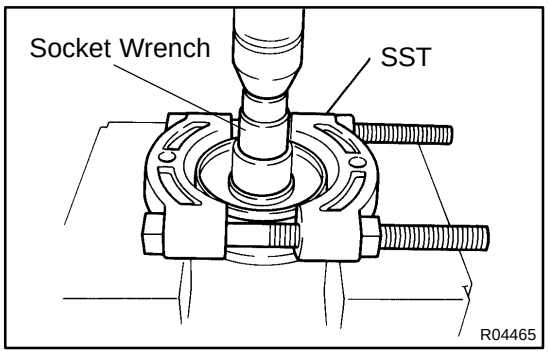
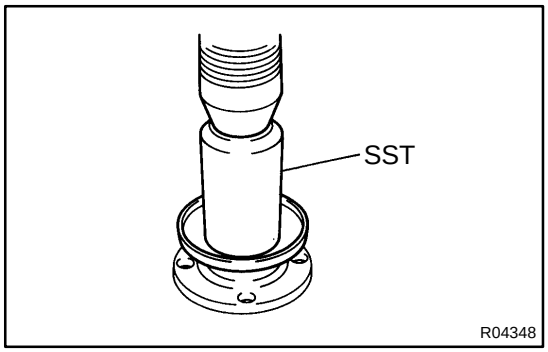
SA24R–02

REPLACEMENT

1. REPLACE COMPANION FLANGE DUST DEFLECTOR, IF NECESSARY

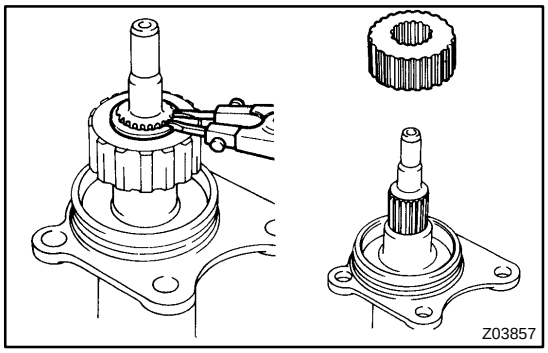


(a) Using SST, a socket wrench and a press, remove the dust deflector.
SST 09950–00020

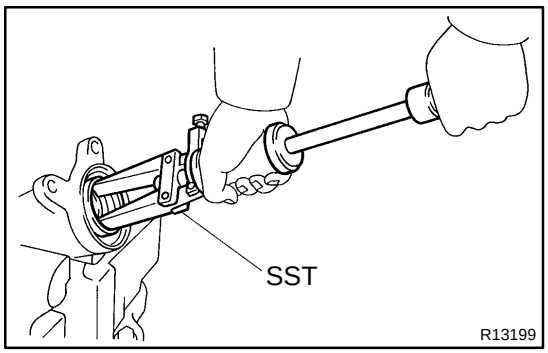


(b) Using SST and a press, install a new dust deflector.
SST 09636–20010

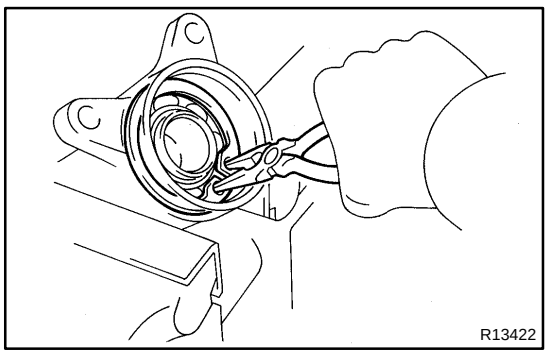
2. REPLACE INTERMEDIATE SHAFT NO. 2, IF NECESSARY



(a) Remove the clutch hub.
(1) Using a snap ring expander, remove the snap ring.
(2) Remove the clutch hub from the intermediate shaft No. 2.



(b) Remove the oil seal.
Using SST, remove the oil seal from the tube.
SST 09308–00010



(c) Remove the intermediate shaft No. 2 from the tube.
(1) Using needle nose pliers, remove the snap ring.
(2) Remove the shaft from the tube.

(d) Remove the intermediate shaft No. 2 bearing.
(1) Using a snap ring expander, remove the snap ring.

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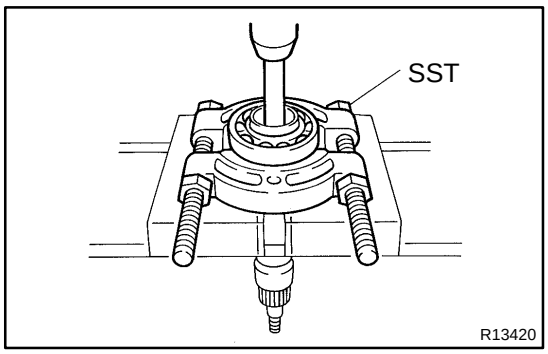
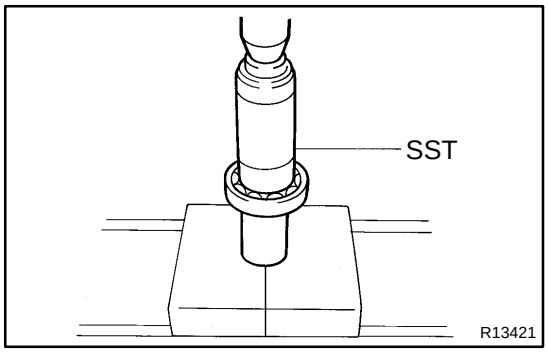


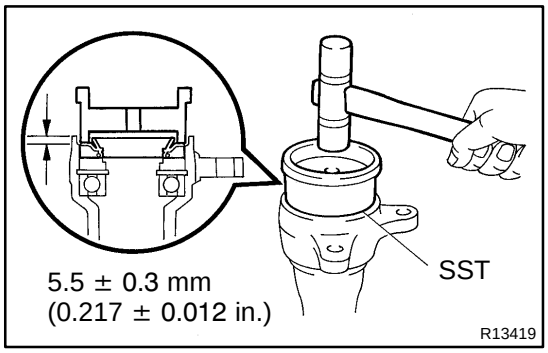
(2) Using SST, a brass bar and press, remove the bearing.

SST 09950–00020

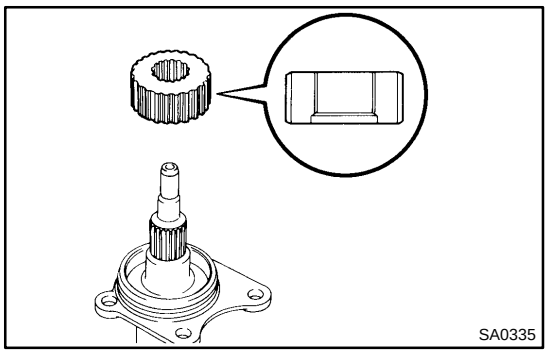


(e) Install a new intermediate shaft No. 2 bearing.
(1) Using SST and a press, install a new bearing.
SST 09309–37010
(2) Using a snap ring expander, install a new snap ring.

(f) Install the intermediate shaft No. 2 to the tube.
(1) Install the shaft into the tube.
(2) Using needle nose pliers, install a new snap ring.



(g) Install a new oil seal.
(1) Using SST and a plastic hammer, install a new oil seal.
SST 09223–15020
Oil seal drive in depth: 5.5 ± 0.3 mm (0.217 ± 0.012 in.)
(2) Coat the oil seal lip with MP grease.



(h) Install the clutch hub.
(1) Install the clutch hub to the shaft.
(2) Using a snap ring expander, install a new snap ring.

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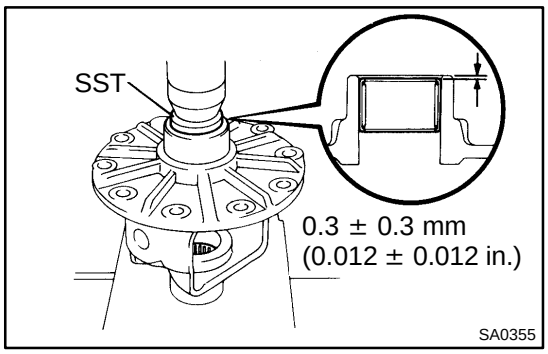
SA23O–04



REASSEMBLY

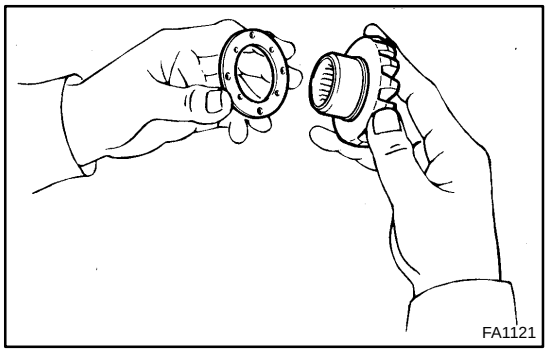
1. INSTALL NEW BEARINGS

Using SST and a press, install 2 new bearings.

SST 09950–60010 (09951–00380)

Bearing press in depth:

0.3 ± 0.3 mm (0.012 ± 0.012 in.)



2. ASSEMBLE DIFFERENTIAL CASE

(a) Install the 2 thrust washers on the side gears.

(b) Install the 2 side gears, pinion gears, pinion gear thrust washers and pinion shaft in the differential case.

HINT:

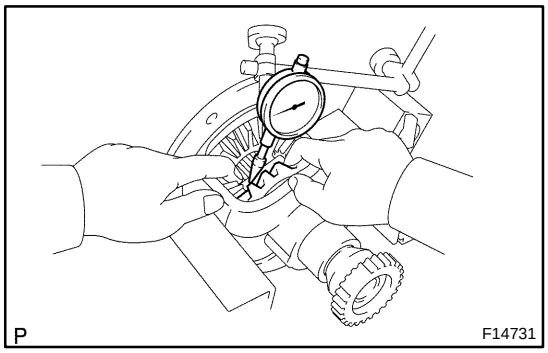
Align the holes for the straight pin in the differential case and pinion shaft.

(c) Measure the side gear backlash.

(1) Install the intermediate shaft No. 1 to the differential case.

(2) Using a dial indicator, measure the side gear backlash while holding one pinion gear toward the differential case.

Backlash: 0 – 0.20 mm (0 – 0.0079 in.)



If the backlash is not within the specified value, replace the side gear thrust washer with an appropriate thickness.

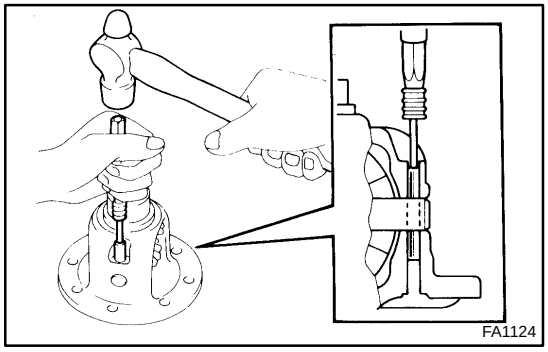
HINT:

Refer to the following table to select thrust washers which will ensure that the backlash is within the specified value.

Washer thickness:

Thickness mm (in.)	Thickness mm (in.)
0.96 – 1.04 (0.0378 – 0.0409)	1.16 – 1.24 (0.0457 – 0.0488)
1.06 – 1.14 (0.0417 – 0.0449)	1.26 – 1.34 (0.0496 – 0.0528)

(3) Remove the intermediate shaft No. 1.



3. INSTALL STRAIGHT PIN AND STAKE DIFFERENTIAL CASE

(a) Using a pin punch and hammer, install the straight pin through the differential case and hole in the pinion shaft.

(b) Stake the differential case.

4. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the contact surfaces of the differential case and ring gear.

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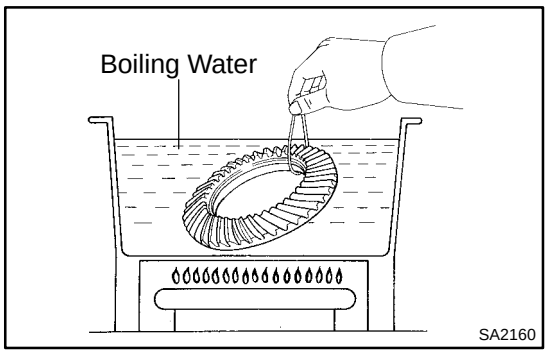
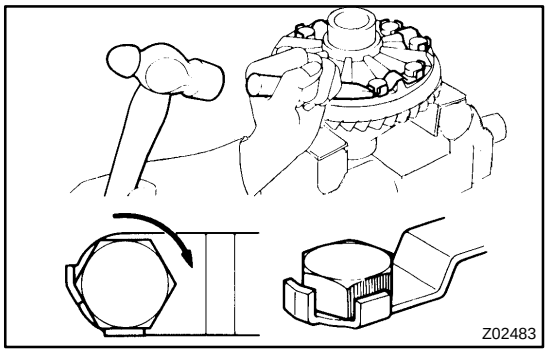


(b) Heat the ring gear to about 100°C (212°F) in boiling water.
(c) Carefully take the ring gear out of the boiling water.
(d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

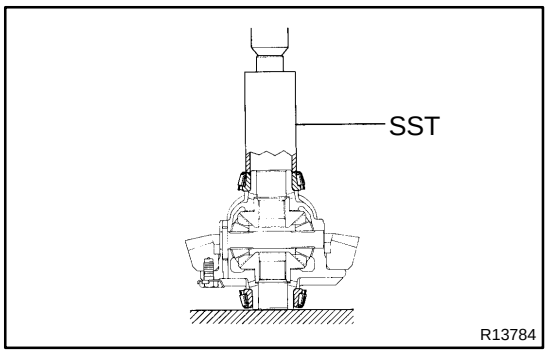
HINT:
Align the matchmarks on the ring gear and differential case.

(e) Temporarily install 5 new lock plates and 10 bolts so that the bolt holes in the ring gear and differential case are aligned.
(f) After the ring gear has cooled sufficiently, torque the ring gear set bolts.
Torque: 97 N·m (985 kgf·cm, 71 ft·lbf)



(g) Using a chisel and hammer, stake the 5 lock plates.

HINT:
Stake the claws of the lock plates to fix the bolts. For the claw contacting the protruding portion of the bolt, stake only the half of it along the tightening direction.



5. INSTALL SIDE BEARINGS

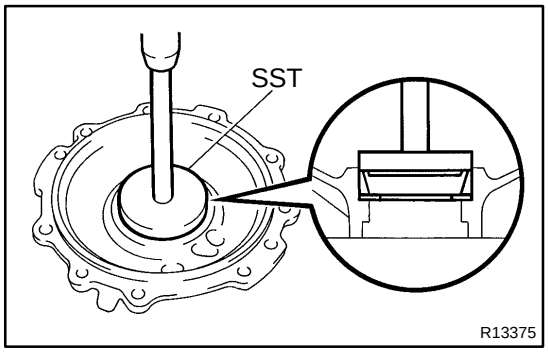
Using SST and a press, install the bearings into the differential case.

SST 09226–10010

6. INSTALL SIDE BEARING OUTER RACES

If replacing the side bearings, fit the thinnest new plate washers to each bearing outer race.
If reusing the bearings, fit the new washers with the same thickness as the washer which was removed.

(a) Install a new plate washer to the side bearing retainer.
(b) Using SST and a press, install the bearing outer race.
SST 09950–60020 (09951–00790),
09950–70010 (09951–07150)
(c) Install a new plate washer to the differential carrier.



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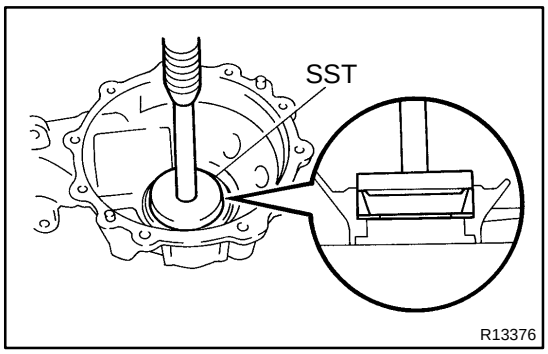
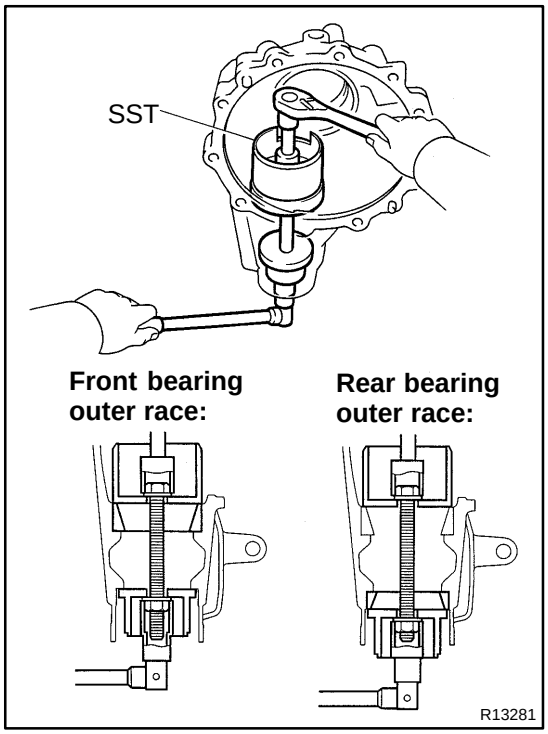


(d) Using SST and a press, install the bearing outer race.
SST 09950–60020 (09951–00790),
09950–70010 (09951–07150)



7. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACES

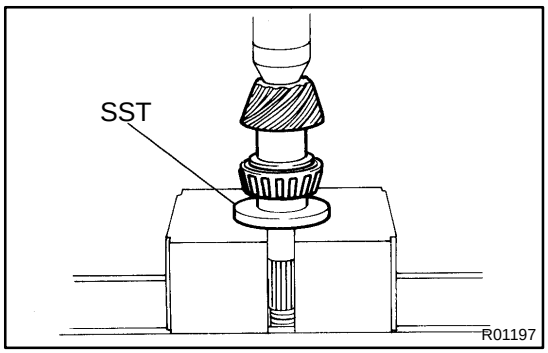
Using SST, install the 2 outer races.
SST 09570–22011

8. INSTALL DRIVE PINION FRONT BEARING

(a) Install the washer on the drive pinion.

HINT:

First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with a different thickness if necessary.



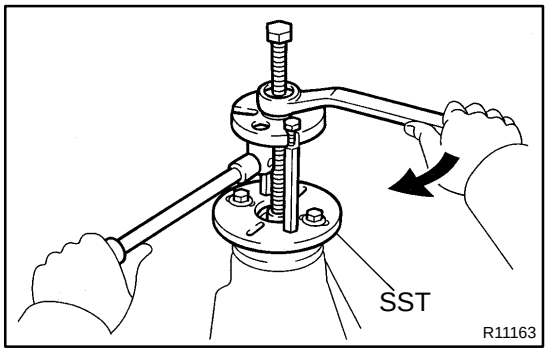
(b) Using SST and a press, install the front bearing onto the drive pinion.
SST 09506–30012

9. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Install the drive pinion, rear bearing and oil slinger.

HINT:

After adjusting the ring gear tooth contact pattern, assemble the spacer and oil seal.



(b) Using SST, install the companion flange.
SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03020)

(c) Coat the threads of the nut with hypoid gear oil.

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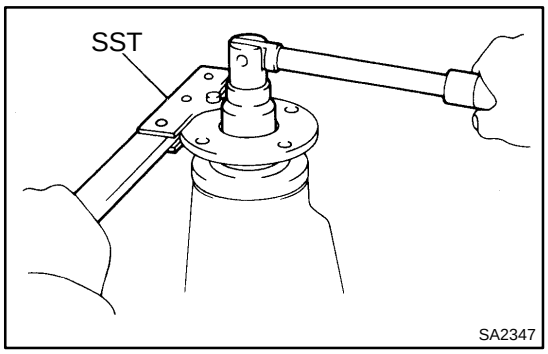


(d) Using SST to hold the flange, tighten the nut.

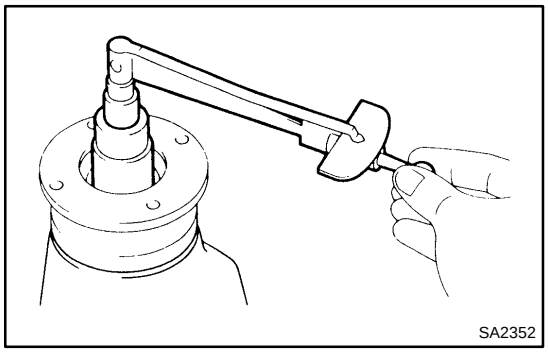
HINT:

Adjust the drive pinion preload by tightening the companion flange nut.

SST 09330–00021

NOTICE:

As there is no spacer, tighten the nut a little at a time and be careful not to overtighten it.



(e) Using a torque wrench, measure the preload of the drive pinion using the backlash between the drive pinion and ring gear.

Preload (at starting):

New bearing

1.1 – 1.8 N·m (11 – 18 kgf·cm, 9.7 – 15.9 in.·lbf)

Reused bearing

0.5 – 0.9 N·m (5 – 9 kgf·cm, 4.4 – 8.0 in.·lbf)

10. INSTALL DIFFERENTIAL CASE IN DIFFERENTIAL CARRIER

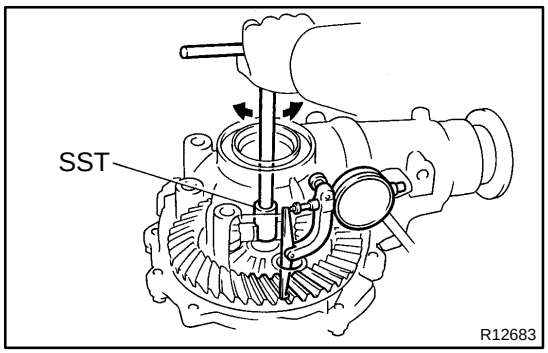
11. ADJUST RING GEAR BACKLASH

(a) Install the side bearing retainer with the 10 bolts.

Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

HINT:

Rotate the ring gear several times to make the bearing fit.



(b) Using SST and a dial indicator, measure the ring gear backlash.

SST 09564–32011

Backlash: 0.1 – 0.18 mm (0.0039 – 0.0071 in.)

If the backlash is not within the specified value, adjust it by either increasing or decreasing the thickness of plate washers on both sides by an equal amount.

HINT:

There should be no clearance between the plate washer and case. Ensure that there is ring gear backlash.

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Washer thickness:

Thickness mm (in.)	Thickness mm (in.)	Thickness mm (in.)
2.00 – 2.02 (0.0787 – 0.0795)	2.27 – 2.29 (0.0894 – 0.0902)	2.54 – 2.56 (0.1000 – 0.1008)
2.03 – 2.05 (0.0799 – 0.0807)	2.30 – 2.32 (0.0906 – 0.0913)	2.57 – 2.59 (0.1012 – 0.1020)
2.06 – 2.08 (0.0811 – 0.0819)	2.33 – 2.35 (0.0917 – 0.0925)	2.60 – 2.62 (0.1024 – 0.1031)
2.09 – 2.11 (0.0823 – 0.0831)	2.36 – 2.38 (0.0929 – 0.0937)	2.63 – 2.65 (0.1035 – 0.1043)
2.12 – 2.14 (0.0835 – 0.0843)	2.39 – 2.41 (0.0941 – 0.0949)	2.66 – 2.68 (0.1047 – 0.1055)
2.15 – 2.17 (0.0846 – 0.0854)	2.42 – 2.44 (0.0953 – 0.0961)	2.69 – 2.71 (0.1059 – 0.1067)
2.18 – 2.20 (0.0858 – 0.0866)	2.45 – 2.47 (0.0965 – 0.0972)	2.72 – 2.74 (0.1071 – 0.1079)
2.21 – 2.23 (0.0870 – 0.0878)	2.48 – 2.50 (0.0976 – 0.0984)	2.75 – 2.77 (0.1083 – 0.1091)
2.24 – 2.26 (0.0882 – 0.0890)	2.51 – 2.53 (0.0988 – 0.0996)	2.78 – 2.80 (0.1094 – 0.1102)

12. MEASURE TOTAL PRELOAD

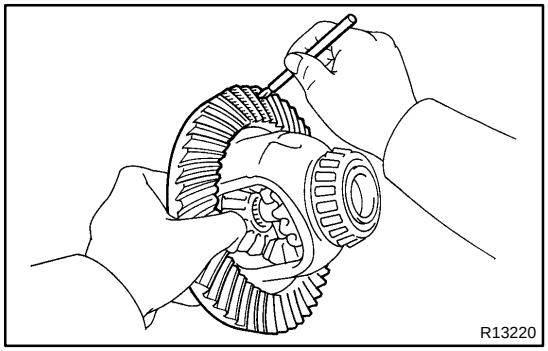
Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):

Drive pinion preload plus 0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)

13. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(a) Remove the 10 bolts, side bearing retainer and differential case.



(b) Coat 3 or 4 teeth at three different positions on the ring gear with red lead primer.

(c) Install the differential case and side bearing retainer with the 10 bolts.

Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

(d) Hold the companion flange firmly and rotate the ring gear in both directions.

(e) Remove the 10 bolts, side bearing retainer and differential case.

(f) Inspect the tooth contact pattern.

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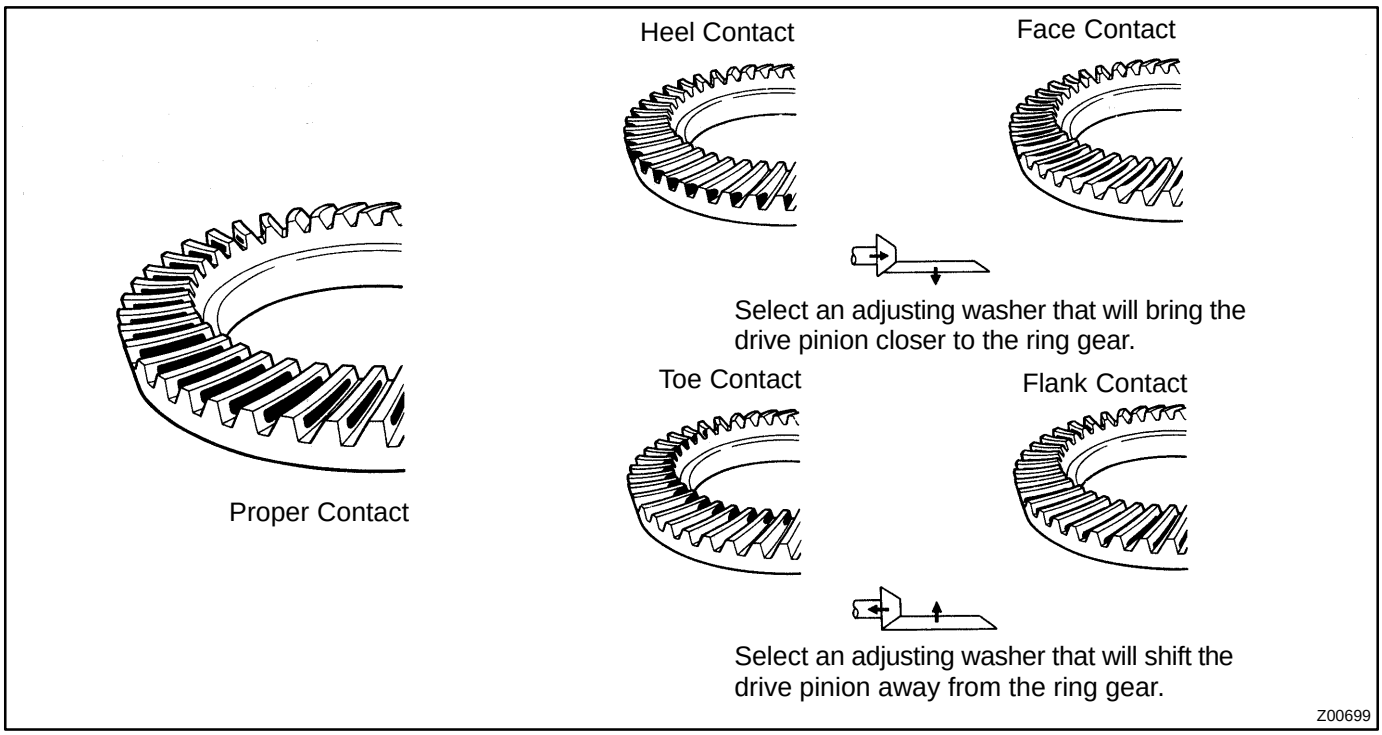

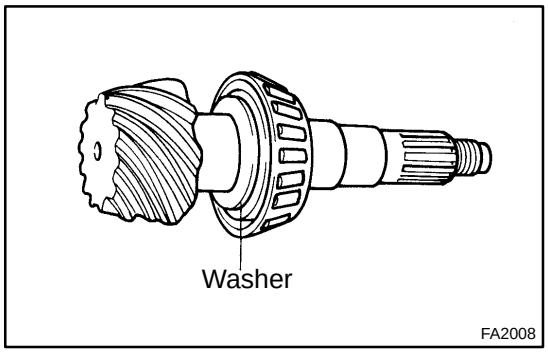

If the teeth are not contacting properly, use the following table to select a proper washer for correction.

Washer thickness:

Thickness mm (in.)	Thickness mm (in.)	Thickness mm (in.)
1.69 – 1.71 (0.0665 – 0.0673)	1.93 – 1.95 (0.0760 – 0.0768)	2.17 – 2.19 (0.0854 – 0.0862)
1.72 – 1.74 (0.0677 – 0.0685)	1.96 – 1.98 (0.0772 – 0.0780)	2.20 – 2.22 (0.0866 – 0.0874)
1.75 – 1.77 (0.0689 – 0.0697)	1.99 – 2.01 (0.0783 – 0.0791)	2.23 – 2.25 (0.0878 – 0.0886)
1.78 – 1.80 (0.0701 – 0.0709)	2.02 – 2.04 (0.0795 – 0.0803)	2.26 – 2.28 (0.0890 – 0.0898)
1.81 – 1.83 (0.0713 – 0.0720)	2.05 – 2.07 (0.0807 – 0.0815)	2.29 – 2.31 (0.0902 – 0.0909)
1.84 – 1.86 (0.0724 – 0.0732)	2.08 – 2.10 (0.0819 – 0.0827)	2.32 – 2.34 (0.0913 – 0.0921)
1.87 – 1.89 (0.0736 – 0.0744)	2.11 – 2.13 (0.0831 – 0.0839)	–
1.90 – 1.92 (0.0748 – 0.0756)	2.14 – 2.16 (0.0843 – 0.0850)	–

14. REMOVE COMPANION FLANGE AND OIL SLINGER (See page SA–43)

15. REMOVE REAR BEARING (See page SA–43)

16. INSTALL NEW BEARING SPACER, REAR BEARING AND OIL SLINGER

(a) Install a new bearing spacer and place the rear bearing and oil slinger.

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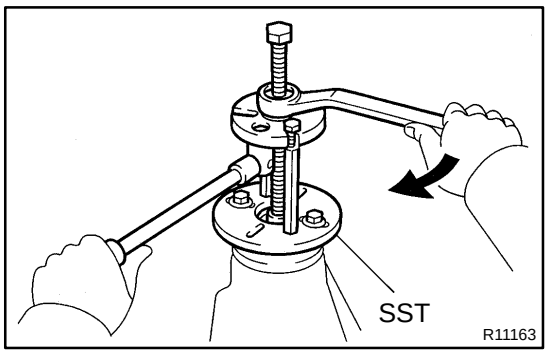
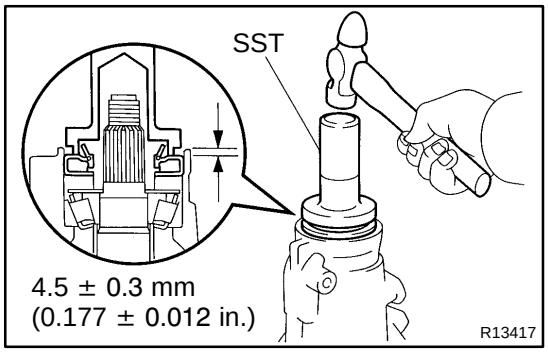


(b) Using SST and the companion flange, install the rear bearing, then remove the companion flange.
SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03020)



17. INSTALL OIL SEAL

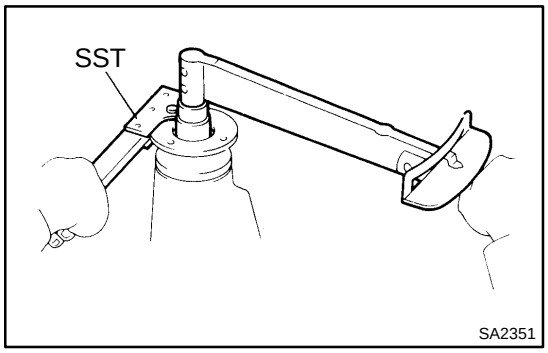
(a) Using SST and a hammer, install a new oil seal.
SST 09554–22010
Oil seal drive in depth: 4.5 ± 0.3 mm (0.177 ± 0.012 in.)

(b) Coat the oil seal lip with MP grease.

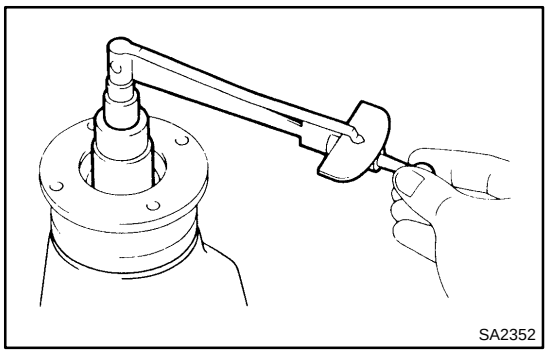
18. INSTALL COMPANION FLANGE

(a) Place the companion flange on the drive pinion.

(b) Coat the threads of a new nut with hypoid gear oil.



(c) Using SST to hold the flange, torque the nut.
SST 09330–00021
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)



19. ADJUST DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the drive pinion using the backlash between the drive pinion and the ring gear.

Preload (at starting):
New bearing
1.2 – 1.9 N·m (12 – 19 kgf·cm, 10.4 – 16.5 in.·lbf)
Reused bearing
0.6 – 1.0 N·m (6 – 10 kgf·cm, 5.2 – 8.7 in.·lbf)

If the preload is greater than the specified value, replace the bearing spacer.

If the preload is less than the specified value, retighten the nut with 13 N·m (130 kgf·cm, 9 ft·lbf) of torque at a time until the specified preload is reached.

Torque: 223 N·m (2,275 kgf·cm, 165 ft·lbf) or less

If the torque is exceeded the maximum while retightening the nut, replace the bearing spacer and repeat the preload adjusting procedure. Do not loosen the nut to reduce the preload.

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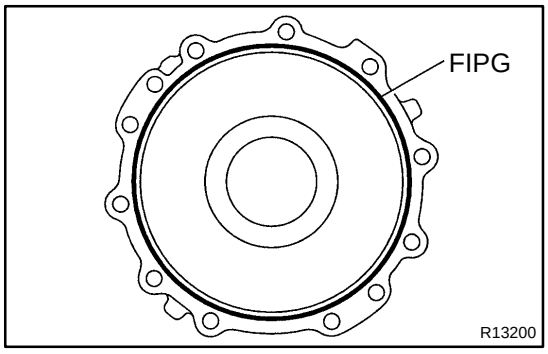
20. INSTALL DIFFERENTIAL CASE

21. INSTALL SIDE BEARING RETAINER

(a) Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential carrier and side bearing retainer.

(b) Clean both installation surfaces with gasoline or alcohol.



(c) Apply FIPG to the side bearing retainer, as shown in the illustration.

FIPG:
Part No. 08826–00090, THREE BOND 1281 or equivalent

HINT:
Install the side bearing retainer within 10 minutes after applying FIPG.

(d) Install the side bearing retainer with the 10 bolts.
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

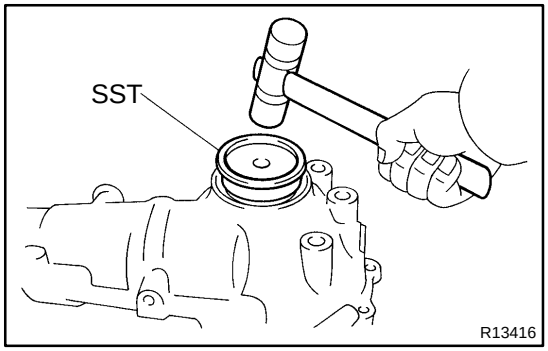
22. CHECK TOTAL PRELOAD (See step 12.)

23. RECHECK RING GEAR BACKLASH
(See page SA–43)

24. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See step 13.)

25. CHECK COMPANION FLANGE RUNOUT
(See step 1.)

26. STAKE DRIVE PINION NUT



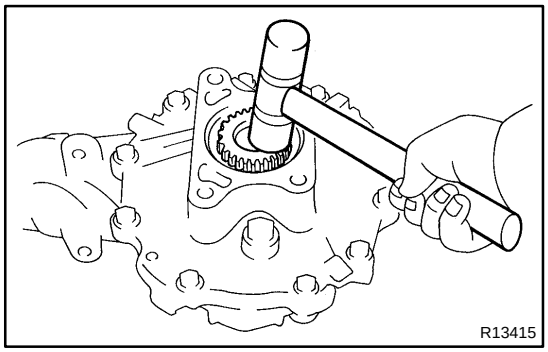
27. INSTALL SIDE OIL SEAL

(a) Using SST and a plastic hammer, install a new oil seal until its surface is flush with the differential carrier end.
SST 09608–32010

(b) Coat the oil seal lip with MP grease.

28. INSTALL INTERMEDIATE SHAFT NO. 1

(a) Install a new snap ring to the shaft.



(b) Using a plastic hammer, install the shaft to the differential case.

(c) Check that the intermediate shaft will not come out by trying to pull it out by hand.

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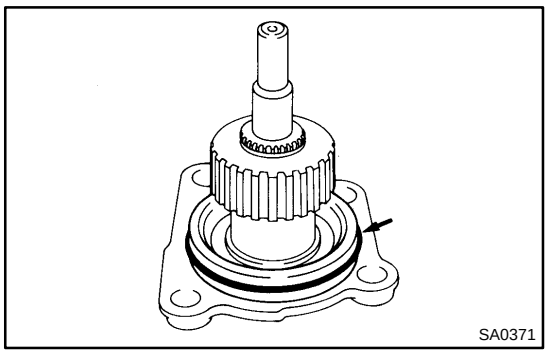

SA0371

29. INSTALL CLUTCH CASE TO DIFFERENTIAL TUBE

(a) Install a new O–ring to the tube.

(b) Coat the O–ring with MP grease.

(c) Install the clutch case to the tube.

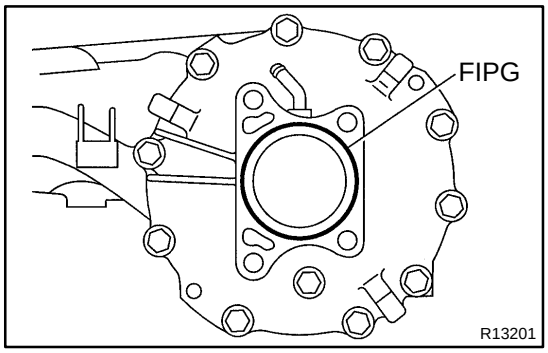
(d) Using a torx® socket (E14), torque the 2 torx bolts.
Torque: 78 N·m (800 kgf·cm, 58 ft·lbf)

30. INSTALL CLUTCH SLEEVE

31. INSTALL DIFFERENTIAL TUBE TO DIFFERENTIAL

(a) Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential and clutch case.

(b) Clean both installation surfaces with gasoline or alcohol.



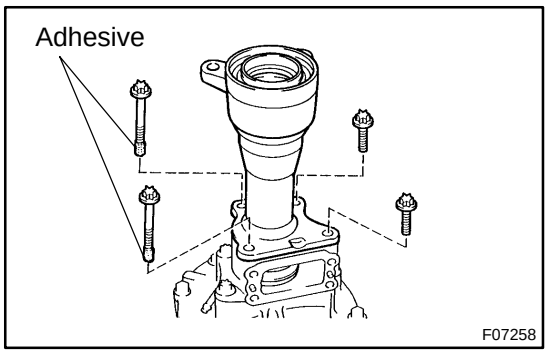
R13201

(c) Apply FIPG to the differential, as shown in the illustration.
FIPG:
Part No. 08826–00090, THREE BOND 1281 or equivalent

HINT:
Install the differential tube within 10 minutes after applying FIPG.

(d) Install the differential tube to the differential.

(e) Clean the threads of the 2 long torx bolts and retainer bolt holes with toluene or trichlorethylene.



F07258

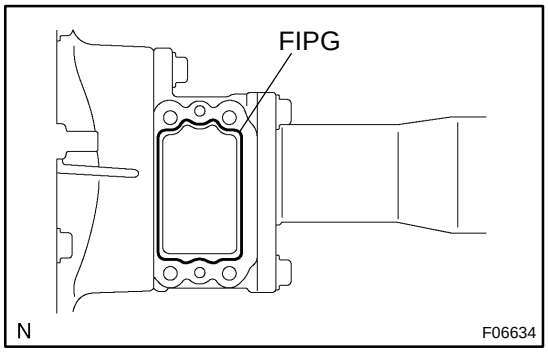
(f) Apply adhesive to 2 or 3 threads of the long bolts end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent

(g) Using torx® socket (E14), torque the 4 torx bolts.
Torque: 78 N·m (800 kgf·cm, 58 ft·lbf)

32. INSTALL A.D.D. ACTUATOR

(a) Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the actuator and clutch case.

(b) Clean both installation surfaces with gasoline or alcohol.



F06634

(c) Apply FIPG to the clutch case, as shown in the illustration.
FIPG:
Part No. 08826–00090, THREE BOND 1281 or equivalent

HINT:
Install the actuator within 10 minutes after applying FIPG.

(d) Install the A.D.D. actuator with the 4 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

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SA14Q–06

INSTALLATION

1. INSTALL DIFFERENTIAL MOUNTING CUSHIONS

(a) Install the 2 front mounting cushions with the 5 bolts.
Torque: 157 N·m (1,600 kgf·cm, 116 ft·lbf)

(b) Install the rear mounting cushion with the 2 bolts.
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)

2. INSTALL FRONT DIFFERENTIAL CARRIER

(a) Jack up the front differential.

(b) Install the 2 front mounting bolts.
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

(c) Using a hexagon (12 mm) wrench, install the rear mounting nut.
Torque: 87 N·m (890 kgf·cm, 64 ft·lbf)

(d) Remove the jack.

3. INSTALL TUBE WITH WIRE HARNESS ASSEMBLY

(a) Install the tube with wire harness assembly with the bolt.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Connect the actuator connector, vacuum hose and breather hose.

4. CONNECT FRONT PROPELLER SHAFT (See page PR–9)

5. INSTALL DRIVE SHAFTS (See page SA–36)

6. FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA–38)

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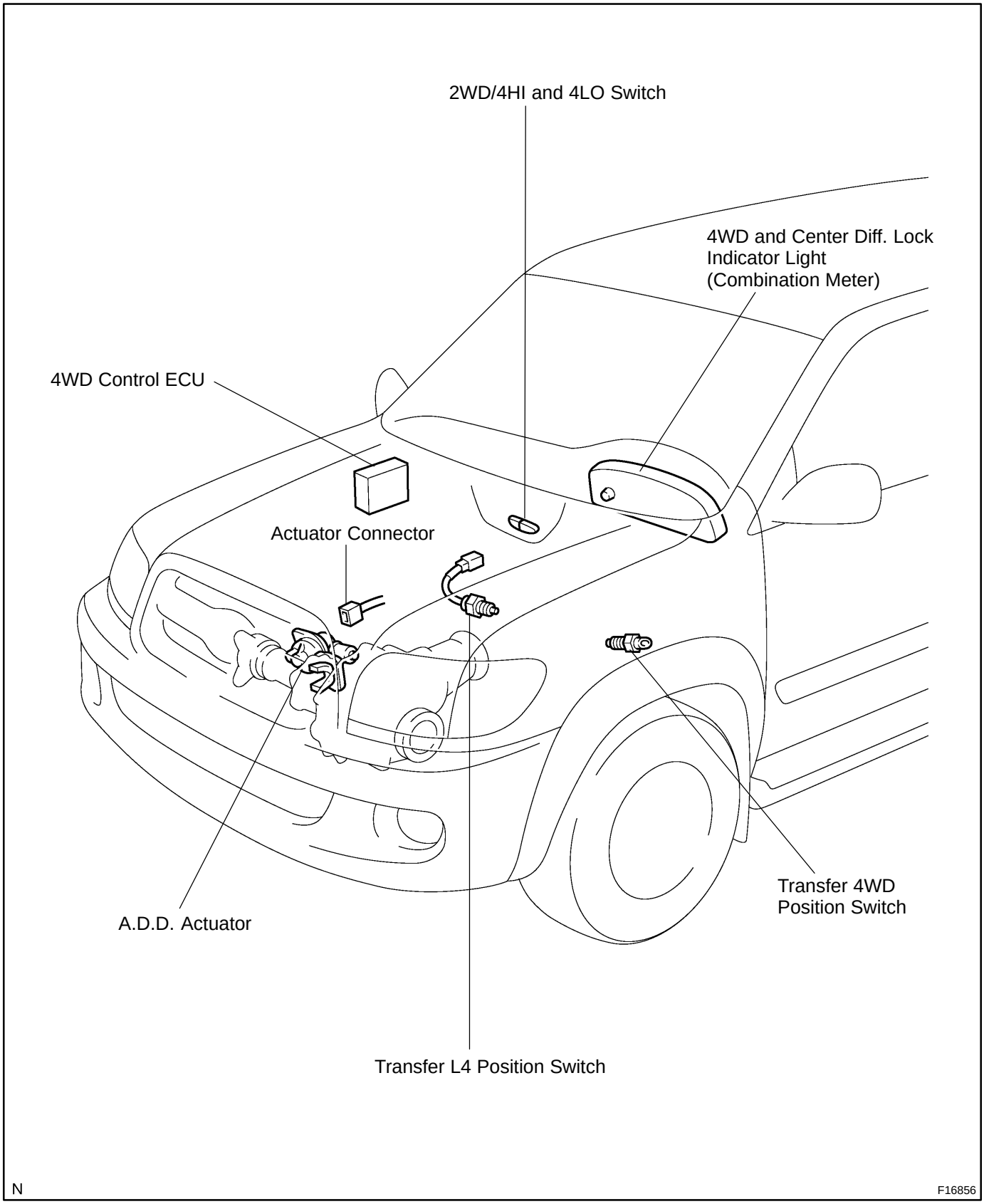
A.D.D. CONTROL SYSTEM

LOCATION

SA23P–03



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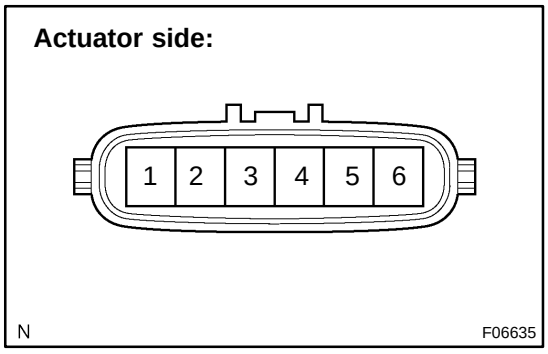
SA23Q–03

INSPECTION

1. INSPECT A.D.D. ACTUATOR

(a) Disconnect the actuator connector.



(b) Measure the resistance between terminals 2 and 6.
Standard resistance: 0.3 – 100 Ω

(c) Measure the resistance between terminal 2 or 6 and body ground.
Standard resistance: More than 0.5 MΩ

If the resistance value is not as specified, replace the actuator assembly.

2. INSPECT A.D.D. ACTUATOR OPERATION

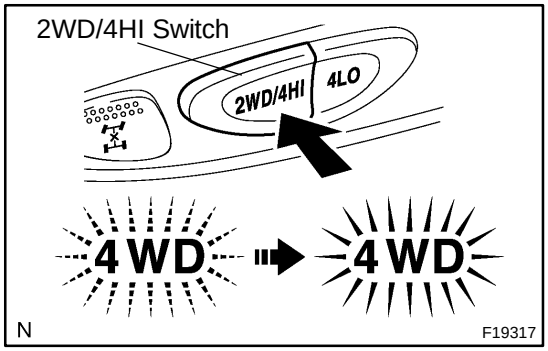
Apply battery positive voltage between terminals 2 and 6, and check the actuator operation by sound, A.D.D. status and continuity between terminals 3 and 4.

Battery voltage applied terminal	3 – 4 terminals continuity	A.D.D. status
2 (+) – 6 (–)	Continuity	Connected
2 (–) – 6 (+)	No continuity	Disconnected

If the operation is not as specified, replace the actuator assembly.

3. INSPECT LIMIT SWITCH CONTINUITY

(a) Connect the actuator connector.



(b) Push the 2WD/4HI switch and check that the 4WD indicator light comes on after it is blinking.

(c) Check the A.D.D. actuator operation by sound.

(d) Disconnect the actuator connector.

(e) Check the continuity between each terminal, as shown in the chart.

Tester connected terminal number	Specified condition
1 – 3	No continuity
1 – 4	No continuity
3 – 5	Continuity
4 – 5	No continuity

(f) Connect the actuator connector.

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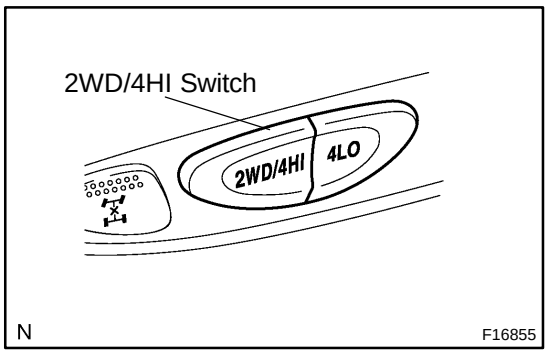


(g) Push the 2WD/4HI switch and check that the 4WD indicator light goes off after it is blinking.
(h) Check the A.D.D. actuator operation by sound.
(i) Disconnect the actuator connector.
(j) Check the continuity between each terminal, as shown in the chart.

Tester connected terminal number	Specified condition
1 – 3	Continuity
1 – 4	No continuity
3 – 5	No continuity
4 – 5	No continuity

(k) Connect the actuator connector.

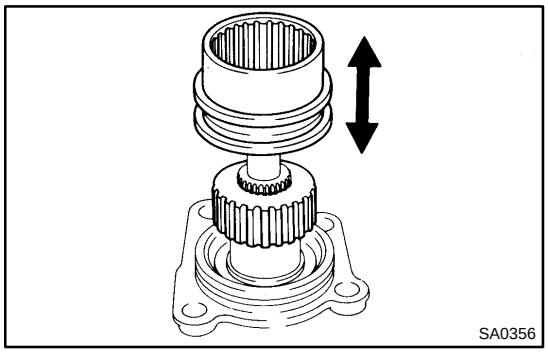
4. INSPECT TRANSFER 4WD POSITION SWITCH (See page TR–9)

5. REMOVE A.D.D. ACTUATOR (See page SA–43)

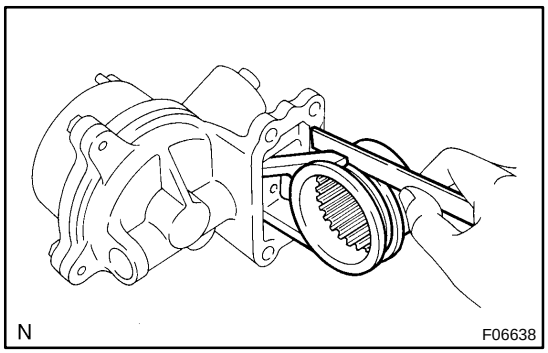
6. INSPECT CLUTCH HUB AND CLUTCH SLEEVE

(a) Check the clutch hub and clutch sleeve for wear and damage.

If necessary, replace them.



(b) Check that clutch sleeve slides smoothly on the clutch hub.



7. MEASURE SLEEVE FORK AND CLUTCH SLEEVE CLEARANCE

Using a feeler gauge, measure the clearance between the sleeve fork and clutch sleeve.

Maximum clearance: 0.35 mm (0.0138 in.)

If the clearance exceeds the maximum, replace the fork or sleeve.

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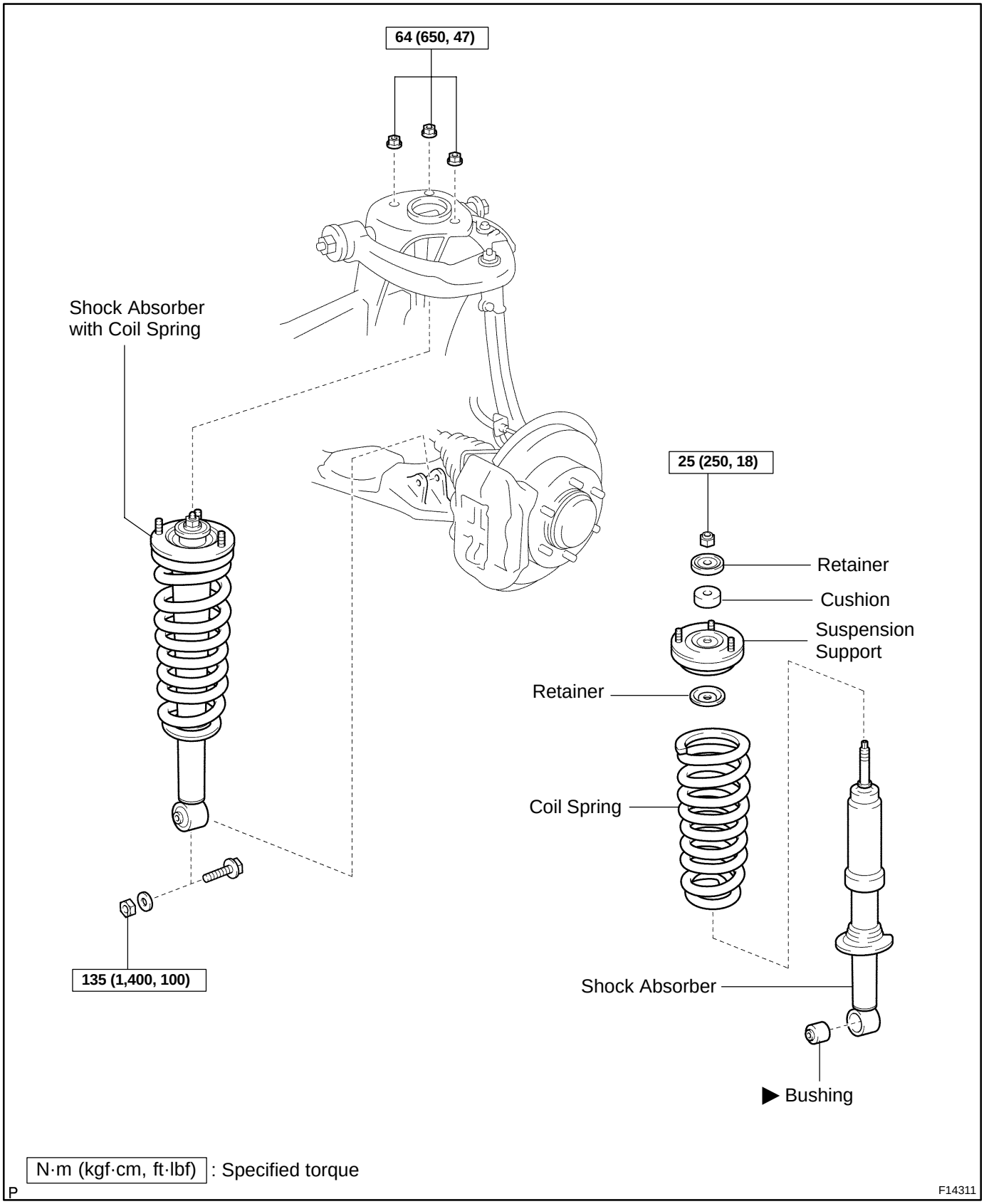
FRONT SHOCK ABSORBER

COMPONENTS

SA17Y–06



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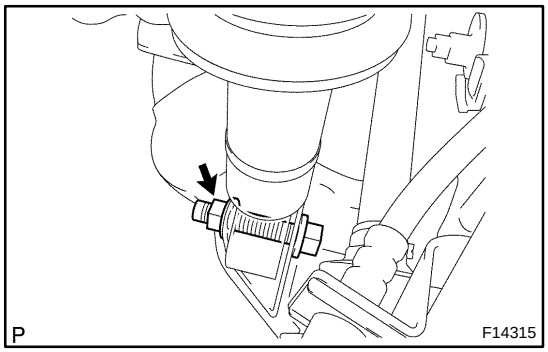
SA23R–03

REMOVAL

1. REMOVE FRONT WHEEL



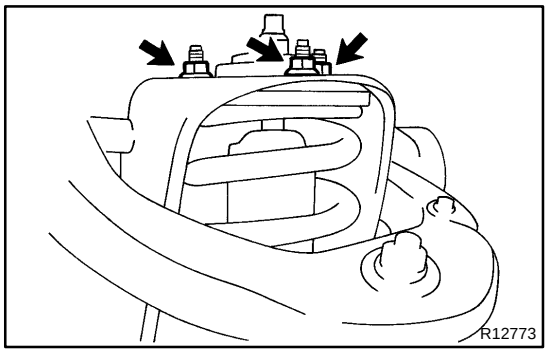
2. DISCONNECT SHOCK ABSORBER FROM LOWER SUSPENSION ARM

(a) Remove the shock absorber lower side set nut and washer.

NOTICE:

Do not remove the bolt.

(b) Pry down the lower suspension arm to remove the bolt and disconnect the shock absorber.



3. REMOVE SHOCK ABSORBER WITH COIL SPRING

Remove the 3 nuts and shock absorber with the coil spring.

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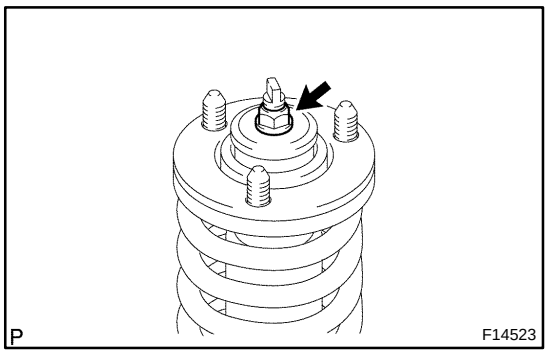
SA23S–03



DISASSEMBLY

REMOVE SUSPENSION SUPPORT AND COIL SPRING

(a) Using a spring compressor, compress the coil spring.

NOTICE:

- **Use a spring compressor with which compressive force of 12,740 N (1,300 kgf, 2,860 lbf) or more can be applied.**
- **Make sure that the suspension support is free from the coil spring.**
- **Do not compress the coil spring more than necessary.**
- **Do not place yourself over the top of the shock absorber.**

(b) Remove the suspension support center nut.

(c) Remove the 2 retainers, cushion, suspension support and coil spring.

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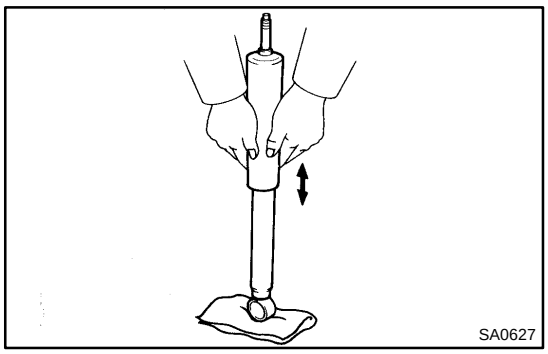
SA180–04



INSPECTION

INSPECT SHOCK ABSORBER

Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual operation sounds. If there is any abnormality, replace the shock absorber with a new one.

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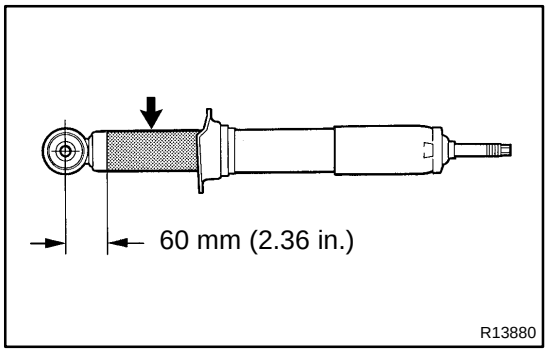
SA23U–03

DISPOSAL

1. FULLY EXTEND SHOCK ABSORBER ROD



2. DRILL HOLE TO DISCHARGE GAS FROM CYLINDER

Using a drill, make a hole in the cylinder as shown in the illustration to discharge the gas inside.

CAUTION:

The discharged gas is harmless, but be careful of chips which may fly out when drilling.

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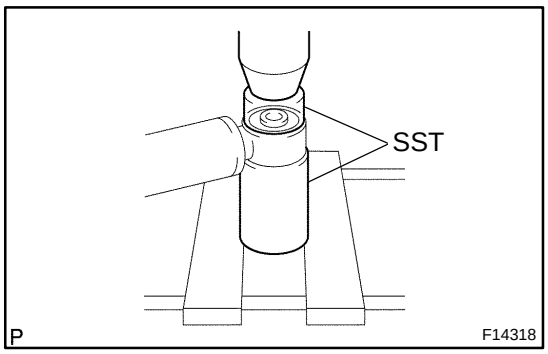
SA23T–03

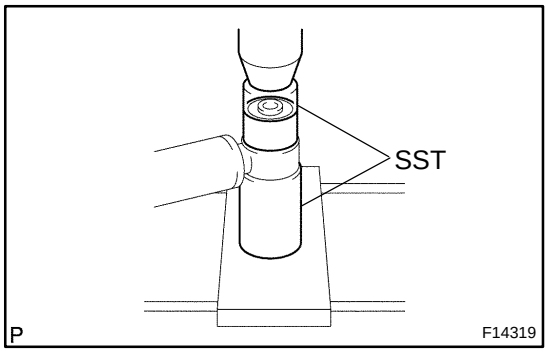
REPLACEMENT



1. REMOVE BUSHING

Using SST and a press, remove the bushing.

SST 09710–30031 (09710–03161, 09710–03171)



2. INSTALL NEW BUSHING

Using SST and a press, install a new bushing.

SST 09710–30031 (09710–03161, 09710–03171)

HINT:

Do not apply grease or oil to the bushing.

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SA23V–03

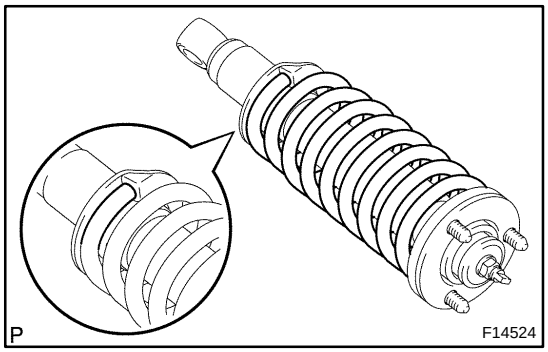
REASSEMBLY

1. INSTALL COIL SPRING TO SHOCK ABSORBER

(a) Using a spring compressor, compress the coil spring.

NOTICE:

Do not compress the coil spring more than necessary.



(b) Install the coil spring to the shock absorber.

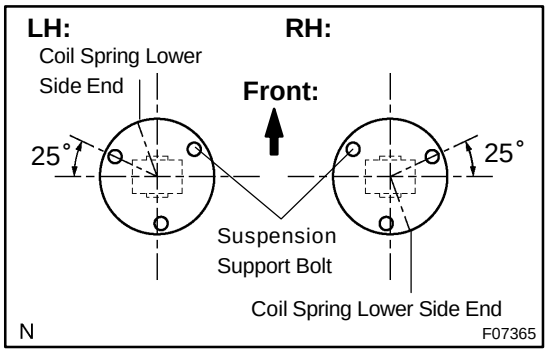
HINT:

Fit the lower end of the coil spring into the gap of the spring seat of the shock absorber.

2. INSTALL SUSPENSION SUPPORT

(a) Install the cushion, 2 retainers and suspension support to the piston rod.

(b) Temporarily tighten a new suspension support center nut.



(c) Position the suspension support as shown in the illustration.

NOTICE:

Do not place yourself over the top of the shock absorber.

HINT:

Recheck the direction of the suspension support.

(d) Torque the suspension center nut.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

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SA182–06

INSTALLATION

1. INSTALL SHOCK ABSORBER WITH COIL SPRING

(a) Install the upper side of the shock absorber to the chassis frame with the 3 nuts.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

(b) Connect the lower side of the shock absorber to the lower suspension arm with the bolt, washer and nut.
Torque: 135 N·m (1,400 kgf·cm, 100 ft·lbf)

2. INSTALL FRONT WHEEL
Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

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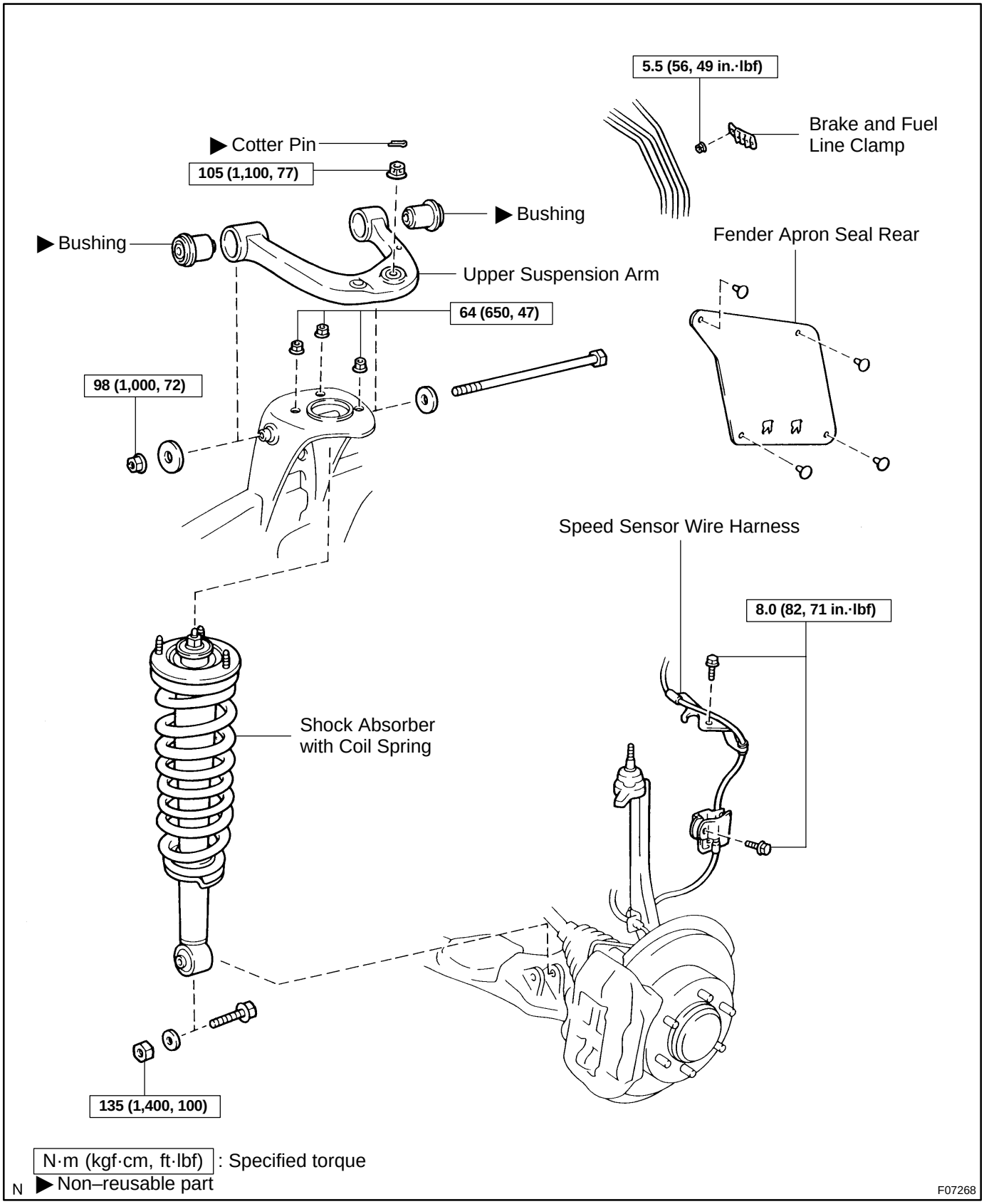
FRONT UPPER SUSPENSION ARM

COMPONENTS

SA183–05



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SA23W–03

REMOVAL

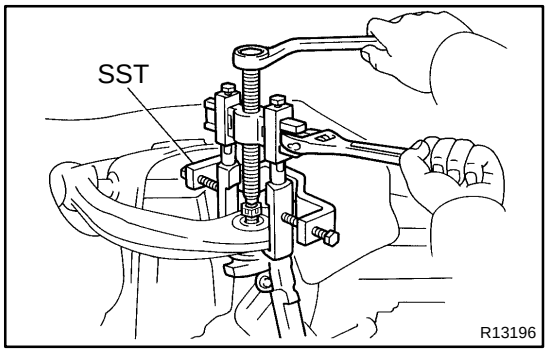
1. REMOVE SHOCK ABSORBER WITH COIL SPRING
(See page SA–64)

2. DISCONNECT SPEED SENSOR WIRE HARNESS CLAMPS

Remove the 2 bolts and speed sensor wire harness clamps from the steering knuckle and upper suspension arm.

3. DISCONNECT UPPER BALL JOINT

(a) Remove the cotter pin and loosen the nut.



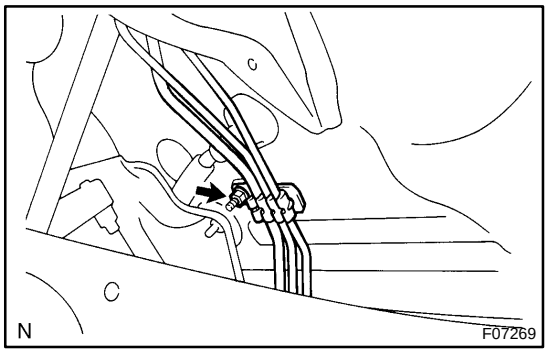
(b) Using SST, disconnect the upper ball joint.
SST 09950–40011 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04031, 09958–04011)

(c) Support the steering knuckle securely.

(d) Remove the nut.

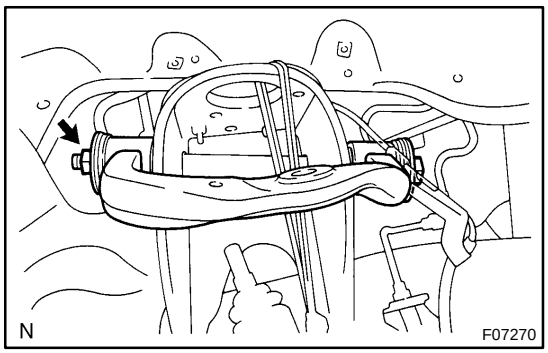
4. REMOVE FENDER APRON SEAL REAR

Remove the 4 clips and fender apron seal rear.



5. REMOVE BRAKE AND FUEL LINE CLAMP

Disengage the 2 brake lines and fuel line, and remove the nut and brake line clamp.



6. REMOVE UPPER SUSPENSION ARM

Remove the nut, bolt, 2 washers and upper suspension arm.

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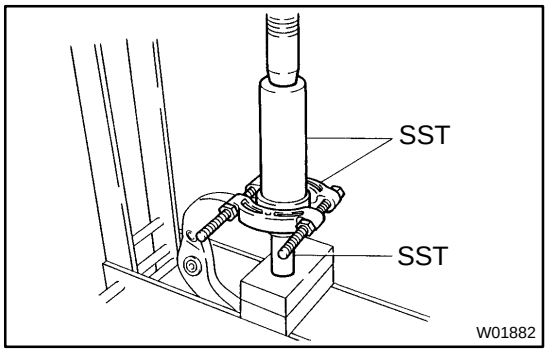
SA24N–02

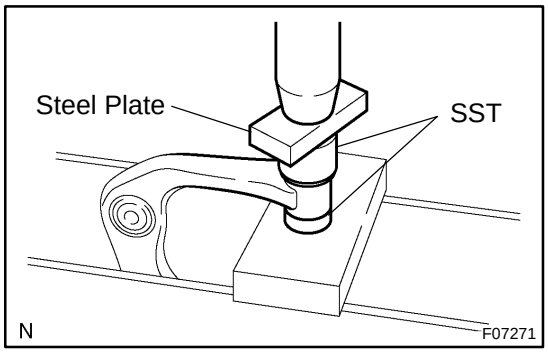
REPLACEMENT

1. REMOVE BUSHING

(a) Using a chisel and hammer, pry up the flange of the bushing.



(b) Using SST and a press, remove the bushing.
SST 09613–26010, 09631–20060, 09950–00020



2. INSTALL NEW BUSHING

Using SST, a press and steel plate, install a new bushing.
SST 09631–12090, 09710–30021 (09710–03051)

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SA187–06

INSTALLATION

1. INSTALL UPPER SUSPENSION ARM

Install the upper suspension arm with the 2 washers, bolt and nut.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

HINT:

After stabilizing the suspension, torque the nut.

2. INSTALL BRAKE AND FUEL LINE CLAMP

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

3. INSTALL FENDER APRON SEAL REAR

4. CONNECT UPPER BALL JOINT

(a) Connect the upper ball joint to the upper suspension arm.

(b) Install the nut and a new cotter pin.

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

Torque: 105 N·m (1,100 kgf·cm, 77 ft·lbf)

5. CONNECT SPEED SENSOR WIRE HARNESS CLAMPS

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

6. INSTALL SHOCK ABSORBER WITH COIL SPRING (See page SA–70)

7. CHECK FRONT WHEEL ALIGNMENT (See page SA–4)

8. PERFORM ZERO POINT CALIBRATION OF STEERING ANGLE, MASTER CYLINDER PRESSURE, YAW RATE AND DECELERATION SENSORS (See page DI–897)

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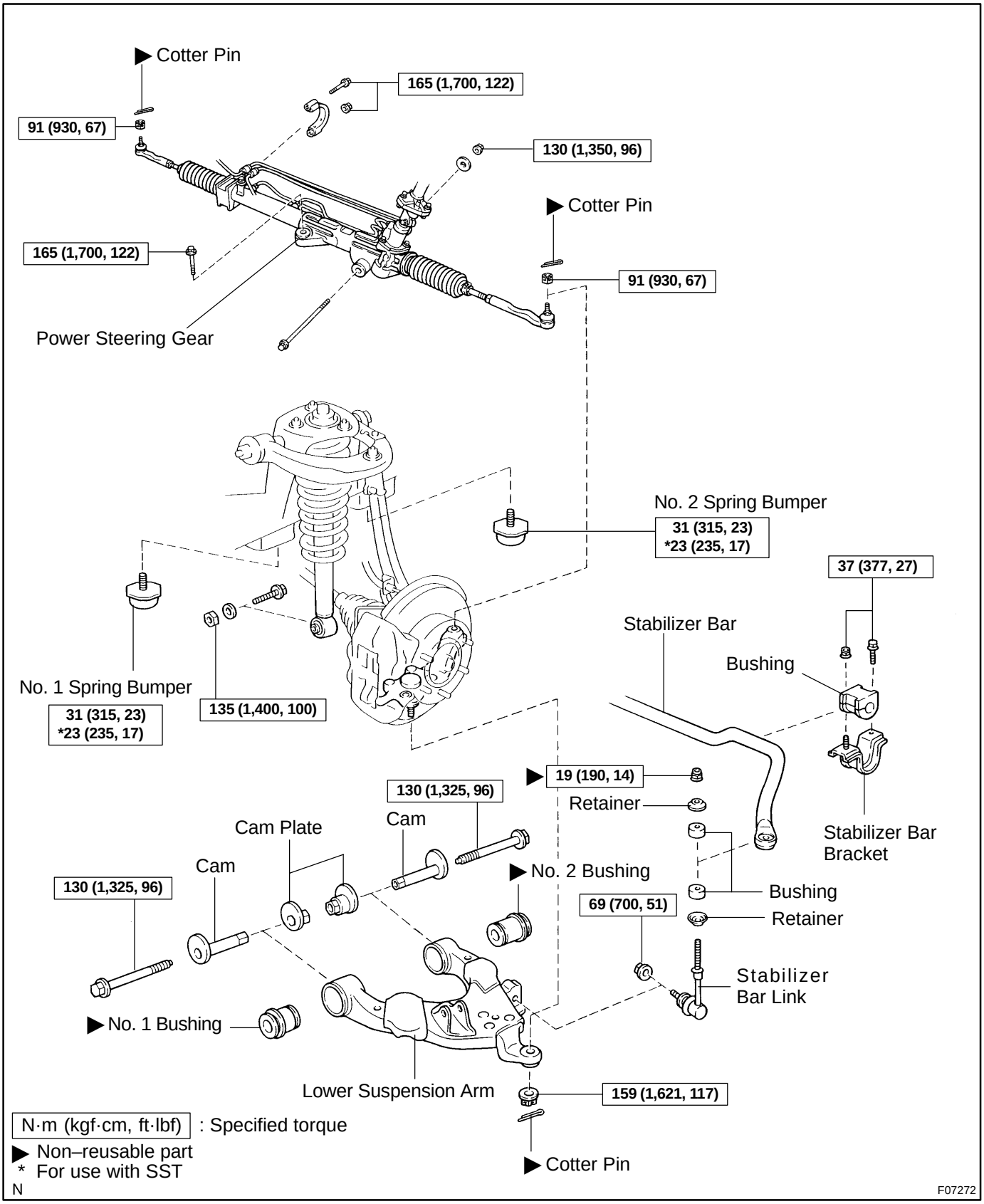
FRONT LOWER SUSPENSION ARM

SA17M–06

COMPONENTS



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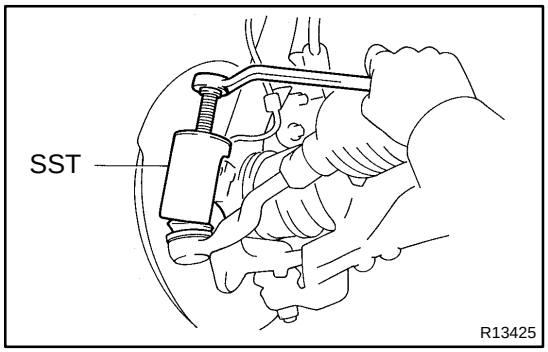
SA23X–03

REMOVAL

1. REMOVE RH AND LH FRONT WHEELS

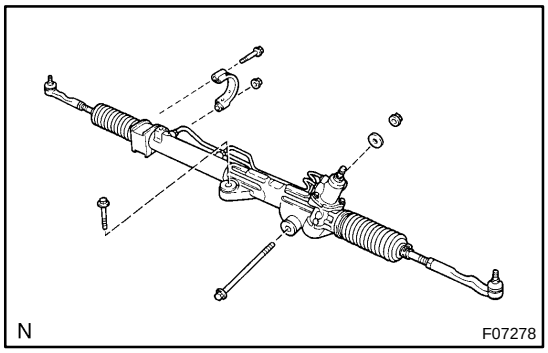
2. DISCONNECT RH AND LH TIE ROD ENDS

(a) Remove the cotter pin and nut.

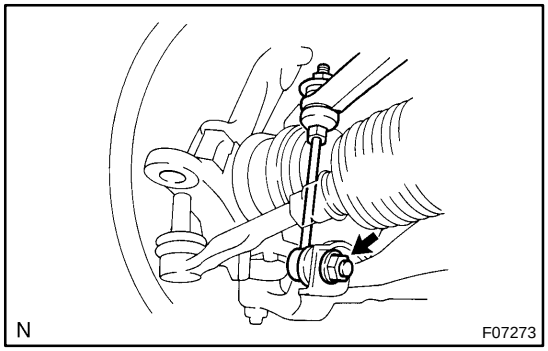


(b) Using SST, disconnect the tie rod end from the lower ball joint.
SST 09610–20012

(c) Use the same procedures described above to the other side.



3. REMOVE POWER STEERING GEAR SET BOLTS AND NUTS

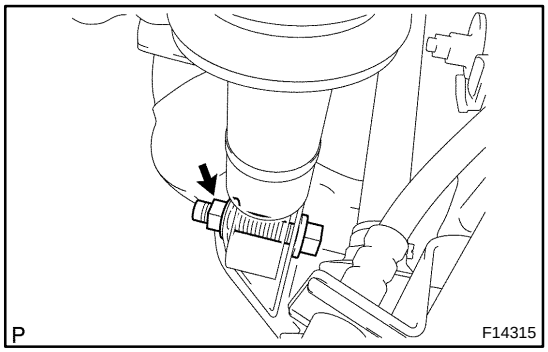


4. DISCONNECT STABILIZER BAR LINK FROM LOWER SUSPENSION ARM

Remove the nut and disconnect the stabilizer bar link from the lower suspension arm.

HINT:

If the ball joint turns together with the nut, use a hexagon (6 mm) wrench to hold the stud.



5. DISCONNECT SHOCK ABSORBER FROM LOWER SUSPENSION ARM

(a) Remove the shock absorber lower side set nut and washer.

NOTICE:

Do not remove the bolt.

(b) Pry down the lower suspension arm to remove the bolt and disconnect the shock absorber.

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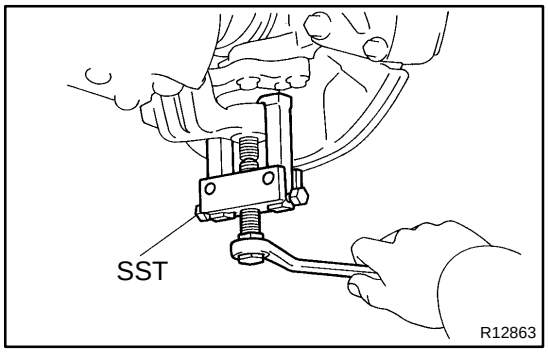
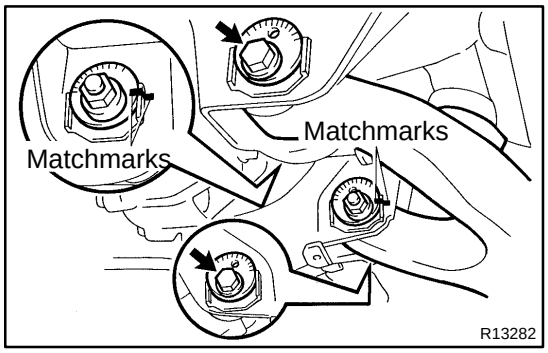
6. DISCONNECT LOWER BALL JOINT FROM LOWER SUSPENSION ARM

(a) Remove the cotter pin and nut.



(b) Using SST, disconnect the lower ball joint from the lower suspension arm.
SST 09628–62011



7. REMOVE LOWER SUSPENSION ARM

(a) Place matchmarks on the front and rear cam plates and chassis frame.

(b) Remove the 2 cam plates, bolts, cams and lower suspension arm while slightly shifting the power steering gear rearward.

NOTICE:
Do not damage the power steering gear tubes.

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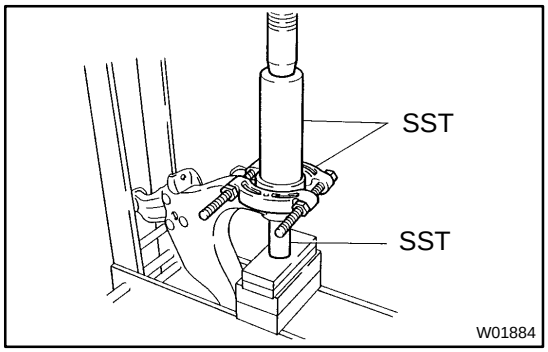
SA24S–02

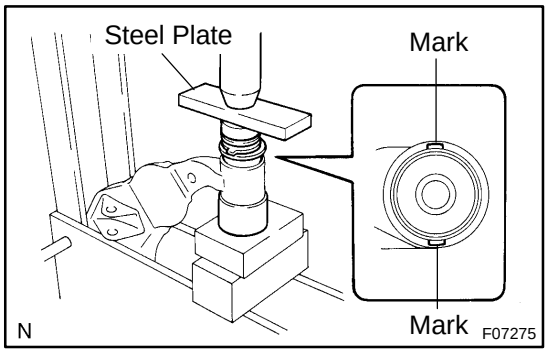
REPLACEMENT

1. REPLACE BUSHING

(a) Using a chisel and hammer, pry up the flange of the bushing.

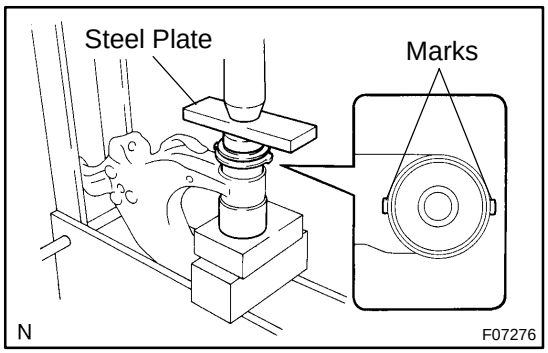


(b) Using SST and a press, remove the bushing.
SST 09613–26010, 09632–36010, 09950–00020



(c) Using SST, a press and steel plate, install a new No. 1 bushing.
SST 09502–12010, 09631–12090

HINT:
Before installing the bushing, set it in the correct direction, as shown in the illustration.

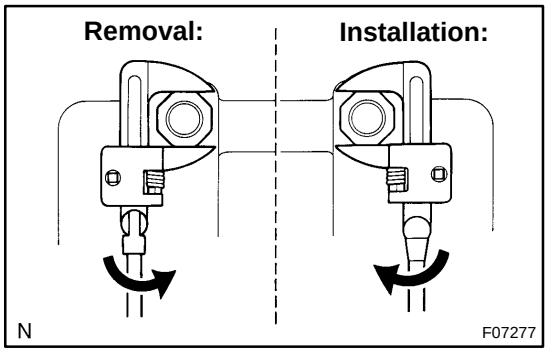


(d) Using SST, a press and steel plate, install a new No. 2 bushing.
SST 09631–12090, 09950–60020 (09951–00680)

HINT:
Before installing the bushing, set it in the correct direction, as shown in the illustration.

2. REPLACE NO. 1 AND NO. 2 SPRING BUMPERS ON–VEHICLE

(a) Remove the front wheel.



(b) Using SST, replace the No. 1 spring bumper.
SST 09922–10010

HINT:
At the time of installation, use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

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(c) Replace the No. 2 spring bumper.

(1) Remove the stabilizer bar (See page SA–91).

(2) Using SST, replace the No. 2 spring bumper.

SST 09922–10010

HINT:

At the time of installation, use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

(3) Install the stabilizer bar (See page SA–93).

(d) Install the front wheel.

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

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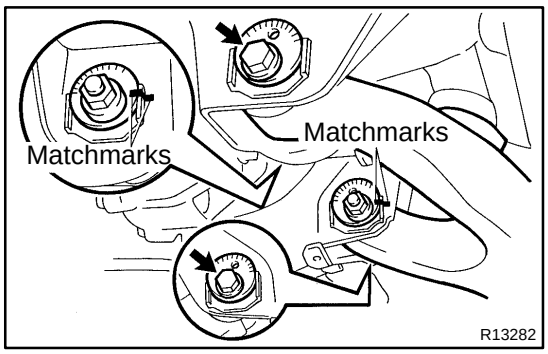
SA23Y–05



INSTALLATION

1. INSTALL LOWER SUSPENSION ARM TO CHASSIS FRAME

Install the lower suspension arm with the 2 cams, bolts and cam plates while slightly shifting the power steering gear rearward.

Torque: 130 N·m (1,325 kgf·cm, 96 ft·lbf)

NOTICE:

Do not damage the power steering gear tubes.

HINT:

After stabilizing the suspension, align the matchmarks on the front and rear cam plates and chassis frame, and torque the bolts.

2. CONNECT LOWER BALL JOINT TO LOWER SUSPENSION ARM

Connect the lower ball joint and install the nut and a new cotter pin.

Torque: 159 N·m (1,621 kgf·cm, 117 ft·lbf)

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

3. CONNECT SHOCK ABSORBER TO LOWER SUSPENSION ARM

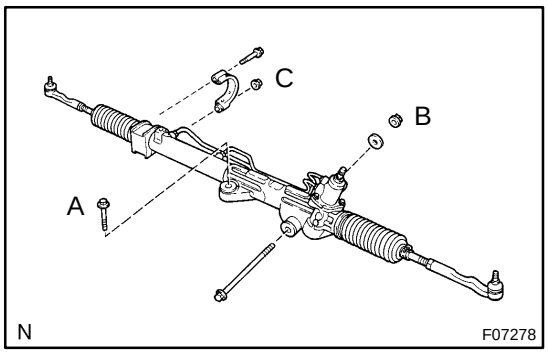
Torque: 135 N·m (1,400 kgf·cm, 100 ft·lbf)

4. CONNECT STABILIZER BAR LINK TO LOWER SUSPENSION ARM

Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

HINT:

If the ball joint turns together with the nut, use a hexagon (6 mm) wrench to hold the stud.



5. INSTALL POWER STEERING GEAR

Torque:

A bolt: 165 N·m (1,700 kgf·cm, 122 ft·lbf)

B nut: 130 N·m (1,350 kgf·cm, 96 ft·lbf)

C bolt and nut: 165 N·m (1,700 kgf·cm, 122 ft·lbf)

6. CONNECT RH AND LH TIE ROD ENDS

Connect the RH and LH tie rod ends to the lower ball joints with the nuts and new cotter pins.

Torque: 91 N·m (930 kgf·cm, 67 ft·lbf)

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

7. INSTALL RH AND LH FRONT WHEELS

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

8. CHECK FRONT WHEEL ALIGNMENT (See page SA–4)

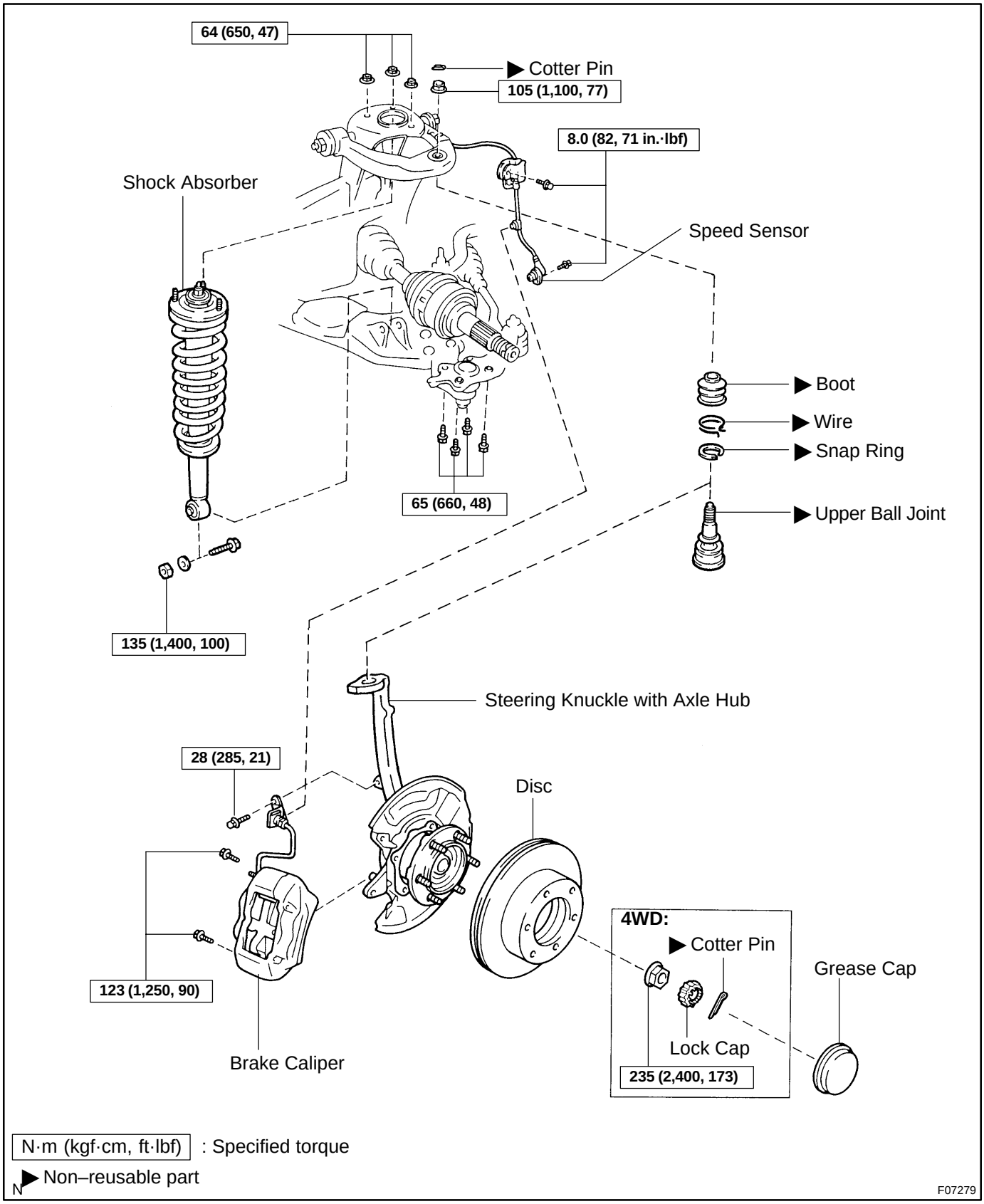
9. PERFORM ZERO POINT CALIBRATION OF STEERING ANGLE, MASTER CYLINDER PRESSURE, YAW RATE AND DECELERATION SENSORS (See page DI–897)

Dardoor.com

FRONT UPPER BALL JOINT

SA23Z–04

COMPONENTS



Dardoor.com

SA240–03

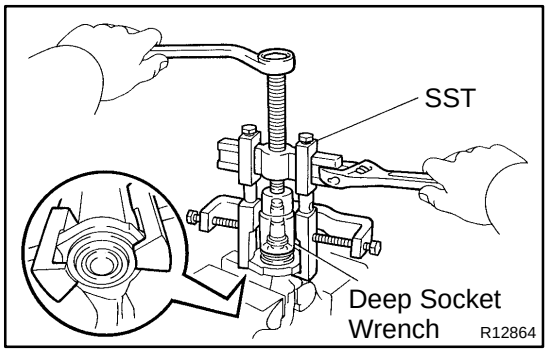
REMOVAL

1. REMOVE STEERING KNUCKLE WITH AXLE HUB (See page SA–22)

2. REMOVE UPPER BALL JOINT

(a) Remove the wire and boot.

(b) Using a snap ring expander, remove the snap ring.



(c) Using SST and a deep socket wrench, remove the upper ball joint.

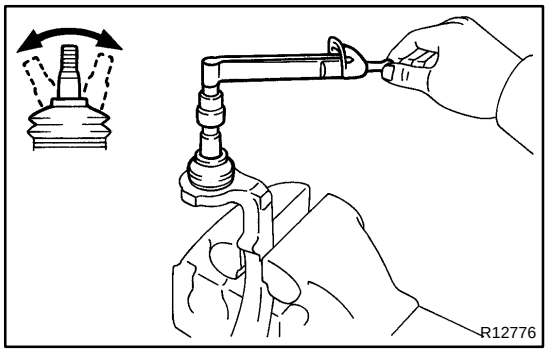
SST 09950–40011 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04031, 09957–04010, 09958–04011)

Dardoor.com

SA241–03

INSPECTION

1. INSPECT UPPER BALL JOINT BOOT FOR DAMAGE



2. INSPECT UPPER BALL JOINT FOR ROTATION CONDITION

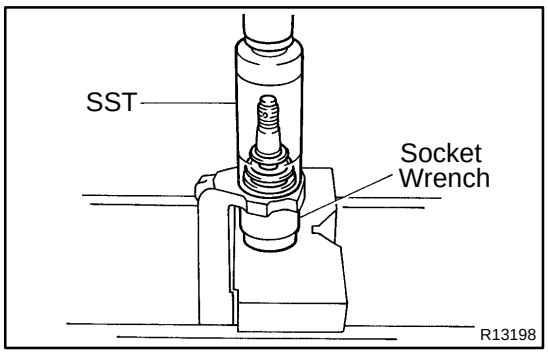
(a) As shown in the illustration, flip the ball joint stud back and forth 5 times before installing the nut.

(b) Using a torque wrench, turn the nut continuously 1 turn per 2 – 4 seconds and take the torque reading on the 5th turn.

Turning torque:
0.7 – 4.4 N·m (7 – 45 kgf·cm, 6 – 39 in.·lbf)

Dardoor.com

SA242–03



INSTALLATION

1. INSTALL UPPER BALL JOINT

(a) Using SST, press and a socket wrench, install a new ball joint.

SST 09309–37010

(b) Using a snap ring expander, install a new snap ring.

(c) Install a new boot and fix it with a new wire.

HINT:

Use the grease supplied in the kit.

2. INSTALL STEERING KNUCKLE WITH AXLE HUB

(See page SA–28)

Dardoor.com

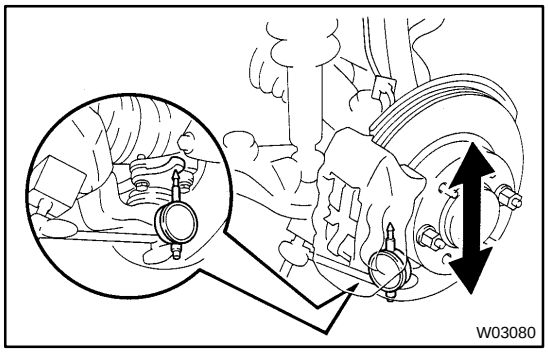
FRONT LOWER BALL JOINT

SA243–03

ON–VEHICLE INSPECTION

INSPECT LOWER BALL JOINT EXCESSIVE PLAY ON–VEHICLE

(a) Remove the front wheel and install the hub nuts to the disc.

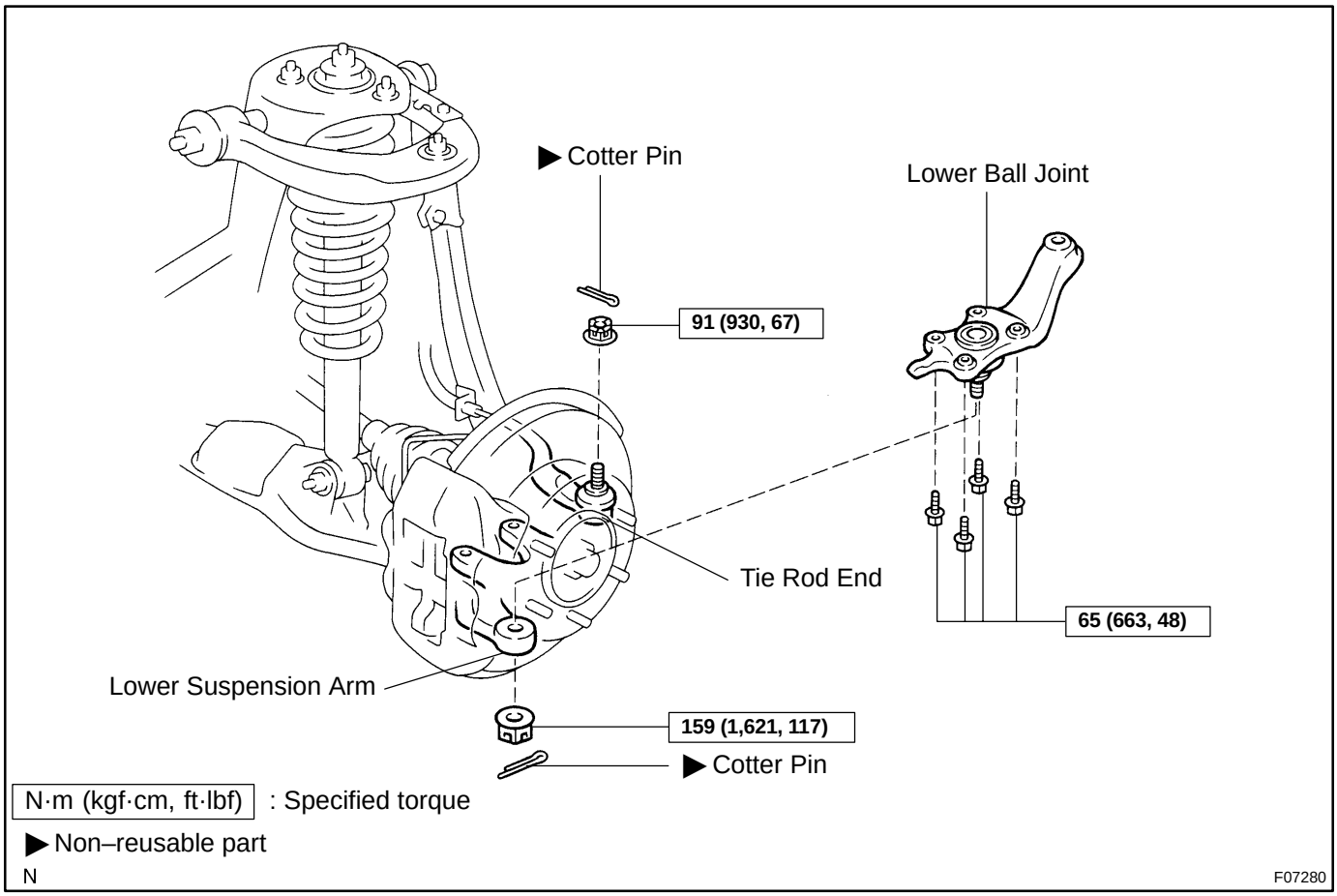


(b) Using a dial indicator, check the lower ball joint for excessive play when you push the hub nuts up and down with a force of 294 N (30 kgf, 66 lbf).
Maximum: 0.5 mm (0.020 in.)

Dardoor.com

SA244–06

COMPONENTS

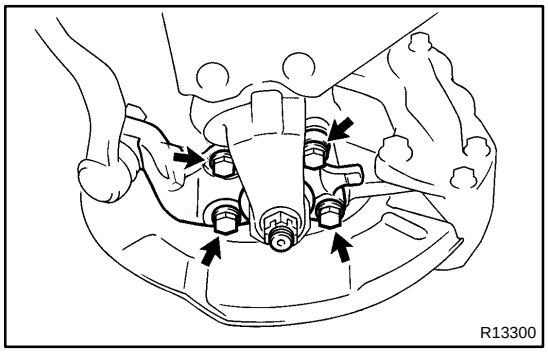


Dardoor.com

SA245–05

REMOVAL

1. REMOVE FRONT WHEEL



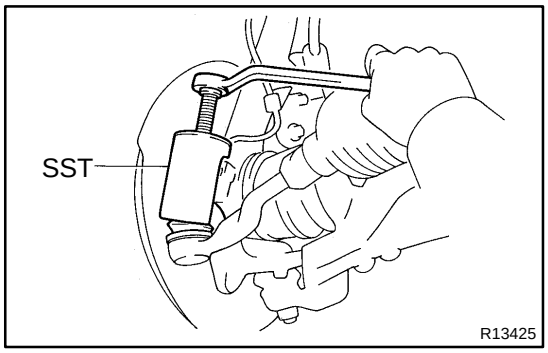
2. LOOSEN 4 LOWER BALL JOINT SET BOLTS

HINT:

Do not remove the bolts.

3. DISCONNECT TIE ROD END

(a) Remove the cotter pin and nut from the tie rod end.

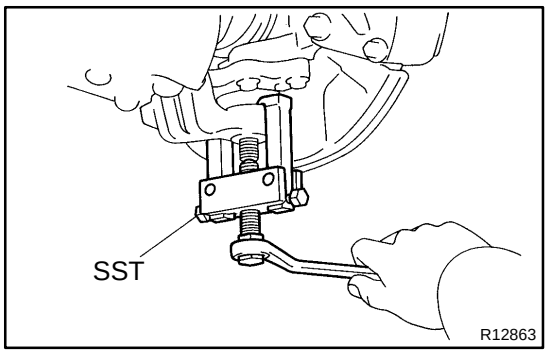


(b) Using SST, disconnect the tie rod end from the lower ball joint.

SST 09610–20012

4. REMOVE LOWER BALL JOINT

(a) Remove the cotter pin and nut from the lower ball joint.



(b) Using SST, disconnect the lower ball joint from the lower suspension arm.

SST 09628–62011

(c) Remove the 4 lower ball joint set bolts.

(d) While lifting the upper suspension arm and steering knuckle, remove the lower ball joint.

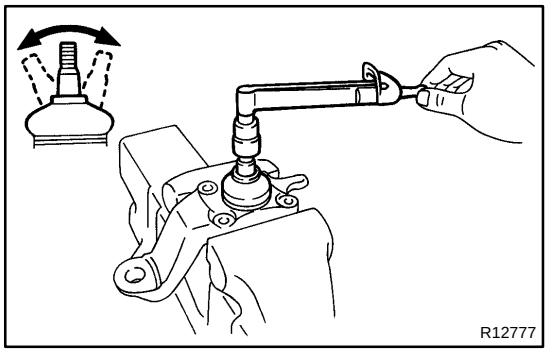
(e) Support the upper suspension arm and steering knuckle securely.

Dardoor.com

SA246–04

INSPECTION

1. INSPECT LOWER BALL JOINT BOOT FOR DAMAGE



2. INSPECT LOWER BALL JOINT FOR ROTATION CONDITION

(a) As shown in the illustration, flip the ball joint stud back and forth 5 times before installing the nut.

(b) Using a torque wrench, turn the nut continuously 1 turn per 3 to 5 seconds and take the torque reading on the 5th turn.

Turning torque:
1.0 – 6.5 N·m (10 – 66 kgf·cm, 9 – 56 in.·lbf)

Dardoor.com

SA247–07

INSTALLATION

1. INSTALL LOWER BALL JOINT

(a) While lifting the upper suspension arm and steering knuckle, install the lower ball joint.

(b) Temporarily install the 4 bolts to the lower ball joint.

(c) Install the set nut to hold the lower ball joint to the lower suspension arm and a new cotter pin.

Torque: 159 N·m (1,621 kgf·cm, 117 ft·lbf)

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

2. CONNECT TIE ROD END

Connect the tie rod end to the lower ball joint with the nut and a new cotter pin.

Torque: 91 N·m (930 kgf·cm, 67 ft·lbf)

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

3. TIGHTEN LOWER BALL JOINT SET 4 BOLTS

Torque: 65 N·m (663 kgf·cm, 48 ft·lbf)

4. INSTALL FRONT WHEEL

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

5. CHECK FRONT WHEEL ALIGNMENT (See page SA–4)

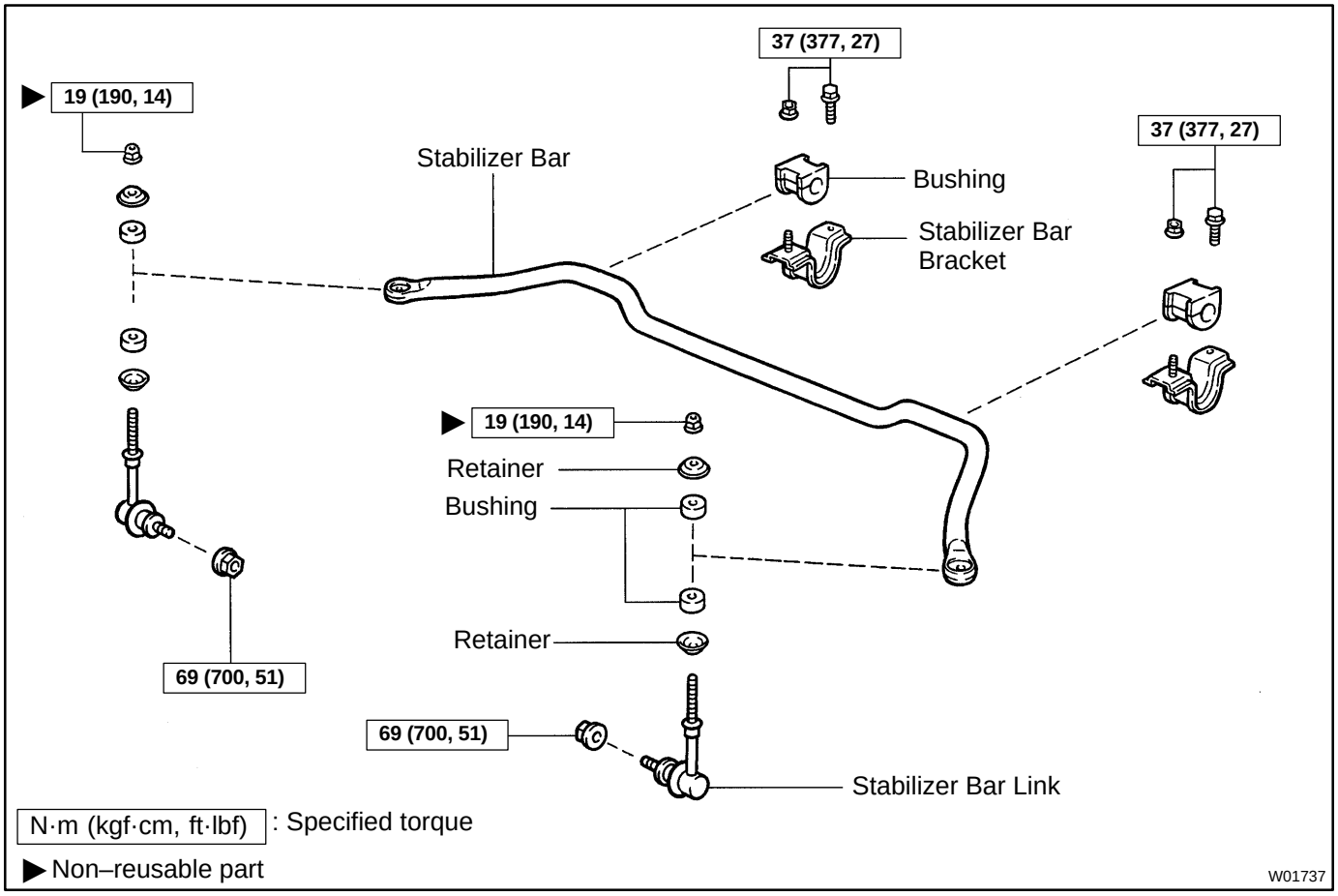
6. PERFORM ZERO POINT CALIBRATION OF STEERING ANGLE, MASTER CYLINDER PRESSURE, YAW RATE AND DECELERATION SENSORS (See page DI–897)

Dardoor.com

FRONT STABILIZER BAR

COMPONENTS

SA188–04



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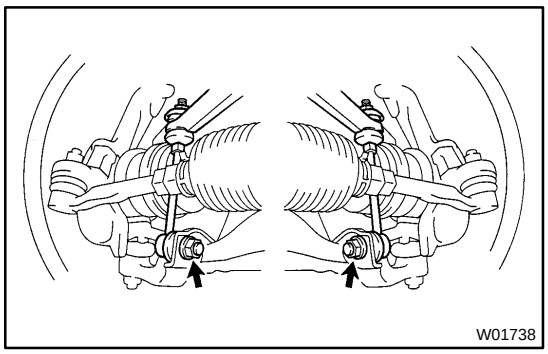
SA24O–02

REMOVAL

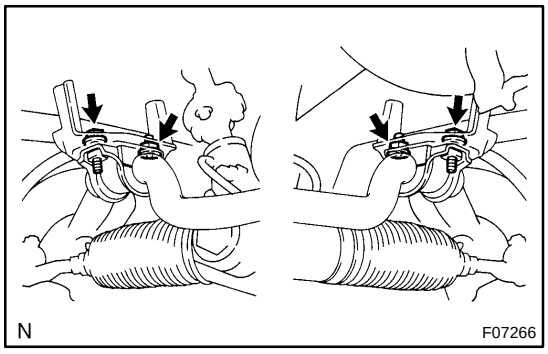


1. DISCONNECT STABILIZER BAR LINKS

Remove the 2 nuts and disconnect the stabilizer bar links from the lower suspension arms.

HINT:

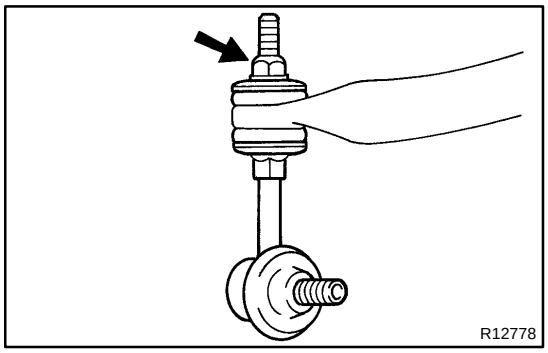
If the ball joint turns together with the nut, use a hexagon (6 mm) wrench to hold the stud.



2. REMOVE STABILIZER BAR

(a) Remove the 2 bolts, nuts and stabilizer bar with the cushions and brackets.

(b) Remove the 2 brackets and cushions from the stabilizer bar.



3. REMOVE STABILIZER BAR LINKS

(a) Hold the stabilizer bar link, and remove the nut.

(b) Remove the stabilizer bar link, 2 retainers and bushings from the stabilizer bar.

(c) Use the same procedures described above to the other side.

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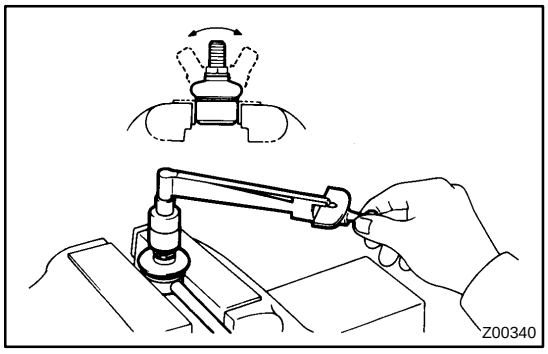
SA248–03

INSPECTION

1. INSPECT STABILIZER BAR LINK BALL JOINT BOOT FOR DAMAGE



2. INSPECT STABILIZER BAR LINK BALL JOINT FOR ROTATION CONDITION

(a) As shown in the illustration, flip the ball joint stud back and forth 5 times before installing the nut.

(b) Using a torque wrench, turn the nut continuously 1 turn per 2 – 4 seconds and take the torque reading on the 5th turn.

Turning torque:
0.05 – 2.0 N·m (0.5 – 20 kgf·cm, 0.4 – 17 in.·lbf)

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SA249–03

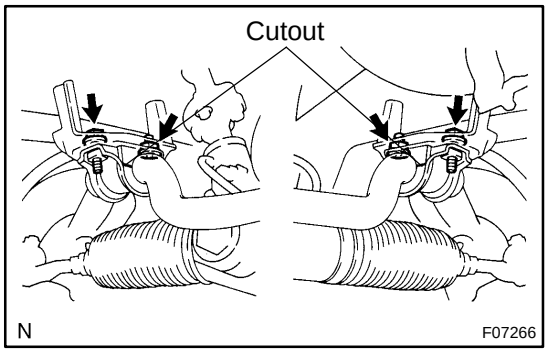
INSTALLATION

1. INSTALL STABILIZER BAR LINKS

(a) Install the 2 bushings, retainers and stabilizer bar link to the stabilizer bar.

(b) Hold the stabilizer bar link, and install a new nut.
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)

(c) Use the same procedures described above to the other side.



2. INSTALL STABILIZER BAR

(a) Install the 2 bushings with their cutout facing to the rearward of the stabilizer bar.

(b) Install the stabilizer bar and 2 brackets with the nuts and bolts.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

3. CONNECT STABILIZER BAR LINKS TO LOWER SUSPENSION ARM
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

HINT:
If the ball joint turns together with the nut, use a hexagon (6 mm) wrench to hold the nut.

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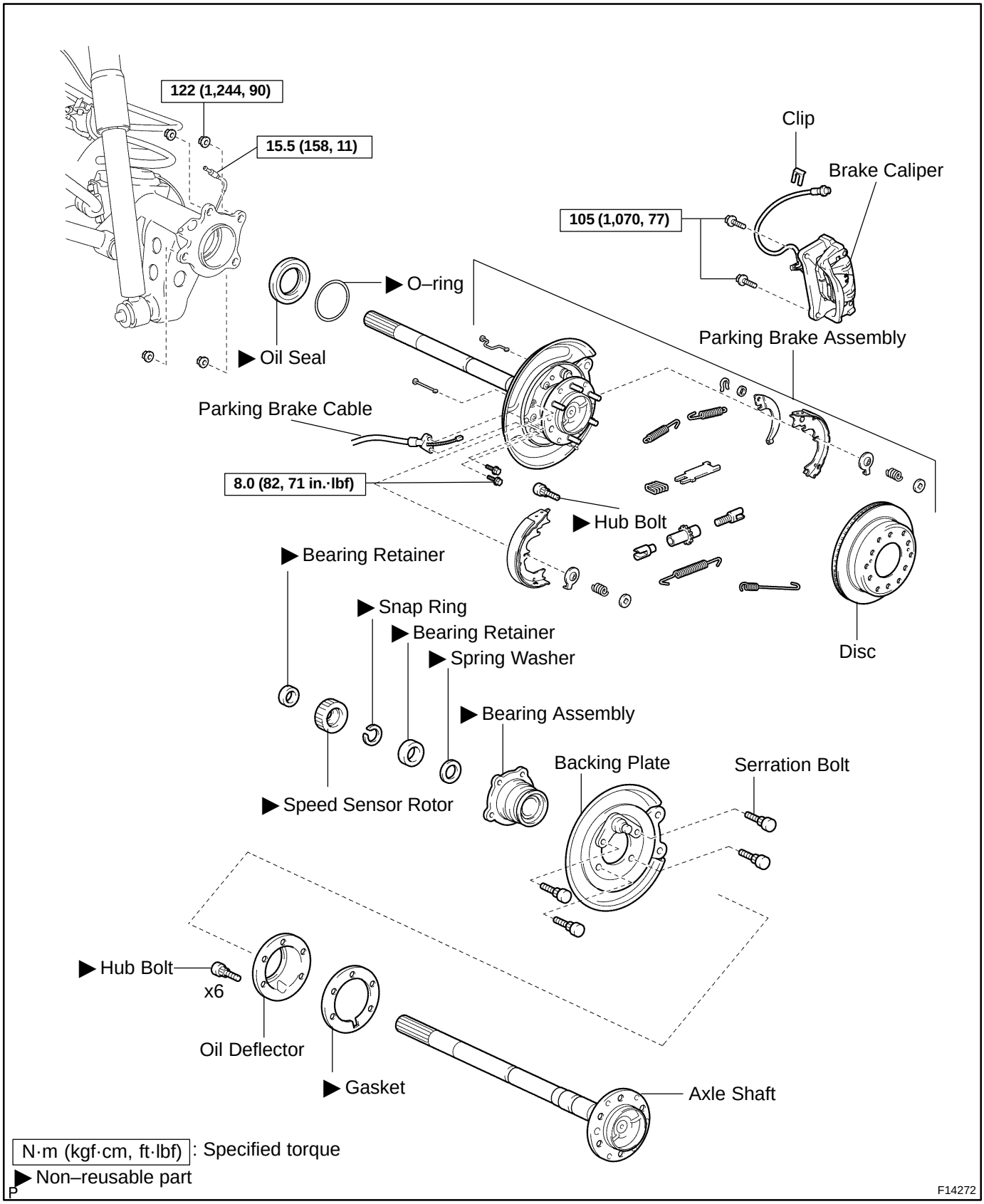
REAR AXLE SHAFT

COMPONENTS

SA17R–04



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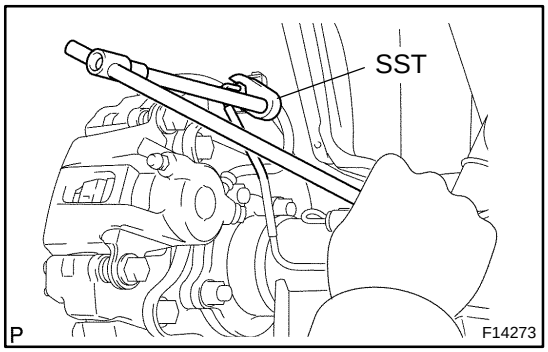
SA17S–04

REMOVAL

1. REMOVE REAR WHEEL

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

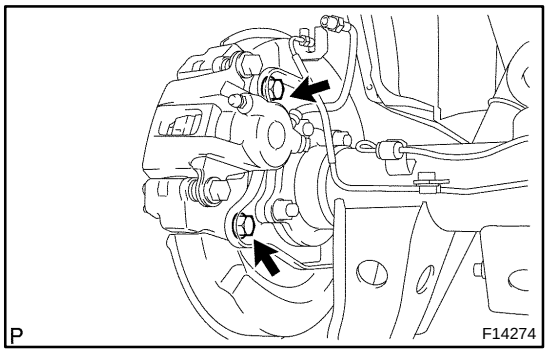


2. DISCONNECT BRAKE LINE

Using SST, disconnect the brake line and remove the clip.

SST 09023–00101

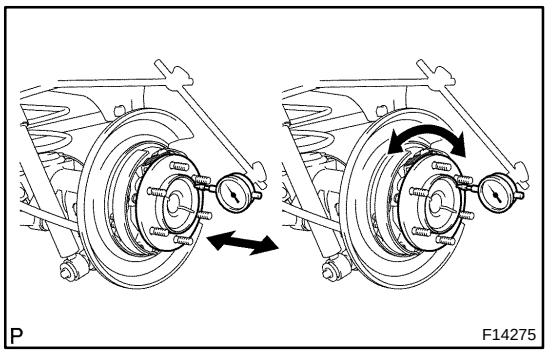
Torque: 15.5 N·m (158 kgf·cm, 11 ft·lbf)



3. REMOVE BRAKE CALIPER AND DISC

Remove the 2 bolts, brake caliper and disc.

Torque: 105 N·m (1,070 kgf·cm, 77 ft·lbf)



4. CHECK BEARING BACKLASH AND AXLE SHAFT DEVIATION

(a) Using a dial indicator, check the backlash in the bearing shaft direction.

Maximum: 0.6 mm (0.024 in.)

If the backlash exceeds the maximum, replace the bearing.

(b) Using a dial indicator, check the deviation at the surface of the axle shaft outside the hub bolt.

Maximum: 0.1 mm (0.0040 in.)

If the deviation exceeds the maximum, replace the axle shaft.

5. REMOVE PARKING BRAKE ASSEMBLY

(a) Remove the parking brake assembly (See page BR–43).

(b) Remove the 2 bolts and pull out the parking brake cable from the backing plate.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(c) Use the same procedures described above to the other side.

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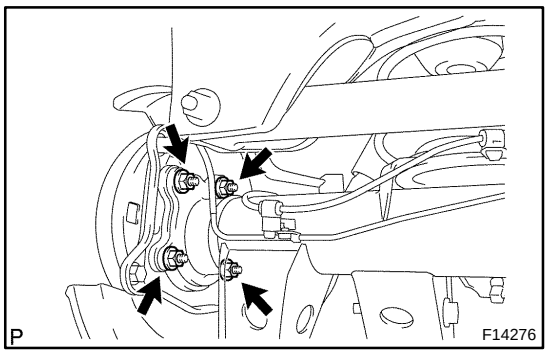

6. REMOVE AXLE SHAFT ASSEMBLY

(a) Remove the 4 nuts.

Torque: 122 N·m (1,244 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft assembly.

NOTICE:

Be careful not to damage the oil seal.

(c) Remove the O–ring from the axle housing.

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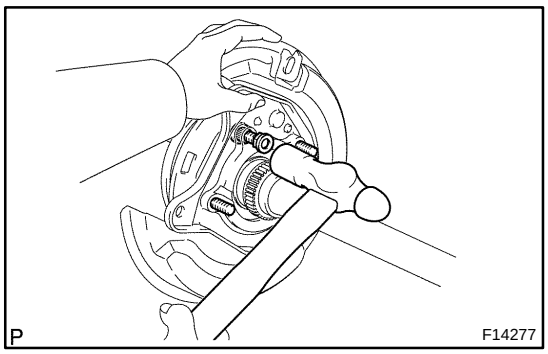
SA24A–02

DISASSEMBLY

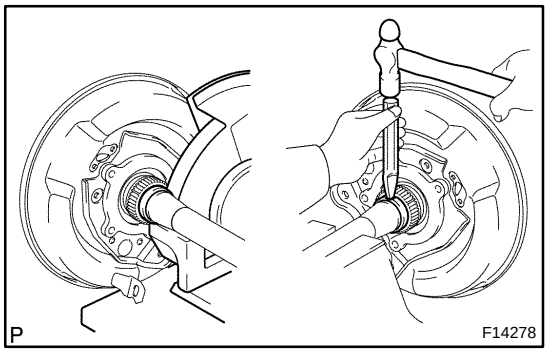


1. REMOVE BEARING RETAINER (DIFFERENTIAL SIDE) AND SPEED SENSOR ROTOR

(a) Attach the 4 nuts to the serration bolts and remove the serration bolts from the backing plate using a hammer.

NOTICE:

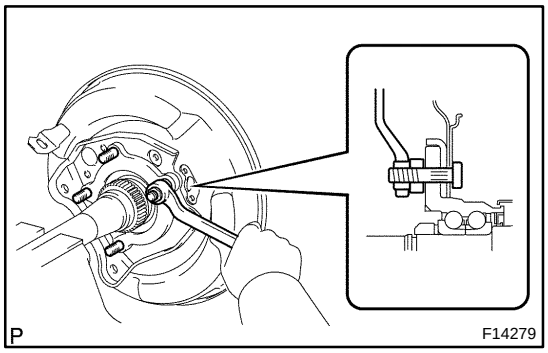
Do not reuse the nuts previously removed from the vehicle.



(b) Grind the retainer and sensor rotor surfaces using a grinder, then pry them out with a chisel and hammer.

2. REMOVE SNAP RING FROM AXLE SHAFT

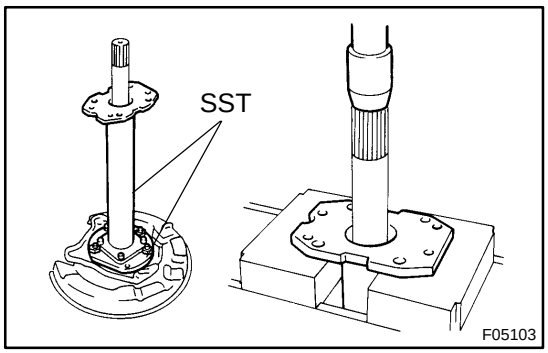
Using a snap ring expander, remove the snap ring.



3. REMOVE REAR AXLE SHAFT FROM BACKING PLATE AND BEARING ASSEMBLY

(a) Attach the washers and nut to the serration bolts, then torque the nuts to install the serration bolts to the backing plate.

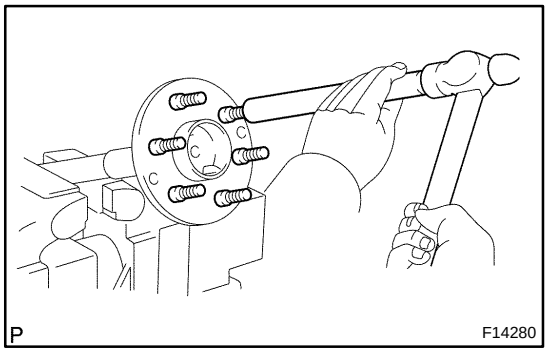
(b) Remove the 4 nuts from the serration bolts.



(c) Position SST on the backing plate with the 4 nuts.
SST 09521–25011, 09521–25021

(d) Using a press, remove the rear axle shaft, spring washer and bearing retainer from the backing plate.

(e) Remove the SST.
SST 09521–25011, 09521–25021



4. REMOVE OIL DEFLECTOR AND GASKET

Using a brass bar and hammer, remove the 6 hub bolts, oil deflector and gasket.

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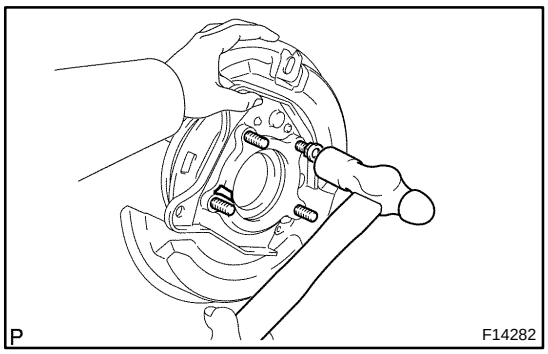

5. REMOVE BEARING ASSEMBLY

Attach the 4 nuts to the serration bolts and remove the serration bolts from the backing plate using a hammer.

NOTICE:

Do not reuse the nuts previously removed from the vehicle.

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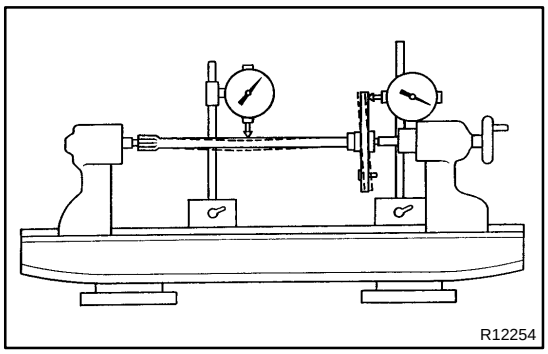
SA17U–04



INSPECTION

INSPECT AXLE SHAFT

Using a dial indicator, measure the runout of the shaft and flange.

Maximum shaft runout: 2.0 mm (0.079 in.)

Maximum flange runout: 0.1 mm (0.0040 in.)

If the rear axle shaft or flange are damaged or worn, or if runout is greater than the maximum, replace the rear axle shaft.

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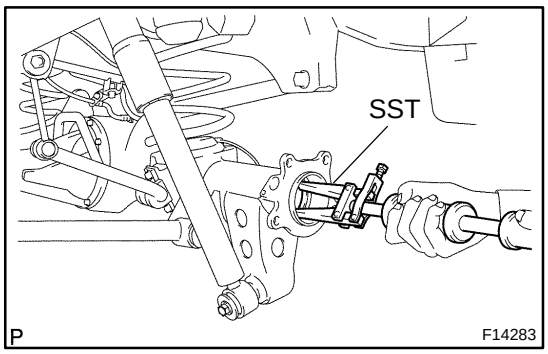
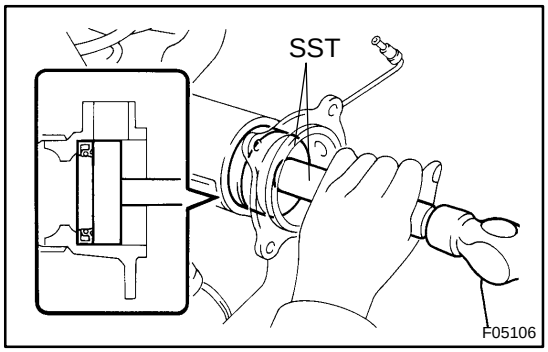
SA17V–06



REPLACEMENT

REPLACE OIL SEAL (INNER SIDE)

(a) Using SST, remove the oil seal.
SST 09308–00010



(b) Using SST and a hammer, install a new oil seal.
SST 09950–60020 (09951–00730),
09950–70010 (09951–07150)

(c) Apply MP grease to the oil seal lip.

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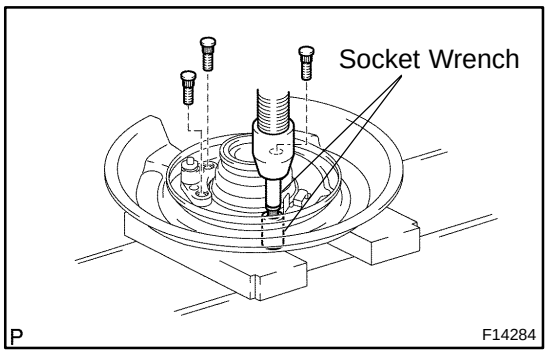
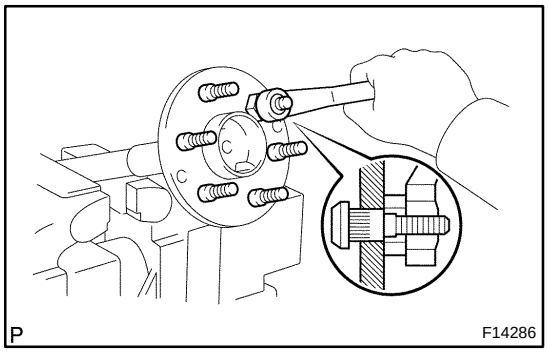
SA24B–02

REASSEMBLY



1. INSTALL BEARING ASSEMBLY

Position the backing plate on the bearing assembly and using a press and 2 socket wrenches, install the serration bolts.

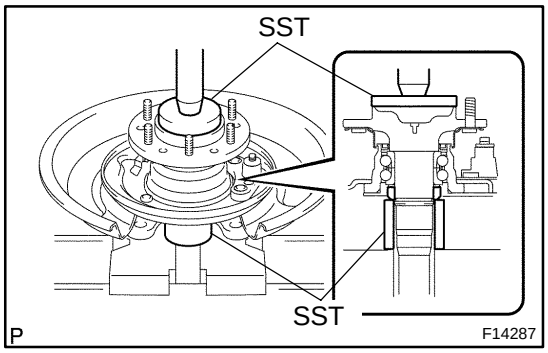


2. INSTALL OIL DEFLECTOR AND GASKET

Position a new gasket and oil deflector on the axle shaft and install a washer and nut to a new hub bolt, as shown in the illustration, and install the hub bolt by torquing the nut.

3. INSTALL REAR AXLE SHAFT TO BACKING PLATE

(a) Install the backing plate, spring washer and bearing retainer on the rear axle shaft.

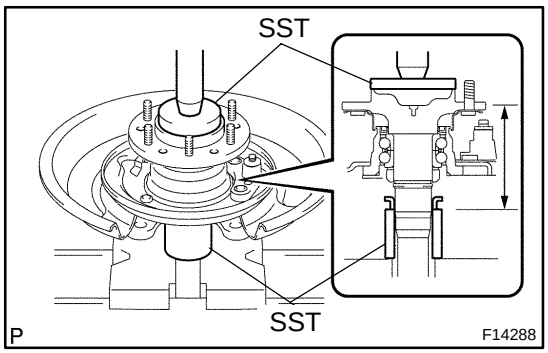


(b) Using SST and a press, install the rear axle shaft into the backing plate.

SST 09631–12090, 09950–60020 (09951–01030)

4. INSTALL SNAP RING TO AXLE SHAFT

Using a snap ring expander, install a new snap ring.



5. INSTALL SPEED SENSOR ROTOR AND BEARING RETAINER (DIFFERENTIAL SIDE)

Using SST and a press, install a new speed sensor rotor and bearing retainer.

SST 09631–12090, 09950–60020 (09951–01030)

Standard length: 132.8 ± 1.0 mm (5.228 ± 0.039 in.)

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SA17X–07

INSTALLATION

Installation is in the reverse order of removal (See page SA–95).

HINT:

After installation, fill the brake reservoir with brake fluid, bleed the brake system (See page BR–4), check for leaks and check the speed sensor signal (See page DI–899).

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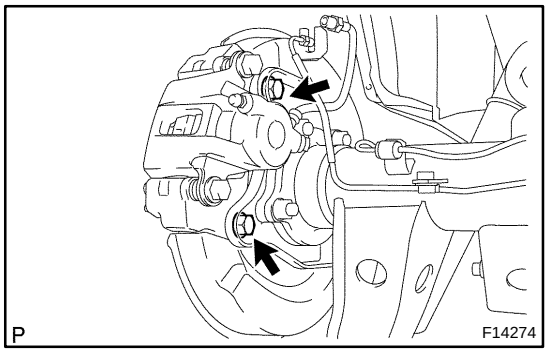
REAR WHEEL HUB BOLT

SA24C–02

REPLACEMENT

1. REMOVE REAR WHEEL

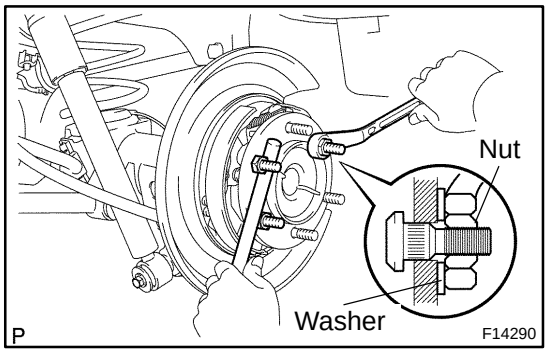


2. REMOVE BRAKE CALIPER AND DISC

(a) Remove the 2 bolts, brake caliper and disc.

(b) Support the brake caliper securely.

3. REMOVE HUB BOLT (See page SA–97)



4. INSTALL HUB BOLT

Install a washer and nut to a new hub bolt, as shown in the illustration. Install the hub bolt by torquing the nut, while holding the axle shaft using a brass bar or an equivalent.

5. INSTALL DISC AND BRAKE CALIPER

Install the disc and brake caliper with the 2 bolts.

Torque: 105 N·m (1,070 kgf·cm, 77 ft·lbf)

6. INSTALL REAR WHEEL

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

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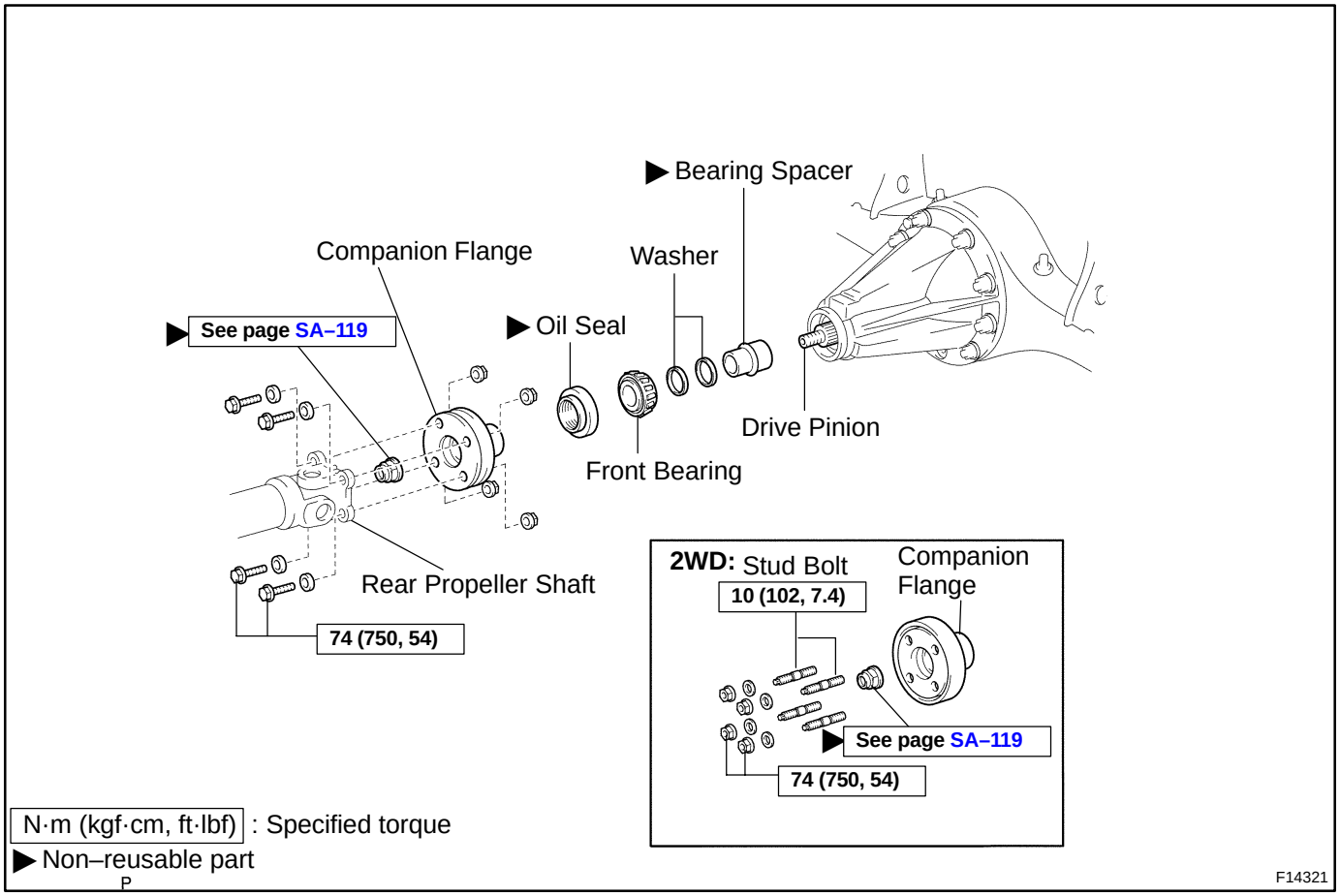
REAR DIFFERENTIAL FRONT OIL SEAL

COMPONENTS

SA15K–09



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SA24D–04

REPLACEMENT

1. DRAIN DIFFERENTIAL OIL

2. DISCONNECT REAR PROPELLER SHAFT

2WD: See page PR–3

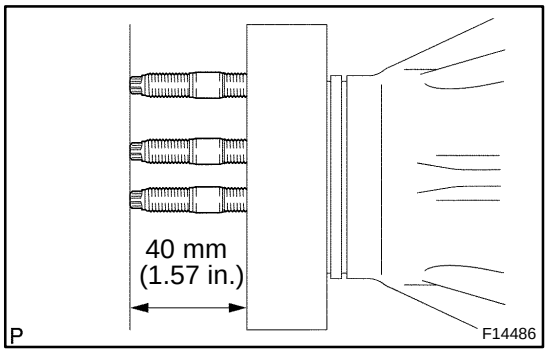
4WD: See page PR–7

3. REMOVE COMPANION FLANGE

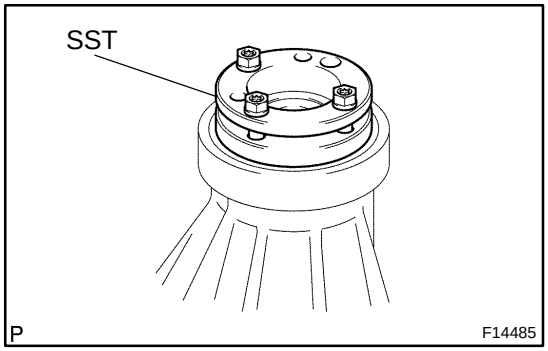
(a) 2WD:

Remove the companion flange nut.

(1) Using a chisel and hammer, loosen the staked part of the nut.

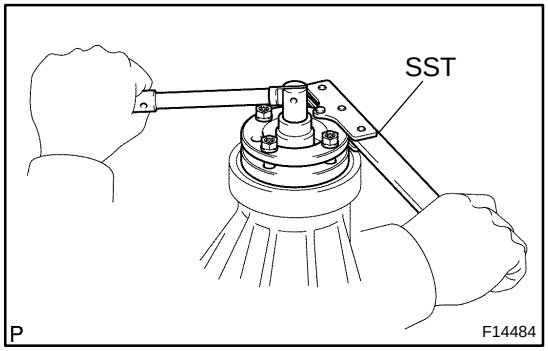


(2) Install the 3 stud bolts so that the heads come out 40 mm (1.57 in.).



(3) Set the SST and install the 3 nuts to the companion flange.

SST 09213–58013



(4) Install the other SST to the set SST to hold the companion flange, and remove the nut.

SST 09330–00021

(5) Remove the 3 nuts, SST and stud bolts from the companion flange.

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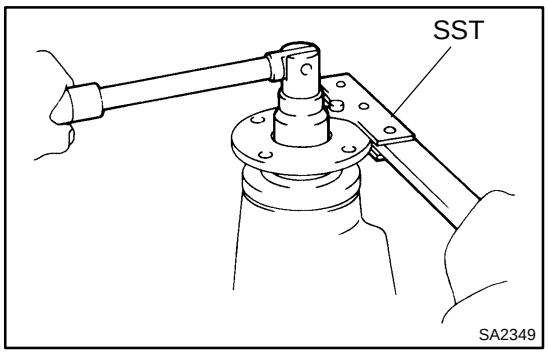
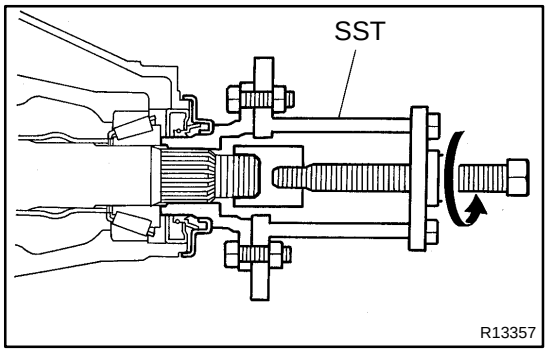
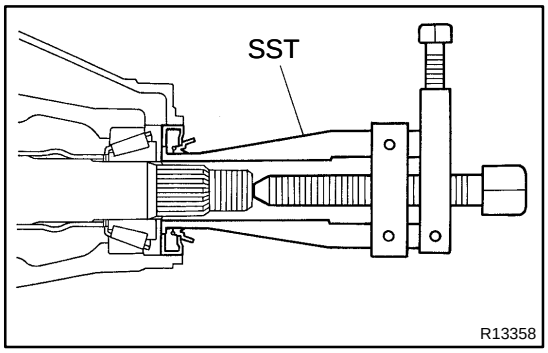


(b) 4WD:
(1) Using a chisel and hammer, loosen the staked part of the nut.
(2) Using SST to hold the flange, remove the nut.
SST 09330–00021

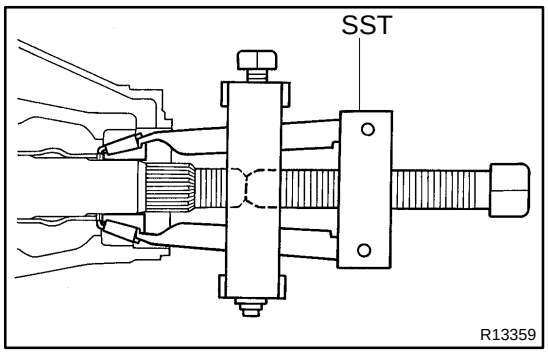


(c) Using SST, remove the companion flange.
SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03050)



4. REMOVE OIL SEAL

Using SST, remove the oil seal.
SST 09308–10010



5. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.
SST 09556–22010

6. REMOVE BEARING SPACER

(a) Remove the 2 washers.
(b) Remove the bearing spacer.

7. INSTALL NEW BEARING SPACER

(a) Install a new bearing spacer.
(b) Install the 2 washers.

8. INSTALL FRONT BEARING

(a) Place the front bearing.

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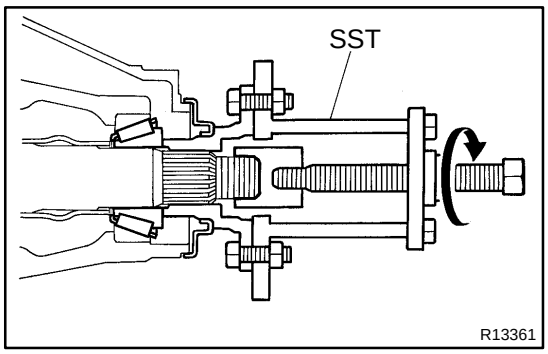
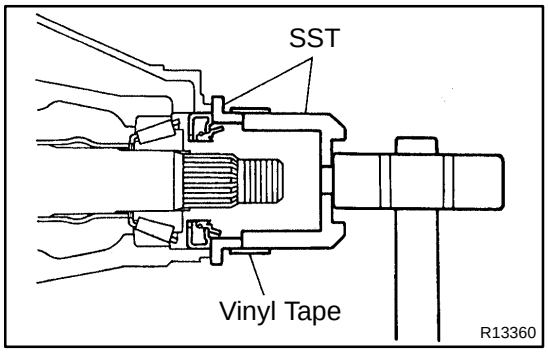


(b) Using SST and the companion flange, install the front bearing then remove the companion flange.
SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03050)

9. INSTALL NEW OIL SEAL

(a) Coat a new oil seal lip with MP grease.



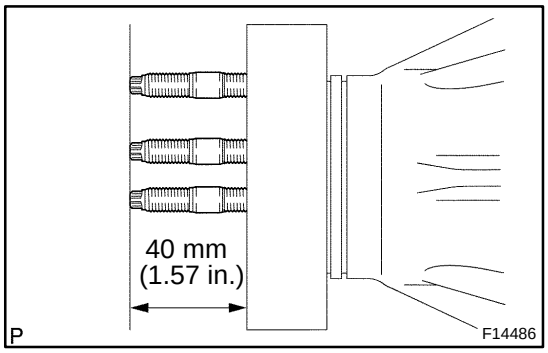
(b) Using SST and a plastic hammer, install the oil seal until its surface is flush with the differential carrier end.
SST 09316–12010, 09649–17010

HINT:
Connect 2 SST with vinyl tape.

10. INSTALL COMPANION FLANGE

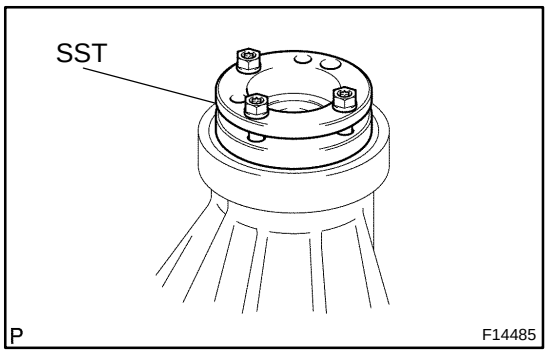
(a) Place the companion flange on the drive pinion.

(b) Coat the threads of a new nut with hypoid gear oil.

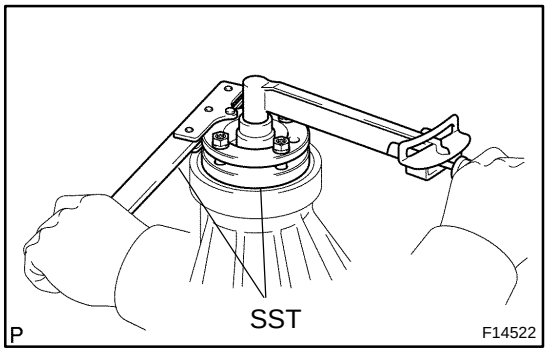


(c) 2WD:
Install the companion flange nut.

(1) Install the 3 stud bolts so that the heads come out 40 mm (1.57 in.).



(2) Set the SST and install the 3 nuts to the companion flange .
SST 09213–58013



(3) Install the other SST to the set SST to hold the companion flange and torque the nut.
SST 09330–00021
Torque: 147 N·m (1,500 kgf·cm, 109 ft·lbf)

(4) Remove the 3 nuts, SST and stud bolts from the companion flange.

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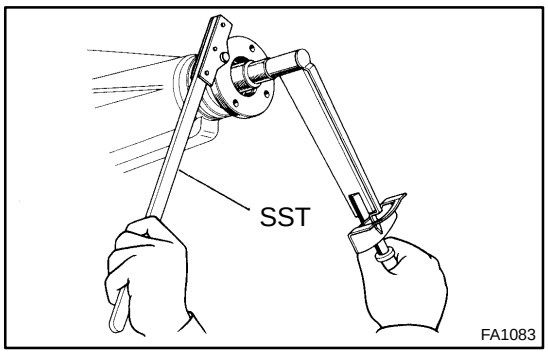
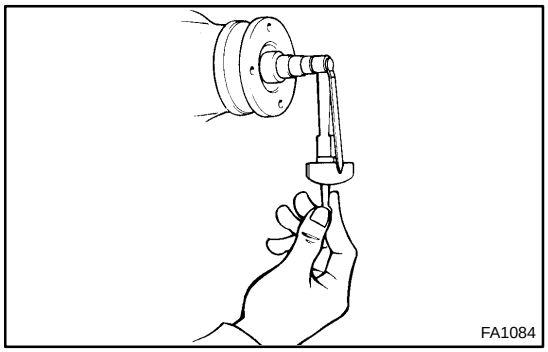
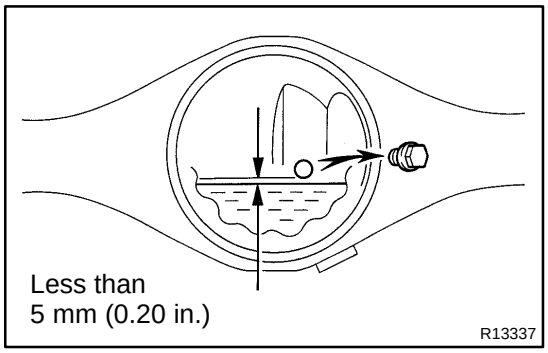


(d) 4WD:
Using SST to hold the flange, torque the nut.
SST 09330–00021
Torque: 147 N·m (1,500 kgf·cm, 109 ft·lbf)



11. ADJUST DRIVE PINION PRELOAD
(See page SA–119)
12. STAKE DRIVE PINION NUT
13. CONNECT REAR PROPELLER SHAFT
2WD: See page PR–5
4WD: See page PR–9



14. FILL DIFFERENTIAL WITH HYPOID GEAR OIL
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
Oil type: Hypoid gear oil API GL–5
Recommended oil viscosity:
SAE 75W – 140 (Synthetic)
Capacity: 3.65 liters (3.86 US qts, 3.21 Imp. qts)

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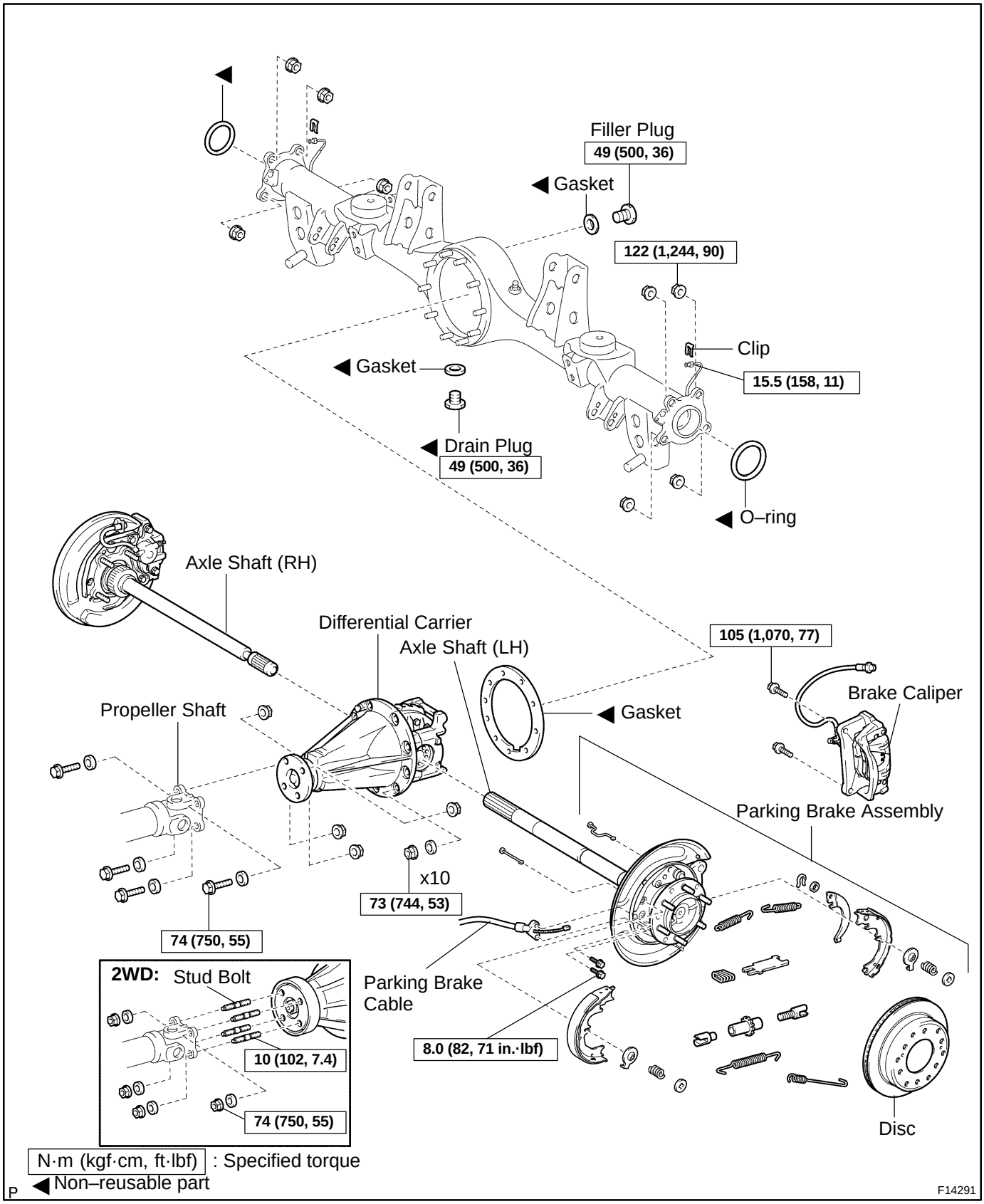
REAR DIFFERENTIAL CARRIER

SA15M–05

COMPONENTS



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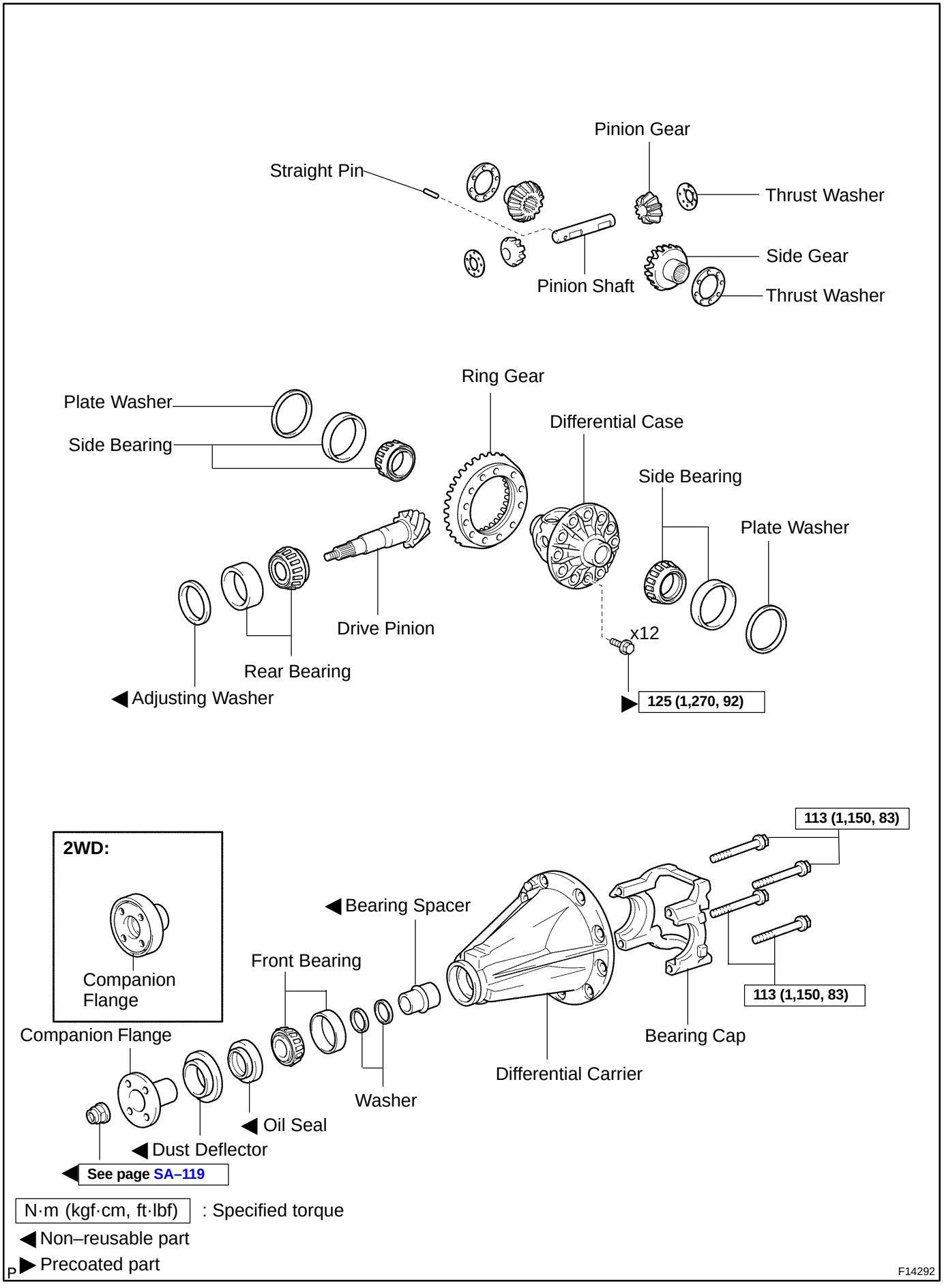
Pinion Gear
Straight Pin
Thrust Washer
Side Gear
Pinion Shaft
Thrust Washer
Ring Gear
Plate Washer
Differential Case
Side Bearing
Side Bearing
Plate Washer
Drive Pinion
x12
Rear Bearing
Adjusting Washer
125 (1,270, 92)
2WD:
Companion Flange
Companion Flange
Bearing Spacer
Front Bearing
113 (1,150, 83)
113 (1,150, 83)
Bearing Cap
Differential Carrier
Washer
Oil Seal
Dust Deflector
See page SA–119
N·m (kgf·cm, ft·lbf) : Specified torque
Non–reusable part
P Precoated part
F14292

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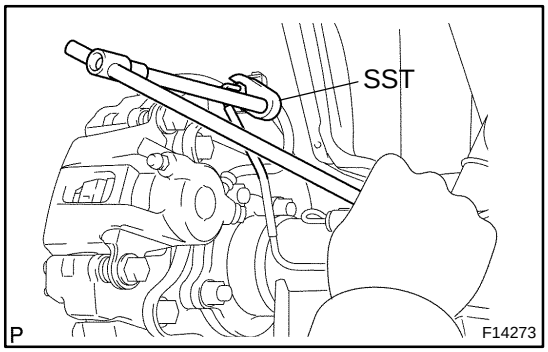
SA24E–02

REMOVAL

1. REMOVE 2 REAR WHEELS
Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)

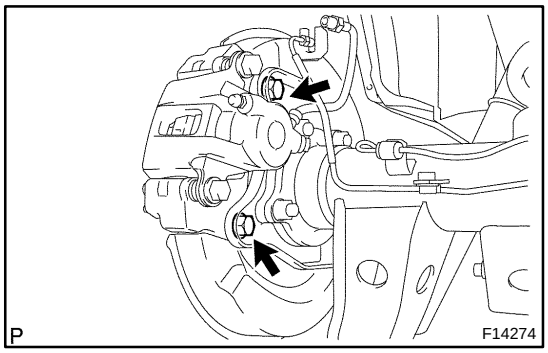
2. DRAIN HYPOID GEAR OIL
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



3. DISCONNECT BRAKE LINES

(a) Using SST, disconnect the brake line and remove the clip.
SST 09023–00100
Torque: 15.5 N·m (158 kgf·cm, 11 ft·lbf)

(b) Use the same procedure described above to the other side.



4. REMOVE BRAKE CALIPER AND DISC

(a) Remove the 2 bolts, brake caliper and disc.
Torque: 105 N·m (1,070 kgf·cm, 77 ft·lbf)

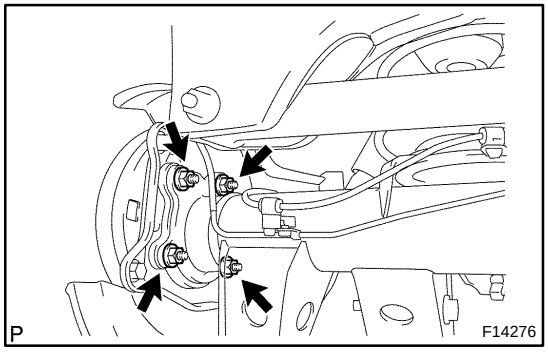
(b) Use the same procedure described above to the other side.

5. REMOVE PARKING BRAKE ASSEMBLY

(a) Remove the parking brake assembly (See page BR–43).

(b) Remove the 2 bolts and pull out the parking brake cable from the backing plate.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(c) Use the same procedures described above to the other side.



6. REMOVE AXLE SHAFTS

(a) Remove the 4 nuts.
Torque: 122 N·m (1,244 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft and remove the O–ring.

NOTICE:
Be careful not to damage the oil seal.

(c) Use the same procedures described above to the other side.

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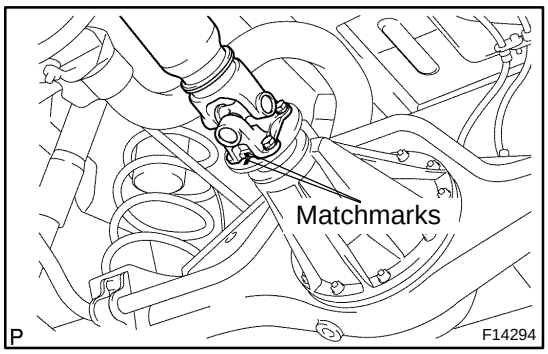


7. DISCONNECT REAR PROPELLER SHAFT

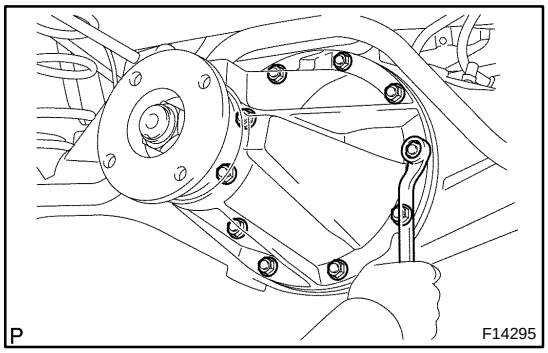
(a) 4WD:
  (1) Place matchmarks on the propeller shaft and differential flange.
  (2) Remove the 4 nuts, bolts, washers and disconnect the propeller shaft.

  Torque: 74 N·m (755 kgf·cm, 55 ft·lbf)

(b) 2WD:
  (1) Place matchmarks on the propeller shaft and differential flange.
  (2) Remove the 4 nuts, stud bolts, washers and disconnect the propeller shaft.

  Torque: 74 N·m (755 kgf·cm, 55 ft·lbf)

(c) Support the propeller shaft securely.



8. REMOVE DIFFERENTIAL CARRIER ASSEMBLY

(a) Remove the 10 nuts, washers and differential carrier assembly.

NOTICE:

Be careful not to damage the installation surface.

  Torque: 73 N·m (744 kgf·cm, 53 ft·lbf)

(b) Remove the gasket.

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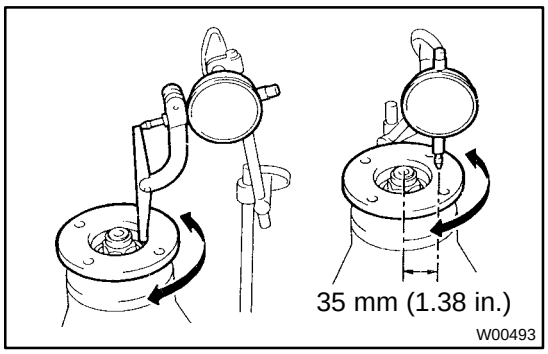
SA24F–03

DISASSEMBLY

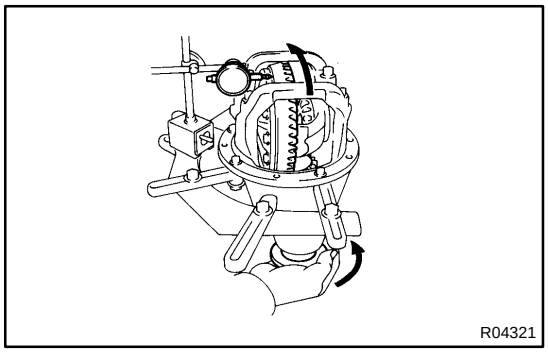


1. CHECK COMPANION FLANGE RUNOUT

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum: runout: 0.09 mm (0.0035 in.)

If the runout exceeds the maximum, replace the companion flange.

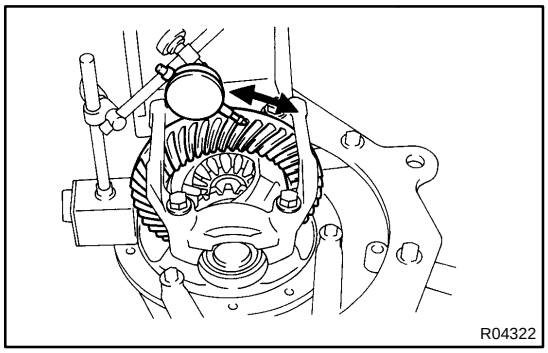


2. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.05 mm (0.0020 in.)

If the runout exceeds the maximum, replace the ring gear.



3. CHECK RING GEAR BACKLASH

Using a dial indicator, while holding the companion flange, measure the ring gear backlash.

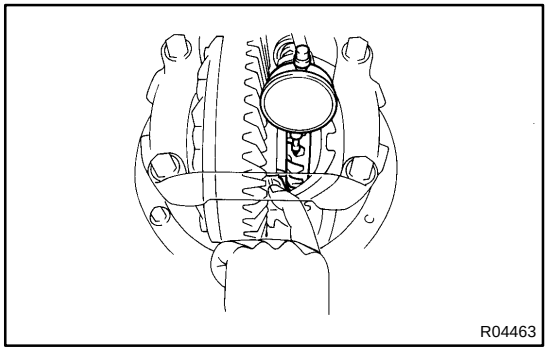
Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

HINT:

Measure at 3 or more positions around the circumference of the ring gear.

If the backlash is not within the specified value, adjust the side bearing preload or repair as necessary.

4. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA–119)



5. CHECK SIDE GEAR BACKLASH

Using a dial indicator, measure the side gear backlash while holding one pinion gear toward the case.

Backlash: 0.05 – 0.20 mm (0.0020 – 0.0079 in.)

If the backlash is not within the specified value, replace the side gear thrust washer of the different thickness (See page SA–119).

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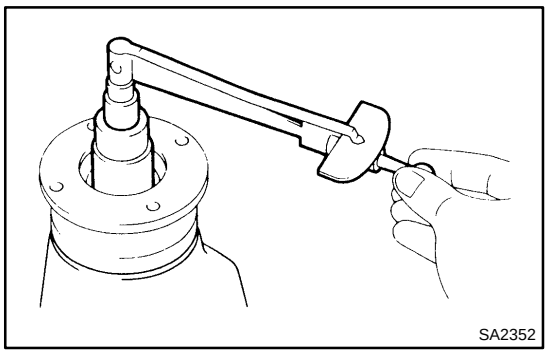


6. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the drive pinion using the backlash between the drive pinion and ring gear.

Preload (at starting):
0.8 – 1.1 N·m (8 – 11 kgf·cm, 7.0 – 9.7 in.·lbf)

7. CHECK TOTAL PRELOAD

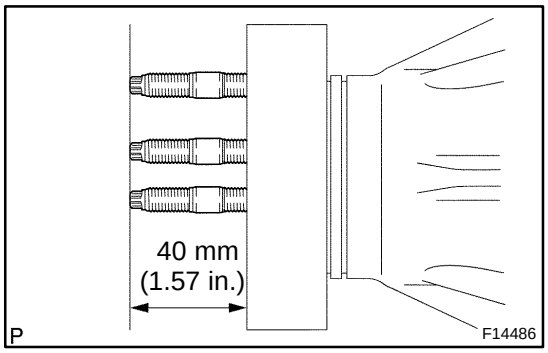
Using a torque wrench, measure the total preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):
Drive pinion preload plus 0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)

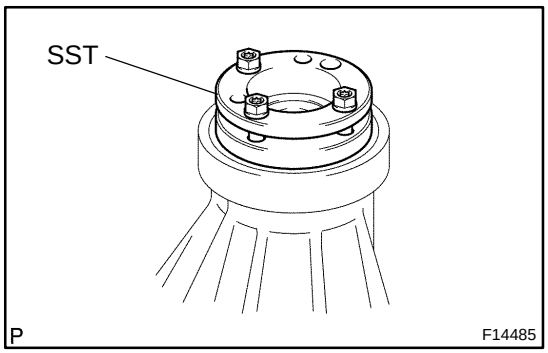
If necessary, disassemble and inspect the differential.

8. REMOVE COMPANION FLANGE

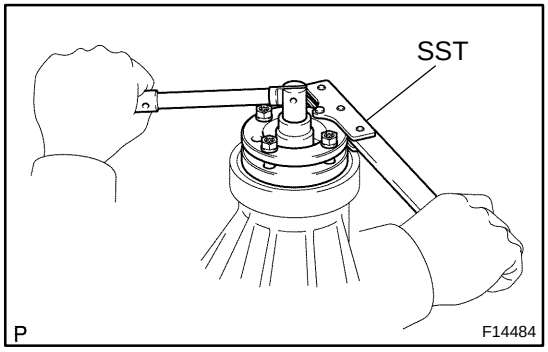
(a) Using a chisel and hammer, unstake the staked part of the nut.



(b) 2WD:
Remove the companion flange nut.
(1) Using a torx® soket (E8), remove the stud bolt and loosen the 3 bolts so that the heads come out 40 mm (1.57 in.).



(2) Set the SST and install the 3 nuts to the companion flange.
SST 09213–58013



(3) Install the other SST to the set SST to hold the companion flange, and remove the nut.
SST 09330–00021
(4) Remove the 3 nuts, stud bolts and SST from the companion flange.

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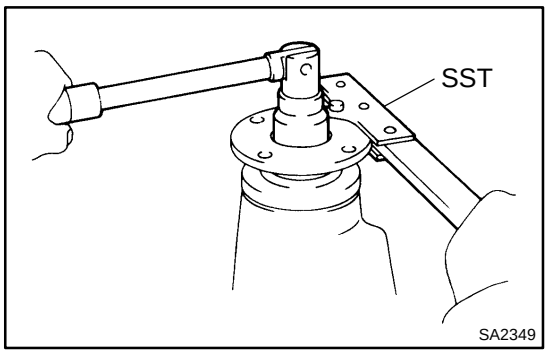
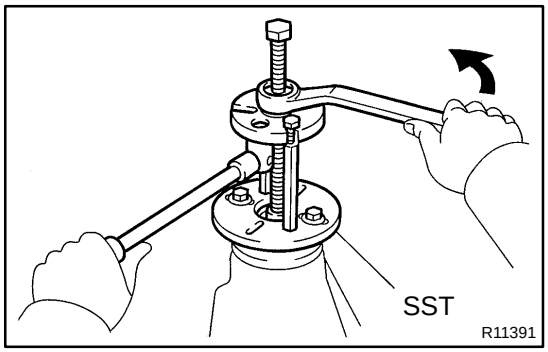
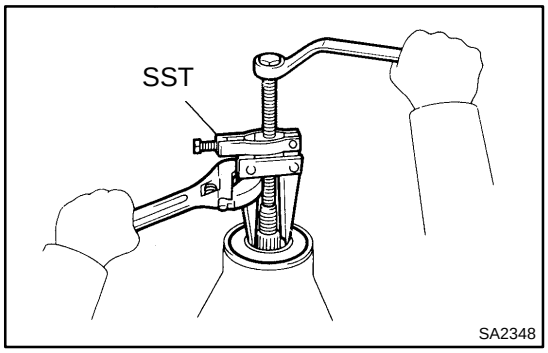


(c) 4WD:
Using SST to hold the flange, remove the nut.
SST 09330–00021

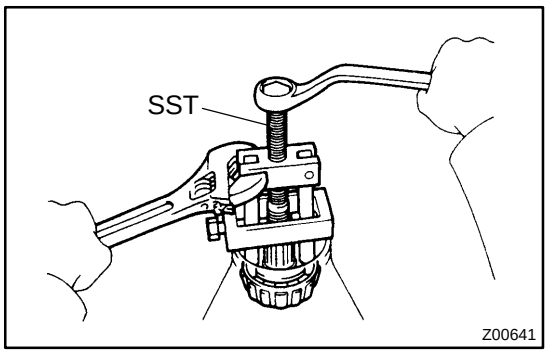


(d) Using SST, remove the companion flange.
SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03050)



9. REMOVE FRONT OIL SEAL

Using SST, remove the oil seal from the differential carrier.
SST 09308–10010

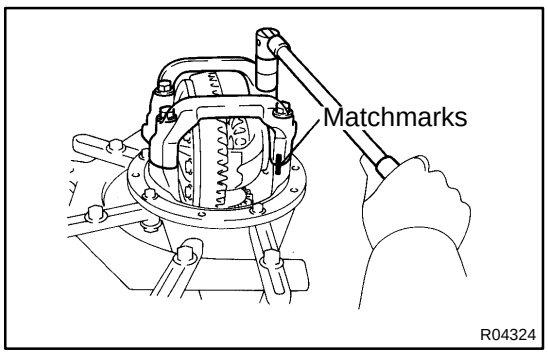


10. REMOVE FRONT BEARING AND BEARING SPACER

(a) Using SST, remove the bearing from the drive pinion.
SST 09556–22010

If the front bearing is damaged or worn, replace the front bearing.

(b) Remove the 2 washers and bearing spacer.



11. REMOVE DIFFERENTIAL CASE

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 4 bolts and bearing cap.

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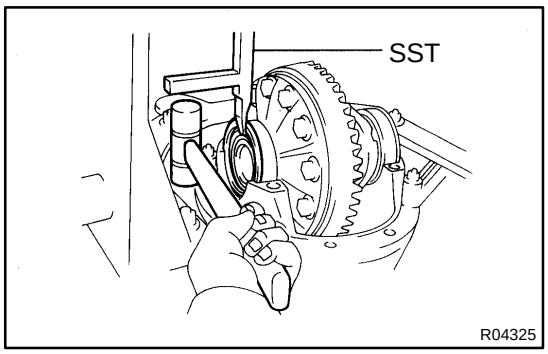


(c) Using SST and a plastic hammer, remove the 2 side bearing plate washers.
SST 09504–22012

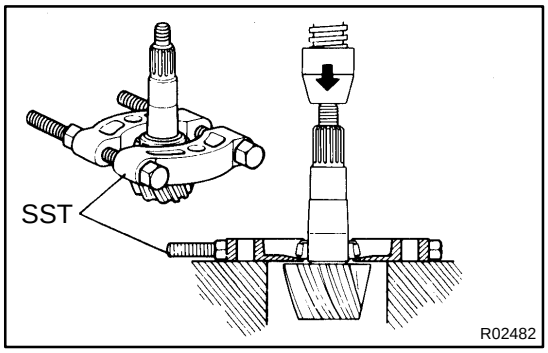
HINT:
Measure the plate washer thickness and note it down.

(d) Remove the differential case with the bearing outer races from the carrier.

HINT:
Tag the bearing outer races to show the location for reassembling.

12. REMOVE DRIVE PINION FROM DIFFERENTIAL CARRIER

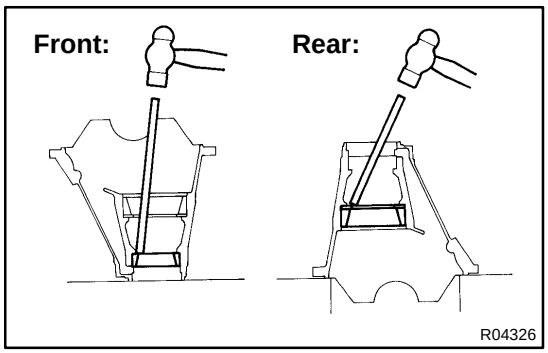
Remove the drive pinion with the rear bearing.



13. REMOVE DRIVE PINION REAR BEARING

Using SST and a press, remove the bearing from the drive pinion.
SST 09950–00020

HINT:
If the drive pinion or ring gear is damaged, replace them as a set.

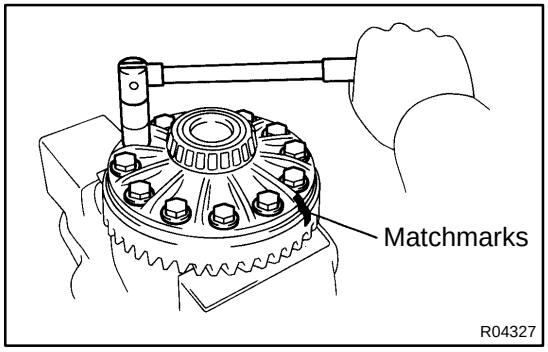


14. REMOVE FRONT AND REAR BEARING OUTER RACES AND ADJUSTING WASHER

NOTICE:
Do not remove the outer races except when replacing the bearings.

Using a brass bar and hammer, remove the outer races and adjusting washer from the carrier.

HINT:
Measure the adjusting washer thickness and note it down.



15. REMOVE RING GEAR

(a) Place matchmarks on the ring gear and differential case.
(b) Remove the 12 ring gear set bolts.
(c) Using a plastic hammer, tap on the ring gear to separate it from the differential case.

16. CHECK DIFFERENTIAL CASE RUNOUT

(a) Install the differential case in the differential carrier (See page SA–119).

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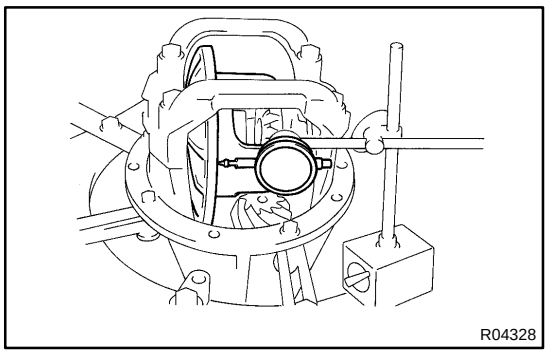
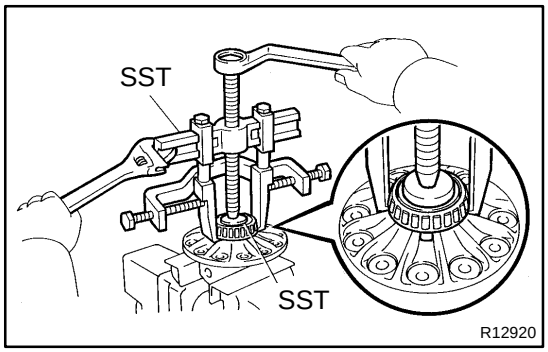


(b) Using a dial indicator, measure the differential case runout.
Maximum case runout: 0.04 mm (0.0016 in.)
(c) Remove the differential case.

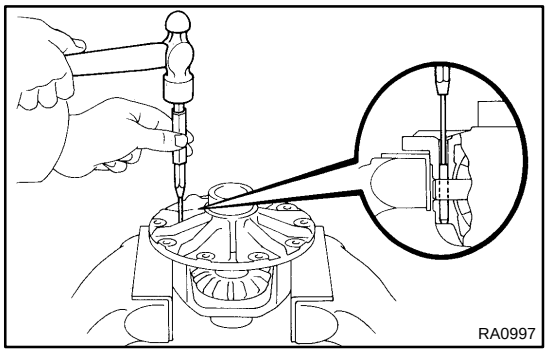


17. REMOVE SIDE BEARINGS

Using SST, remove the 2 side bearings from the differential case.

SST 09950–40011 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04061, 09957–04010, 09958–04011), 09950–60010 (09951–00480)

HINT:
Fix the claws of SST to the notch in the differential case.



18. DISASSEMBLE DIFFERENTIAL CASE ASSEMBLY

(a) Using a pin punch and hammer, remove the straight pin.
(b) Remove the pinion shaft, 2 pinion gears, pinion gear thrust washers, side gears and side gear thrust washers from the differential case.

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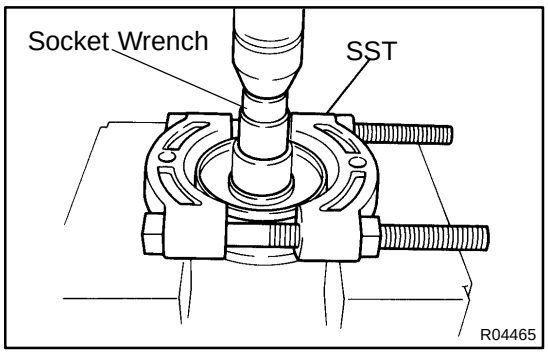
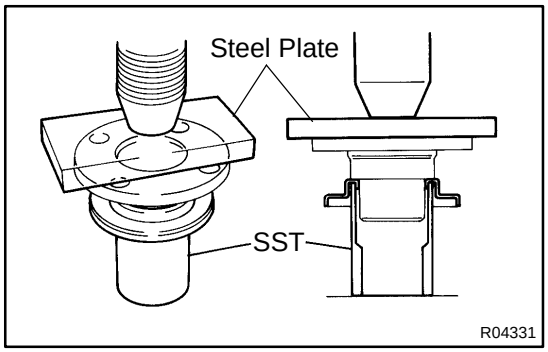
SA15P–07

REPLACEMENT

REPLACE COMPANION FLANGE DUST DEFLECTOR



(a) Using SST, a socket wrench and a press, remove the dust deflector.
SST 09950–00020



(b) Using SST, a press and steel plate, install a new dust deflector.
SST 09523–36010

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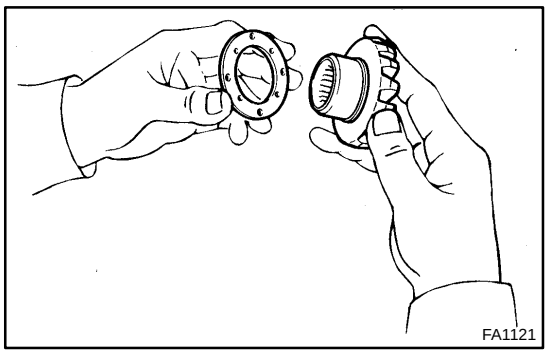
SA24G–03



REASSEMBLY

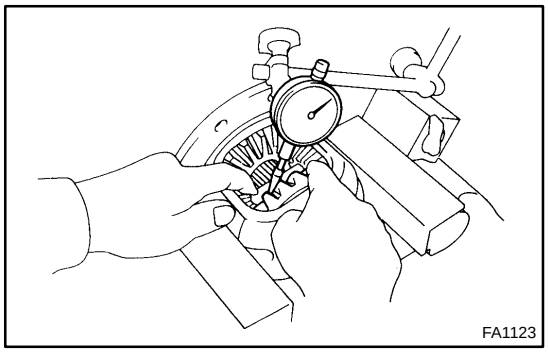
1. ASSEMBLE DIFFERENTIAL CASE

(a) Install the 2 thrust washers to the side gears.

(b) Install the 2 side gears with the thrust washers, 2 pinion gears, 2 pinion gear thrust washers and pinion shaft.

HINT:

Align the holes for the straight pin in the differential case and pinion shaft.



(c) Using a dial indicator, measure the side gear backlash while holding one pinion gear toward the differential case.

Backlash: 0.05 – 0.20 mm (0.0020 – 0.0079 in.)

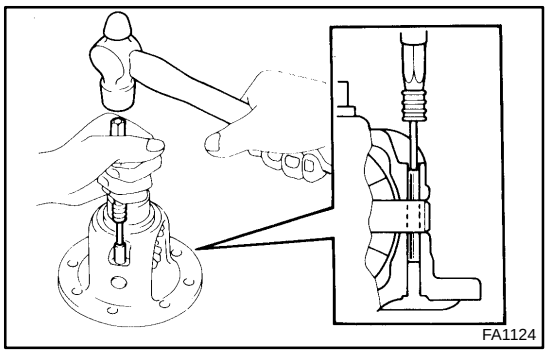
If the backlash is not within the specified value, replace the side gear thrust washer with an appropriate thickness.

HINT:

Refer to the following table to select thrust washers which will ensure that the backlash is within the specified value.

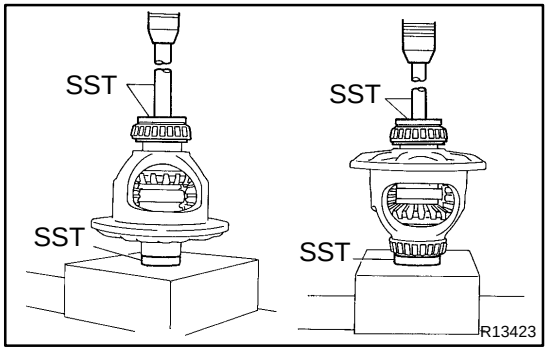
Washer thickness:

Thickness mm (in.)	Thickness mm (in.)
1.50 (0.0590)	1.75 (0.0689)
1.55 (0.0610)	1.80 (0.0709)
1.60 (0.0630)	1.85 (0.0728)
1.65 (0.0650)	1.90 (0.0748)
1.70 (0.0669)	–



(d) Using a pin punch and hammer, install the straight pin through the holes in the differential case and pinion shaft.

(e) Using a chisel and hammer, stake the outside of the differential case pin hole.



2. INSTALL SIDE BEARINGS

Using SST and a press, install the 2 side bearings into the differential case.

SST 09950–60010 (09951–00510),
09950–60020 (09950–00680),
09950–70010 (09951–07150)

3. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the contact surfaces of the differential case and ring gear.

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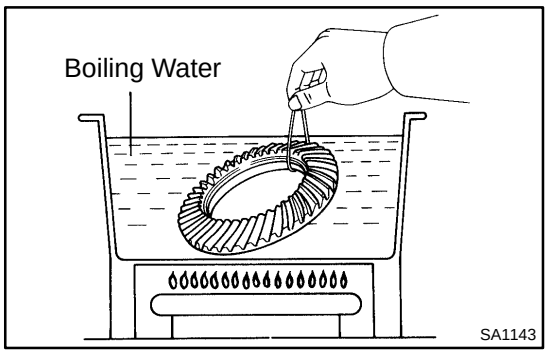
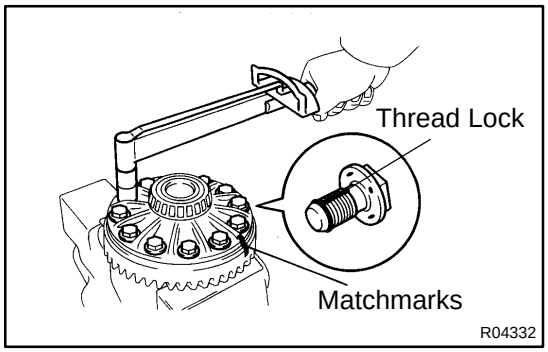


(b) Heat the ring gear to about 100°C (212°F) in boiling water.
(c) Carefully take the ring gear out of the boiling water.



(d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

HINT:

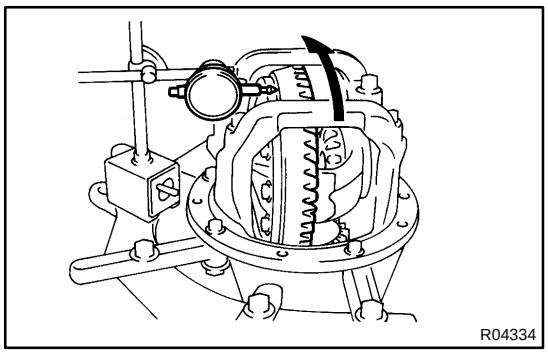
Align the matchmarks on the ring gear and differential case.

(e) After the ring gear has cooled sufficiently, torque the set bolts to which thread lock has been applied.

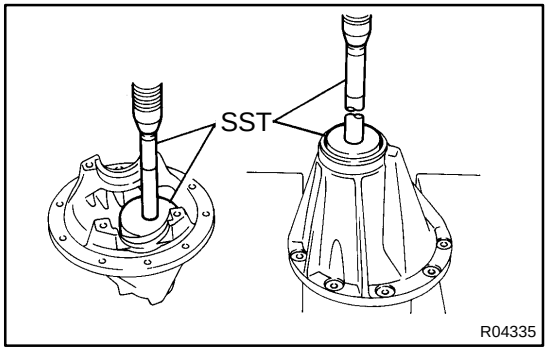
Thread lock:
Part No. 08833–00100, THREE BOND 1360K or equivalent.
Torque: 125 N·m (1,270 kgf·cm, 92 ft·lbf)

4. INSPECT RING GEAR RUNOUT

(a) Install the differential case into the carrier and install the plate washers to where there is no play in the bearing (See step 8.).
(b) Install the bearing cap (See step 11.).



(c) Using a dial indicator, measure the runout of the ring gear.
(d) Remove the bearing caps and differential case.
Maximum runout: 0.05 mm (0.0020 in.)



5. INSTALL DRIVE PINION BEARING OUTER RACES AND ADJUSTING WASHER

(a) Using SST and a press, install a new front bearing outer race to the carrier.
SST 09950–60020 (09951–00710),
09950–70010 (09951–07150)
(b) Using SST and a press, install a new adjusting washer and a new rear bearing outer race to the carrier.
SST 09950–60020 (09951–00910),
09950–70010 (09951–07150)

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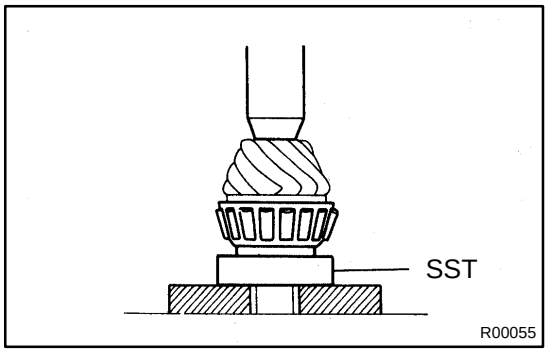
HINT:
First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with a different thickness if necessary.



6. INSTALL DRIVE PINION REAR BEARING

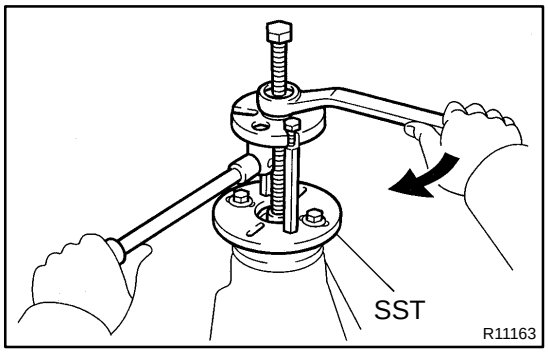
Using SST and a press, install the rear bearing onto the drive pinion.

SST 09506–35010

7. TEMPORARILY ADJUST DRIVE PINION PRELOAD

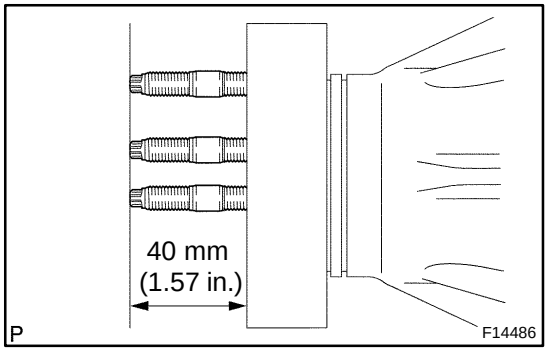
(a) Install the drive pinion and front bearing.

HINT:
After adjusting the ring gear tooth contact pattern, assemble the spacer, washers and oil seal.

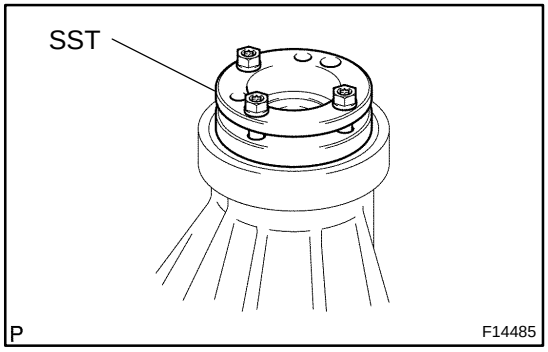


(b) Using SST, install the companion flange.
SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03050)

(c) Coat the threads of a new nut with hypoid gear oil.



(d) 2WD:
Install the conpanion flange nut.
(1) Install the 3 stud bolts so that the heads come out 40 mm (1.57 in.).



(2) Set the SST and install the 3 nuts to the companion flange.
SST 09213–58013

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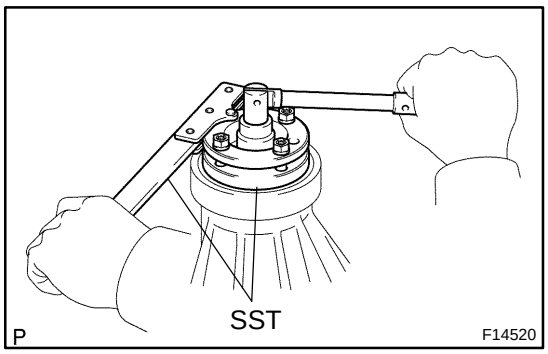


(3) Adjust the drive pinion preload by tightening the companion flange nut.

HINT:

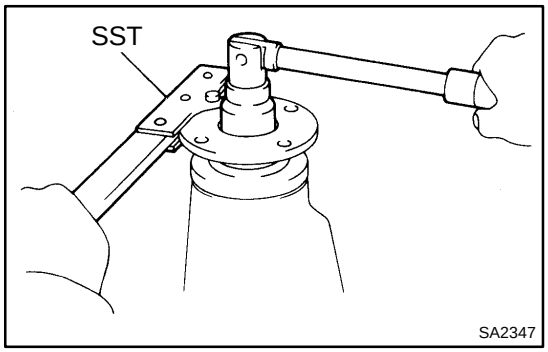
Using SST to hold the flange, torque the nut.

SST 09330–00021

NOTICE:

As there is no spacer, tighten the nut a little at a time and be careful not to overtighten it.

(4) Remove the 3 nuts and SST.



(e) 4WD:

Adjust the drive pinion preload by tightening the companion flange nut.

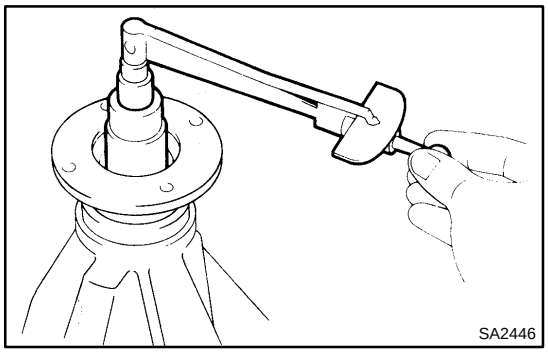
HINT:

Using SST to hold the flange, torque the nut.

SST 09330–00021

NOTICE:

As there is no spacer, tighten the nut a little at a time and be careful not to overtighten it.



(f) Using a torque wrench, measure the preload of the drive pinion using the backlash between the drive pinion and ring gear.

Preload (at starting):

New bearing

1.3 – 1.9 N·m (13 – 19 kgf·cm, 11.4 – 16.7 in.·lbf)

Reused bearing

0.8 – 1.1 N·m (8 – 11kgf·cm, 7.0 – 9.7 in.·lbf)

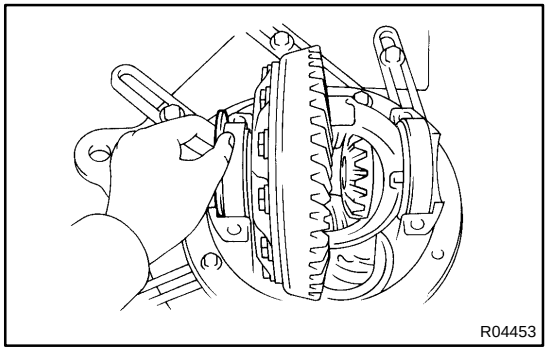
(g) 2WD:

Remove the stud bolts from the companion flange.

8. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the 2 bearing outer races on their respective bearings. Make sure the right and left races are not interchanged.

(b) Install the differential case in the carrier.



9. ADJUST RING GEAR BACKLASH

(a) Install the plate washer on the ring gear back side.

HINT:

Make sure that the ring gear has backlash.

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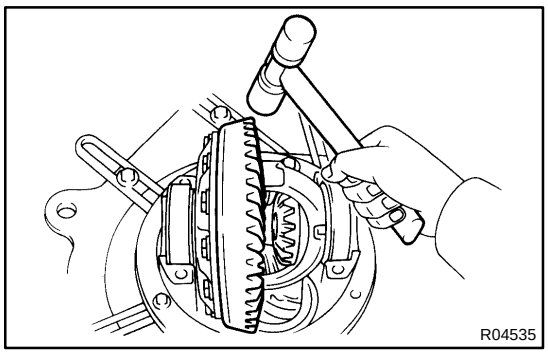
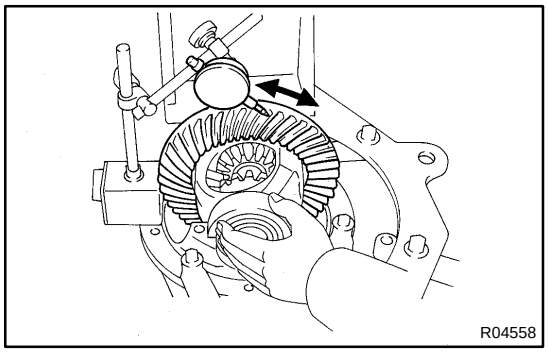
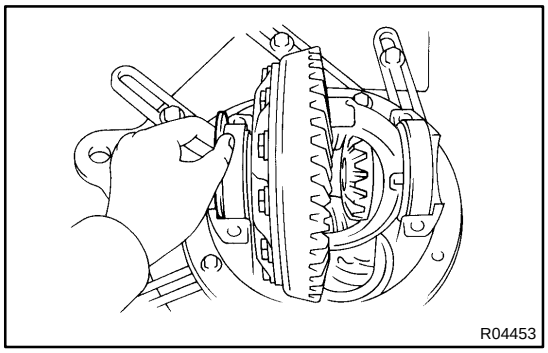


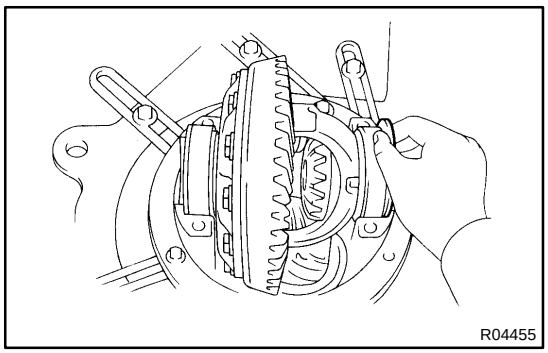
(b) Tap on the ring gear with a plastic hammer so that the washer fits to the bearing.



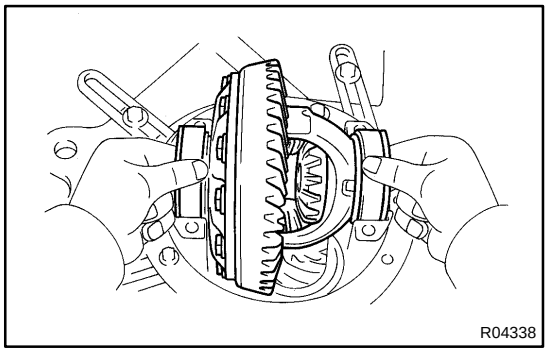
(c) Using a dial indicator, while holding the companion flange, measure the ring gear backlash.
Backlash (reference):
0.13 – 0.18 mm (0.0051 – 0.0071 in.)



(d) Select a plate washer for the back side of the ring gear using the backlash as a reference.



(e) Select a ring gear teeth side plate washer so that there is no clearance between the outer race and case.
(f) Remove the 2 plate washers and differential case.
(g) Install the plate washer into the ring gear back side of the carrier.



(h) Place the other plate washer onto the differential case together with the outer race, and install the differential case with the outer race into the carrier.
(i) Tap on the ring gear with a plastic hammer so that the washers fit to the bearing.

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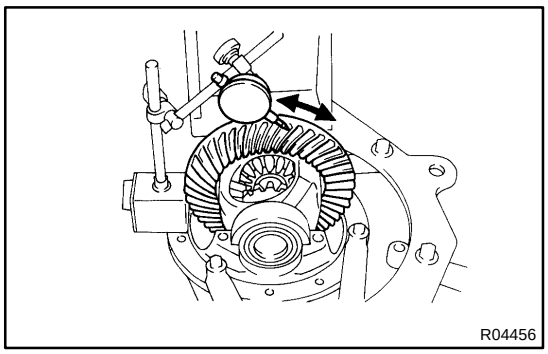
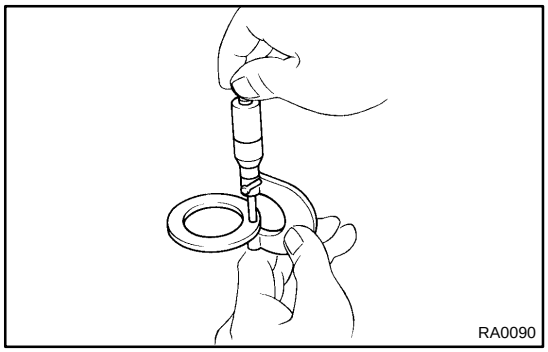
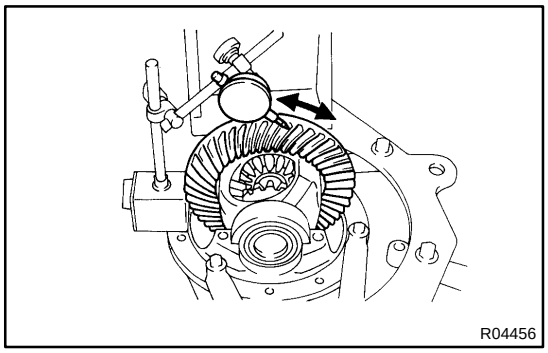

R04456


RA0090


R04456

(j) Using a dial indicator, while holding the companion flange measure the ring gear backlash.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

If the backlash is not within the specified value, adjust it by either increasing or decreasing the thickness of washers on both sides by an equal amount.

HINT:

There should be no clearance between the plate washer and the case.

Make sure that there is a ring gear backlash.

10. ADJUST SIDE BEARING PRELOAD

(a) Remove the ring gear teeth side plate washer and using a micrometer, measure the thickness.

(b) Using the backlash as a reference, install a new washer that is 0.05 – 0.20 mm (0.0019 – 0.0078 in.) thicker than the washer removed.

HINT:

Select a washer which can be pressed in 2/3 of the way with your finger.

(c) Using a plastic hammer, install the plate washer.

(d) Recheck the ring gear backlash.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

If the backlash is not within the specified value, adjust it by either increasing or decreasing the thickness of washers on both sides by equal amount.

HINT:

The backlash will change by about 0.02 mm (0.0008 in.) corresponding to 0.03 mm (0.0012 in.) change in the plate washer.

Washer thickness:

Thickness		Thickness		Thickness	
Mark	mm (in.)	Mark	mm (in.)	Mark	mm (in.)
58	2.58 (0.1015)	90	2.90 (0.1142)	22	3.22 (0.1268)
60	2.60 (0.1024)	92	2.92 (0.1150)	24	3.24 (0.1276)
62	2.62 (0.1031)	94	2.94 (0.1157)	26	3.26 (0.1283)
64	2.64 (0.1039)	96	2.96 (0.1165)	28	3.28 (0.1291)
66	2.66 (0.1047)	98	2.98 (0.1173)	30	3.30 (0.1299)
68	2.68 (0.1055)	00	3.00 (0.1181)	32	3.32 (0.1307)
70	2.70 (0.1063)	02	3.02 (0.1189)	34	3.34 (0.1315)
72	2.72 (0.1071)	04	3.04 (0.1197)	36	3.36 (0.1323)
74	2.74 (0.1079)	06	3.06 (0.1205)	38	3.38 (0.1331)
76	2.76 (0.1087)	08	3.08 (0.1213)	40	3.40 (0.1339)
78	2.78 (0.1094)	10	3.10 (0.1220)	42	3.42 (0.1346)
80	2.80 (0.1102)	12	3.12 (0.1228)	44	3.44 (0.1354)
82	2.82 (0.1110)	14	3.14 (0.1236)	46	3.46 (0.1362)
84	2.84 (0.1118)	16	3.16 (0.1244)	48	3.48 (0.1370)

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86	2.86 (0.1126)	18	3.18 (0.1252)	–
88	2.88 (0.1134)	20	3.20 (0.1260)	–

11. INSTALL BEARING CAP

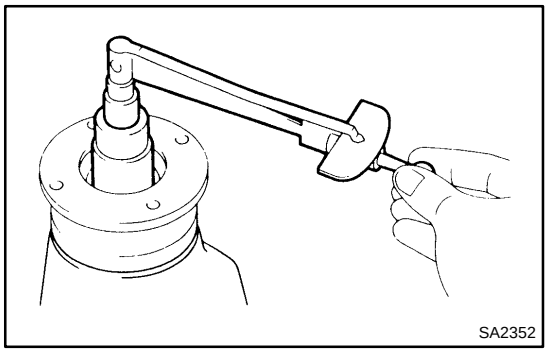
(a) Align the matchmarks on the cap and carrier.

(b) Install and torque the 4 bolts.

Torque: 113 N·m (1,150 kgf·cm, 83 ft·lbf)

HINT:

After giving the ring gear 5 rotations or more, recheck the back lash.

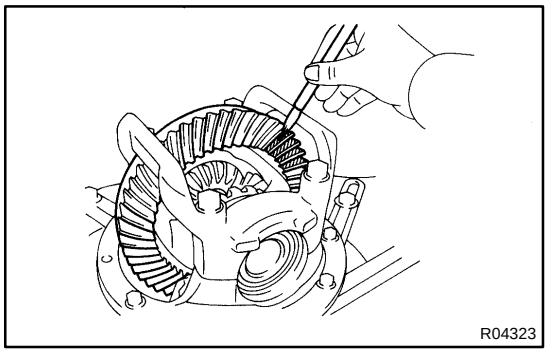

SA2352

12. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the total preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):

Drive pinion preload plus 0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)

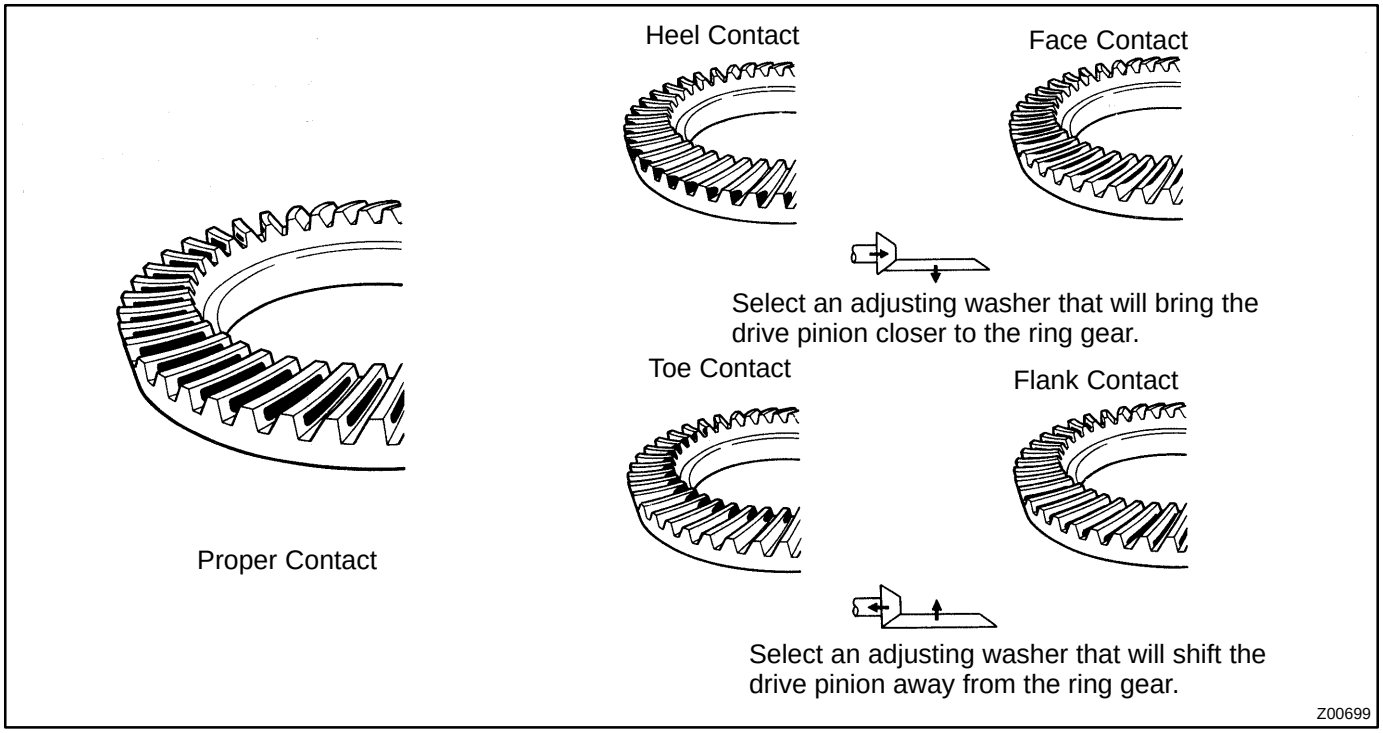

R04323

13. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(a) Coat 3 or 4 teeth at three different positions on the ring gear with red lead primer.

(b) Hold the companion flange firmly and rotate the ring gear in both directions.

(c) Inspect the teeth pattern.



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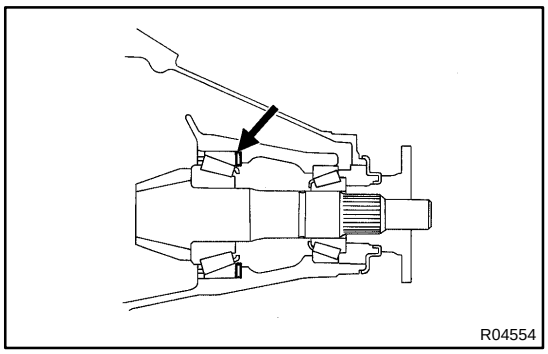


If the teeth are not contacting properly, use the following table to select a proper washer for correction.

Washer thickness:

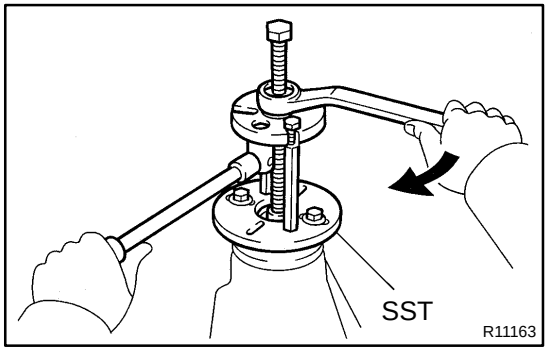
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
87	1.87 (0.0736)	01	2.01 (0.0791)	15	2.15 (0.0846)
88	1.88 (0.0740)	02	2.02 (0.0795)	16	2.16 (0.0850)
89	1.89 (0.0744)	03	2.03 (0.0799)	17	2.17 (0.0854)
90	1.90 (0.0748)	04	2.04 (0.0803)	18	2.18 (0.0858)
91	1.91 (0.0752)	05	2.05 (0.0807)	19	2.19 (0.0862)
92	1.92 (0.0756)	06	2.06 (0.0811)	20	2.20 (0.0866)
93	1.93 (0.0760)	07	2.07 (0.0815)	21	2.21 (0.0870)
94	1.94 (0.0764)	08	2.08 (0.0819)	22	2.22 (0.0874)
95	1.95 (0.0768)	09	2.09 (0.0823)	23	2.23 (0.0878)
96	1.96 (0.0772)	10	2.10 (0.0827)	24	2.24 (0.0882)
97	1.97 (0.0776)	11	2.11 (0.0831)	25	2.25 (0.0886)
98	1.98 (0.0780)	12	2.12 (0.0835)	26	2.26 (0.0890)
99	1.99 (0.0783)	13	2.13 (0.0839)	27	2.27 (0.0894)
00	2.00 (0.0787)	14	2.14 (0.0843)	28	2.28 (0.0898)

14. REMOVE COMPANION FLANGE (See page SA–113)

15. REMOVE FRONT BEARING (See page SA–113)

16. INSTALL NEW BEARING SPACER, 2 WASHERS AND FRONT BEARING

(a) Install a new bearing spacer and 2 washers, and place the front bearing.



(b) Using SST and the companion flange, install the front bearing then remove the companion flange.

SST 09950–30012 (09951–03010, 09953–03010, 09954–03010, 09955–03030, 09956–03050)

17. INSTALL NEW OIL SEAL

(a) Coat a new oil seal lip with MP grease.

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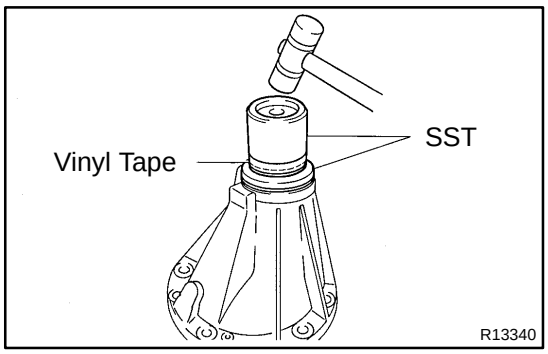


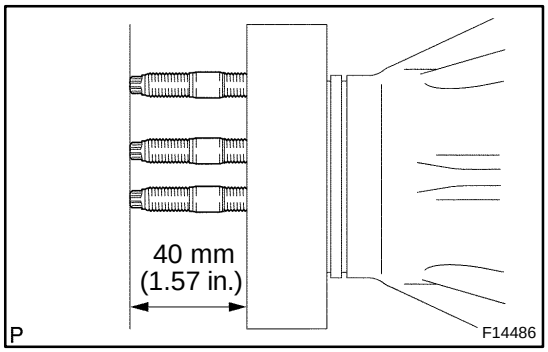
(b) Using SST and a plastic hammer, install the oil seal until its surface is flush with the differential carrier end.
SST 09316–12010, 09649–17010

HINT:
Connect 2 SST with vinyl tape.

18. INSTALL COMPANION FLANGE

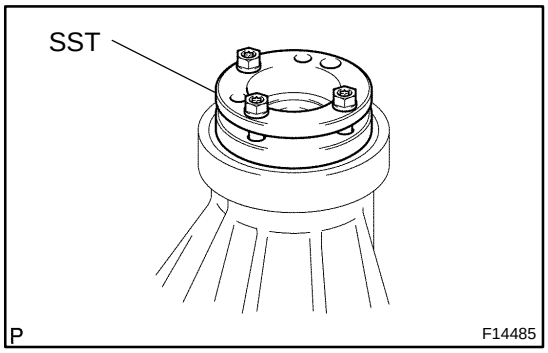
(a) Place the companion flange.

(b) Coat the threads of a new nut with hypoid gear oil.

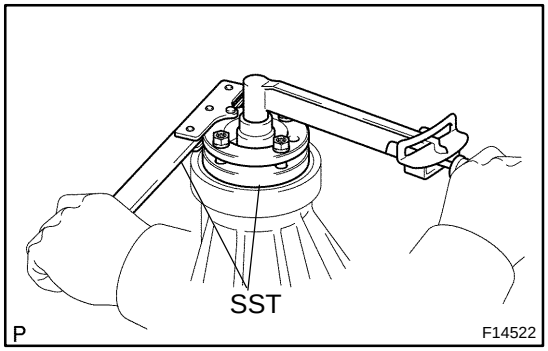


(c) 2WD:
Torque the companion flange nut.

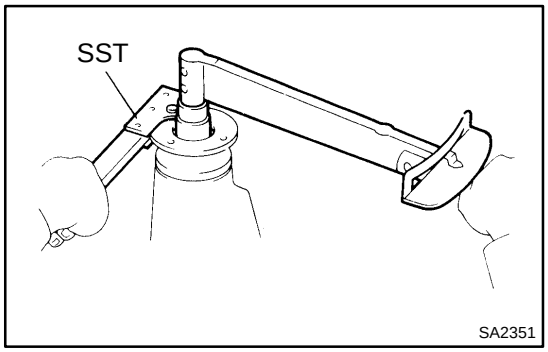
(1) Install the 3 stud bolts so that the heads come out 40 mm (1.57 in.).



(2) Set the SST and install the 3 nuts to the companion flange.
SST 09213–58013



(3) Using SST to hold the flange, torque the nut.
SST 09330–00021
Torque: 147 N·m (1,500 kgf·cm, 109 ft·lbf)



(d) 4WD:
Using SST to hold the flange, torque the nut.
SST 09330–00021
Torque: 147 N·m (1,500 kgf·cm, 109 ft·lbf)

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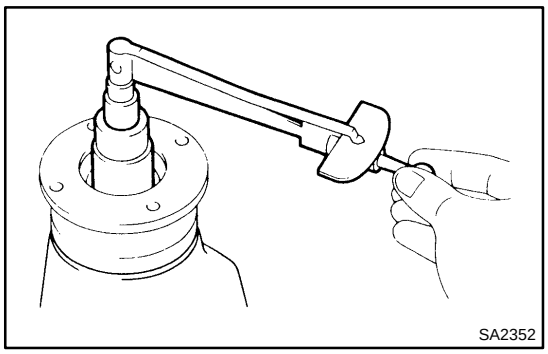


19. ADJUST DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the drive pinion using the backlash between the drive pinion and ring gear.

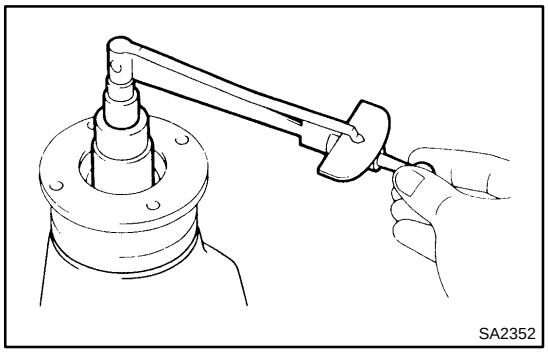
Preload (at starting):
New bearing
1.3 – 1.9 N·m (13 – 19 kgf·cm, 11.4 – 16.7 in.·lbf)
Reused bearing
0.8 – 1.1 N·m (8 – 11 kgf·cm, 7.0 – 9.7 in.·lbf)

If the preload is greater than the specified value, replace the bearing spacer.

If the preload is less than the specified value, retighten the nut with a force of 13 N·m (130 kgf·cm, 9 ft·lbf) until the specified preload is reached.

Torque: 451 N·m (4,600 kgf·cm, 333 ft·lbf) or less

If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.



20. CHECK TOTAL PRELOAD

Using a torque wrench, measure the total preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):
Drive pinion preload plus 0.4 – 0.6 N·m (4 – 6 kgf·cm, 3.5 – 5.2 in.·lbf)

21. CHECK RING GEAR BACKLASH

Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 – 0.18 mm (0.0051 – 0.0071 in.)

22. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See step 13.)

23. CHECK COMPANION FLANGE RUNOUT
(See page SA–113)

24. STAKE DRIVE PINION NUT

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SA15R–13

INSTALLATION

1. INSTALL DIFFERENTIAL CARRIER ASSEMBLY

(a) Install a new gasket.

(b) Install the differential carrier assembly with the 10 washers and nuts.

NOTICE:

Be careful not to damage the installation surface.

Torque: 73 N·m (740 kgf·cm, 54 ft·lbf)

2. CONNECT REAR PROPELLER SHAFT

2WD: See page PR–5

4WD: See page PR–9

3. INSTALL REAR AXLE SHAFTS (See page SA–102)

4. FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA–105)

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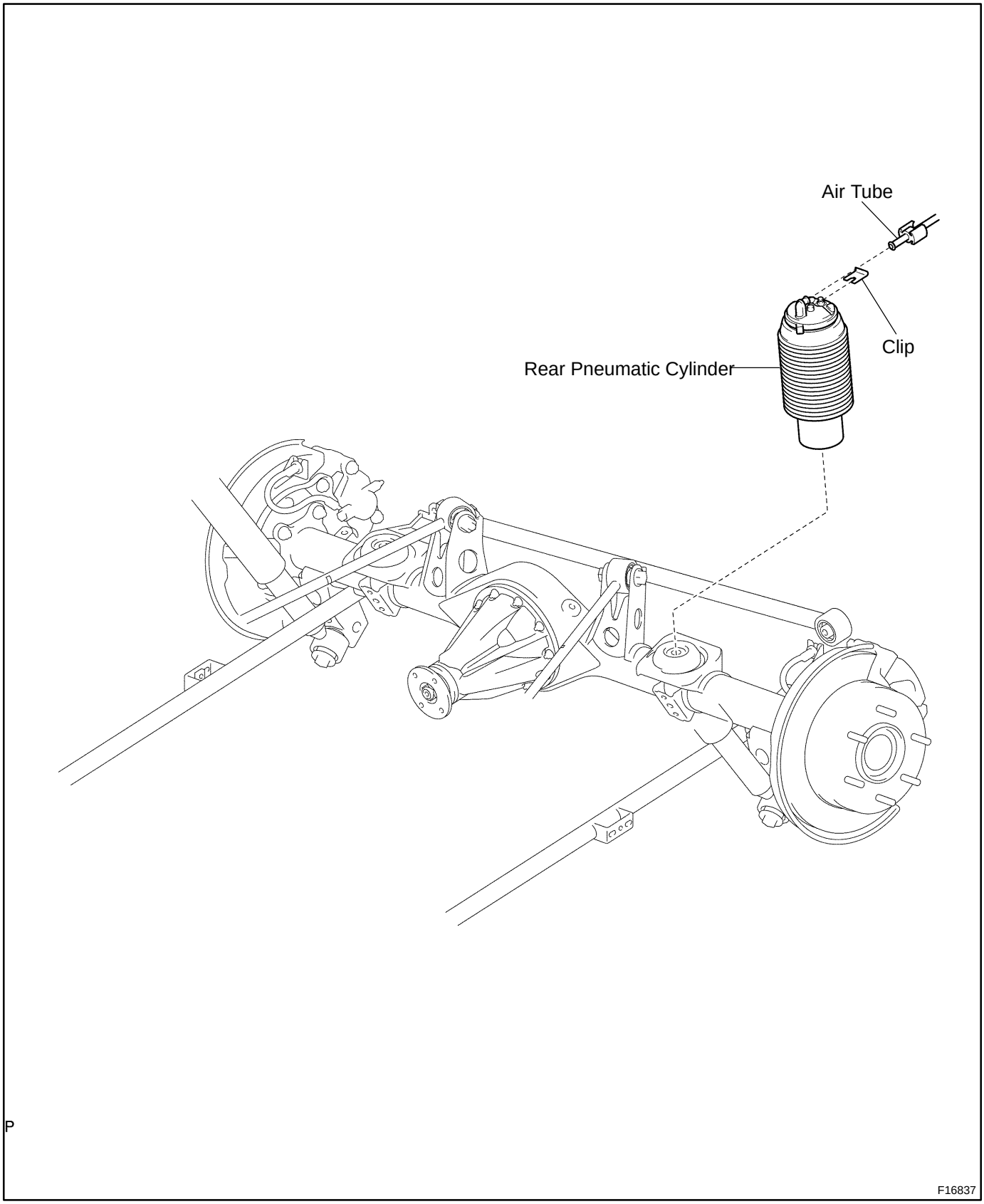
REAR PNEUMATIC CYLINDER

COMPONENTS

SA0KI–05



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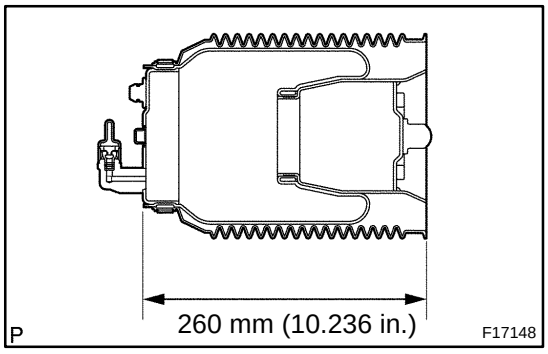
SA2CX–01

REMOVAL

NOTICE:

- **Do not extend the pneumatic cylinder by itself. If the cylinder is fully extended, it cannot be reused.**
- **Do not replenish the pneumatic cylinder by itself with air.**
- **Do not remove the pneumatic cylinder with air in it.**
- **If reusing the pneumatic cylinder, replace the 2 O–rings, plate and connector No.2 with new ones.**



- **When installing the pneumatic cylinder, keep the cylinder length 260 mm (10.236 in.) or less.**

1. BLEED AIR (See page SA–153)

HINT:

Disconnect the one touch air connector of the height control valve and bleed the air.

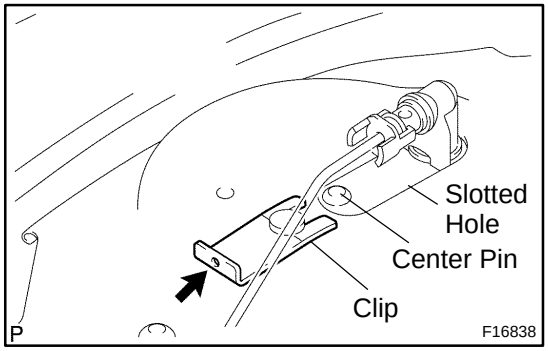
2. REMOVE REAR PNEUMATIC CYLINDER

(a) Jack up the vehicle and support the frame with safety stands.

NOTICE:

- **Do the work with the rear axle assy lowered.**
- **Do the work with the shock absorber installed.**

(b) Disconnect the height control tube.



(c) Remove the clip on the upper side of the rear pneumatic cylinder.

HINT:

- If the clip cannot be easily removed, thread a wire through the hole to pull it.
- When installing the clip, make sure that the center pin on the upper side of the rear pneumatic cylinder is in the slotted hole of the frame.

(d) Remove the rear pneumatic cylinder.

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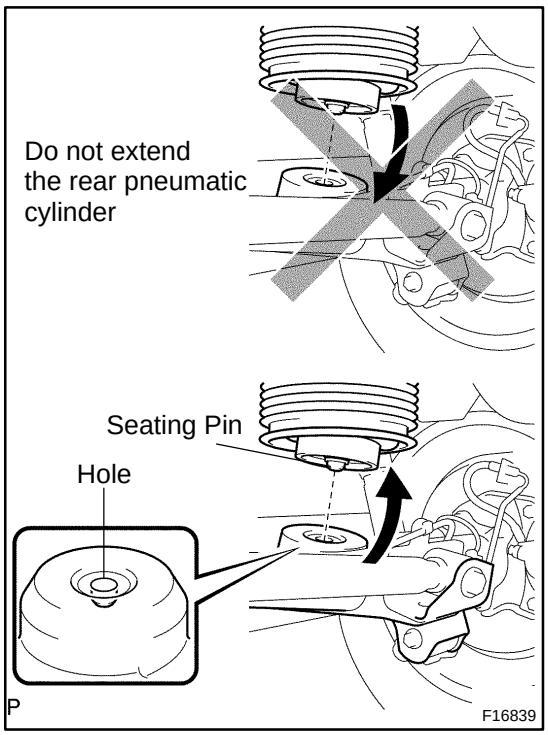

HINT:
Perform the following before installation.
When using safety stands and jack:

(1) Jack up the rear axle until the bottom of the rear pneumatic cylinder touches the rear axle and fit the seating pin on the lower side of the rear pneumatic cylinder into the rear axle.

NOTICE:

- **Do not extend the rear pneumatic cylinder in order to fit the seating pin into the hole.**
- **Make sure that the seating pin on the lower side of the rear pneumatic cylinder fits in the hole in the rear axle.**

(2) Remove the safety stands with care not to extend the rear pneumatic cylinder when jacking down the vehicle till it sits on the ground.

NOTICE:
Make sure that the diaphragm (rubber part) of the pneumatic cylinder is not deformed.

(3) Start the engine and replenish the rear pneumatic cylinder with air.

(e) When using a swing arm type lift:

(1) Lower the vehicle till the tires hit the ground, and continue lowering slowly until the bottom of the rear pneumatic cylinder touches the rear axle.

(2) Align the seating pin on the cylinder with the hole in the rear axle and install the rear pneumatic cylinder on the rear axle.

NOTICE:

- **Do not extend the rear pneumatic cylinder by lifting up the rear axle housing after fitting the seating pin.**
- **Make sure that the diaphragm (rubber part) of the pneumatic cylinder is not deformed.**

(3) Lower the lift carefully so as not to extend the rear pneumatic cylinder.

NOTICE:
Make sure that the diaphragm (rubber part) of the pneumatic cylinder is not deformed.

(4) Start the engine and replenish the rear pneumatic cylinder with air.

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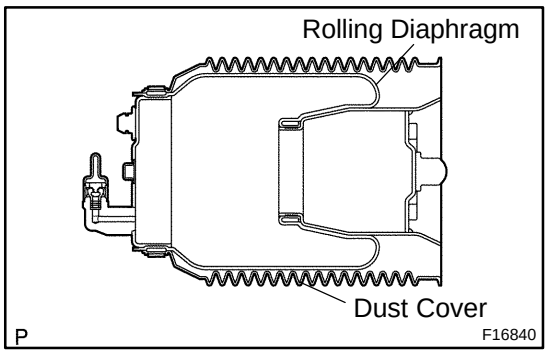
SA2CY–01



INSPECTION

1. INSPECT ROLLING DIAPHRAGM

(a) Lift up the dust cover and check that the rolling diaphragm is not damaged or cracked.

If damage or cracks exist, replace the pneumatic cylinder.

(b) Return the dust cover back to the original position.

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SA0KM–05

INSTALLATION

Installation is in the reverse order of removal (See page SA–131).

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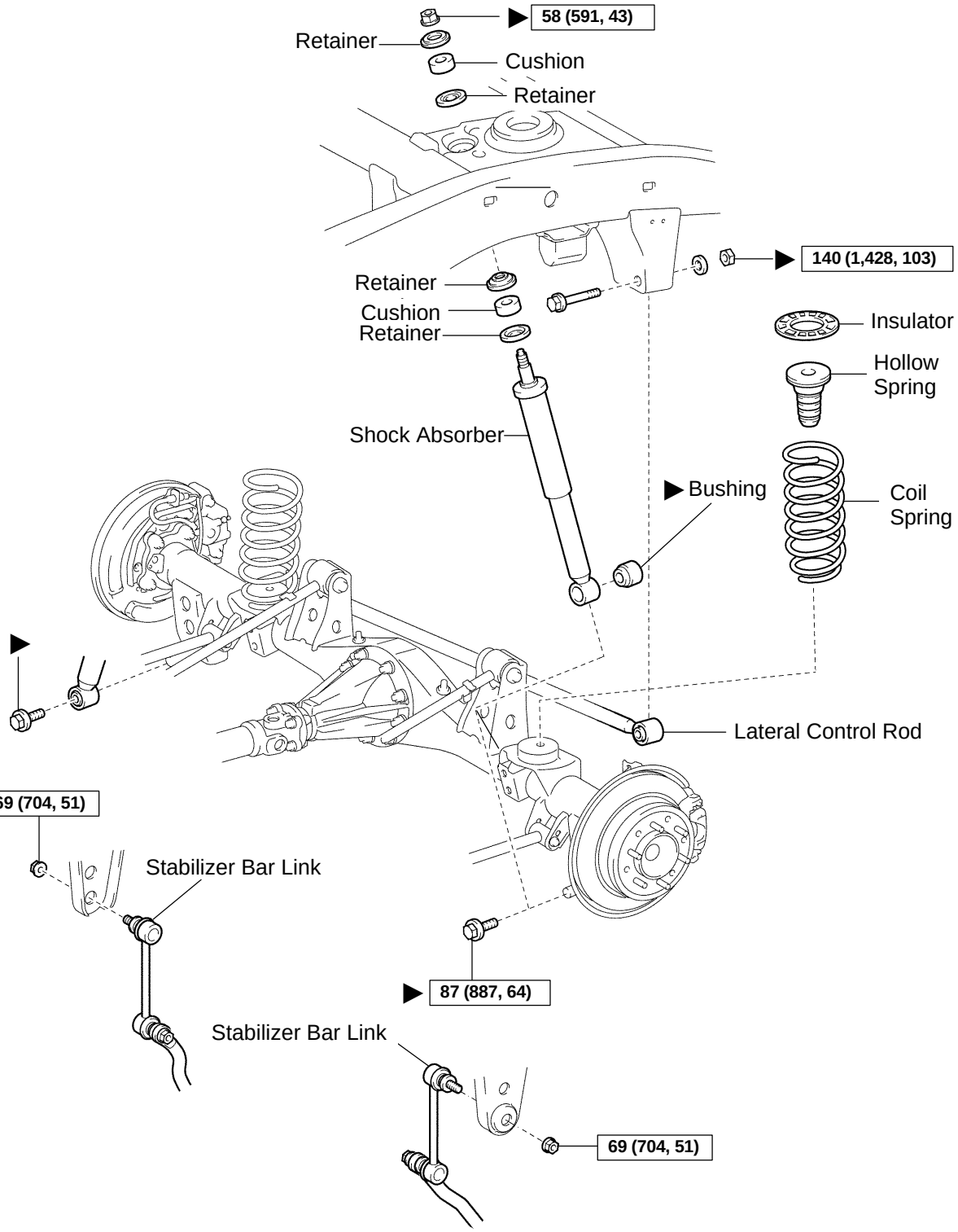
COIL SPRING AND REAR SHOCK ABSORBER

SA2BG–02

COMPONENTS

Normal Type:



N·m (kgf·cm, ft·lbf) : Specified torque

▶ Non–reusable part

P

F14308

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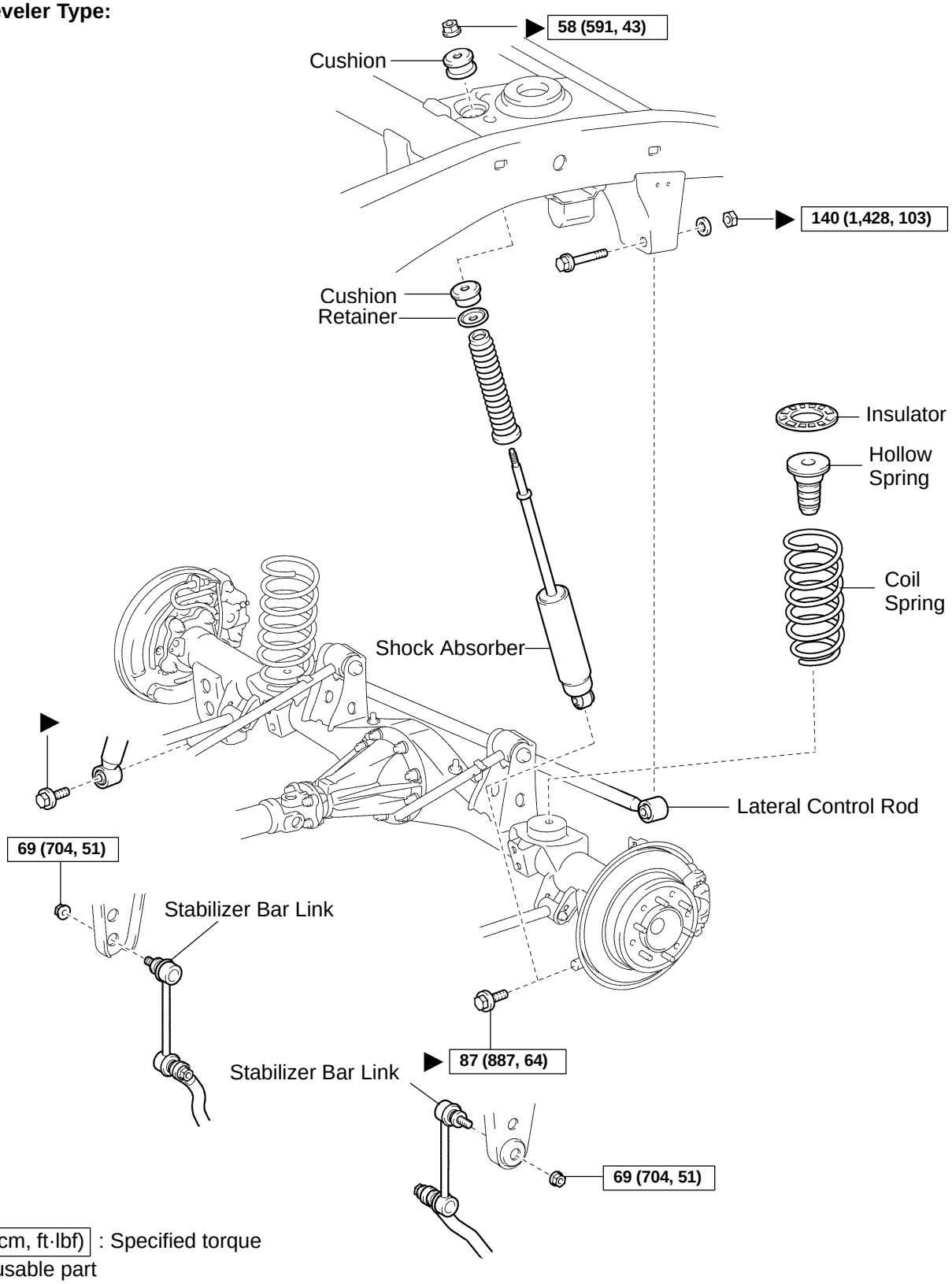
Auto Leveler Type:



N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part

P F16917

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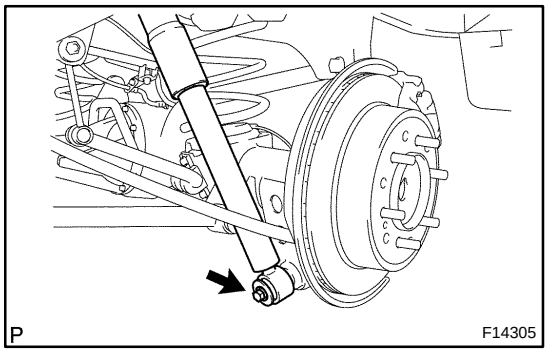
SA2BH–02

REMOVAL

1. REMOVE REAR WHEELS
Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

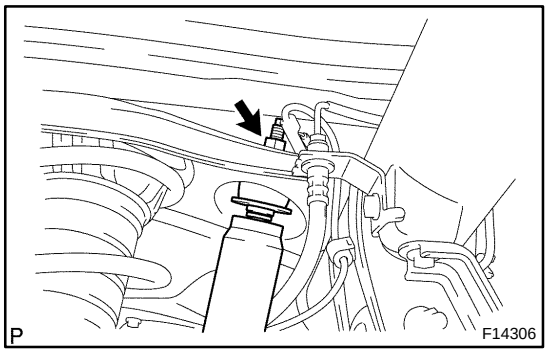
2. SUPPORT REAR AXLE HOUSING WITH JACK



3. Normal Type:
REMOVE SHOCK ABSORBER

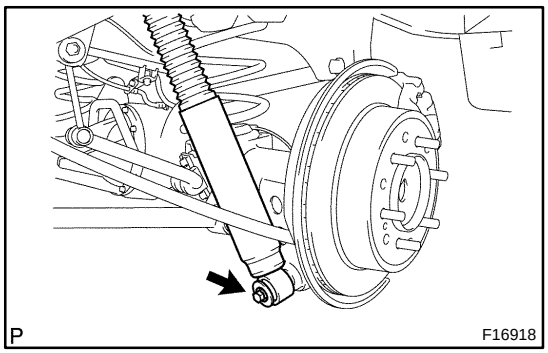
(a) Remove the bolt and disconnect the shock absorber from the axle housing.
Torque: 87 N·m (887 kgf·cm, 64 ft·lbf)

(b) Use the same procedure described above to the other side.



(c) While holding the piston rod, remove the nut, 2 retainers, cushion and shock absorber.
Torque: 58 N·m (591 kgf·cm, 43 ft·lbf)

(d) Remove the 2 retainers and cushion from the shock absorber.



4. Auto Leveler Type:
REMOVE SHOCK ABSORBER

NOTICE:
When removing and installing of the shock absorber, perform the procedure with the shock absorber stretched completely. The primary rod reaction force of the shock absorber is apploximately 1,000 N.

(a) Remove the bolt and disconnect the shock absorber from the axle housing.
Torque: 87 N·m (887 kgf·cm, 64 ft·lbf)

(b) Use the same procedure described above to the other side.

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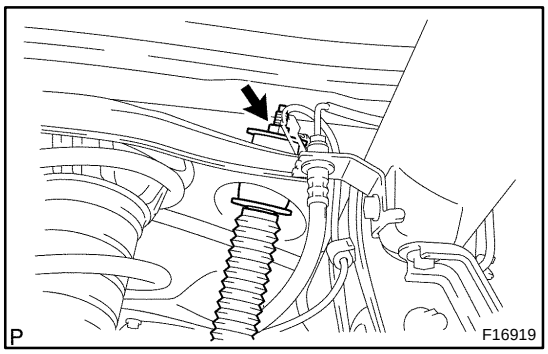
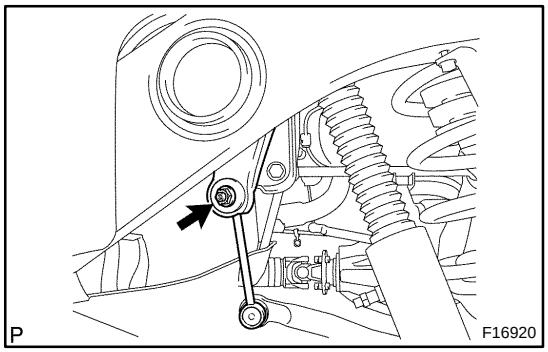
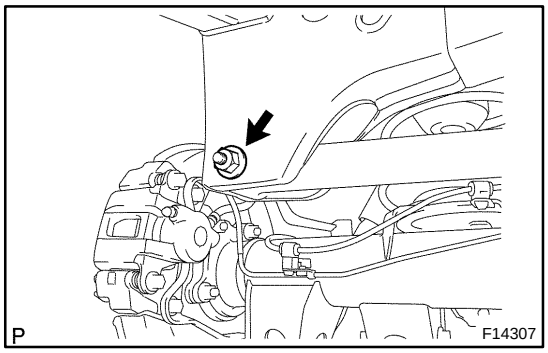


(c) While holding the piston rod, remove the nut, retainer, cushion and shock absorber.
Torque: 58 N·m (591 kgf·cm, 43 ft·lbf)
(d) Remove the retainer and cushion from the shock absorber.

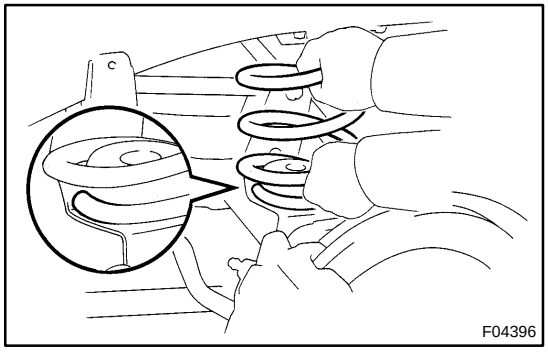


5. DISCONNECT LH AND RH STABILIZER BAR LINKS
Remove the 2 nuts and disconnect the LH and RH stabilizer bar links.
Torque: 69 N·m (704 kgf·cm, 51 ft·lbf)



6. DISCONNECT LATERAL CONTROL ROD
Remove the nut, washer, bolt and disconnect the lateral control rod.
Torque: 140 N·m (1,428 kgf·cm, 103 ft·lbf)
HINT:
At the time of installation, after stabilizing the suspension, torque the nut and bolt.

7. REMOVE COIL SPRING
(a) Lower the axle housing.
NOTICE:
Be careful not to snap the brake line and parking brake cable.



(b) While lowering the axle housing, remove the coil spring, hollow spring and insulator.
HINT:
At the time of installation, please refer to the following items.
- ▶ Check that the coil spring end is installed correctly.
- ▶ If the coil spring end is not in the correct position, reinstall the coil spring.

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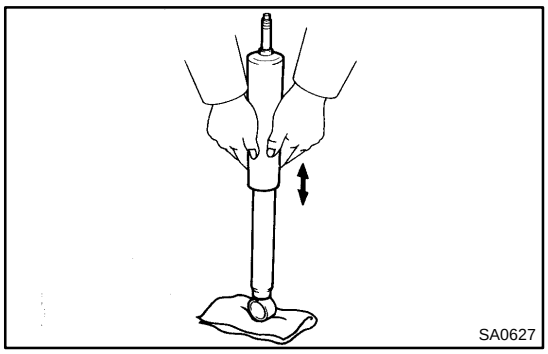
SA174–05



INSPECTION

Normal Type:

INSPECT SHOCK ABSORBER

Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual operation sounds. If there is any abnormality, replace the shock absorber with a new one.

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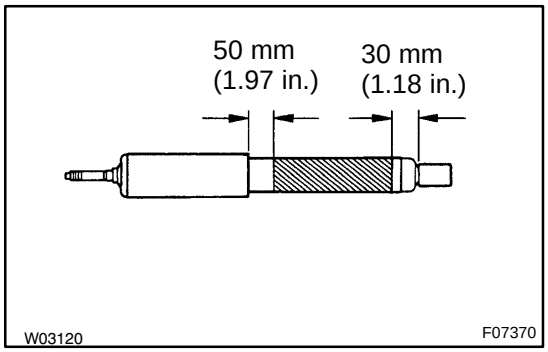
SA2BI–02

DISPOSAL

1. FULLY EXTEND SHOCK ABSORBER ROD



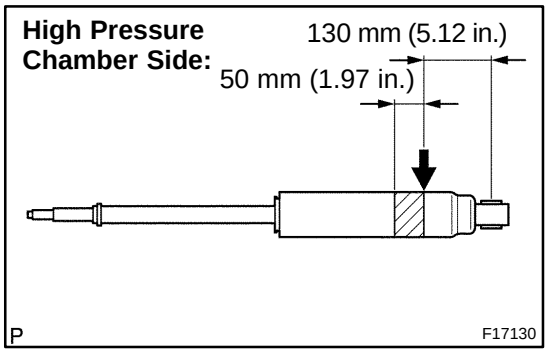
2. Normal Type:

DRILL HOLE TO REMOVE GAS FROM CYLINDER

Using a drill, make a hole in the cylinder, as shown in the illustration to discharge the gas inside.

CAUTION:

The discharged gas is harmless, but be careful of chips which may fly out when drilling.



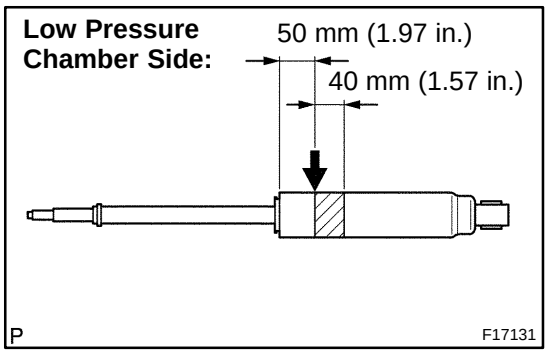
3. Auto Leveler Type:

DRILL HOLE TO REMOVE GAS FROM CYLINDER

Using a drill, make a hole on the shaded area of the cylinder, as shown in the illustration to discharge the gas inside.

CAUTION:

- **Be sure to perform the procedure in the order, the high pressure chamber and the low pressure chamber.**
- **Wear protective goggles and cover the absorber with a plastic bag or like when boring.**
- **The discharged gas is harmless, but be careful of chips which may fly out when drilling.**



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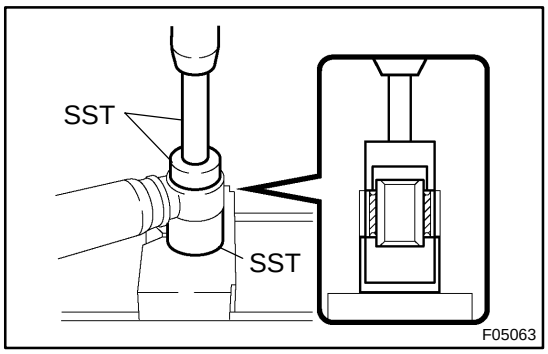
SA175–05

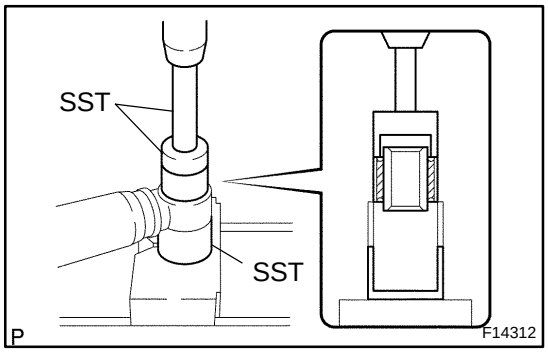


REPLACEMENT

1. Normal Type:
REMOVE BUSHING

Using SST and a press, remove the bushing.

SST 09710–14013 (09710–00061),
09710–28012 (09710–07031),
09950–70010 (09951–07100)



2. Normal Type:
INSTALL BUSHING

Using SST and a press, install a new bushing.

SST 09710–14013 (09710–00061),
09710–28012 (09710–07031),
09950–70010 (09951–07100)

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SA176–04

INSTALLATION

Installation is in the reverse order of removal (See page SA–137).

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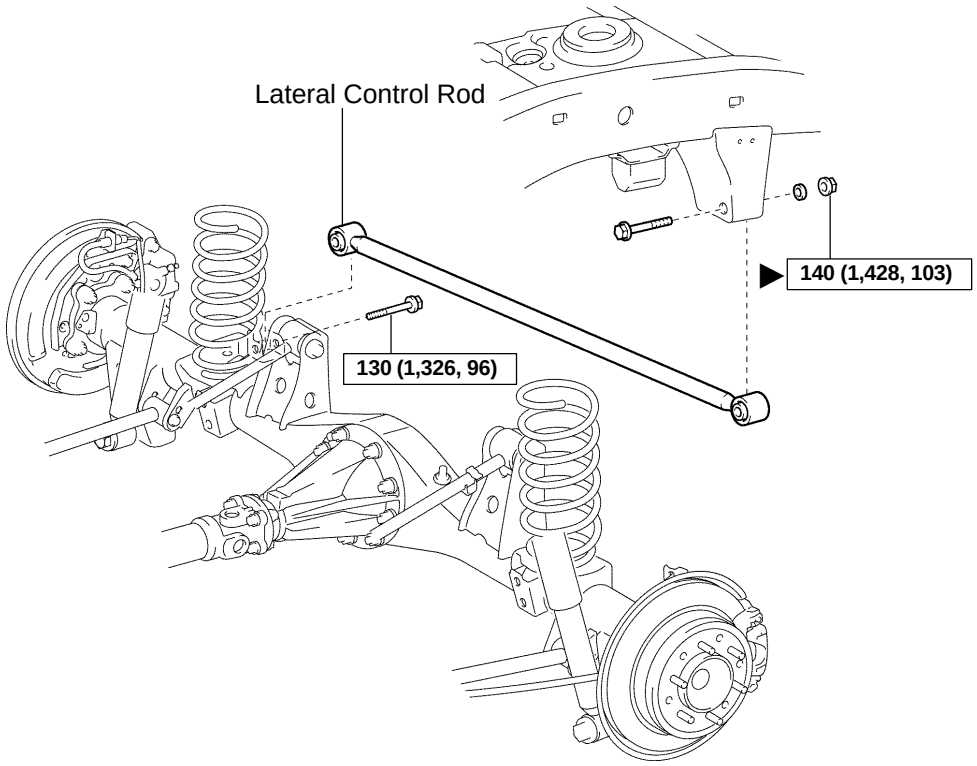
REAR LATERAL CONTROL ROD

COMPONENTS

SA177–04



N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part

P

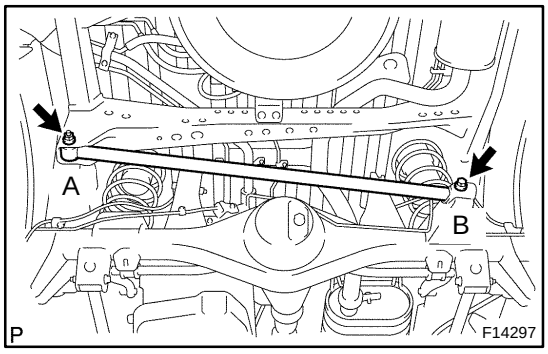
F14296

Dardoor.com

SA178–04

REMOVAL

1. SUPPORT REAR AXLE HOUSING WITH JACK



2. REMOVE LATERAL CONTROL ROD

Remove the 2 bolts, nut, washer and lateral control rod.

Torque:

A 140 N·m (1,428 kgf·cm, 103 ft·lbf)

B 130 N·m (1,326 kgf·cm, 96 ft·lbf)

HINT:

At the time of installation, please refer to the following items.

- ▶ Replace the used nut with a new one.
- ▶ After stabilizing the suspension, torque the nut and bolt.

Dardoor.com

SA179–01

INSTALLATION

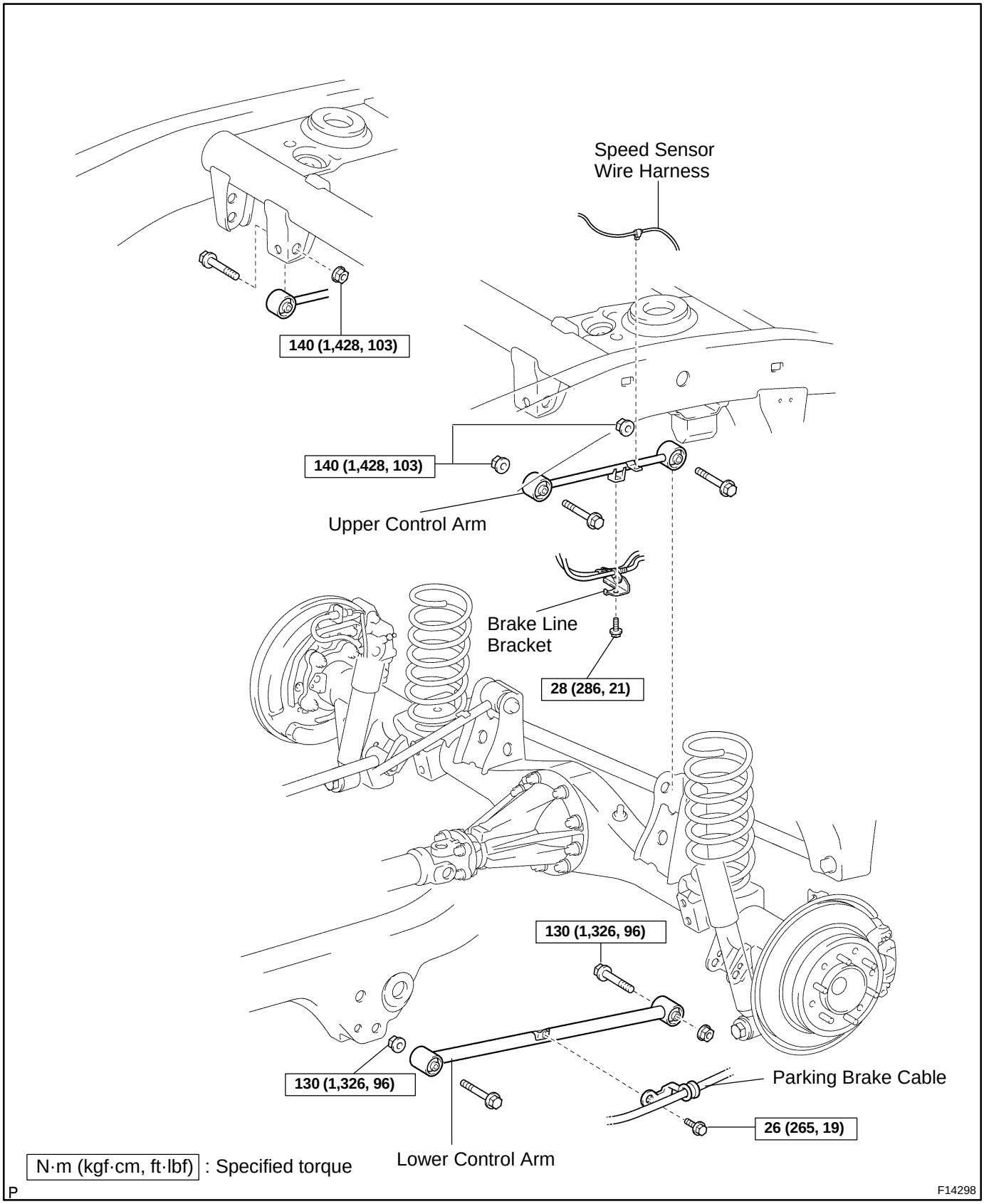
Installation is in the reverse order of removal (See page SA–144).

Dardoor.com

REAR UPPER AND LOWER CONTROL ARM

SA17B–05

COMPONENTS



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SA24J–02

REMOVAL

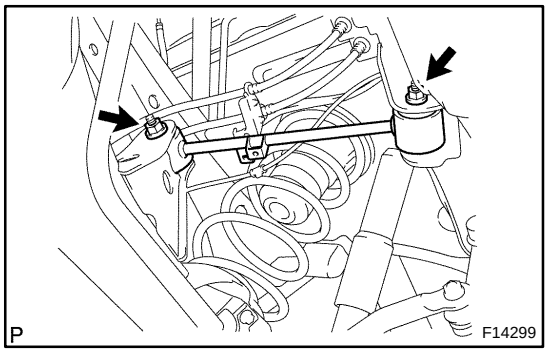
1. REMOVE REAR WHEEL
Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

2. SUPPORT REAR AXLE HOUSING WITH JACK

3. REMOVE UPPER CONTROL ARM

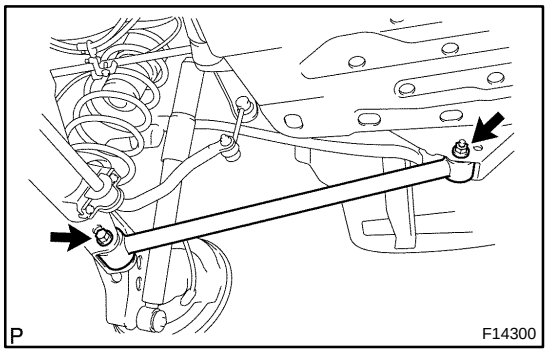
(a) Disconnect the speed sensor wire harness.

(b) Remove the bolt and brake line bracket.
Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)



(c) Remove the 2 nuts, washers, bolts and upper control arm.
Torque: 140 N·m (1,428 kgf·cm, 103 ft·lbf)

HINT:
At the time of installation, after stabilizing the suspension, torque the nuts.



4. REMOVE LOWER CONTROL ARM

(a) Remove the bolt and parking brake cable bracket.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

(b) Remove the 2 nuts, bolts and lower control arm.
Torque: 130 N·m (1,326 kgf·cm, 96 ft·lbf)

HINT:
At the time of installation, after stabilizing the suspension, torque the nuts.

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SA17D–01

INSTALLATION

Installation is in the reverse order of removal (See page SA–147).

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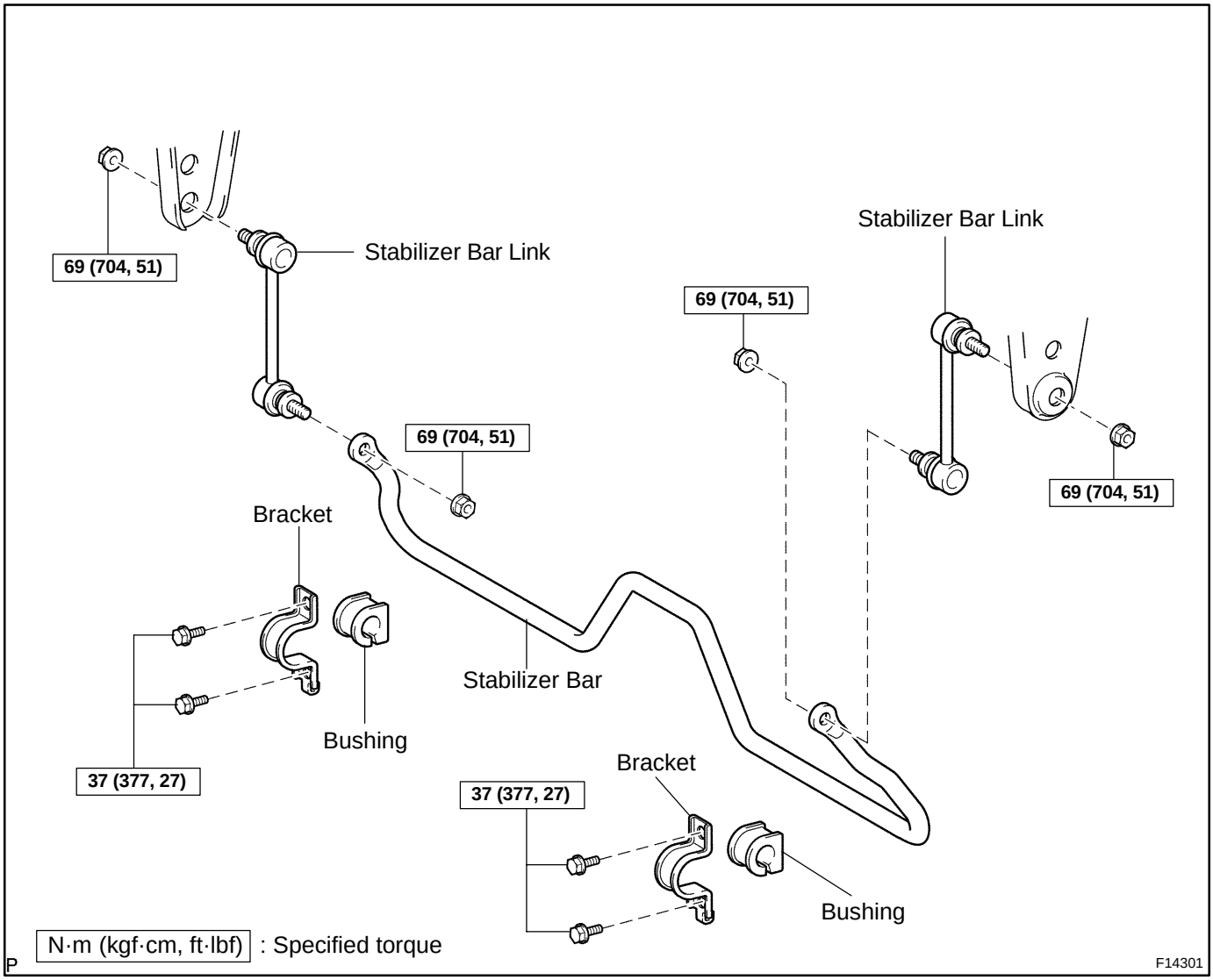
REAR STABILIZER BAR

COMPONENTS

SA17E–04



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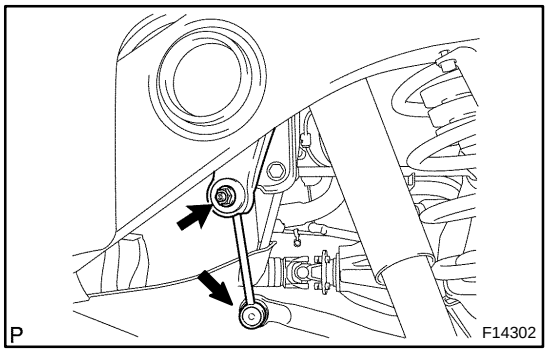
SA17F–04

REMOVAL

1. REMOVE REAR WHEELS
Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

2. SUPPORT REAR AXLE HOUSING WITH JACK



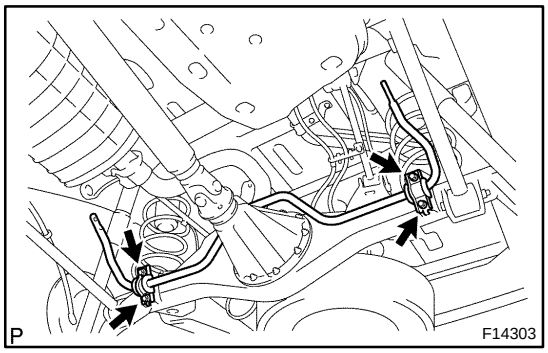
3. REMOVE STABILIZER BAR LINKS

(a) Remove the 2 nuts and stabilizer bar link.
Torque: 69 N·m (704 kgf·cm, 51 ft·lbf)

HINT:

If the ball joint stud turns together with the nut, use a hexagon wrench to hold the stud.

(b) Use the same procedure described above to the other side.



4. REMOVE STABILIZER BAR FROM REAR AXLE HOUSING

(a) Remove the 4 bolts and stabilizer bar with the bushings and brackets.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

(b) Remove the 2 brackets and 2 bushings from the stabilizer bar.

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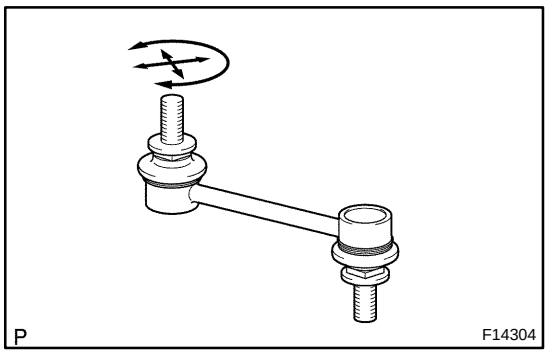
SA24K–02



INSPECTION

INSPECT STABILIZER BAR LINK

Rotate the ball joint stud in all directions.

If it does not move smoothly and freely, replace the stabilizer link.

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SA17G–03

INSTALLATION

Installation is in the reverse order of removal (See page SA–150).

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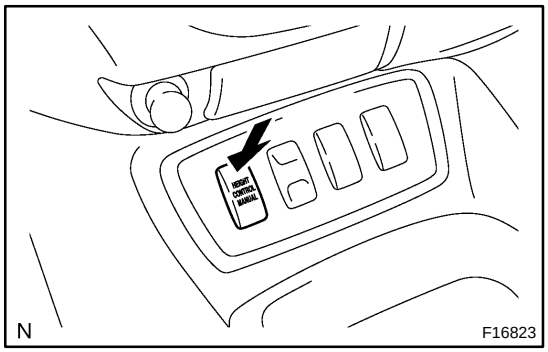
ELECTRONIC MODULATED AIR SUSPENSION

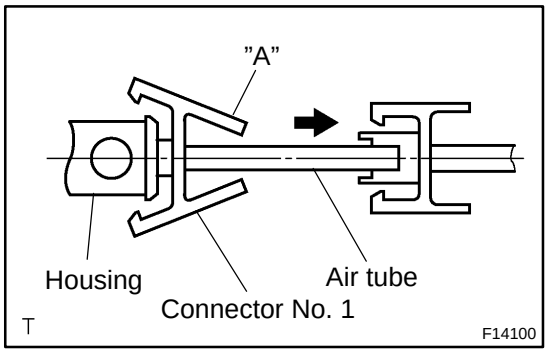
SA2CZ–01

PRECAUTION



1. WHEN LIFTING UP VEHICLE

(a) When jacking up or lifting up, stop operation of the air suspension control system by pressing the height control mode select switch.



2. DISCONNECTION AND CONNECTION OF HEIGHT CONTROL TUBE

NOTICE:

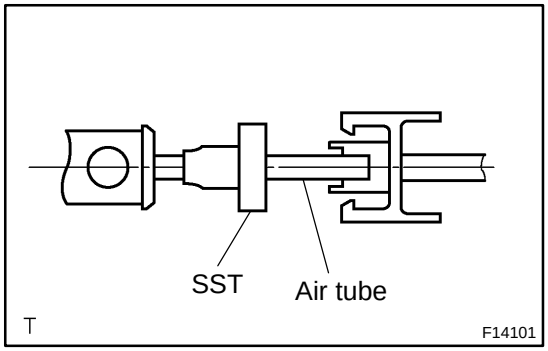
- **Disconnection and connection of the height control tube should be performed by hand to prevent foreign objects from entering.**
- **Never damage the height control tube.**

(a) Disconnect the height control tube.

(1) Pinch ”A” of the connector No. 1 and pull out from the housing.

(2) Set the SST to the tube.

SST 09730–00010

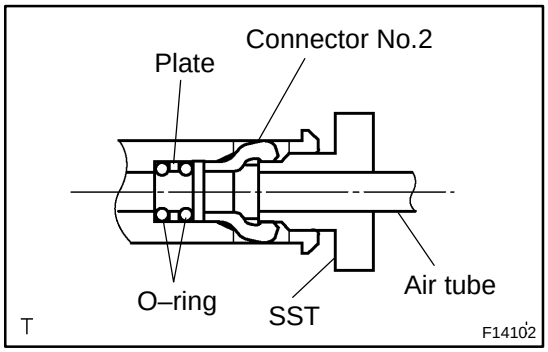


(3) Insert SST into the housing to expand the claw of the connector No.2 in the housing.

(4) Pull out the tube with SST inserted.

NOTICE:

Do not pull on the tube with excessive force.



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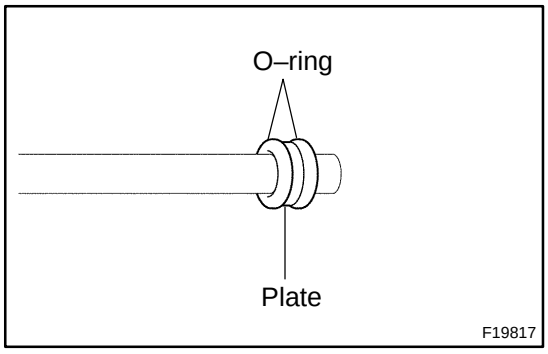
(5) Insert a screwdriver into the circular hole on the housing, and remove the connector No.2, the 2 O–rings and the plate from the housing.

HINT:

The O–rings, plate and connector No.2 are non–reusable parts.



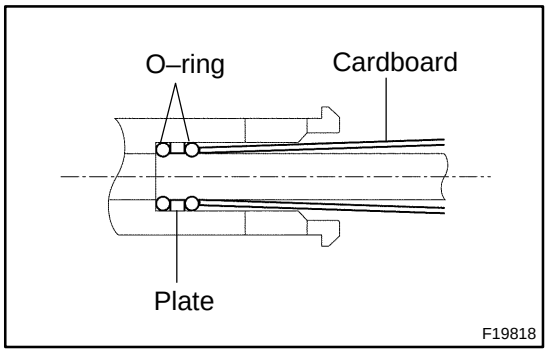
(b) Install 2 O–rings and the plate.

(1) Apply MP grease to 2 new O–rings and plate and install them to the straight tube or an equivalent.

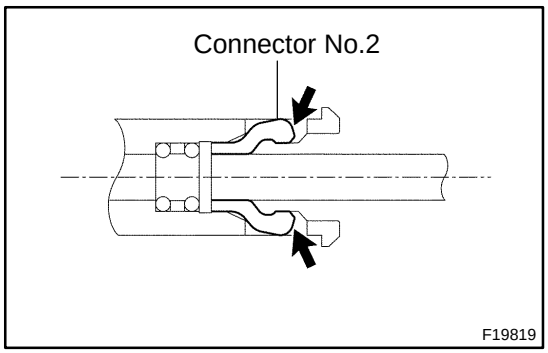
NOTICE:

Install the plate between the O–rings.

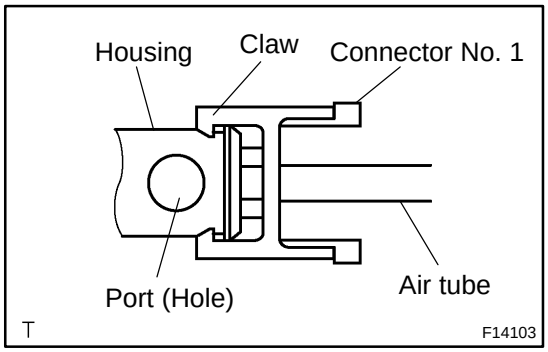
Keep foreign matter from adhering to the O–rings and the height control tube in order to prevent air leaks.



(2) Insert the tube on which the 2 O–rings and plate are installed into the housing, and then push it in lightly with a piece of rolled up cardboard.



(3) Push the connector No.2 into the housing to where a clicking sound is heard.



(c) Install the height control tube.

(1) Push the tube and connector No.1 into the housing to where a clicking sound is heard.

NOTICE:

- **The port (hole) of the housing should be set in the position 90˚ from the claws of connector No. 1.**
- **Pull the tube lightly to make sure that it is securely connected.**

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▶ **Prevent foreign matter from being attached to the O–rings and height control tube. Failure to do so may cause air leakage.**

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SA2D0–01

ADJUSTMENT

1. ADJUST STANDARD VEHICLE HEIGHT

(a) Release the parking brake and stabilize the suspensions by pushing up and down on the corners of the vehicle.

(b) Place the shift lever into the ”N” position and settle the tires by moving the vehicle back and forth.

(c) Start the engine.

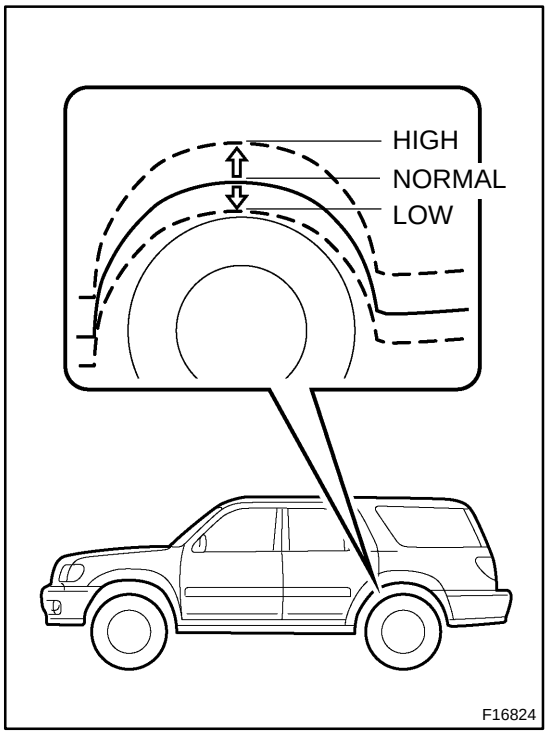
(d) On the height control switch, first press ”HIGH” to raise the vehicle height, and then change the switch to ”LOW” to lower it. Perform this operation one more time.

NOTICE:

Make sure to release the parking brake and move the shift lever into the ”N” position.

2. INSPECT TIRE (See page SA–3)

3. MEASURE VEHICLE HEIGHT (See page SA–4)



4. OPERATE HEIGHT CONTROL SWITCH AND CHECK VEHICLE HEIGHT CHANGE

(a) Start the engine and change the height control switch from the NORMAL position to the HIGH and LOW positions.

Check the time until the height adjustment is completed and the amount of change in vehicle height.

Adjustment time

From operation of height control switch to start of compressor.	Approx. 2 sec.
From start of compressor to completion of height adjustment.	Approx. 20 sec.

Amount of change in vehicle height

HIGH position: 40 mm (1.57 in.)

LOW position:

4WD models: –30 mm (–1.18 in.)

2WD models: –15 mm (–0.59 in.)

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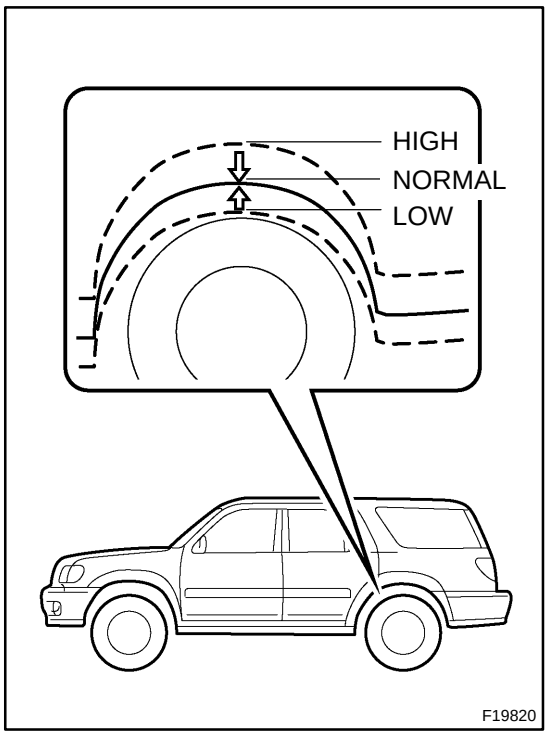

(b) While adjusting vehicle height in the HIGH position, start the engine and change the height control switch from the HIGH position to the NORM position.
Check the time until the height adjustment is completed and the amount of change in vehicle height.

Adjustment time

From operation of height control switch to open of exhaust valve.	Approx. 2 sec.
From open of exhaust valve to completion of height adjustment.	Approx. 30 sec.

Amount of change in vehicle height
HIGH position: 40 mm (1.57 in.)
LOW position:
4WD models: –30 mm (–1.18 in.)
2WD models: –15 mm (–0.59 in.)

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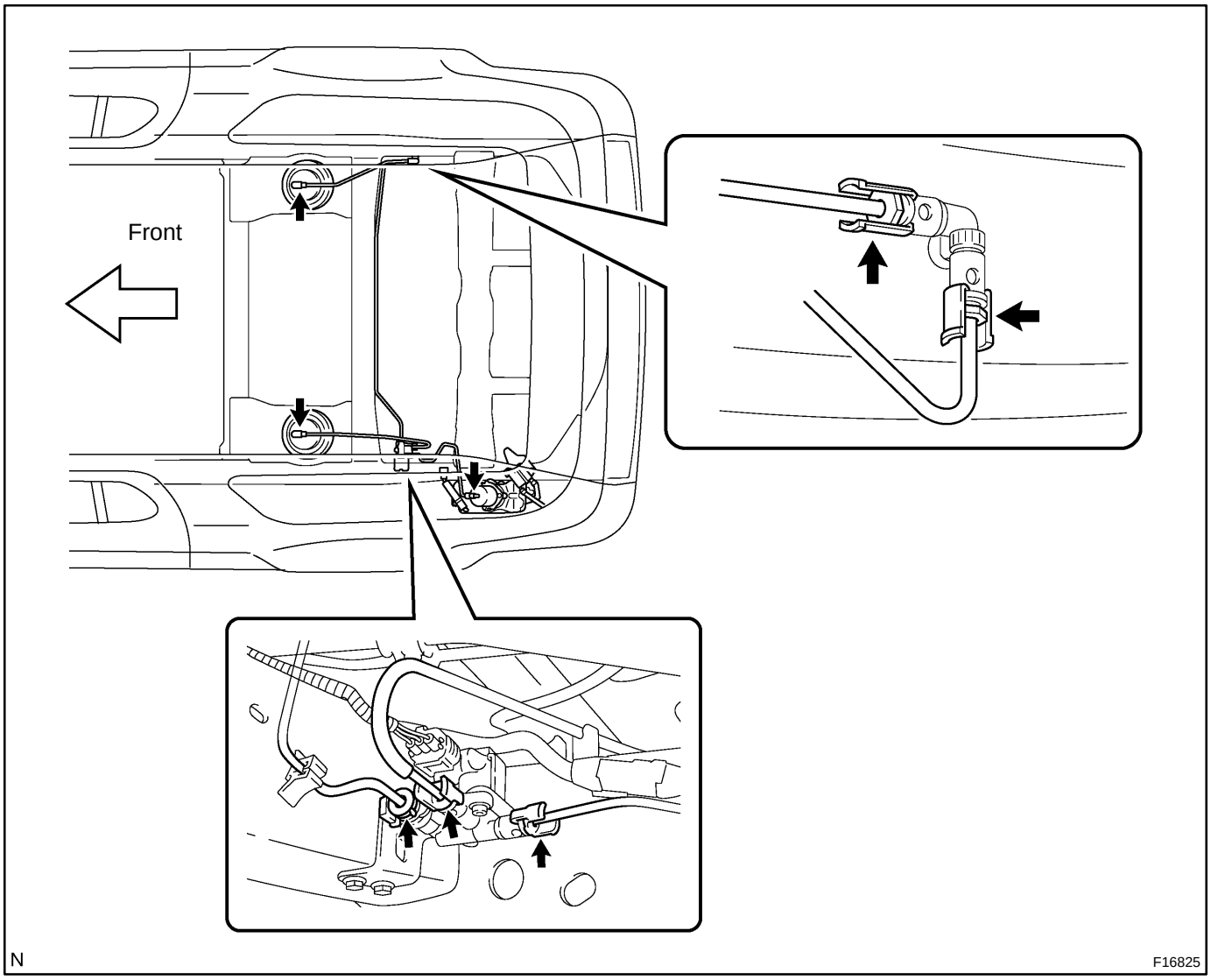
5. CHECK CONNECTIONS OF TUBES FOR AIR LEAKAGE

(a) Set the height control switch in the HIGH position and raise the vehicle height.
(b) Stop the engine.
(c) Apply soapy water to the connections of the tubes and check if there is any air leakage.



6. ADJUST VEHICLE HEIGHT

NOTICE:

While adjusting vehicle height, do not put anyone or anything on or in the vehicle as it will affect vehicle height.

(a) Suspend the vehicle height control by pressing the height control mode select switch.
(b) Put the vehicle on a level surface.

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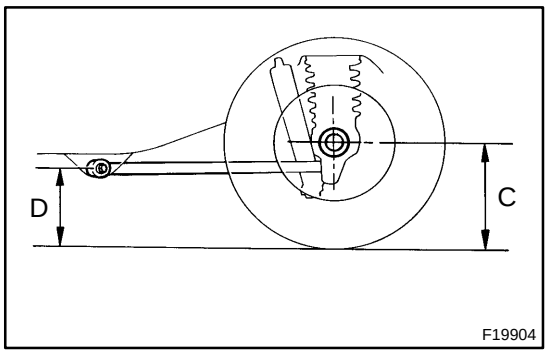
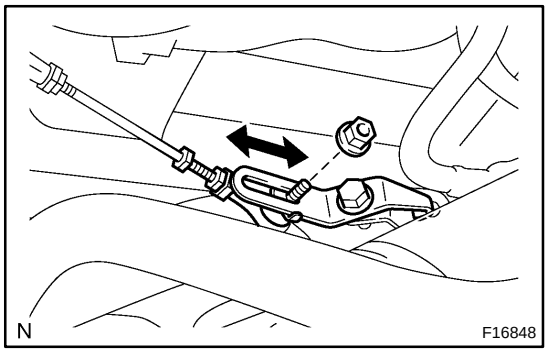


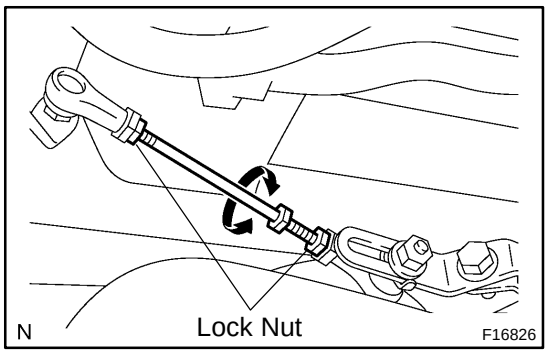
(c) Measure the vehicle height (C – D measurement) on the right side and left side.
Standard vehicle height value: See page SA–4



(d) If the value in (c) differs from the vehicle height (C – D measurement), adjust it by following the procedures below:
(1) Loosen the nut.
(2) Move the height control sensor link back and forth along the slotted hole of the bracket.

HINT:
Move the link toward the front of the vehicle to raise vehicle height. Move the link toward the rear of the vehicle to lower vehicle height. Every 1 mm (0.039 in.) change in the installation position of the link causes vehicle height to change by approximately 2 mm (0.079 in.).

(3) Tighten the nut.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



(e) If the vehicle height cannot be adjusted by performing (d), adjust it again by following the procedures below.
(1) Loosen the 2 lock nuts of the height control sensor link.
(2) Adjust the vehicle height to the vehicle height (C – D measurement) by turning the link.

HINT:
Extend the link to raise vehicle height. Shorten the link to lower vehicle height. Every 1 turn of the link causes vehicle height to change by approximately 4 mm (0.157 in.).

(3) Tighten the 2 lock nuts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

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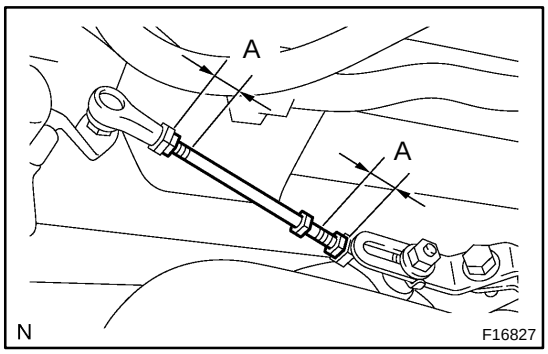

(f) Check that the lengths of the screw parts, "A" in the illustration, are within the standard values.
Standard length: 6.5 to 15.0 mm (0.26 to 0.59 in.)

(g) Change the vehicle height. (From the normal position to the high position, and from the high position to the normal position)

(h) Measure the vehicle height (C – D measurement) on the right side and left side.

(i) Check if the vehicle height (C – D measurement) is within the specified range.

HINT:
If the values are outside the standard, perform the procedures from (d) to (i) again.

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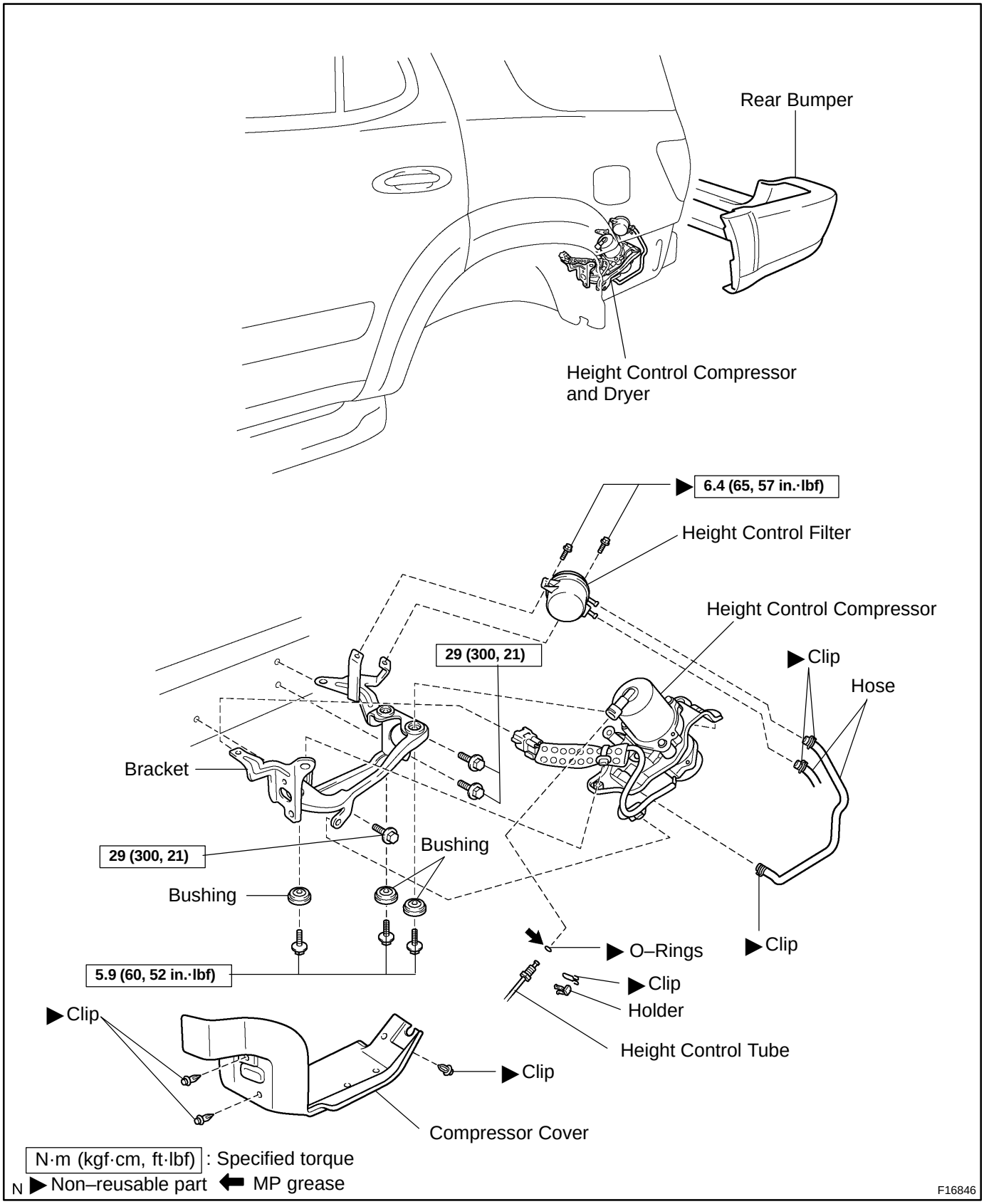
HEIGHT CONTROL COMPRESSOR AND DRYER

SA0L1–06

COMPONENTS



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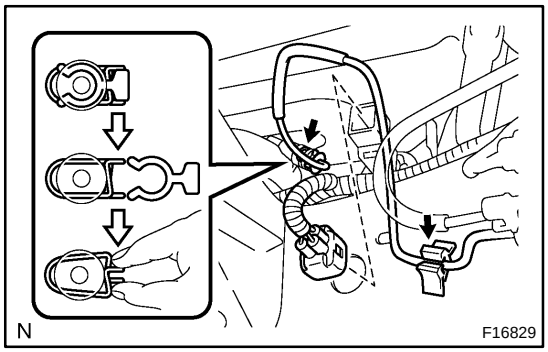
SA2D1–01

REMOVAL

1. REMOVE REAR BUMPER (See page BO–6)



2. DISCONNECT HEIGHT CONTROL TUBE

(a) Remove the holder.

(b) Spread the clip and slowly pull the height control tube straight out.

NOTICE:

Do not remove the clip from the union except when replacing it.

(c) Remove the O–ring.

HINT:

Perform the following before installation:

- ▶ Coat a new O–ring with MP grease.
- ▶ Push the air tube in straight to connect it until the clip makes a ”clicking” sound.

3. REMOVE HEIGHT CONTROL COMPRESSOR AND DRYER

HINT:

Check for leakage after installation (See page SA–153).

(a) Separate the hose from the compressor cover.

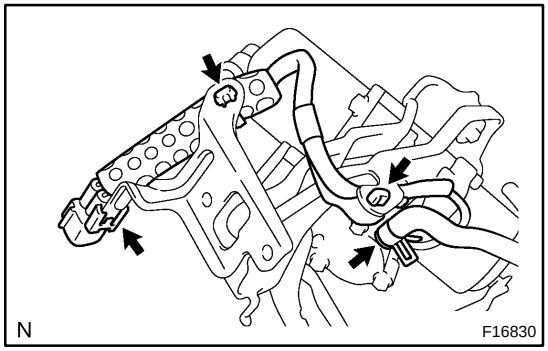
(b) Remove the 3 clips and compressor cover.

(c) Remove the hose.

(d) Disconnect the wire harness from the clamp.

(e) Remove the 3 bolts and height control compressor and dryer.

Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)



(f) Disconnect the 3 wire harness clamps and hose.

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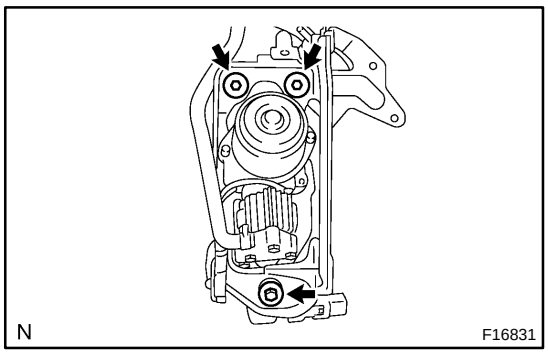

(g) Remove the 3 bolts, bushing and the bracket from the height control compressor.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)

(h) Remove the 2 bolts and the filter from the height control compressor.
Torque: 6.4 N·m (65 kgf·cm, 56 in.·lbf)

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SA0L3–03

INSTALLATION

Installation is in the reverse order of removal (See page SA–162).

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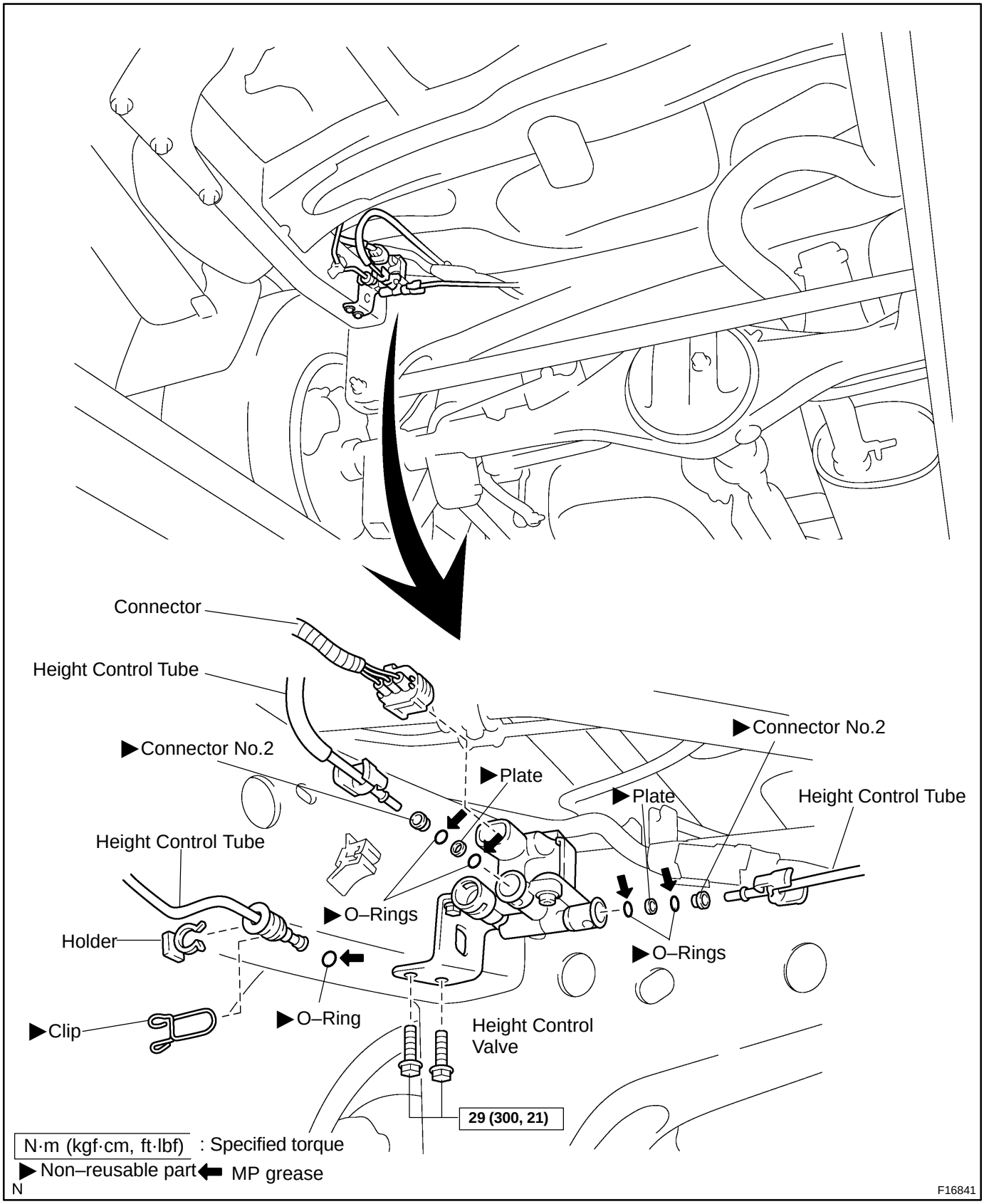
HEIGHT CONTROL VALVE

COMPONENTS

SA0L4–05



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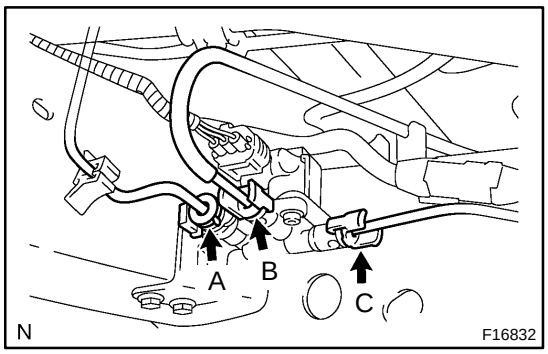
SA2D2–01

REMOVAL



1. DISCONNECT HEIGHT CONTROL TUBE

(a) When disconnecting the height control tube A:

(1) Remove the clip and holder.

(2) Using SST, disconnect the height control tube.

SST 09730–00010

(3) Remove the O–ring from the height control tube.

HINT:

Perform the following before installation:

- ▶ Coat a new O–ring with MP grease.
- ▶ Push the air tube in straight to connect it until the clip makes a ”clicking” sound.

(b) When disconnecting the height control tubes B and C:

NOTICE:

Be careful when removing tube as it will cause air to be released from the pneumatic cylinder and vehicle height to decrease. When using a jack or two–post lift, read the operation procedures and precautions for the pneumatic cylinder to prevent damaging the cylinder.

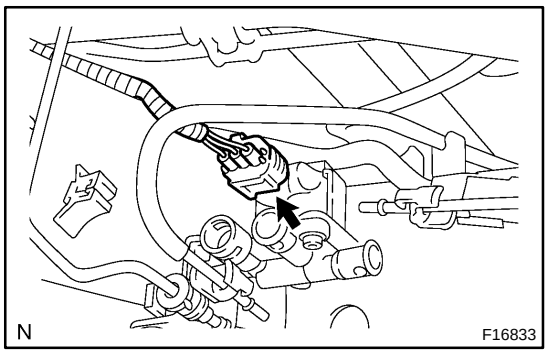
(1) Spread the clip and slowly pull the 2 height control tubes straight out.

(2) Remove the 4 O–rings, 2 plates, and 2 connector No.2 from the height control tube.

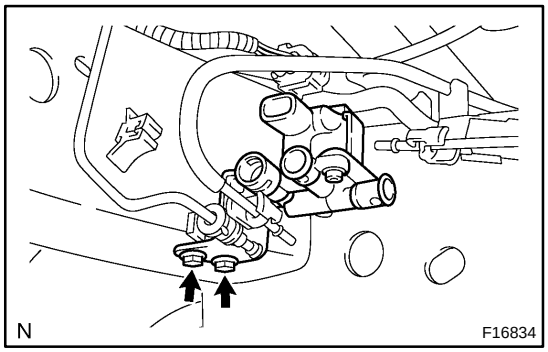
HINT:

Perform the following before installation:

- ▶ Coat 4 new O–rings with MP grease.



2. DISCONNECT CONNECTOR



3. REMOVE HEIGHT CONTROL VALVE

(a) Remove the 2 bolts and height control valve.

Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)

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SA0L6–03

INSTALLATION

Installation is in the reverse order of removal (See page SA–166).

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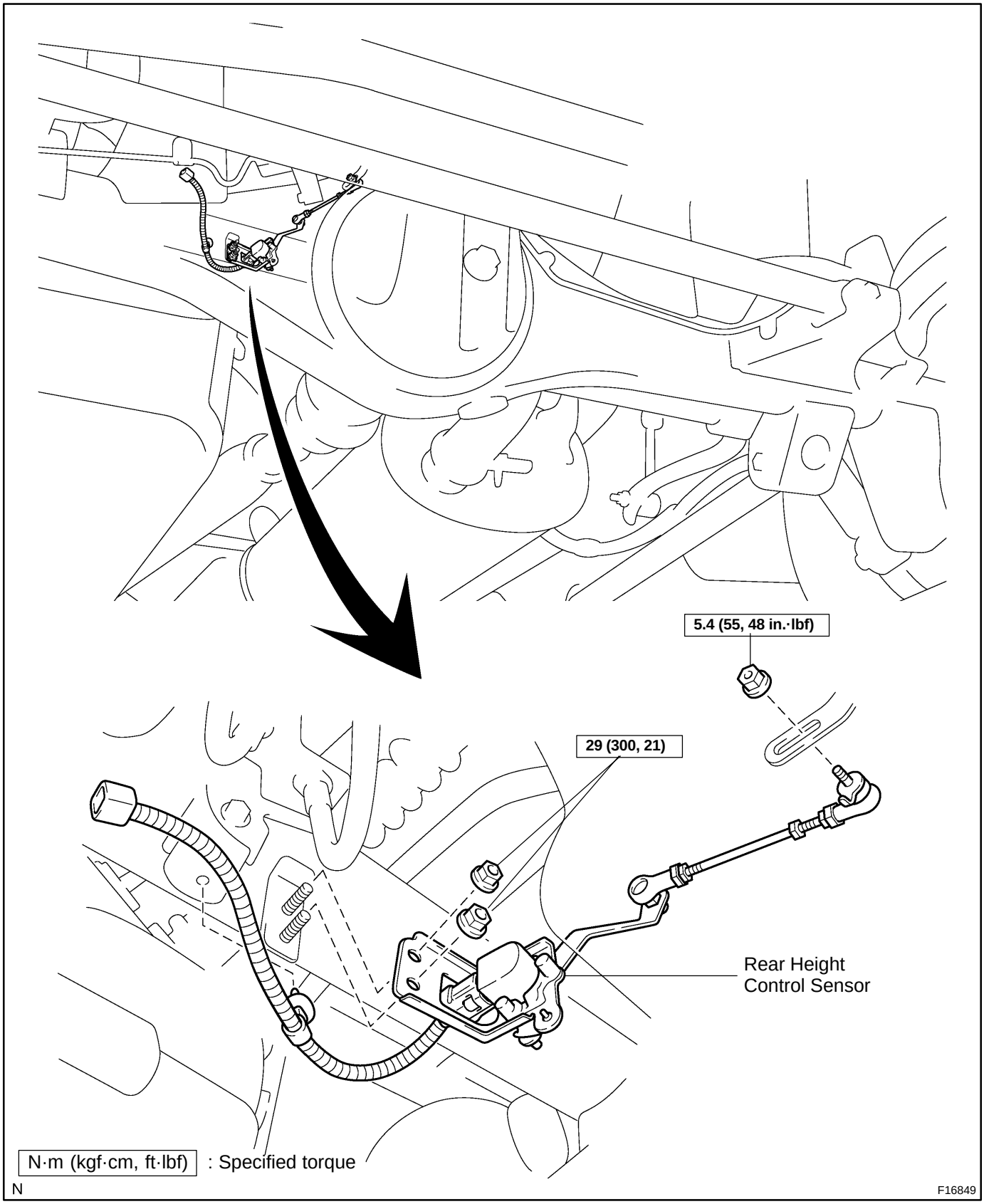
REAR HEIGHT CONTROL SENSOR

SA1I9–03

COMPONENTS



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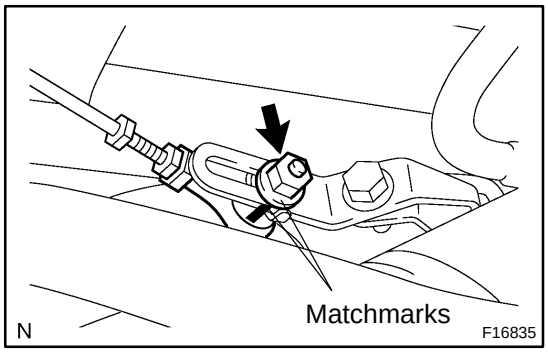
SA2D3–01

REMOVAL

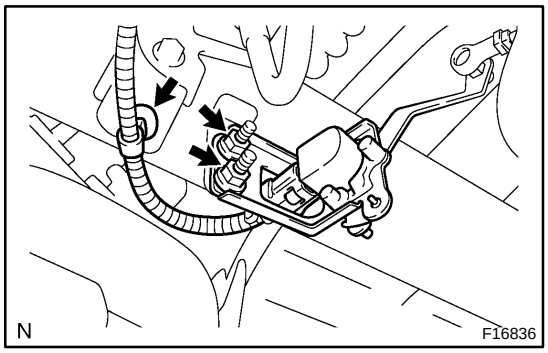
1. DISCONNECT CONNECTOR



2. DISCONNECT HEIGHT CONTROL SENSOR LINK

(a) Put matchmarks on the height control sensor link and bracket.

(b) Remove the nut and disconnect the sensor link.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



3. REMOVE REAR HEIGHT CONTROL SENSOR

(a) Disconnect the wire harness clamp.

(b) Remove the 2 bolts and rear height control sensor.
Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)

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SA1IB–03

INSTALLATION

Installation is in the reverse order of removal (See page SA–169).

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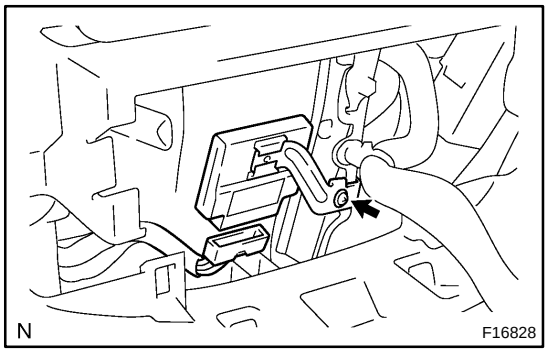
SUSPENSION CONTROL ECU

SA2CW–01

REPLACEMENT

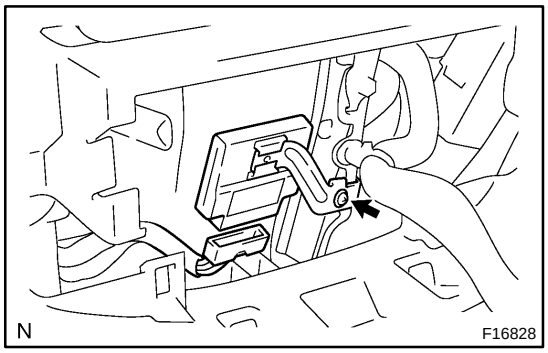
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE INTEGRATION CONTROL PANEL (See page BO–89)**



3. **REMOVE SUSPENSION CONTROL ECU**

(a) Disconnect the connector.

(b) Remove the screw and suspension control ECU.



4. **INSTALL SUSPENSION CONTROL ECU**

(a) Install the suspension control ECU with the screw.

(b) Connect the connector.

5. **INSTALL INTEGRATION CONTROL PANEL (See page BO–97)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION (See page IN–20)**

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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BRAKE SYSTEM

BR0A9–04

PRECAUTION

- **Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with parts having the same part number or equivalent.**
- **It is very important to keep parts and the area clean when repairing the brake system.**
- **If the vehicle is equipped with a mobile communication system, refer to the precautions in the IN section.**

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TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

BR08P–07

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Low pedal or spongy pedal	1. Fluid leaks for brake system	DI–1059
	2. Air in brake system	BR–4
	3. Piston seals (Worn or damaged)	BR–27 BR–36
	4. Master cylinder (Faulty)	BR–15
Brake drags	1. Brake pedal free play (Minimum)	BR–6
	2. Parking brake pedal travel (Out of adjustment)	BR–9
	3. Parking brake wire (Sticking)	–
	4. Parking brake (Shoe clearance out of adjustment)	BR–42
	5. Pad (Cracked or distorted)	BR–24 BR–33
	6. Piston (Stuck)	BR–27 BR–36
	7. Piston (Frozen)	BR–27 BR–36
	8. Tension or return spring (Faulty)	BR–42
	9. Vacuum leaks for booster system	BR–21
	10.Master cylinder (Faulty)	BR–15
Brake pulls	1. Piston (Stuck)	BR–27 BR–36
	2. Pad (Cracked or distorted)	BR–24 BR–33
	3. Piston (Frozen)	BR–27 BR–36
	4. Disc (Scored)	BR–30 BR–39
	5. Vacuum leaks for booster system	BR–21
	6. Master cylinder (Faulty)	BR–15

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Hard pedal but brake inefficient	1. Fluid leaks for brake system	DI–1059
	2. Air in brake system	BR–4
	3. Pad (Worn)	BR–24 BR–33
	4. Pad (Cracked or distorted)	BR–24 BR–33
	5. Pad (Oily)	BR–24 BR–33
	6. Pad (Glazed)	BR–24 BR–33
	7. Disc (Scored)	BR–30 BR–39
	8. Vacuum leaks for booster system	BR–21
Noise from brakes	1. Pad (Cracked or distorted)	BR–24 BR–33
	2. Installation bolt (Loose)	BR–27 BR–36
	3. Disc (Scored)	BR–30 BR–39
	4. Pad support plate (Loose)	BR–33
	5. Sliding pin (Worn)	BR–36
	6. Pad (Dirty)	BR–24 BR–33
	7. Pad (Glazed)	BR–24 BR–33
	8. Tension or return spring (Faulty)	BR–42
	9. Anti–squeal shim (Damaged)	BR–24 BR–33
	10.Shoe hold–down spring (Damaged)	BR–42

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BRAKE FLUID

BR08Q–05

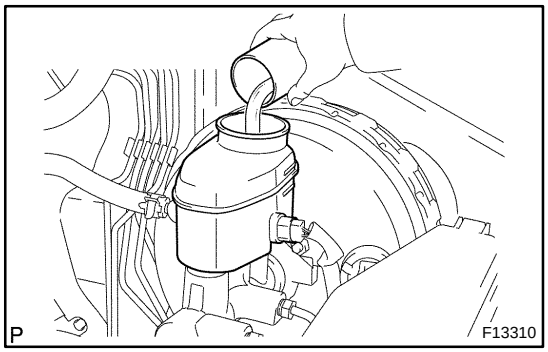
BLEEDING

HINT:

If any work is done on the brake system or if air is suspected in the brake lines, bleed the air from the system.

NOTICE:

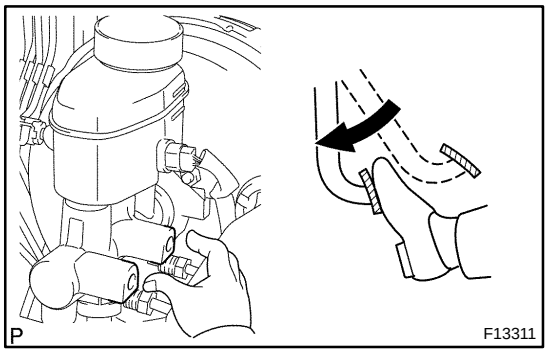
Do not let brake fluid remain on a painted surface. Wash it off immediately.



1. FILL BRAKE RESERVOIR WITH BRAKE FLUID

Check the fluid level in the reservoir after bleeding each wheel. Add fluid, if necessary.

Fluid: SAE J1703 or FMVSS No. 116 DOT3



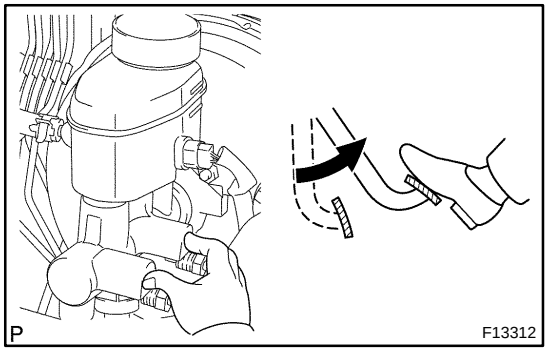
2. BLEED MASTER CYLINDER

HINT:

If the master cylinder was disassembled or if the reservoir becomes empty, bleed the air from the master cylinder.

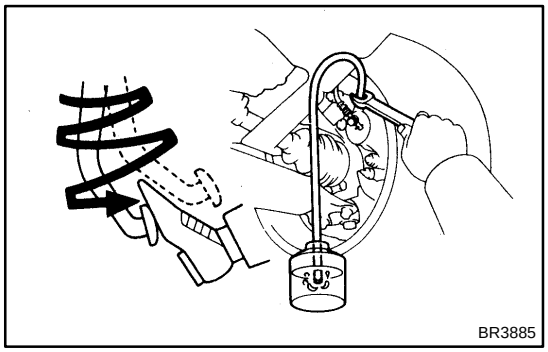
(a) Disconnect the brake lines from the master cylinder.
SST 09751–36011

(b) Slowly depress the brake pedal and hold it.



(c) Block off the outlet plug with your finger, and release the brake pedal.

(d) Repeat (b) and (c) 3 or 4 times.



3. BLEED BRAKE LINE

(a) Connect the vinyl tube to the caliper.

(b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.

(c) At the point when fluid stops coming out, tighten the bleeder plug, then release the brake pedal.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

(d) Repeat (b) and (c) until all the air in the fluid has been bled out.

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(e) Repeat the procedure on the previous page to bleed the air out of brake line for each wheel.

4. CHECK FLUID LEVEL IN RESERVOIR

Check the fluid level and add fluid if necessary.

Fluid: SAE J1703 or FMVSS No. 116 DOT3

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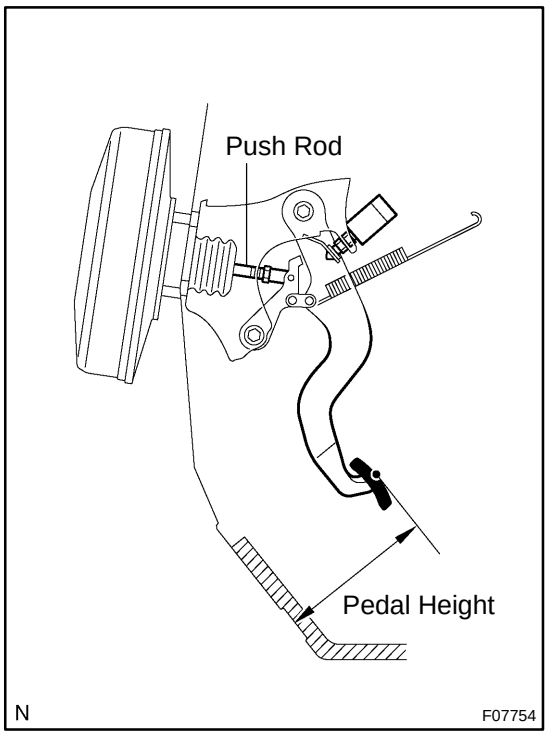


BRAKE PEDAL

BR107–04

ON–VEHICLE INSPECTION

1. CHECK PEDAL HEIGHT

Pedal height from dash panel:
151.1 – 165.1 mm (5.949 – 6.500 in.)

NOTICE:

Do not adjust the pedal height. Doing so by changing the push rod length of the brake booster will structurally change the pedal ratio.

If the pedal height is incorrect, check that there is no damage in brake pedal, brake pedal lever, brake pedal bracket and dash panel.

- ▶ Even if there is damage, there is no problem if the reserve distance is within the standard value.
- ▶ If necessary, replace them.

2. IF NECESSARY, ADJUST STOP LIGHT SWITCH

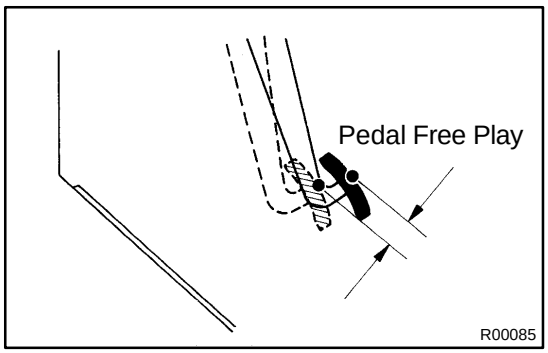
(a) Remove the front door scuff plate, cowl side trim, side panel, lower finish panel and No. 2 heater to register duct (See page BO–89).

(b) Loosen the stop light switch lock nut.

(c) Push the brake pedal in 5 – 15 mm (0.20 – 0.59 in.), turn the stop light switch to lock the nut in the position where the stop light goes off.

(d) Push the brake pedal in 5 –15 mm (0.20 – 0.59 in.), check that the stop light lights up.

(e) Install the No. 2 heater to register duct, lower finish panel, side panel, cowl side trim and front door scuff plate (See page BO–89).



3. CHECK PEDAL FREE PLAY

(a) Stop the engine and depress the brake pedal several times until there is no more vacuum left in the booster.

(b) Push in the pedal by hand until the second point of resistance begins to be felt, then measure the distance as shown in the illustration.

Pedal free play: 1 – 6 mm (0.04 – 0.24 in.)

HINT:

The free play to the first point of resistance is due to the play between the clevis and pin. It is 1 – 3 mm (0.04 – 0.12 in.) at the pedal.

If incorrect, check the stop light switch clearance. If the clearance is OK, then troubleshoot the brake system.

Stop light switch clearance:
0.5 – 2.4 mm (0.020 – 0.095 in.)

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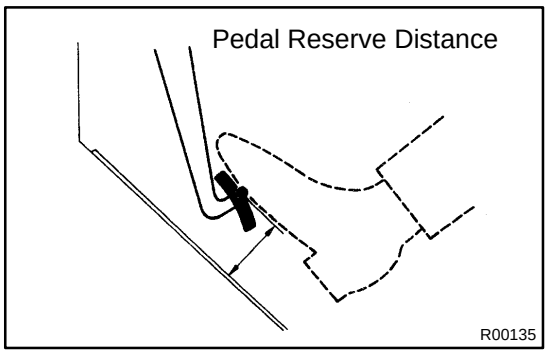

4. CHECK PEDAL RESERVE DISTANCE

Release the parking brake.

With the engine running, depress the pedal and measure the pedal reserve distance, as shown.

Pedal reserve distance from asphalt sheet at 490 N (50 kgf, 110.2 lbf): More than 95 mm (3.74 in.)

If the reserve distance is incorrect, troubleshoot the brake system.

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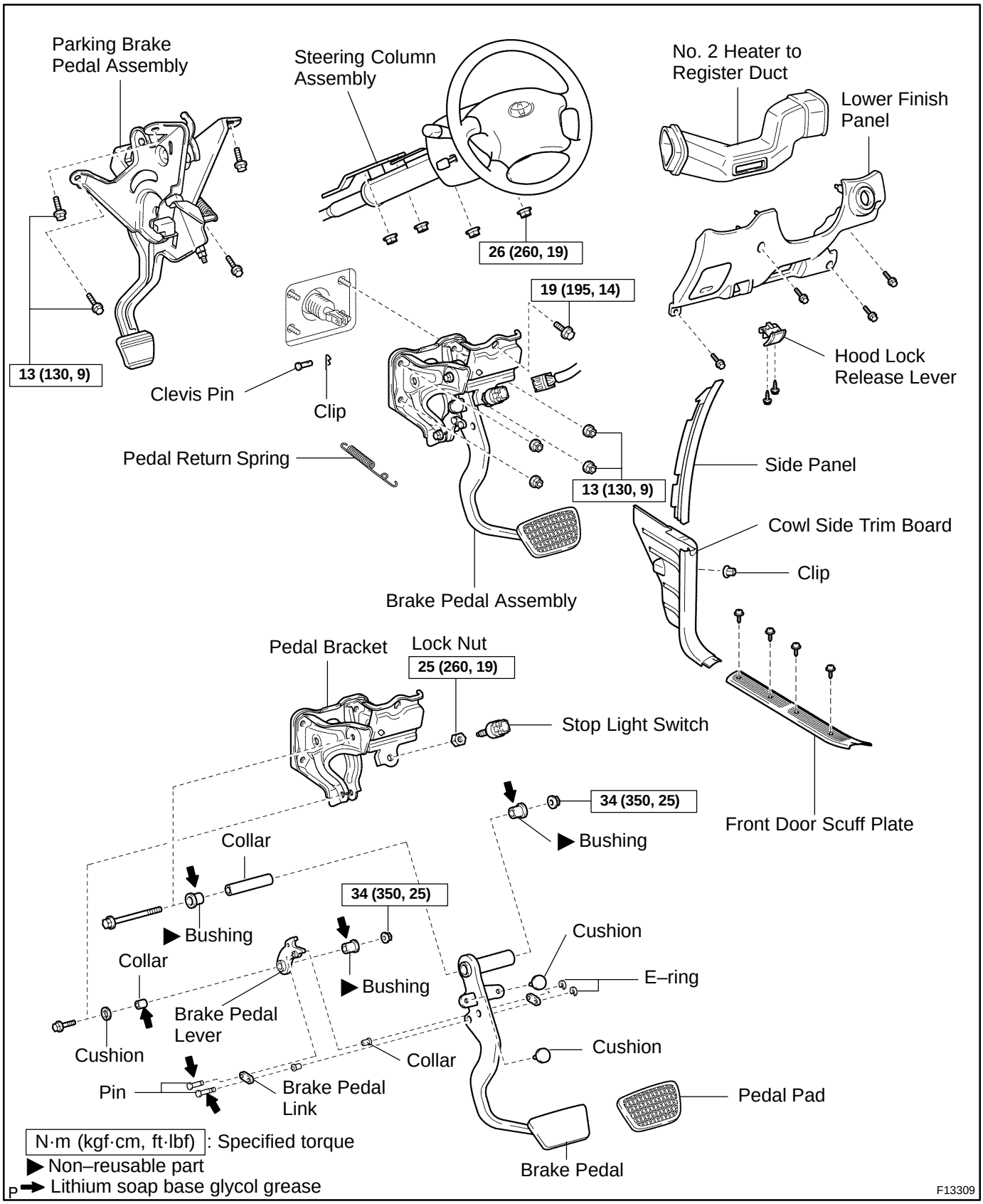
BR108–06

COMPONENTS



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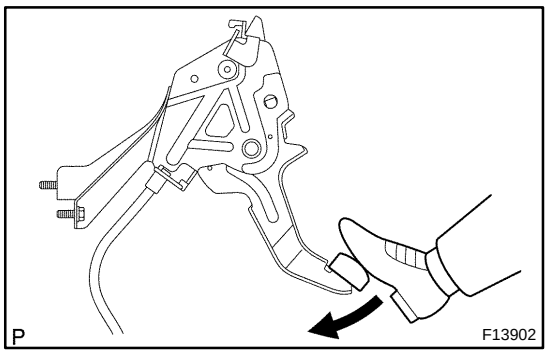


PARKING BRAKE PEDAL

BR109–04

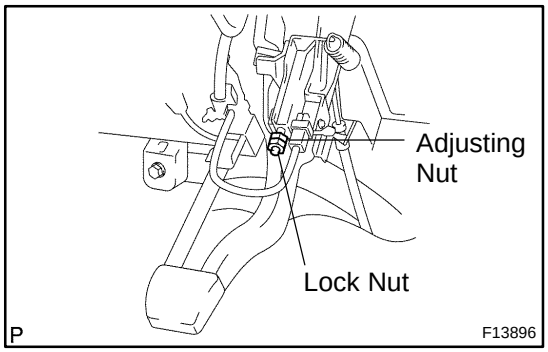
ON–VEHICLE INSPECTION

1. CHECK PARKING BRAKE PEDAL TRAVEL

Depress the parking brake pedal all the way and count the number of clicks.

Parking brake pedal travel at 300 N (31 kgf, 67 lbf): 6 – 9 clicks

If incorrect, adjust the parking brake.



2. IF NECESSARY, ADJUST PARKING BRAKE PEDAL TRAVEL

HINT:

Before adjusting the parking brake, make sure that the rear brake shoe clearance has been adjusted. For shoe clearance adjustment, see step 1 on page BR–47.

(a) Remove the front door scuff plate, cowl side trim board, side panel, lower finish panel and No. 2 heater to register duct (See page BO–89).

(b) Loosen the lock nut and turn the adjusting nut until the pedal travel is correct.

(c) Tighten the lock nut.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(d) Install the No. 2 heater to register duct, lower finish panel, side panel, cowl side trim and front door scuff plate.

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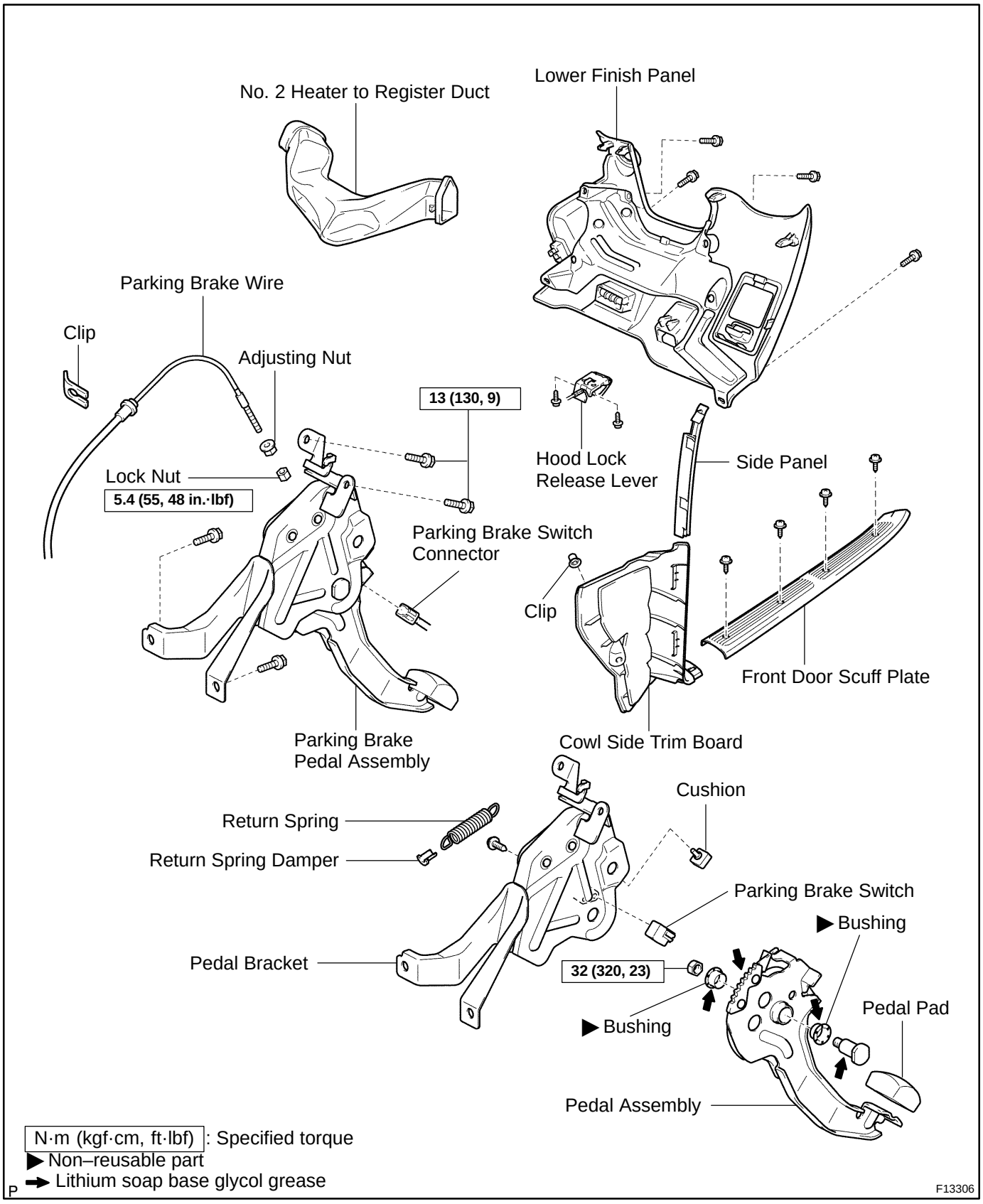
BR10A–04

COMPONENTS



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BR10B–04

REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE, COWL SIDE TRIM BOARD, SIDE PANEL, LOWER FINISH PANEL AND NO. 2 HEATER TO REGISTER DUCT (See page BO–89)

2. REMOVE PARKING BRAKE PEDAL ASSEMBLY

(a) Disconnect the parking brake switch connector.

(b) Remove the lock nut and adjusting nut from the parking brake wire.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(c) Remove the clip and disconnect the parking brake wire from the parking brake pedal assembly.

(d) Remove the 4 bolts and parking brake pedal assembly.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

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BR1NB–02

DISASSEMBLY

1. REMOVE RETURN SPRING AND RETURN SPRING DAMPER

2. REMOVE CUSHION

3. REMOVE PEDAL ASSEMBLY

(a) Remove the nut, bolt and pedal assembly.
Torque: 32 N·m (320 kgf·cm, 23 ft·lbf)

(b) Remove the 2 bushings from the pedal assembly.

(c) Remove the pedal pad.

4. REMOVE PARKING BRAKE SWITCH

Remove the screw and parking brake switch.

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BR1NC–02

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–12).

NOTICE:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR–10).

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BR10C–03

INSTALLATION

Installation is in the reverse order of removal (See page BR–11).

HINT:

After the installation, check and adjust parking brake pedal travel (See page BR–9).

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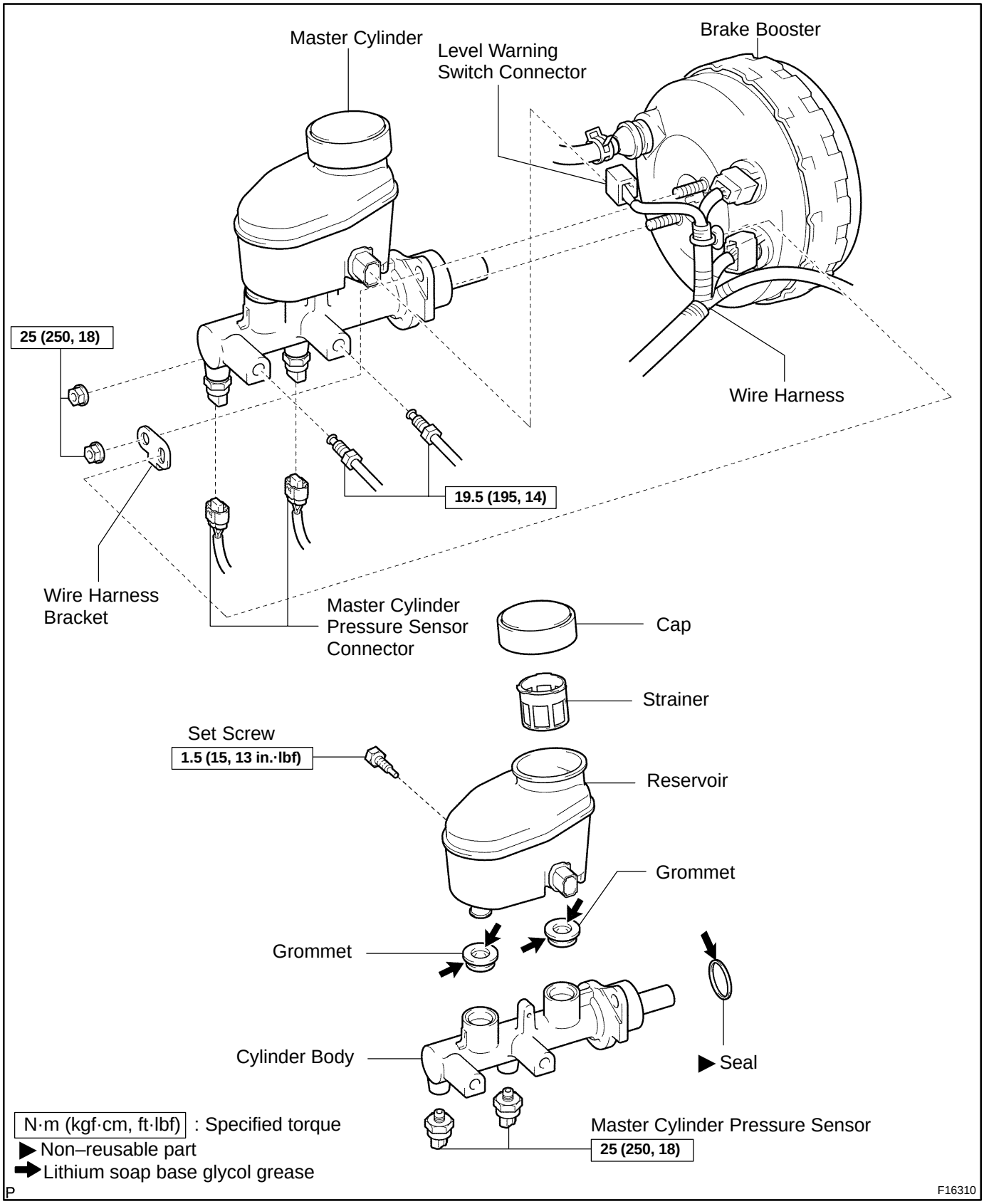
BRAKE MASTER CYLINDER

COMPONENTS

BR10E–04



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BR08U–05

REMOVAL

1. DRAW OUT FLUID WITH SYRINGE

NOTICE:

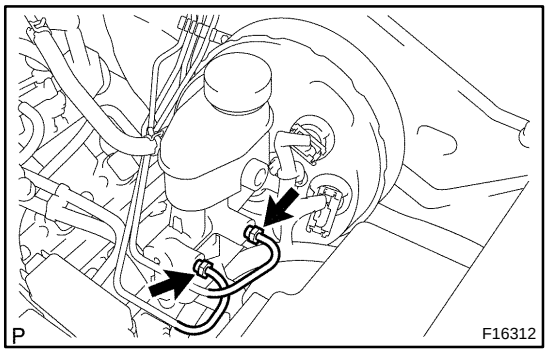
Wash the brake fluid off immediately if it comes into contact with any painted surface.

2. DISCONNECT LEVEL WARNING SWITCH CONNECTOR

3. DISCONNECT 2 MASTER CYLINDER PRESSURE SENSOR CONNECTORS

4. DISCONNECT WIRE HARNESS

Using a clip remover, disconnect the wire harness from the wire harness bracket.

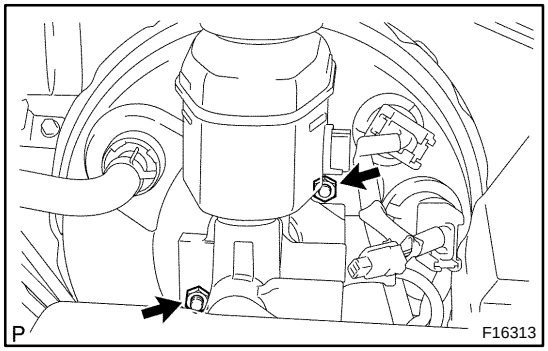


5. DISCONNECT BRAKE LINES

Using SST, disconnect the 2 brake lines from the master cylinder.

SST 09023–38201

Torque: 19.5 N·m (195 kgf·cm, 14 ft·lbf)



6. REMOVE MASTER CYLINDER

(a) Remove the 2 nuts and wire harness bracket.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(b) Pull out the master cylinder from the brake booster.

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BR1ND–02

DISASSEMBLY

1. REMOVE RESERVOIR

(a) Remove the set screw and pull out the reservoir.
Torque: 1.5 N·m (15 kgf·cm, 13 in.·lbf)

(b) Remove the cap and strainer from the reservoir.

2. REMOVE 2 GROMMETS

3. REMOVE SEAL

4. REMOVE 2 MASTER CYLINDER PRESSURE SENSORS
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

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BR08X–06

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–17).

NOTICE:

Apply lithium soap base glycol grease to the rubber parts indicated by the arrows (See page BR–15).

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BR08Y–07

INSTALLATION

Installation is in the reverse order of removal (See page BR–16).

HINT:

- ▶ After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR–4).
- ▶ Check for leaks.

NOTICE:

In case of replacing the master cylinder assembly or master cylinder pressure sensor, perform the zero point calibration of the steering angle, master cylinder pressure, yawrate and deceleration sensors (See page DI–897).

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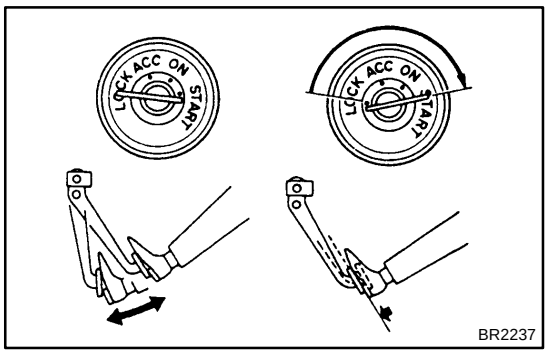


BRAKE BOOSTER ASSEMBLY

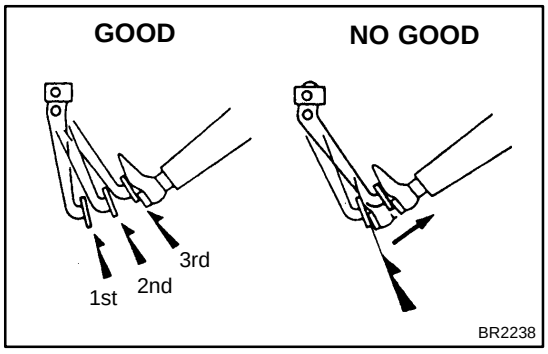
BR0AK–07

ON–VEHICLE INSPECTION

1. OPERATING CHECK

(a) Depress the brake pedal several times with the engine off and check that there is no change in the pedal reserve distance.

(b) Depress the brake pedal and start the engine. If the pedal goes down slightly, operation is normal.



2. AIR TIGHTNESS CHECK

(a) Start the engine and stop it after 1 or 2 minutes. Depress the brake pedal several times slowly.

If the pedal goes down farthest the 1st time, but gradually rises after the 2nd or 3rd time, the booster is airtight.

(b) Depress the brake pedal while the engine is running, and stop the engine with the pedal depressed. If there is no change in the pedal reserve travel after holding the pedal for 30 seconds, the booster is airtight.

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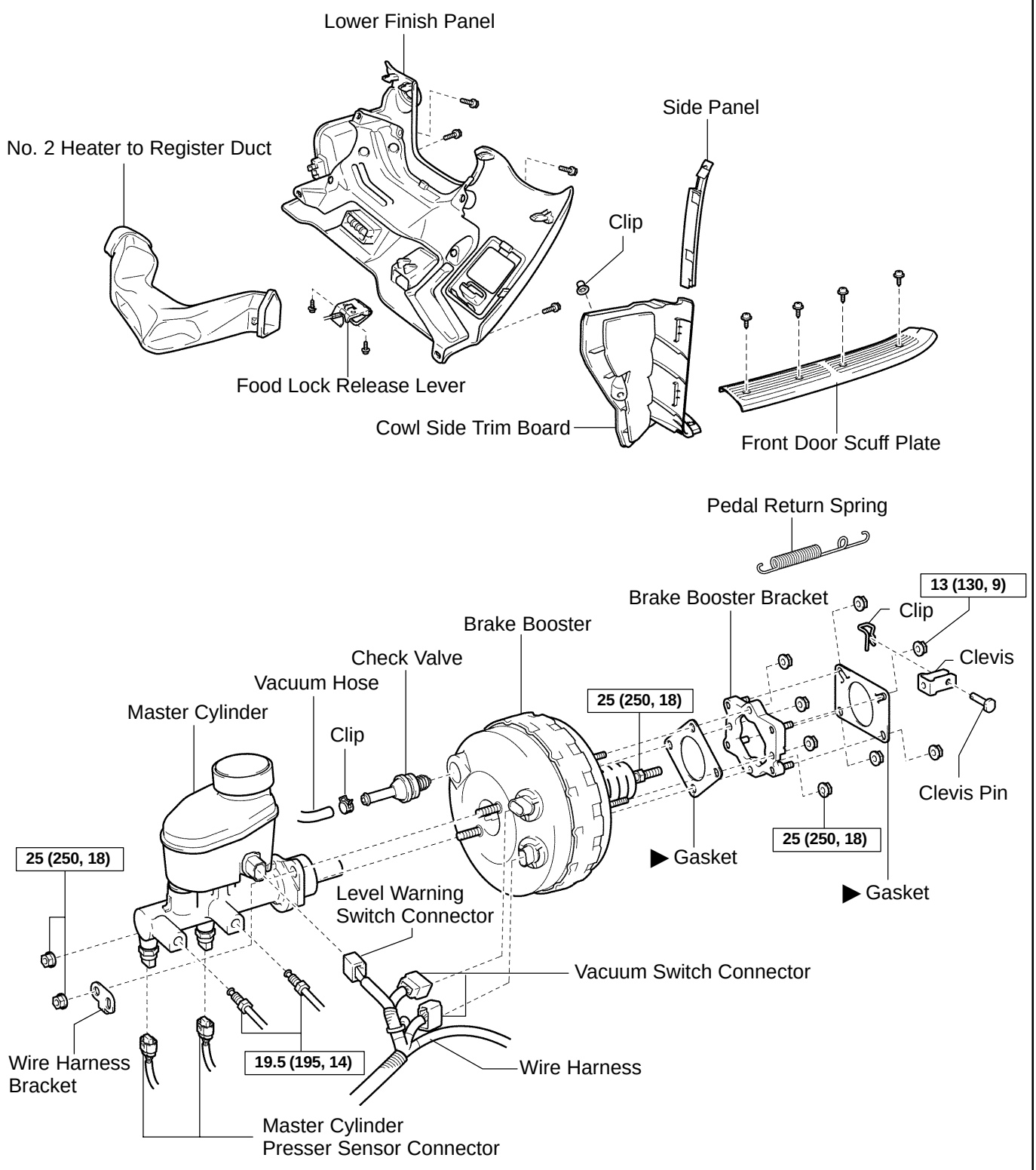
BR10G–04

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

P ▶ Non–reusable part

F16311

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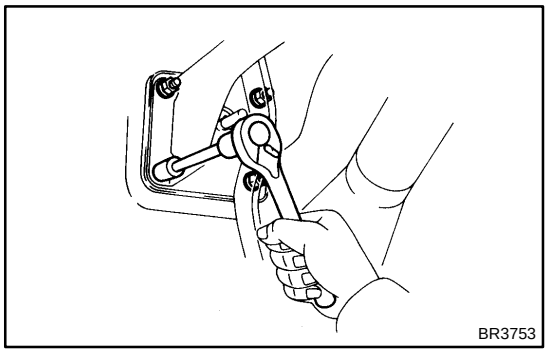
BR10H–05

REMOVAL

1. **REMOVE MASTER CYLINDER (See page BR–16)**
2. **DISCONNECT VACUUM HOSE FROM BRAKE BOOSTER**
3. **DISCONNECT 2 VACUUM SWITCH CONNECTORS FROM BRAKE BOOSTER**
4. **REMOVE FRONT DOOR SCUFF PLATE, COWL SIDE TRIM BOARD, SIDE PANEL, LOWER FINISH PANEL AND NO. 2 HEATER TO REGISTER DUCT (See page BO–89)**
5. **REMOVE PEDAL RETURN SPRING**
6. **REMOVE CLIP AND CLEVIS PIN**



7. **REMOVE BRAKE BOOSTER**

(a) Remove the 4 nuts, pull out the brake booster.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Remove the gasket from the brake booster bracket.

(c) Loosen the lock nut then remove the clevis.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(d) Remove the check valve.

(e) Remove the 4 nuts, brake booster bracket and gasket from the brake booster.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

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BR1NE–03

INSTALLATION

Installation is in the reverse order of removal (See page BR–22).

HINT:

- ▶ Fill the brake reservoir with brake fluid and bleed brake system (See page BR–4).
- ▶ Check the brake pedal hight (See page BR–6).
- ▶ Do the operational check (See page BR–20).

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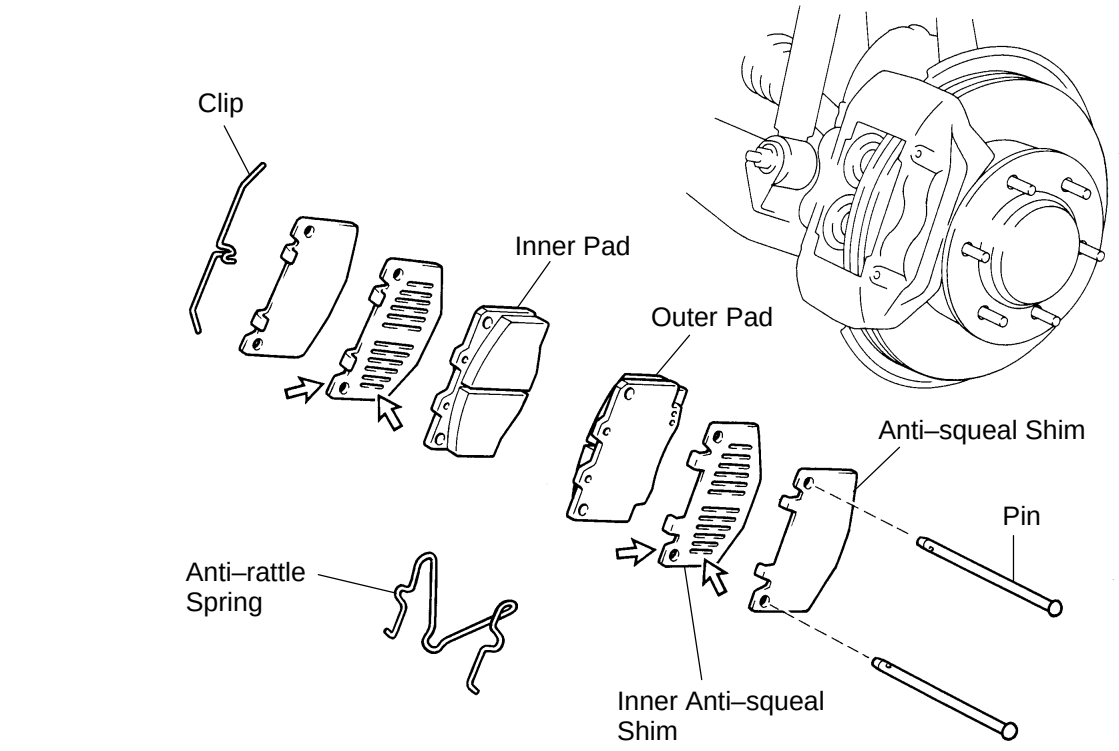
FRONT BRAKE PAD

COMPONENTS

BR10J–04



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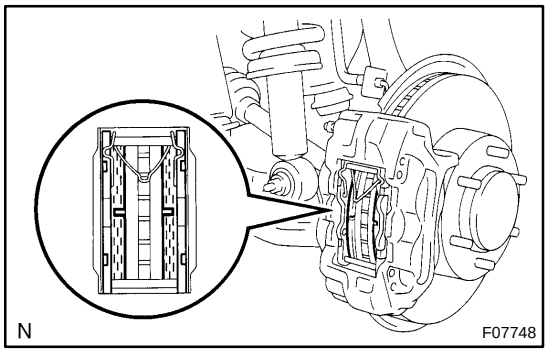
BR10K–04

REPLACEMENT

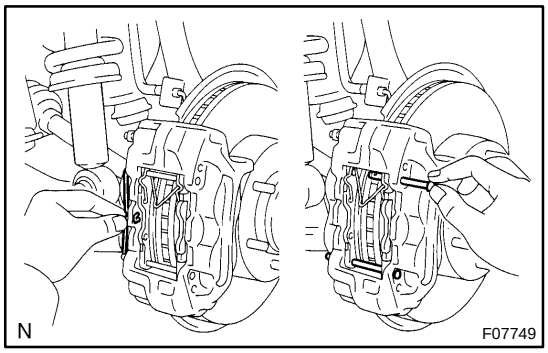
1. REMOVE FRONT WHEEL



2. INSPECT PAD LINING THICKNESS

Check the pad thickness and replace pads if not within specification.

Minimum thickness: 1.0 mm (0.039 in.)



3. REMOVE CLIP, 2 PINS AND ANTI–RATTLE SPRING

4. REMOVE 2 PADS WITH 4 ANTI–SQUEAL SHIMS

NOTICE:

The anti–rattle spring and clip can be used again provided that they have sufficient rebound, no deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.

5. CHECK DISC THICKNESS AND RUNOUT

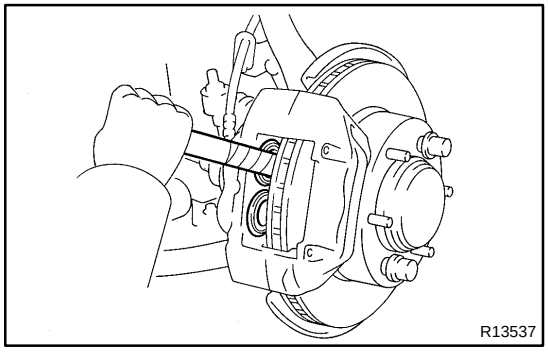
(See page BR–30)

6. INSTALL NEW PADS

NOTICE:

When replacing worn pads, the anti–squeal shims must be replaced together with the pads.

(a) Draw out a small amount of brake fluid from the reservoir.



(b) Press in the pistons with a monkey wrench handle or equivalent.

HINT:

- ▶ Tape the monkey wrench handle before use.
- ▶ Always change the pad on one wheel at a time as there is a possibility of the opposite piston flying out.
- ▶ If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.

(c) Install the 4 anti–squeal shims to new pads.

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HINT:
Apply disc brake grease to both sides of inner anti–squeal shims (See page BR–24).

(d) Install new pads.

NOTICE:
Do not allow oil or grease to get on the rubbing face.

7. INSTALL ANTI–RATTLE SPRING AND 2 PINS
8. INSTALL CLIP
9. INSTALL FRONT WHEEL
Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)
10. DEPRESS BRAKE PEDAL SEVERAL TIMES
11. CHECK THAT FLUID LEVEL IS AT MAX LINE

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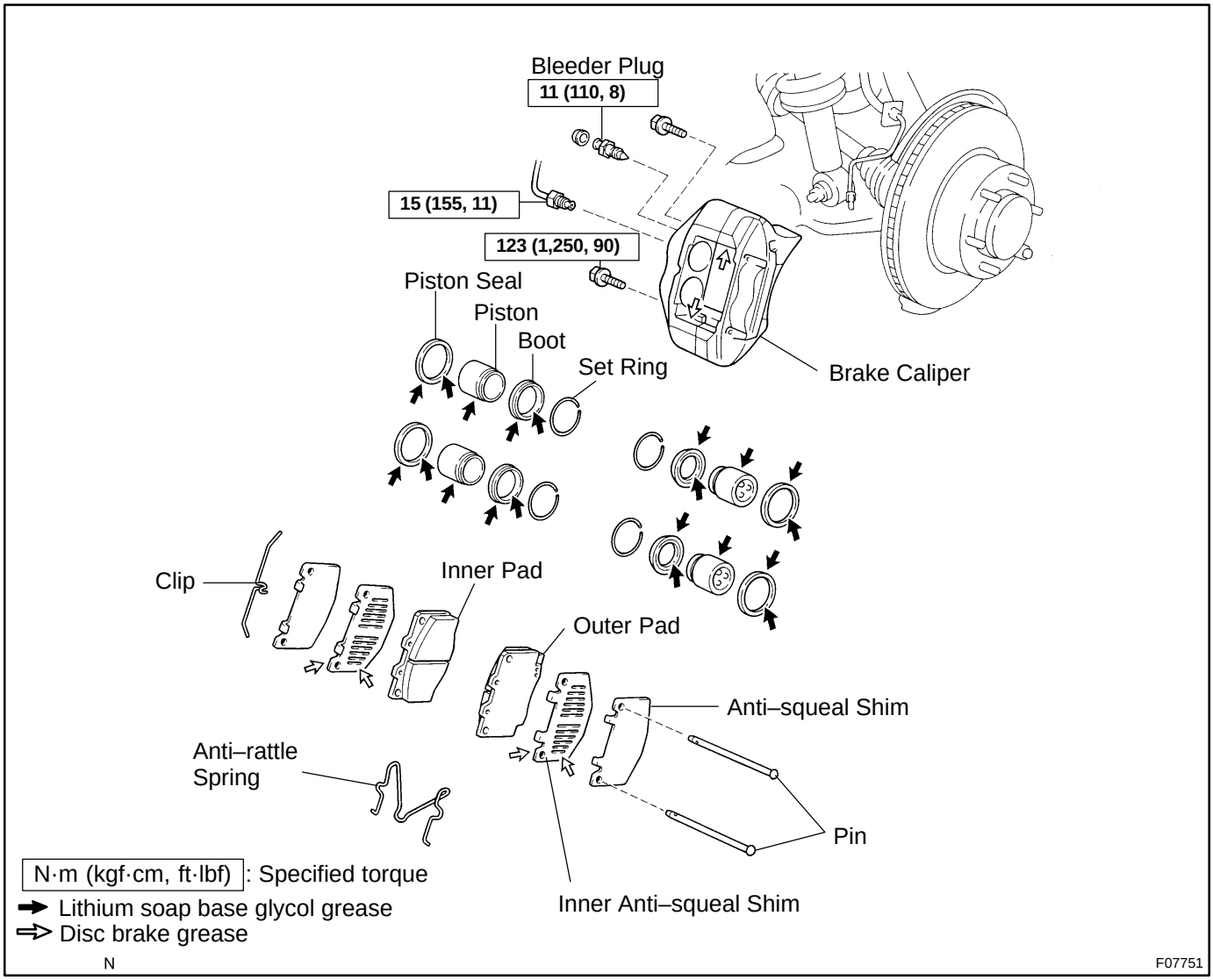
FRONT BRAKE CALIPER

COMPONENTS

BR10L–03



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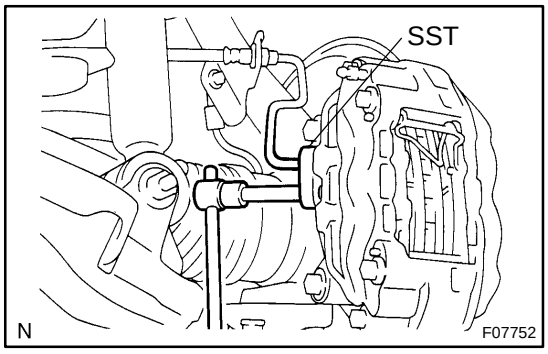
BR10M–03

REMOVAL

1. REMOVE FRONT WHEEL

Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)

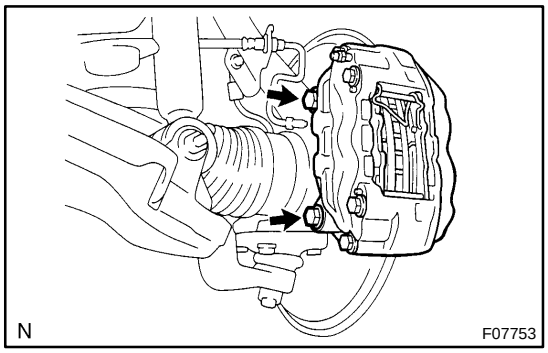


2. DISCONNECT BRAKE LINE

Using SST, disconnect the brake line. Use a container to catch the brake fluid.

SST 09023–00101

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)



3. REMOVE CALIPER

Remove the 2 mounting bolts and caliper.

Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

4. REMOVE CLIP, 2 PINS AND ANTI–RATTLE SPRING

5. REMOVE 2 PADS WITH 4 ANTI–SQUEAL SHIMS

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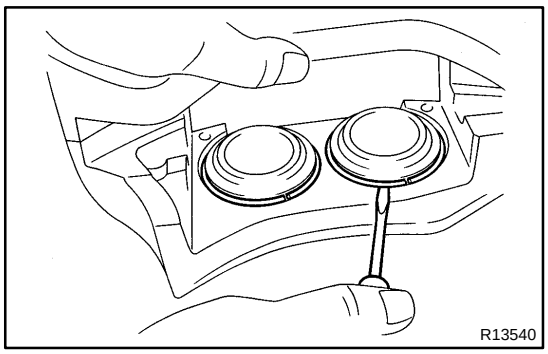
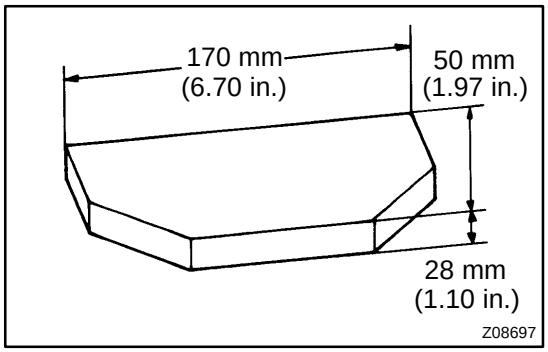
BR10N–03

DISASSEMBLY



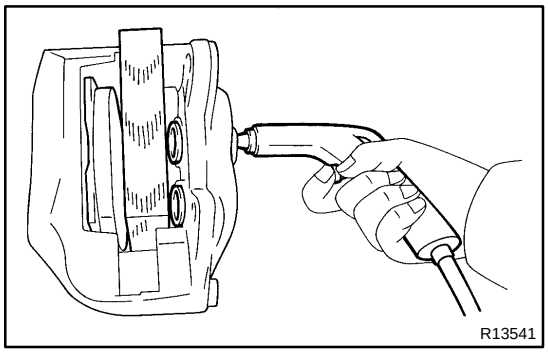
1. REMOVE CYLINDER BOOT SET RINGS AND BOOTS

Using a screwdriver, remove the 4 cylinder boot set rings and boots.



2. REMOVE PISTONS FROM CYLINDER

(a) Prepare the wooden plate to hold the pistons.

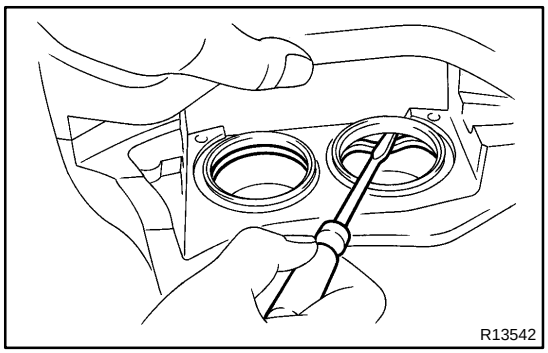


(b) Place the plate between the pistons and insert a pad at one side.

(c) Use compressed air to remove the pistons alternately from the cylinder.

CAUTION:

Do not place your fingers in front of the pistons when using compressed air.



3. REMOVE PISTON SEALS

Using a screwdriver, remove the 4 piston seals from the cylinder.

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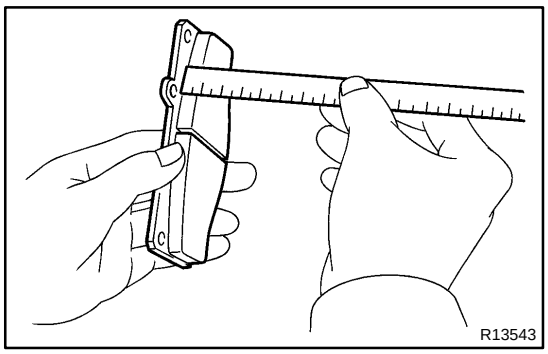
BR10O–04

INSPECTION



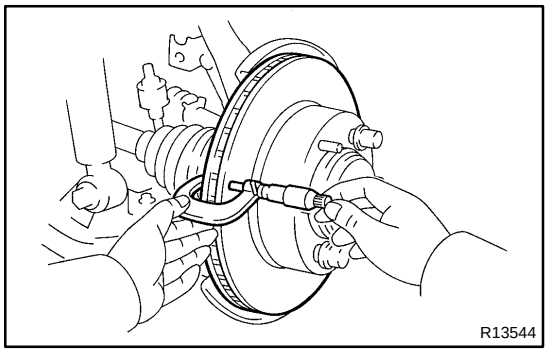
1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness: 11.5 mm (0.453 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the thickness is less than the minimum (the 1.0 mm slit is no longer visible), or if it shows signs of uneven wear.



2. MEASURE DISC THICKNESS

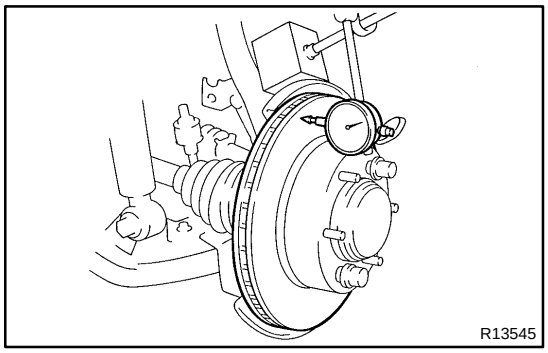
(a) Temporarily fasten the disc with 3 hub nuts.

(b) Using a micrometer, measure the disc thickness.

Standard thickness: 28.0 mm (1.102 in.)

Minimum thickness: 26.0 mm (1.024 in.)

Replace the disc if the thickness of the disc is at the minimum or less. Replace the disc or grind it on a lathe if it is scored or worn unevenly.



3. MEASURE DISC RUNOUT

Using a dial indicator, measure the disc runout at a position 10 mm (0.39 in.) from the outside edge.

Maximum disc runout: 0.07 mm (0.0028 in.)

If the runout is greater than the maximum, replace the disc or grind it on a ”On–Car” brake lathe.

HINT:

When the disc runout is outside the specified range, check the front hub bearing in the same way.

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the hub nuts and disc. Reinstall the disc 1/6 of a turn round from its original position on the hub. Install and torque the hub nuts.

Torque: 110 N·m (1,150 kgf·cm, 83 ft·lbf)

(b) Remeasure the disc runout. Make a note of the runout and the disc’s position on the hub.

(c) Repeat (a) and (b) until the disc has been installed on the 4 remaining hub positions.

- ▶ If the minimum runout recorded in (a) to (c) is less than the maximum disc runout, install the disc in that position.
- ▶ If the minimum runout recorded in (a) to (c) is greater than the maximum disc runout, replace the disc and repeat step 3.

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BR10P–03

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–29).

NOTICE:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR–27).

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BR10Q–03

INSTALLATION

Installation is in the reverse order of removal (See page BR–28).

HINT:

- ▶ After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR–4).
- ▶ Check for leaks.

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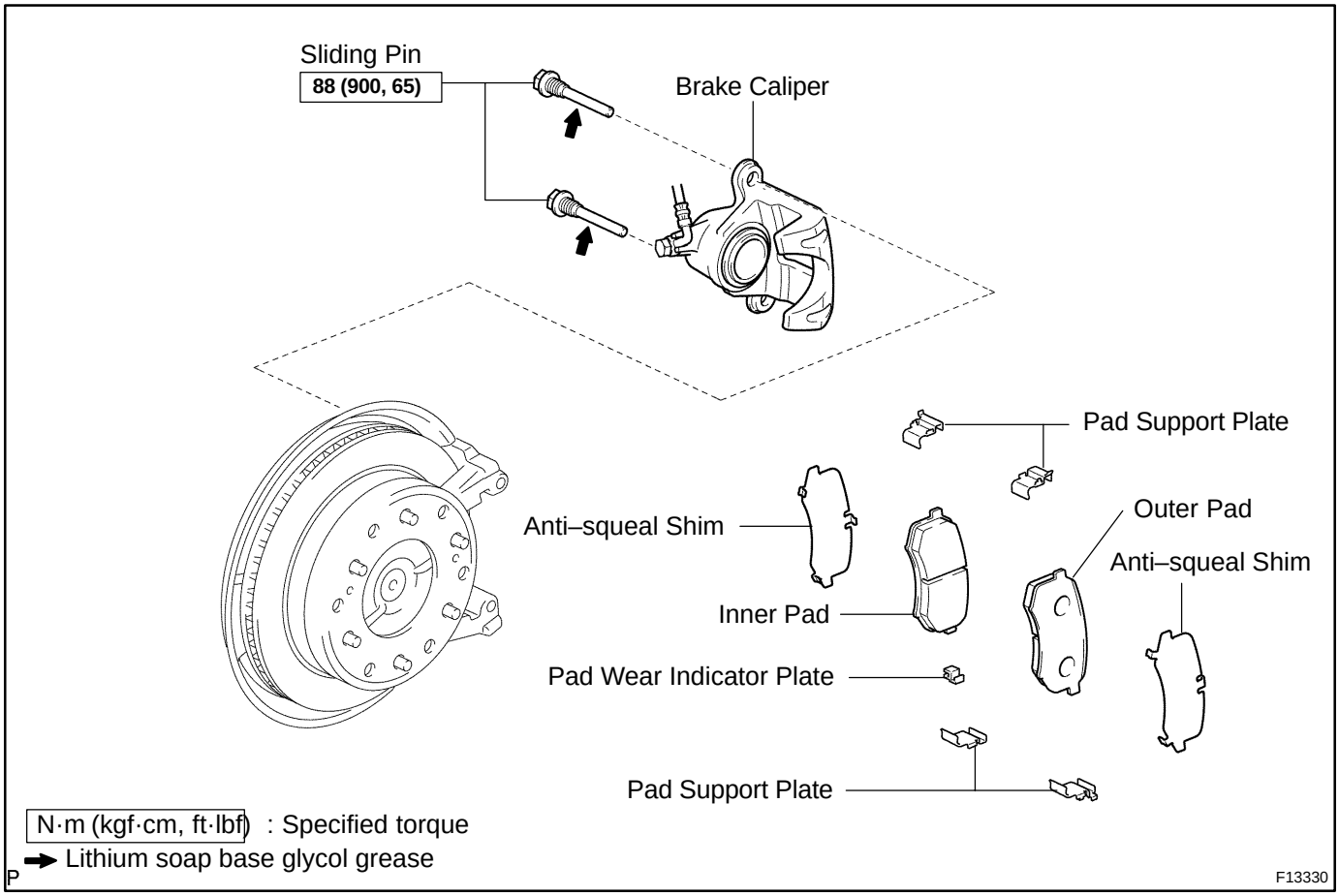
REAR BRAKE PAD

COMPONENTS

BR0JP–15



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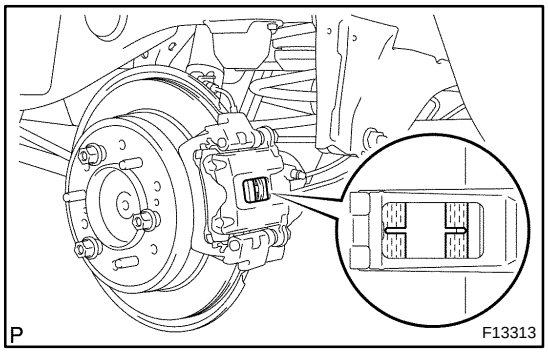
BR0TB–07

REPLACEMENT

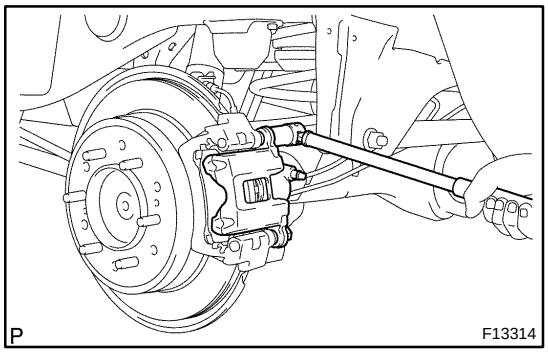
1. REMOVE REAR WHEEL



2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the caliper inspection hole and replace pads if not within the specification.

Minimum thickness: 1.0 mm (0.039 in.)



3. REMOVE BRAKE CALIPER

(a) Remove the 2 sliding pins.

(b) Remove the caliper and suspend it so the hose is not stretched.

HINT:

Do not disconnect the flexible hose.

4. REMOVE 2 PADS WITH 2 ANTI–SQUEAL SHIMS

5. REMOVE 4 PAD SUPPORT PLATES

NOTICE:

The pad support plates can be used again provided that they have sufficient rebound, no deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.

6. CHECK DISC THICKNESS AND RUNOUT

(See page BR–39)

7. INSTALL PAD SUPPORT PLATES

8. INSTALL NEW PADS

NOTICE:

When replacing worn pads, the anti–squeal shims must be replaced together with the pads.

(a) Install the pad wear indicator plate on new inner pad.

(b) Install the anti–squeal shim on each pad.

(c) Install the inner pad with the pad wear indicator plate facing downward.

(d) Install outer pad.

NOTICE:

There should be no oil or grease adhering to the friction surfaces of the pads or the disc.

9. INSTALL CALIPER

(a) Draw out a small amount of brake fluid from the reservoir.

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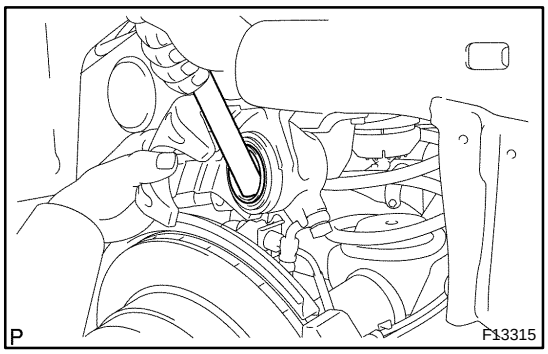

(b) Press in the pistons with a hammer handle or an equivalent.

HINT:

If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some fluid escape.

(c) Install the caliper carefully so the boot is not wedged.

(d) Apply lithium soap base glycol grease to the sliding pins and install the 2 sliding pins.

Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)

10. INSTALL REAR WHEEL

Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)

11. DEPRESS BRAKE PEDAL SEVERAL TIMES

12. CHECK THAT FLUID LEVEL IS AT MAX LINE

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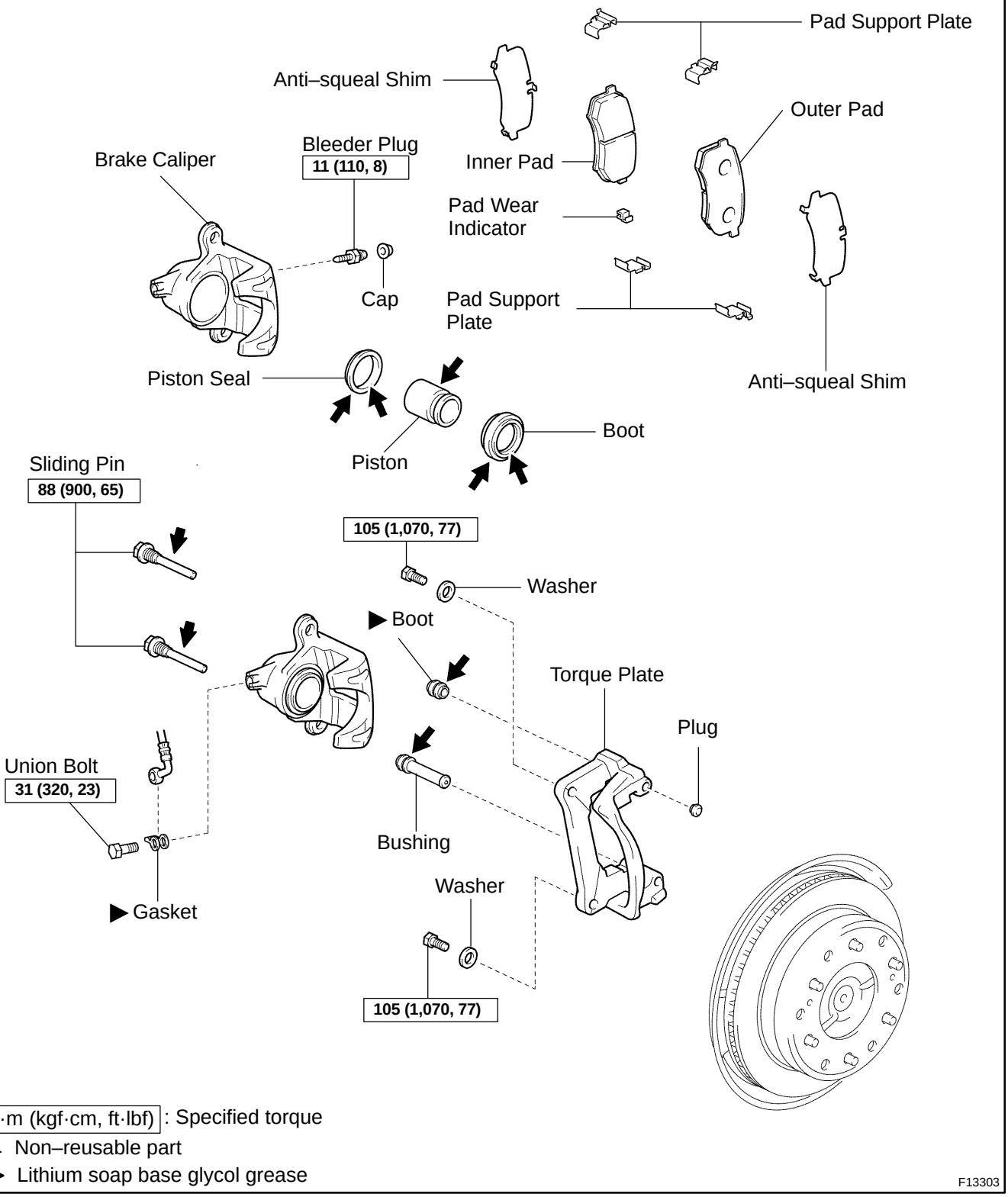
REAR BRAKE CALIPER

BR0JR–16

COMPONENTS



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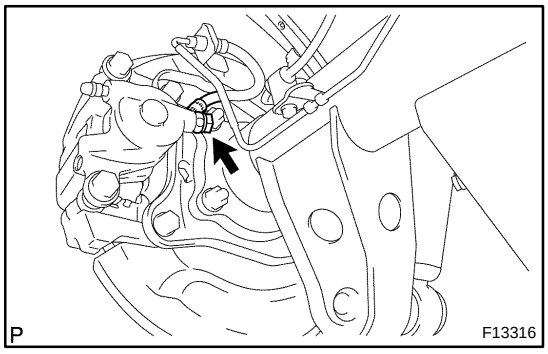
BR0JS–14

REMOVAL

1. REMOVE REAR WHEEL

Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)



2. DISCONNECT FLEXIBLE HOSE

Remove the union bolt and gasket from the caliper, then disconnect the flexible hose from the caliper. Use a container to catch brake fluid as it drains out.

Torque: 31 N·m (320 kgf·cm, 23 ft·lbf)

HINT:

Securely set the flexible hose between the projections of the caliper.

3. REMOVE CALIPER

(a) Remove the 2 sliding pins.

Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)

(b) Remove the caliper from the torque plate.

4. REMOVE 2 BRAKE PADS WITH ANTI–SQUEAL SHIM

5. REMOVE 4 PAD SUPPORT PLATES

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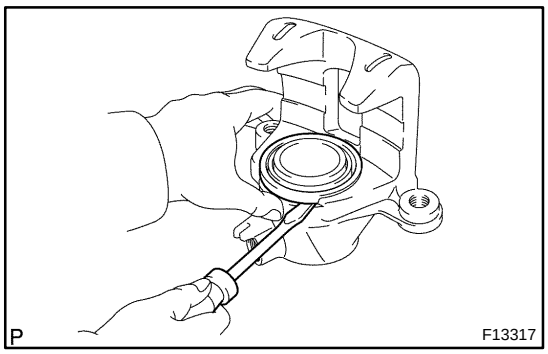
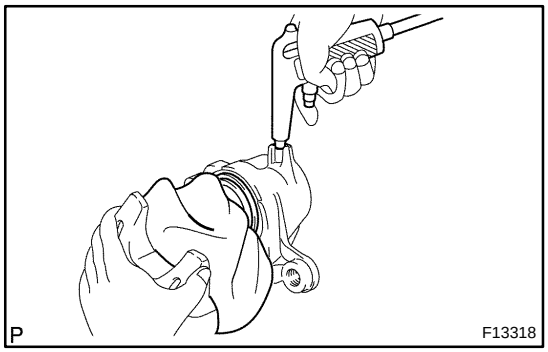
BR0TC–06

DISASSEMBLY



1. REMOVE CYLINDER BOOTS

Using a screwdriver, remove the cylinder boot from the caliper.



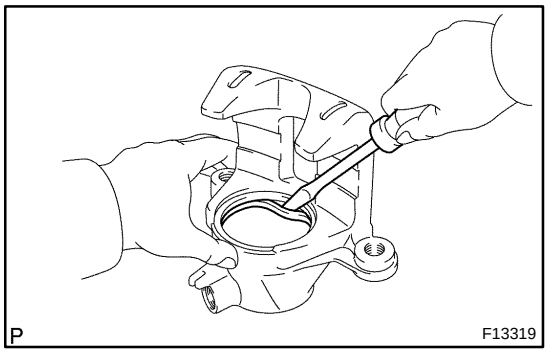
2. REMOVE PISTON

(a) Place a piece of cloth or a similar object between the piston and caliper.

(b) Use compressed air to remove the piston from the cylinder.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.



3. REMOVE PISTON SEAL FROM BRAKE CYLINDER

Using a screwdriver, remove the piston seal from the caliper.

4. REMOVE CAP AND BLEEDER PLUG

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

5. REMOVE BUSHING, PLUG AND BOOT

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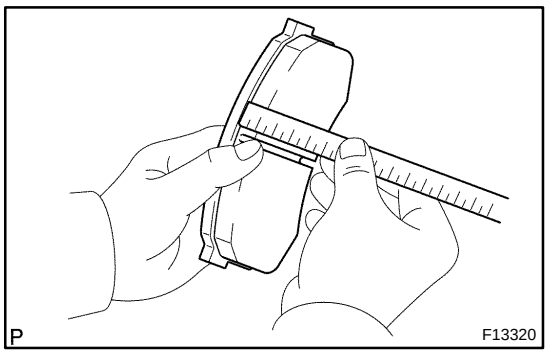
BR0JU–14

INSPECTION



1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

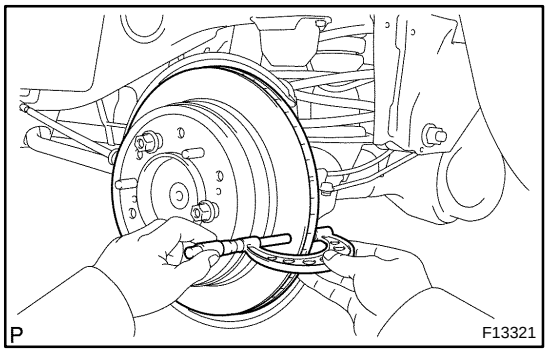
Standard thickness: 10.0 mm (0.39 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the pad's thickness is at the minimum or if it shows signs of uneven wear.

2. MEASURE DISC THICKNESS

(a) Temporarily fasten the disc with the 3 hub nuts.

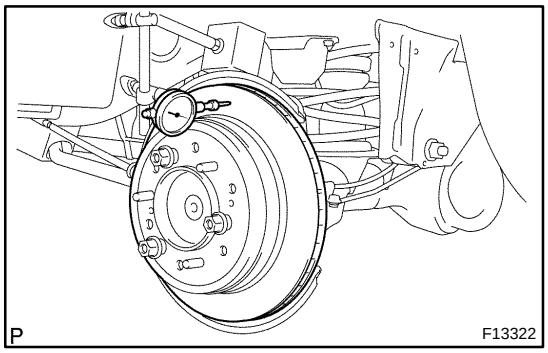


(b) Using a micrometer, measure the disc thickness.

Standard thickness: 18.0 mm (0.709 in.)

Minimum thickness: 16.0 mm (0.611 in.)

Replace the disc if the thickness of the disc is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is scored or is worn unevenly.



3. MEASURE DISC RUNOUT

Using a dial indicator, measure the disc runout at a position 10 mm (0.39 in.) from the outside edge.

Maximum disc runout: 0.1 mm (0.0039 in.)

If the disc's runout is at the maximum value or greater, check the bearing play is in the axial direction and check the axle hub runout (See page SA–95). If the bearing play and axle hub runout are not abnormal, adjust the disc runout or grind it on an "On–Car" brake lathe.

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the 2 bolts and torque plate from the backing plate.

(b) Remove the hub nuts and the disc. Reinstall the disc rotating 1/6 of a turn from its original position on the hub. Install and torque the hub nuts.

Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)

Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 4 remaining hub positions.

(d) If the minimum runout recorded in (b) and (c) is less than 0.1 mm (0.0039 in.), install the disc in that position.

(e) If the minimum runout recorded in (b) and (c) is greater than 0.1 mm (0.0039 in.), replace the disc and repeat step 3.

(f) Install the torque plate and tighten the 2 bolts.

Torque: 105 N·m (1,070 kgf·cm, 77 ft·lbf)

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BR0JV–09

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–38).

HINT:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR–36).

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BR0JW–10

INSTALLATION

Installation is in the reverse order of removal (See page BR–37).

HINT:

- ▶ After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR–4).
- ▶ Check for leaks.

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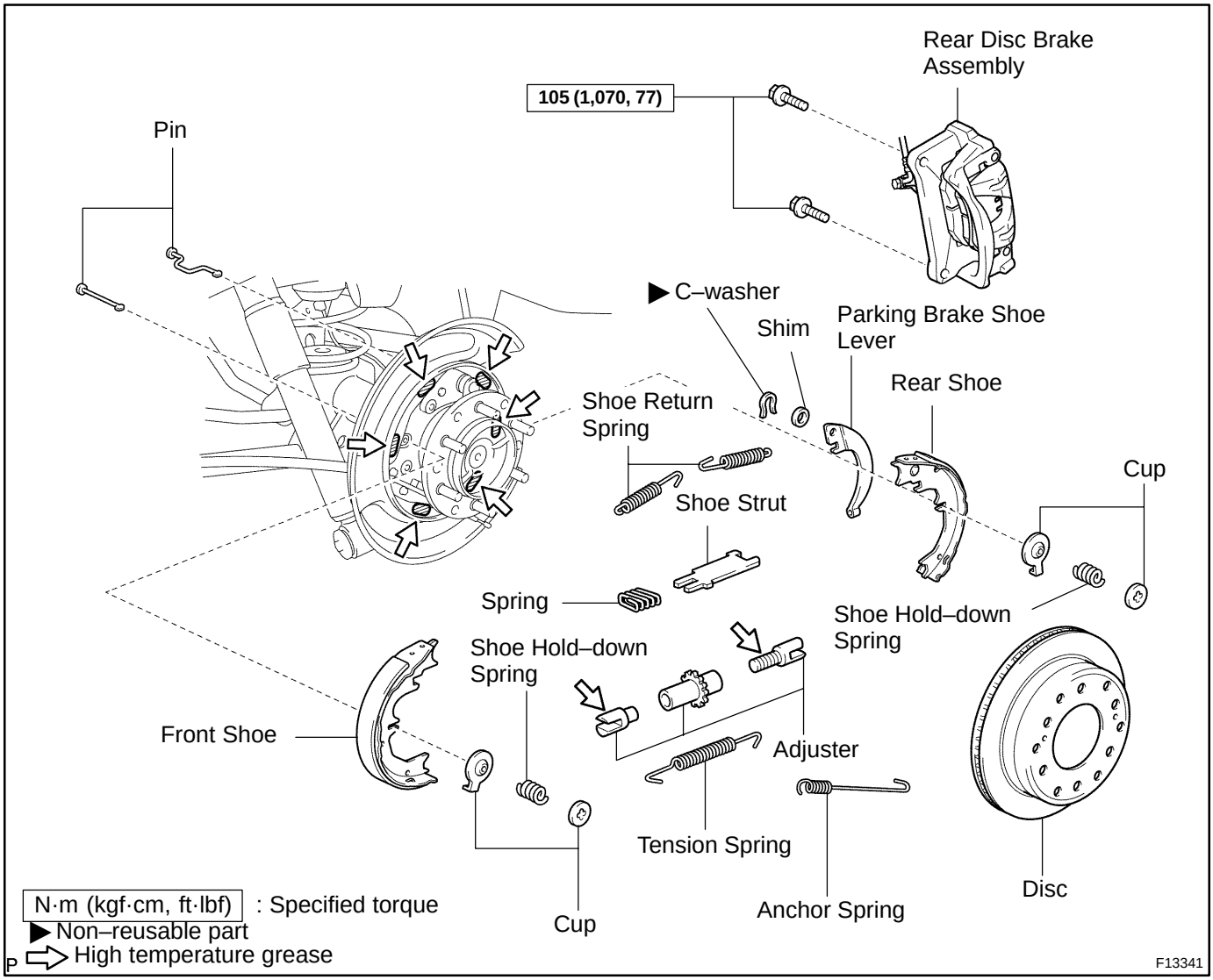
PARKING BRAKE

COMPONENTS

BR0JX–17



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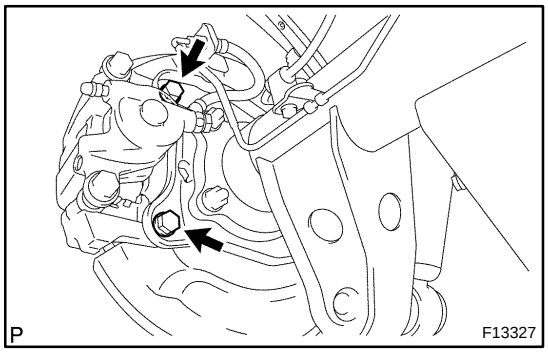
BR1NF–02

DISASSEMBLY

1. REMOVE REAR WHEEL

Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)

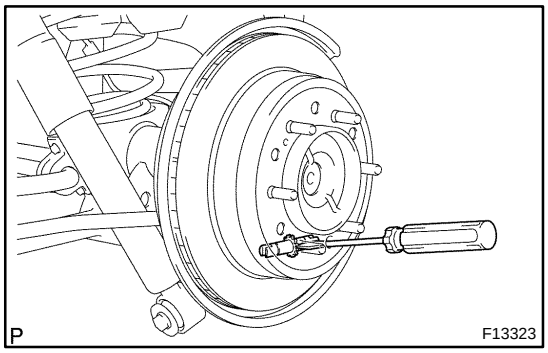


2. REMOVE REAR DISC BRAKE ASSEMBLY

(a) Remove the 2 mounting bolts and remove the disc brake assembly.

Torque: 105 N·m (1,070 kgf·cm, 77 ft·lbf)

(b) Suspend the disc brake securely and so the hose is not stretched.



3. REMOVE DISC

(a) Release the parking brake lever.

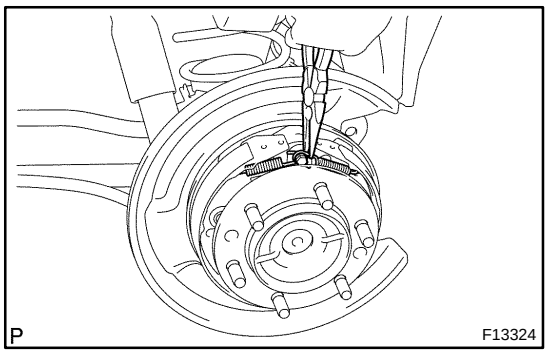
(b) Place matchmarks on the disc and rear axle hub.

(c) Remove the disc.

HINT:

▶ If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.

▶ If there are no matchmarks, temporarily install the disc, then measure the disc runout and install the disc in position (See page BR–39).



4. REMOVE SHOE RETURN SPRINGS

Using needle–nose pliers, remove the 2 shoe return springs.

5. REMOVE SHOE STRUT WITH SPRING

HINT:

At the time of reassembly, install the strut with the spring facing forward.

6. REMOVE SHOE ADJUSTER

Slide the front shoe toward outside, remove the shoe adjuster.

7. REMOVE FRONT SHOE

(a) Using a needle–nose pliers, disconnect the anchor spring and tension spring from the front shoe.

(b) Remove the anchor spring and tension spring.

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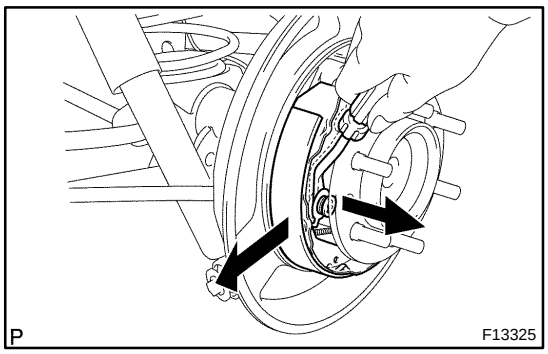
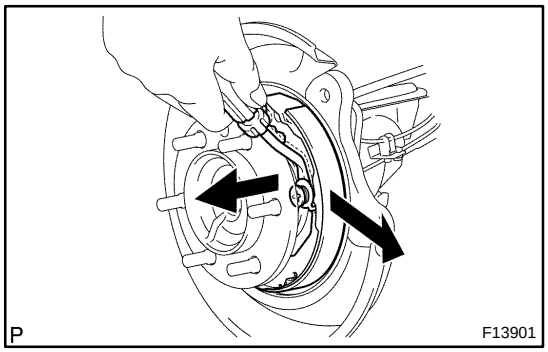


(c) Using a clip remover, remove the front shoe with holding the cup.

HINT:

At the time of reassembly, hold the cup with clip remover. In this condition, install the front shoe.

(d) Remove the 2 cups, shoe hold–down spring and pin.



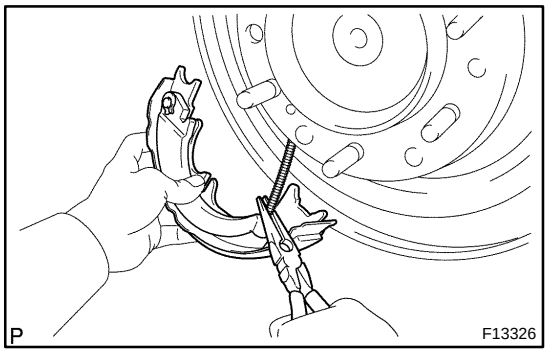
8. REMOVE REAR SHOE

(a) Using a clip remover, remove the rear shoe with holding the cup.

HINT:

At the time of reassembly, hold the cup with clip remover. In this condition, install the rear shoe.

(b) Remove the 2 cups, shoe hold–down spring and pin.



(c) Disconnect the parking brake cable from the parking brake shoe lever.

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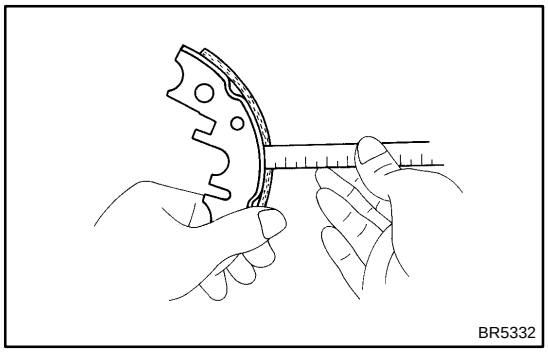
BR0ZY–05

INSPECTION

1. INSPECT DISASSEMBLED PARTS

Inspect the disassembled parts for wear, rust or damage.



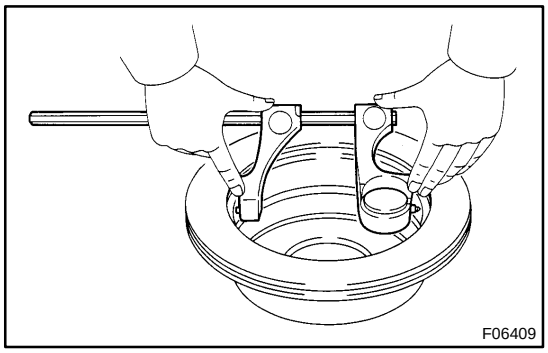
2. MEASURE BRAKE SHOE LINING THICKNESS

Using a ruler, measure the thickness of the shoe lining.

Standard thickness: 4.0 mm (0.157 in.)

Minimum thickness: 1.0 mm (0.039 in.)

If the lining thickness is at the minimum thickness or less, or if there is severe and uneven wear, replace the brake shoe.



3. MEASURE BRAKE DISC INSIDE DIAMETER

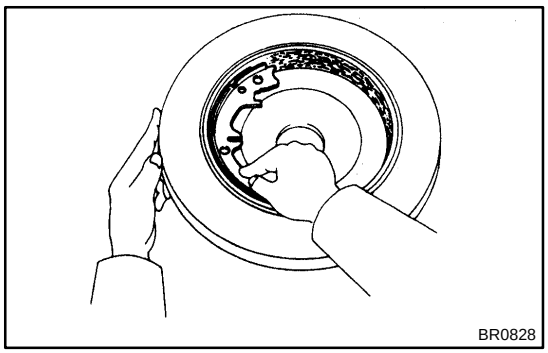
Using a brake drum gauge or equivalent, measure the inside diameter of the disc.

Standard inside diameter: 210 mm (8.27 in.)

Maximum inside diameter: 211 mm (8.31 in.)

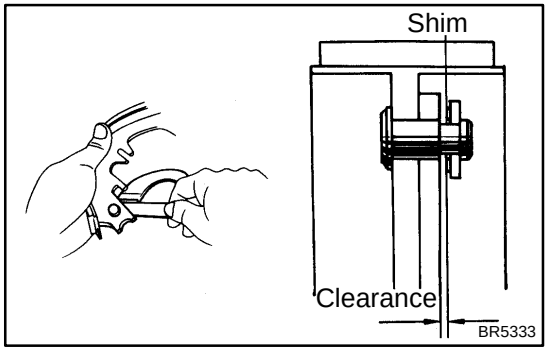
Replace the disc if the inside diameter is at the maximum value or more.

Replace the disc or grind it with a lathe if the disc is scored or worn unevenly.



4. INSPECT PARKING BRAKE SHOE LINING AND DISC FOR PROPER CONTACT

Apply chalk to the inside surface of the disc, then grind down the brake shoe lining to fit. If the contact between the disc and the brake shoe lining is improper, repair it using a brake shoe grinder or replace the brake shoe assembly.



5. MEASURE CLEARANCE BETWEEN PARKING BRAKE SHOE AND LEVER

Using a feeler gauge, measure the clearance.

Standard clearance: Less than 0.25 mm (0.010 in.)

If the clearance is not within the specification, replace the shim with one of the correct size.

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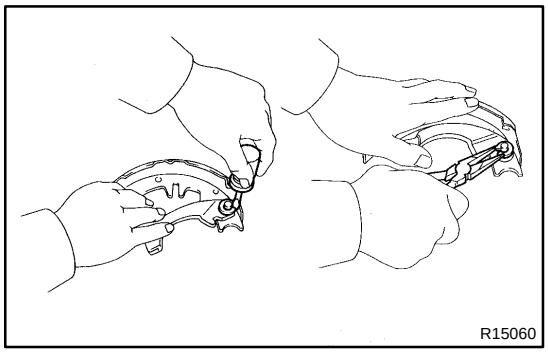
Thickness mm (in.)	Thickness mm (in.)
0.3 (0.012)	0.6 (0.024)
0.4 (0.016)	0.9 (0.035)
0.5 (0.020)	–



6. IF NECESSARY, REPLACE SHIM

(a) Using a screwdriver, remove the C–washer and shim.
(b) Install the correct size shim with a new C–washer.
(c) Remeasure the clearance.

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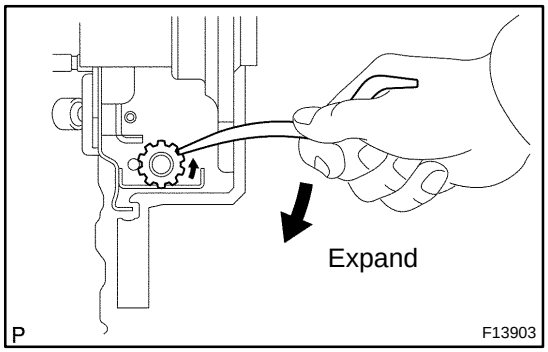
BR0K0–11

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–43).

HINT:

Apply high temperature grease to the parts indicated by the arrows (See page BR–42).



1. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Temporarily install the 3 hub nuts.

(b) Turn the adjuster and expand the shoes until the disc locks.

(c) Return the adjuster 8 notches.

2. SETTLING PARKING BRAKE SHOES AND DISC

(a) Depress the parking brake pedal with 147 N (15 kgf, 33 lbf).

(b) Drive the vehicle at about 50 km/h (31 mph) on a safe, level and dry road for about 400 meters (0.25 mile) in this condition.

(c) Repeat this procedure 2 or 3 times.

3. CHECK AND ADJUST PARKING BRAKE PEDAL TRAVEL (See page BR–9)

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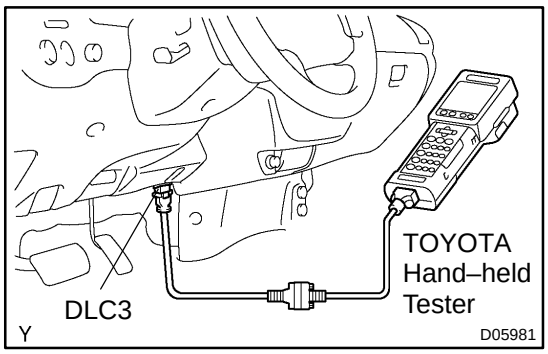

ABS & VSC ACTUATOR

BR1NG–05

ON–VEHICLE INSPECTION

1. CONNECT TOYOTA HAND–HELD TESTER:

(a) Connect the TOYOTA hand–held tester to the DLC3.

(b) Start the engine and run it at idle.

(c) Select the ACTIVE TEST mode on the TOYOTA hand–held tester.

HINT:

Please refer to the TOYOTA hand–held tester operator's manual for further details.

2. INSPECT ACTUATOR MOTOR OPERATION

(a) With the motor relay ON, check the actuator motor operation noise.

(b) Turn the motor relay OFF.

(c) Depress the brake pedal and hold it for about 15 seconds. Check that the pedal does not go down any further while holding.

(d) With the motor relay ON, check that the pedal does not pulsate.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

(e) Turn the motor relay OFF and release the brake pedal.

3. INSPECT RIGHT FRONT WHEEL OPERATION

NOTICE:

Never turn ON the solenoid which is not described below.

(a) With the brake pedal depressed, perform the following operations.

(b) Turn the SFRH and SFRR solenoid ON simultaneously, and check that the pedal cannot be depressed.

NOTICE:

Do not keep solenoid ON for more than 10 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

(c) Turn the SFRH and SFRR solenoid OFF simultaneously, and check that the pedal can be depressed.

(d) Turn the motor relay ON and check that the pedal returns.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

(e) Turn the motor relay OFF and release the brake pedal.

4. INSPECT OTHER WHEEL OPERATION

As in the same procedure, check the solenoids of other wheels.

HINT:

Left front wheel: SFLH, SFLR

Right rear wheel: SRRH, SRRR

Left rear wheel: SRLH, SRLR

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5. CLEAR DTC (See page DI–911)

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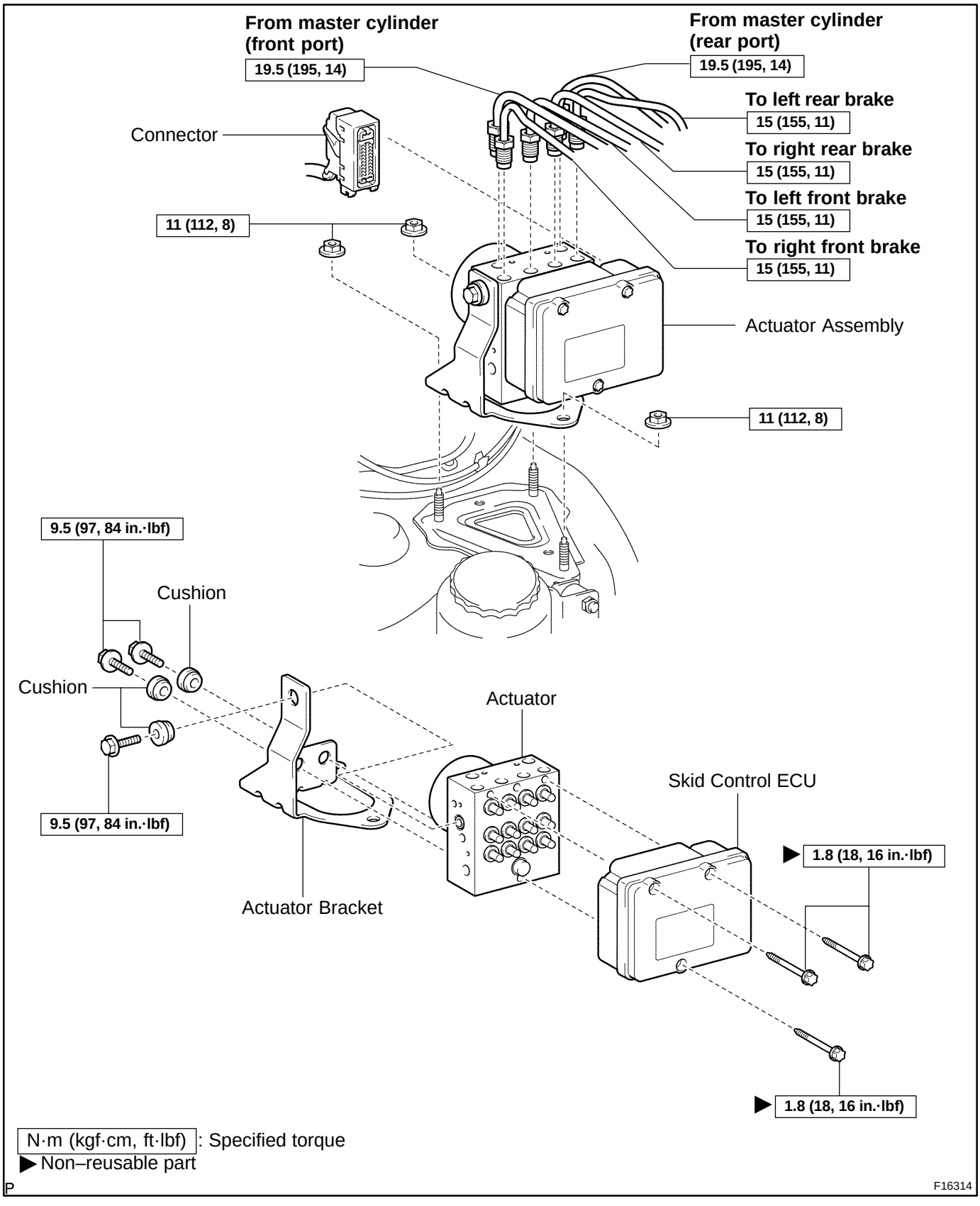
BR1NH–03

COMPONENTS



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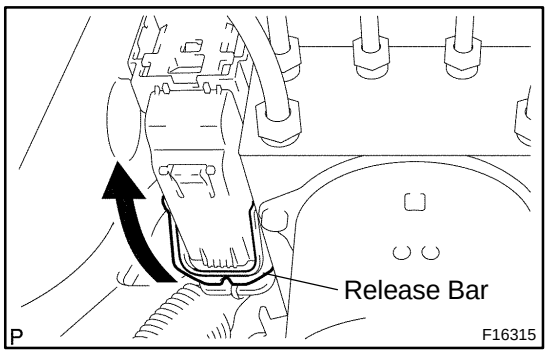
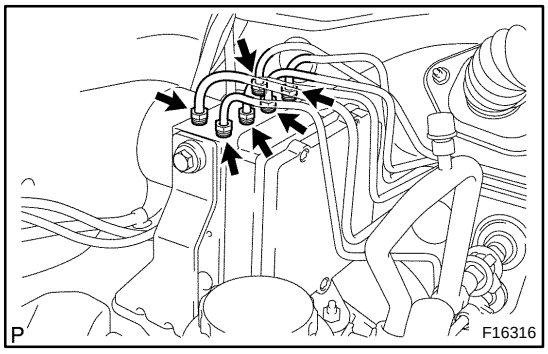
BR1NI–03

REMOVAL



1. DISCONNECT CONNECTOR

Pull the release bar and disconnect the connector.



2. DISCONNECT BRAKE LINES

Using SST, disconnect the 6 brake lines from the actuator assembly.

SST 09023–00101, 09023–38201

Torque:
10 mm nut: 15 N·m (155 kgf·cm, 11 ft·lbf)
12 mm nut: 19.5 N·m (195 kgf·cm, 14 ft·lbf)

HINT:

- When disconnecting the brake lines, use tags or make a memo to identify the place to reconnect (See page BR–50).
- At the time of installation, connect each brake line to the correct position (See page BR–50).

3. REMOVE ACTUATOR ASSEMBLY

Remove the 3 nuts and actuator assembly with the actuator bracket.

Torque: 11 N·m (112 kgf·cm, 8 ft·lbf)

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BR1NJ–03

DISASSEMBLY

1. REMOVE ACTUATOR BRACKET

(a) Remove the 3 bolts and actuator bracket.

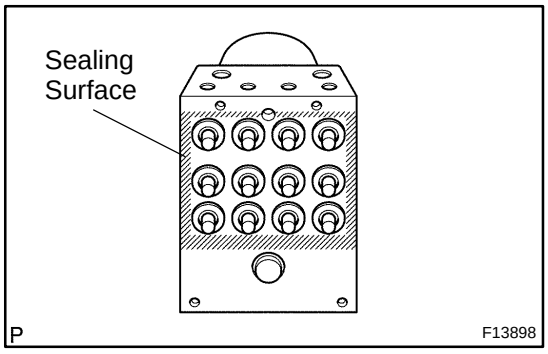
Torque: 9.5 N·m (97 kgf·cm, 84 in.·lbf)

(b) Remove the 3 cushions from the actuator bracket.

2. REMOVE SKID CONTROL ECU

Using a E5 torx® wrench, remove the 3 screws and skid control ECU.

Torque: 1.8 N·m (18 kgf·cm, 16 in.·lbf)



NOTICE:

Protect the actuator in order to prevent sealing surface from getting dirty and causing damage on the valve body. If the dirt and the like is stuck to the sealing surface, use plastic tools or soft objects to remove the dirt. Do not use chemical solvents.

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BR1NK–02

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR–52).

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BR1NL–04

INSTALLATION

Installation is in the reverse order of removal (See page BR–51).

HINT:

- ▶ After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR–4).
- ▶ Check for leaks.

NOTICE:

In case of replacing the skid control ECU, perform the zero point calibration of the steering angle, master cylinder pressure, yawrate and deceleration sensors (See page DI–897).

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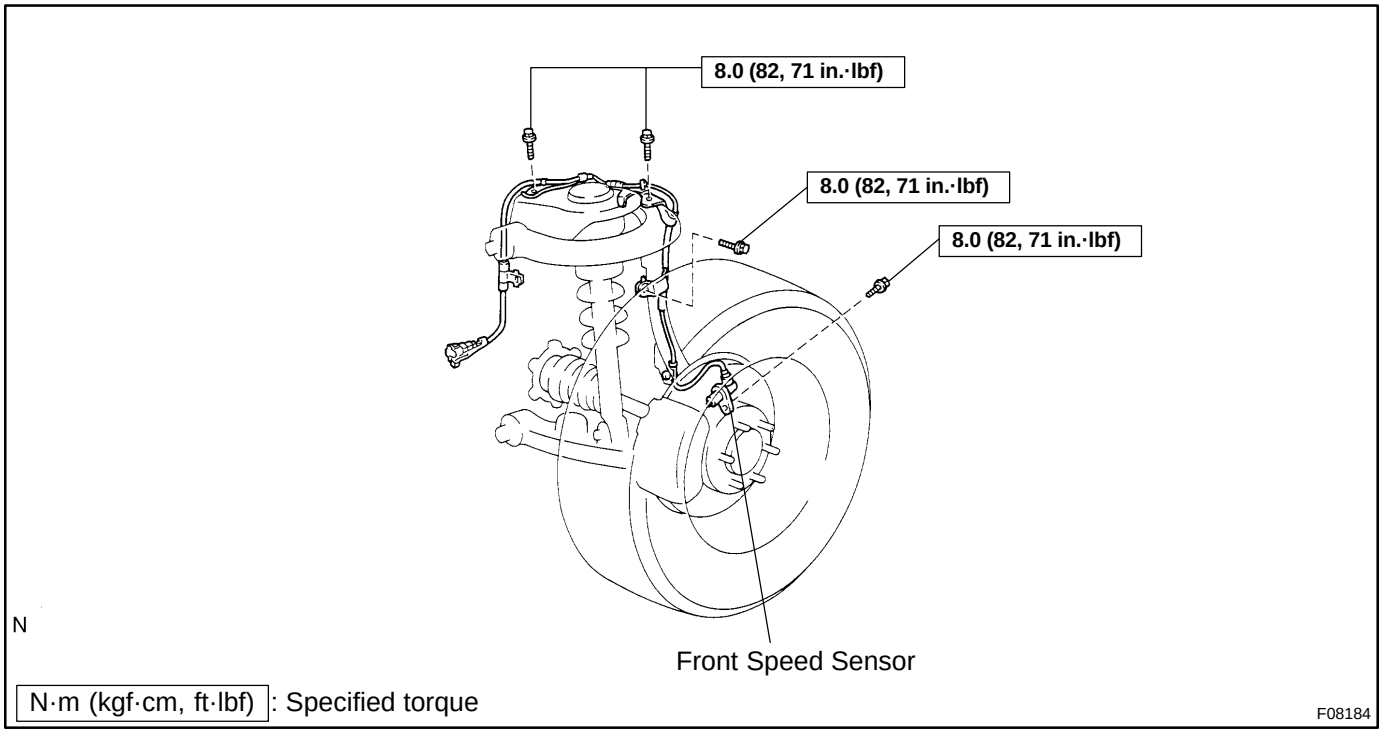
FRONT SPEED SENSOR

COMPONENTS

BR0A2–05



N·m (kgf·cm, ft·lbf) : Specified torque

F08184

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BR0A3–04

REMOVAL

1. REMOVE FRONT WHEEL

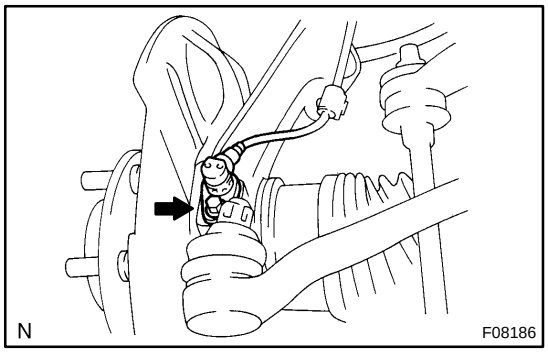
Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)

2. DISCONNECT SPEED SENSOR CONNECTOR

3. REMOVE SPEED SENSOR

(a) Remove the clips and 3 clamp bolts holding the sensor harness from the frame, upper arm and steering knuckle.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



(b) Remove the bolt and speed sensor from the steering knuckle.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

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BR0A4–07

INSTALLATION

Installation is in the reverse order of removal (See page BR–56).

HINT:

After installation, check speed sensor signal (See page DI–899).

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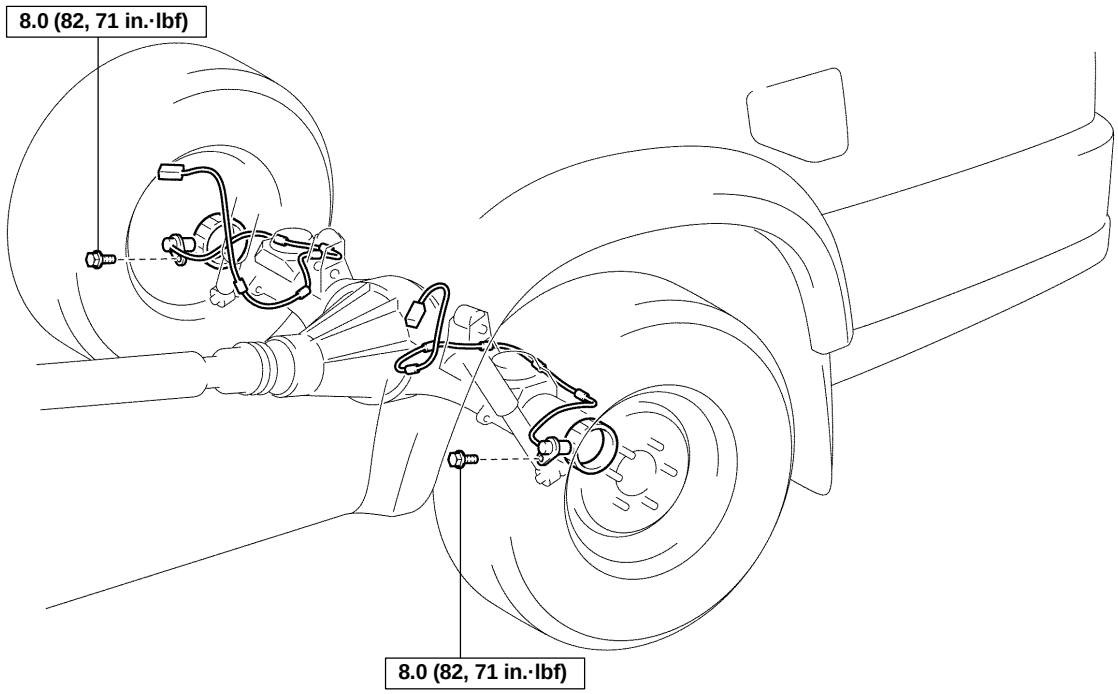
REAR SPEED SENSOR

COMPONENTS

BR0A5–05



P N·m (kgf·cm, ft·lbf) : Specified torque

F13329

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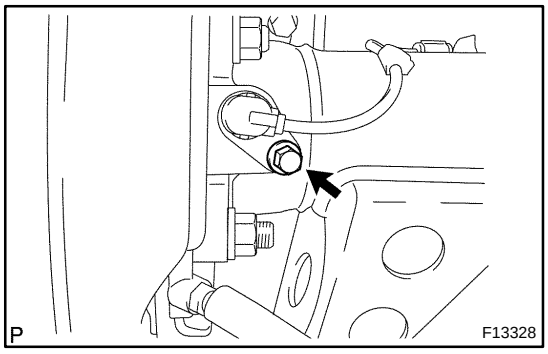
BR0A6–04

REMOVAL

1. DISCONNECT SPEED SENSOR CONNECTOR

2. REMOVE SPEED SENSOR

(a) Remove the 6 resin clips holding the sensor wire harness.



(b) Remove the bolt and speed sensor from the axle carrier.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

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BR0A7–07

INSTALLATION

Installation is in the reverse order of removal (See page BR–59).

HINT:

After installation, check speed sensor signal (See page DI–899).

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STEERING SYSTEM

SR01S–06

PRECAUTION

- **Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.**
- **The SEQUOIA is equipped with an SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the notices precautionary in the RS section.**
- **When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.**

System Name	See Page
Back Door Power Window Control System	BE–77

- **When replacing the steering angle sensor, drive the vehicle straight ahead at a speed of 6.5 mph (10.5 km/h) or more. Accordingly, zero point calibration of the steering angle sensor is performed.**
- **After performing "Front wheel alignment adjustment", clearing and reading the yaw rate & deceleration sensor zero point calibration data is necessary (See page DI–897).**

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TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

SR01T–07

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspect Area	See page
Hard steering	1. Tires (Improperly inflated)	SA–3
	2. Power steering fluid level (Low)	SR–5
	3. Drive belt (Loose)	SR–3
	4. Front wheel alignment (Incorrect)	SA–4
	5. Steering system joints (Worn)	–
	6. Suspension arm ball joints (Worn)	SA–86
	7. Steering column (Binding)	–
	8. Power steering vane pump	SR–26
	9. Power steering gear	SR–37
Poor return	1. Tires (Improperly inflated)	SA–3
	2. Front wheel alignment (Incorrect)	SA–4
	3. Steering column (Binding)	–
	4. Power steering gear	SR–37
Excessive play	1. Steering system joints (Worn)	–
	2. Suspension arm ball joints (Worn)	SA–86
	3. Intermediate shaft, Sliding yoke (Worn)	–
	4. Front wheel bearing (Worn)	SA–21
	5. Power steering gear	SR–37
Abnormal noise	1. Power steering fluid level (Low)	SR–5
	2. Steering system joints (Worn)	–
	3. Power steering vane pump	SR–26
	4. Power steering gear	SR–37

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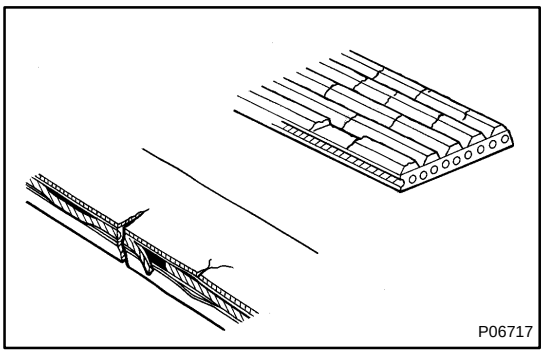


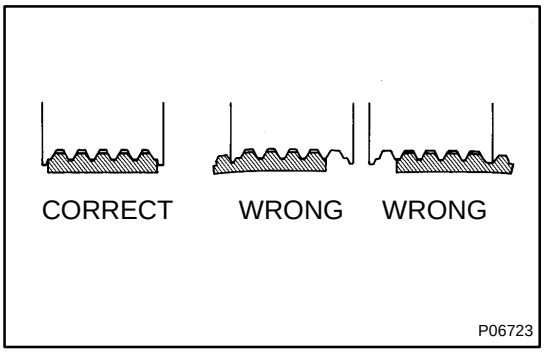
DRIVE BELT

SR1F2–02

INSPECTION

INSPECT DRIVE BELT

Visually check the belt for excessive wear, frayed cords, etc.
If any defect has been found, replace the drive belt.
HINT:
Cracks on the rib side of the belt are considered acceptable. If the missing chunks from the ribs are found on the belt, it should be replaced.



HINT:

- ”New belt” refers to a belt which has been used less than 5 minutes on a running engine.
- ”Used belt” refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

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POWER STEERING FLUID

SR01V–10

BLEEDING

1. CHECK FLUID LEVEL (See page SR–5)

2. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS

3. TURN STEERING WHEEL

With the engine stopped, turn the wheel slowly from lock to lock several times.

4. LOWER VEHICLE

5. START ENGINE

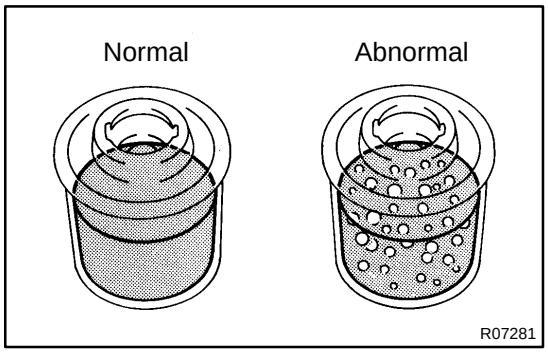
Run the engine at idle for a few minutes.

6. TURN STEERING WHEEL

(a) With the engine idling, turn the wheel left or right to the full lock position and keep it there for 2 to 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 to 3 seconds.

(b) Repeat (a) several times.

7. STOP ENGINE



8. CHECK FOR FOAMING OR EMULSIFICATION

If the system has to be bled twice specifically because of foaming or emulsification, check for fluid leaks in the system.

9. CHECK FLUID LEVEL (See page SR–5)

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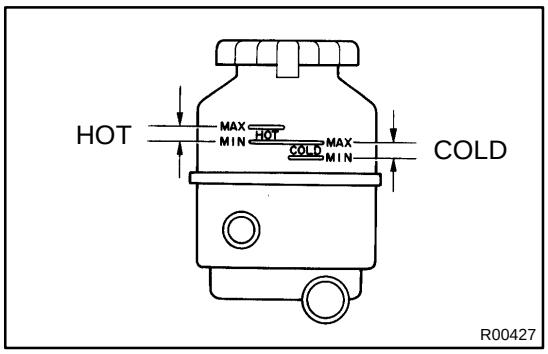
SR01W–10



INSPECTION

1. CHECK FLUID LEVEL

(a) Keep the vehicle level.

(b) With the engine stopped, check the fluid level in the reservoir.

If necessary, add fluid.

Fluid: ATF DEXRON® II or III

HINT:

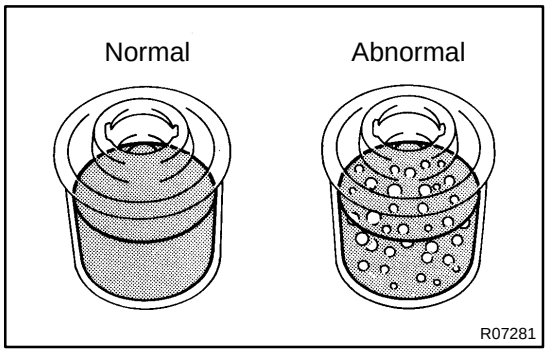
When the fluid is hot, check that the fluid level is within the HOT range on the reservoir/reservoir cap dipstick.

If the fluid is cold, check that it is within the COLD range.

(c) Start the engine and run at idle.

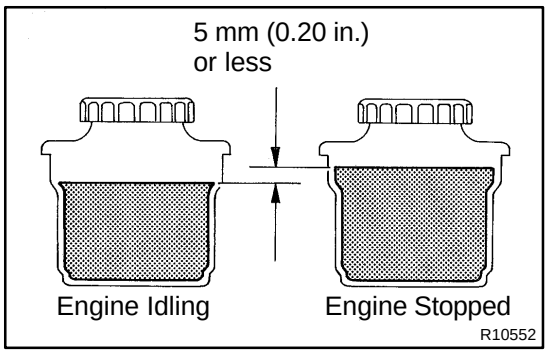
(d) Turn the steering wheel from the lock position to the other side of lock position several times to boost fluid temperature.

Fluid temperature: 80˚C (176˚F)



(e) Check for foaming or emulsification.

If there is foaming or emulsification, bleed the air from the power steering system (See page SR–4).



(f) With the engine idling, measure the fluid level in the reservoir.

(g) Stop the engine.

(h) Wait a few minutes and remeasure the fluid level in the reservoir.

Maximum fluid level rise: 5 mm (0.20 in.)

If a problem is found, bleed the air from the power steering system (See page SR–4).

(i) Check the fluid level.

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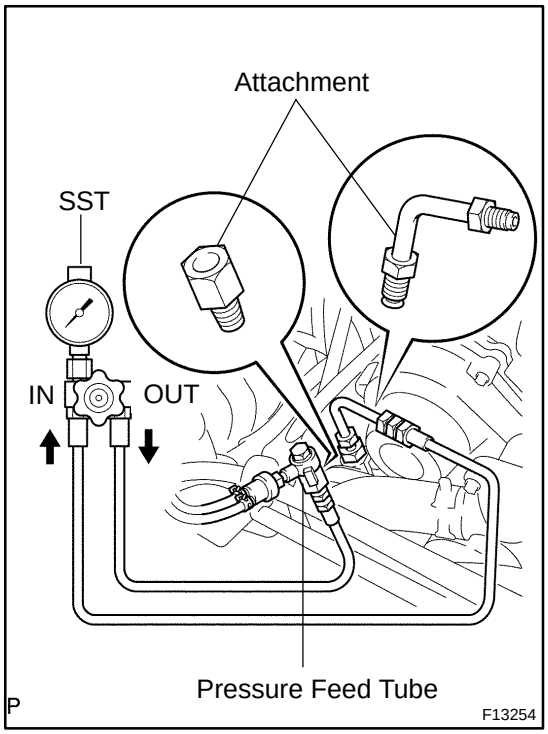
2. CHECK STEERING FLUID PRESSURE

(a) Remove the air cleaner assembly with the air cleaner hose connected (See page SR–26).

(b) Disconnect the pressure feed tube from the PS vane pump (See page SR–26).



(c) Connect SST, as shown in the illustration.
SST 09640–10010 (09641–01010, 09641–01030, 09641–01060)

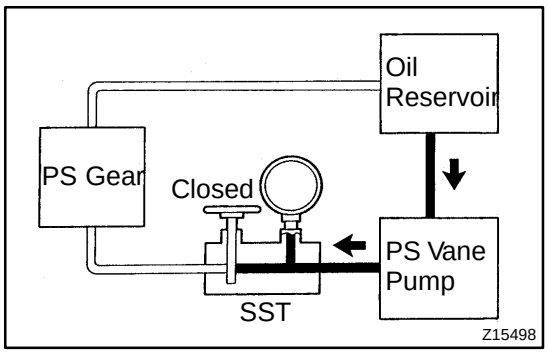
NOTICE:

Check that the valve of the SST is in the open position.

(d) Bleed the power steering system (See page SR–4).

(e) Start the engine and run at idle.

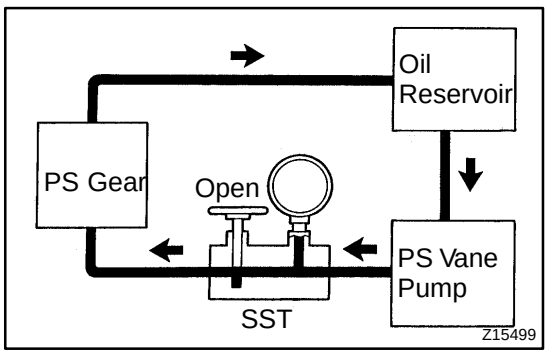
(f) Turn the steering wheel from the lock position to the other side of lock position several times to boost fluid temperature.
Fluid temperature: 80 ˚C (176 ˚F)



(g) With the engine idling, close the valve of the SST and observe the reading on the SST.
Minimum fluid pressure:
8,336 kPa (85 kgf/cm^2, 1,209 psi)

NOTICE:

- **Do not keep the valve closed for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**



(h) With the engine idling, open the valve fully.

(i) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.
Difference in fluid pressure:
490 kPa (5 kgf/cm^2, 71 psi) or less

NOTICE:

Do not turn the steering wheel.

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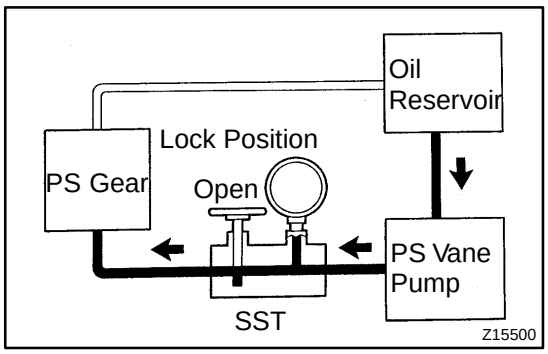

(j) With the engine idling and the valve fully opened, turn the steering wheel left or right to the full lock position.
Minimum fluid pressure:
8,336 kPa (85 kgf/cm^2, 1,209 psi)

NOTICE:

- **Do not maintain the lock position for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**

(k) Disconnect the SST.
SST 09640–10010 (09641–01010, 09641–01030, 09641–01060)

(l) Connect the pressure feed tube (See page SR–36).

(m) Install the air cleaner assembly with air cleaner hose (See page SR–36).

(n) Bleed air from the power steering system (See page SR–4).

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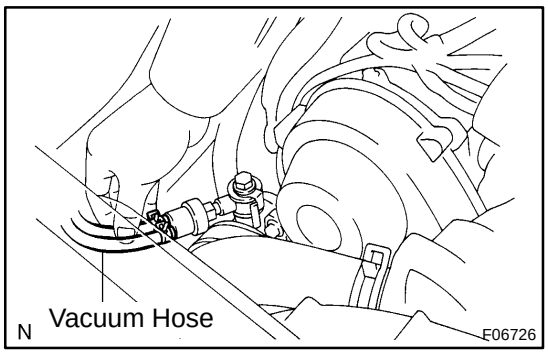

AIR CONTROL VALVE

SR01X–08

INSPECTION

1. TURN AIR CONDITIONING SWITCH OFF

2. CHECK IDLE–UP

(a) Start the engine and run it at idle.

(b) Fully turn the steering wheel.

(c) Check that the engine speed decrease when the vacuum hose of the air control valve is pinched.

(d) Check that the engine speed increase when the hose is released.

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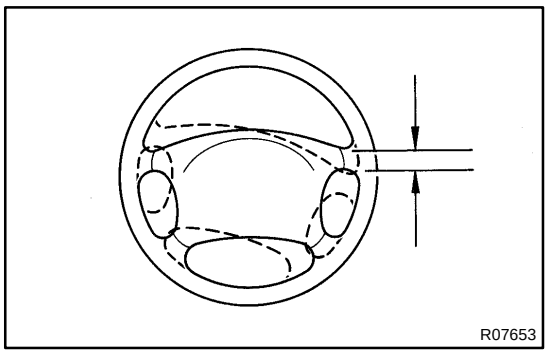

R07653

STEERING WHEEL

SR01Y–11

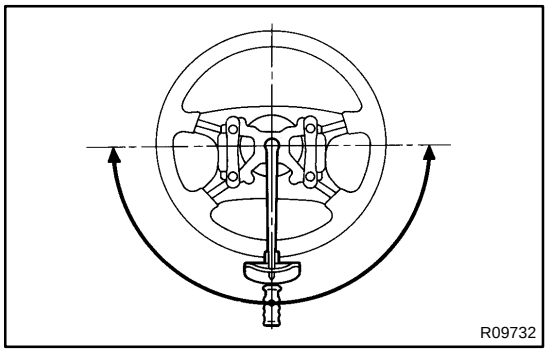
INSPECTION

1. CHECK STEERING WHEEL FREE PLAY

(a) Stop the vehicle and face the tires straight ahead.

(b) Gently rock the steering wheel up and down with a finger, and check the steering wheel free play.

Maximum free play: 30 mm (1.18 in.)


R09732

2. CHECK STEERING EFFORT

(a) Center the steering wheel.

(b) Remove the steering wheel pad (See page SR–12).

(c) Start the engine and run at idle.

(d) Measure the steering effort in both directions.

Steering effort (Reference):

4.9 N·m (50 kgf·cm, 43 in.·lbf)

HINT:

Check tire type, pressure and contact surface before making your diagnosis.

(e) Tighten the steering wheel set nut.

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

(f) Install the steering wheel pad (See page SR–23).

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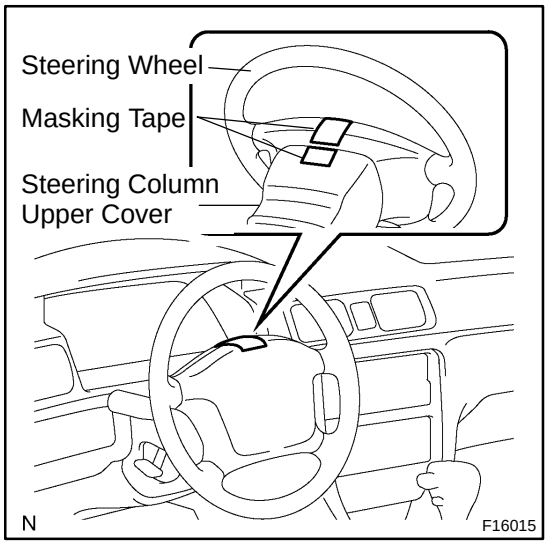
SR1HO–08

REPAIR PROCEDURES

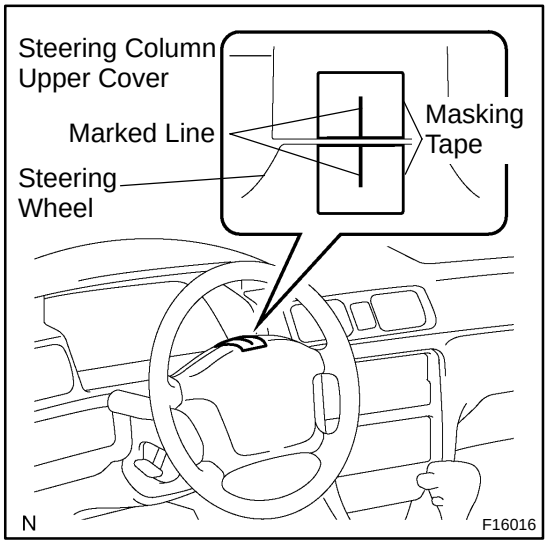
HINT:

This is the repair procedure for steering off center.



1. INSPECT STEERING WHEEL OFF CENTER

(a) Apply masking tape on the top center of the steering wheel and steering column upper cover.



(b) Drive the vehicle in a straight line for 100 meters at a constant speed of 35 mph (56 km/h), and hold the steering wheel to maintain the course.

(c) Draw a line on the masking tape as shown in the illustration.

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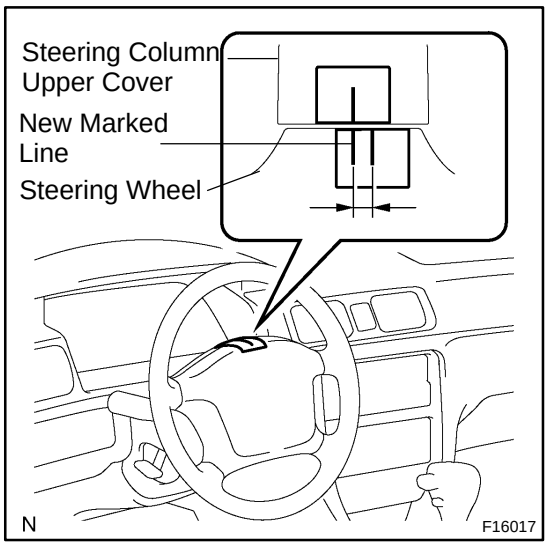


(d) Turn the steering wheel to its straight position.

HINT:

Refer to the upper surface of the steering wheel, steering spoke and SRS airbag line for the straight position.

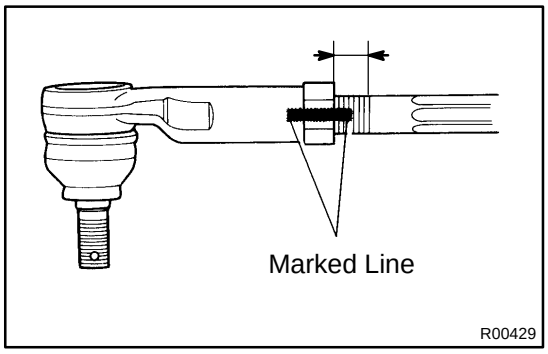
(e) Draw a new line on the masking tape of the steering wheel as shown in the illustration.

(f) Measure the distance between the 2 lines on the masking tape of the steering wheel.

(g) Convert the measured distance to steering angle.
Measured distance 1 mm (0.04 in.) = Steering angle approximately 1 deg.

HINT:

Make a note of the steering angle.



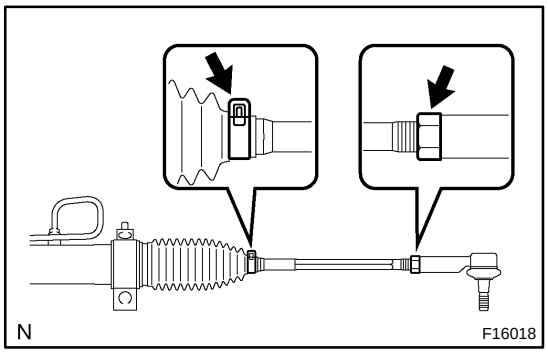
2. ADJUST STEERING ANGLE

(a) Draw a line on the RH and LH tie rod and rack ends where it can easily be seen.

(b) Using a paper gauge, measure the distance from RH and LH tie rod ends to the rack end screws.

HINT:

- ▶ Measure the RH side and LH side.
- ▶ Make a note of the measured values.



(c) Remove the RH and LH boot clips from the rack boots.

(d) Loosen the RH and LH lock nuts.

(e) Turn the RH and LH rack end by the same amount (but in different directions) according to the steering angle.
1 turn 360 deg. of rack end (1.5 mm (0.059 in.) horizontal movement) = 12 deg. of steering angle

(f) Tighten the RH and LH lock nuts.
Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

NOTICE:

Make sure that the difference in length between RH and LH tie rod ends and rack end screws are within 1.5 mm (0.059 in.).

(g) Install the RH and LH boot clips.

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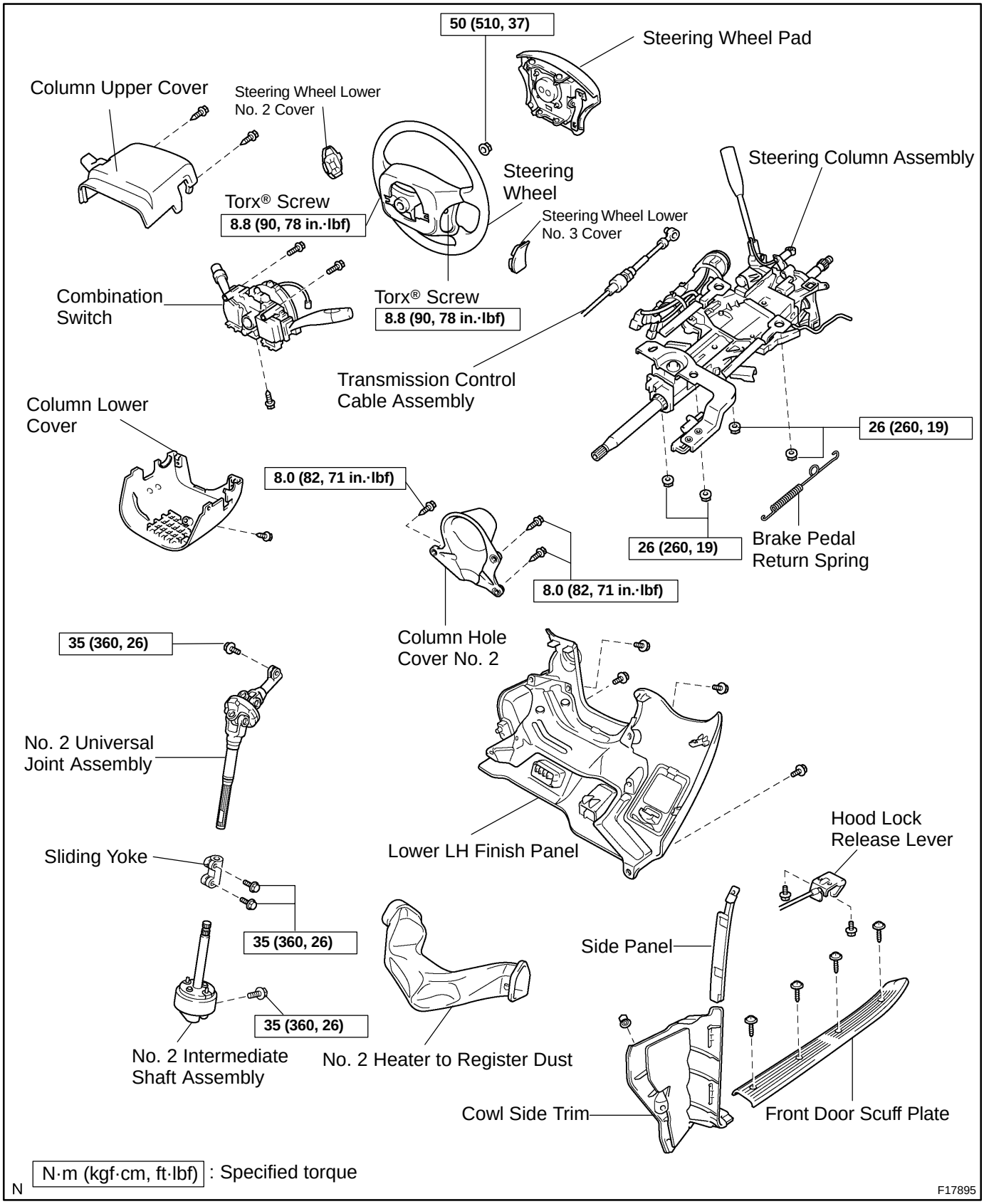
TILT STEERING COLUMN

COMPONENTS

SR1F3–03



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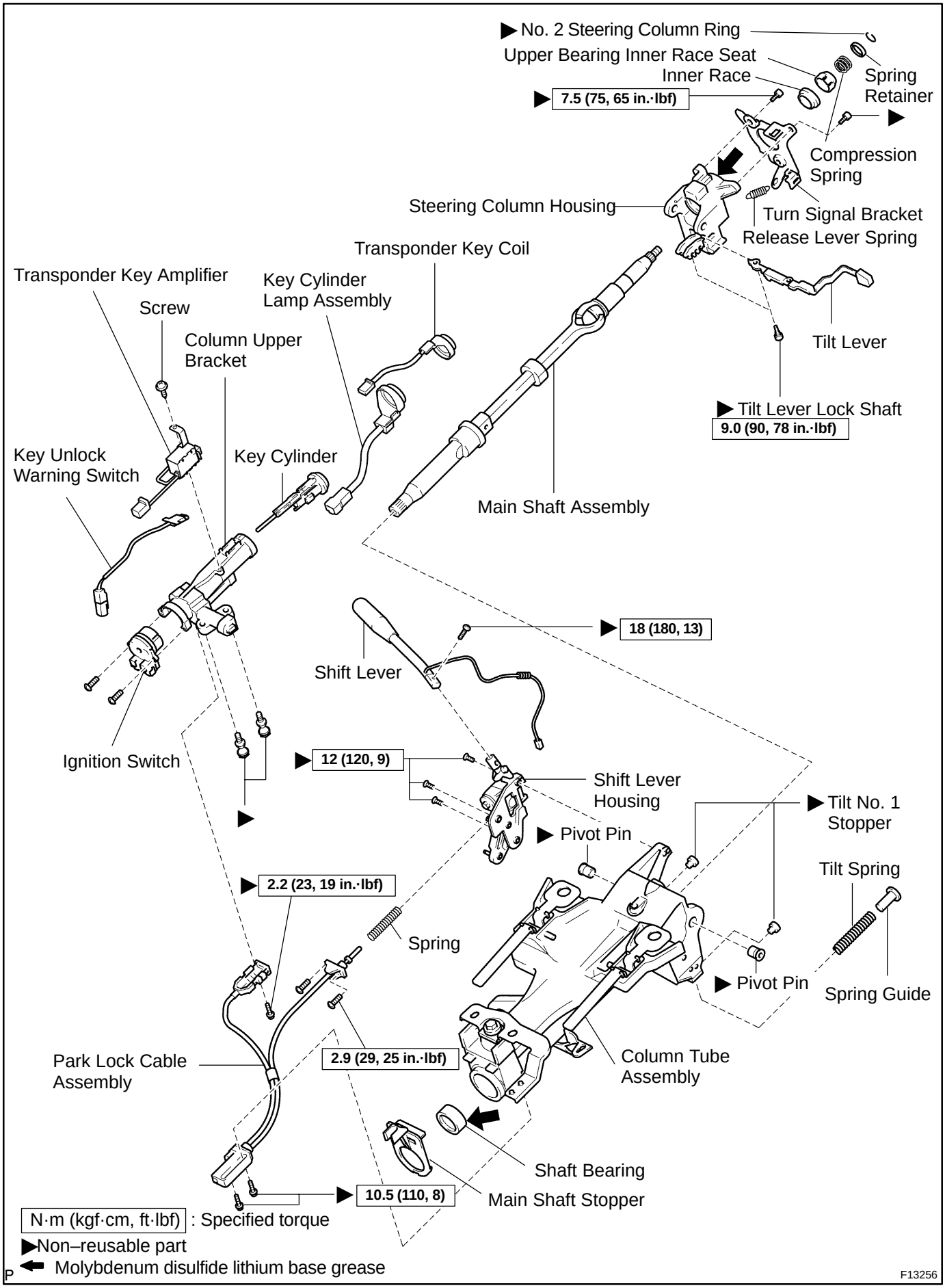
▶No. 2 Steering Column Ring
Upper Bearing Inner Race Seat
Inner Race
Spring Retainer
▶7.5 (75, 65 in.·lbf)
Compression Spring
Steering Column Housing
Turn Signal Bracket
Release Lever Spring
Transponder Key Coil
Transponder Key Amplifier
Key Cylinder Lamp Assembly
Screw
Column Upper Bracket
Tilt Lever
▶Tilt Lever Lock Shaft
9.0 (90, 78 in.·lbf)
Key Unlock Warning Switch
Key Cylinder
Main Shaft Assembly
▶18 (180, 13)
Shift Lever
Ignition Switch
▶12 (120, 9)
Shift Lever Housing
▶Tilt No. 1 Stopper
▶Pivot Pin
Tilt Spring
▶2.2 (23, 19 in.·lbf)
Spring
▶Pivot Pin
Spring Guide
Park Lock Cable Assembly
2.9 (29, 25 in.·lbf)
Column Tube Assembly
Shaft Bearing
Main Shaft Stopper
▶10.5 (110, 8)
N·m (kgf·cm, ft·lbf) : Specified torque
▶Non–reusable part
Molybdenum disulfide lithium base grease
P
F13256

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SR1KD–01

REMOVAL

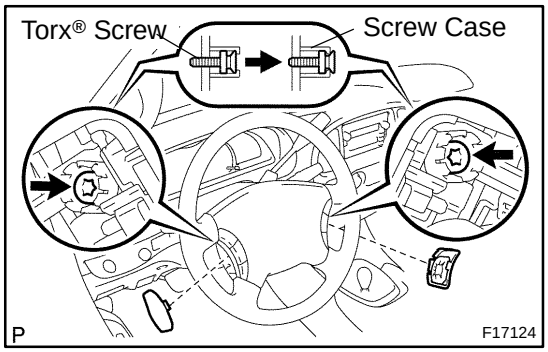
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

2. REMOVE STEERING WHEEL PAD

NOTICE:

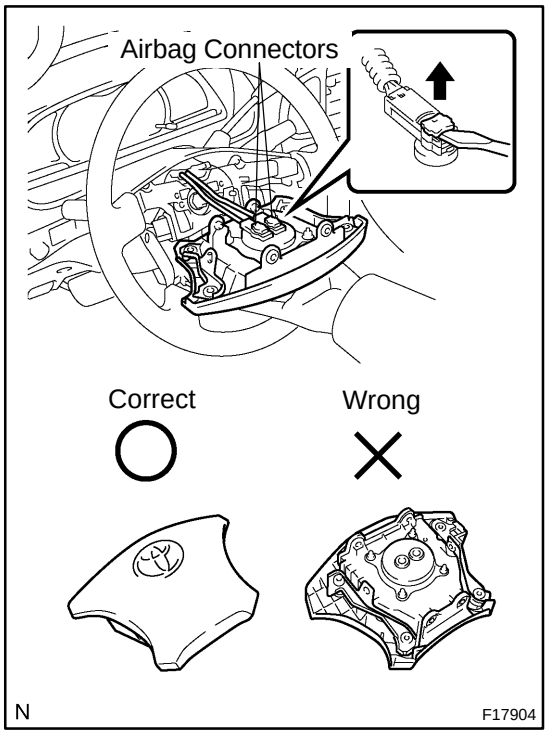
If the airbag connector is disconnected with the ignition switch in the ACC or ON position, DTCs will be recorded.



(a) Place the front wheels facing straight ahead.
(b) Remove the steering wheel lower No. 3 cover.
(c) Remove the steering wheel lower No. 2 cover.
(d) Using a torx® socket wrench (T30), loosen the 2 torx® screws.

HINT:

Loosen each screw until the groove along the screw circumference is caught on the screw case.



(e) Pull out the wheel pad from the steering wheel.
(f) Using a screwdriver, disconnect the airbag connectors.

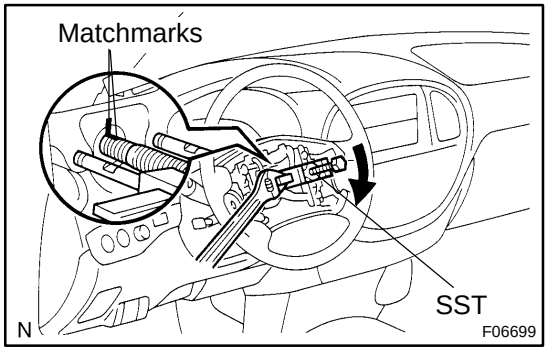
CAUTION:

- **When storing the steering wheel pad, keep the upper surface of the pad facing upward.**
- **Never disassemble the steering wheel pad.**

NOTICE:

When removing the steering wheel pad, take care not to pull the airbag wire harness.

(g) Disconnect the horn terminal and remove the steering wheel pad.



3. REMOVE STEERING WHEEL

(a) Remove the steering wheel set nut.
(b) Put matchmarks on the steering wheel and main shaft assembly.
(c) Using SST, remove the wheel.

SST 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05021)

4. REMOVE UPPER AND LOWER COLUMN COVERS

Remove the 3 screws, upper and lower column covers.

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5. REMOVE COMBINATION SWITCH WITH SPIRAL CABLE

(a) Disconnect the 4 connectors.
(b) Disconnect the airbag connector.
(c) Remove the 3 screws and combination switch.

6. REMOVE SPIRAL CABLE (See page BE–26)

NOTICE:

Do not disassemble the cable or apply oil to it.

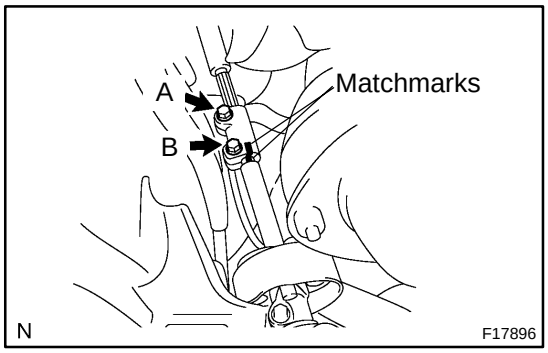
7. REMOVE COWL SIDE TRIM AND FRONT DOOR SCUFF PLATE

8. REMOVE LOWER LH FINISH PANEL

(a) Remove the 2 screws and disconnect the hood lock release lever from the panel.
(b) Remove the 4 panel set bolts and lower LH finish panel.

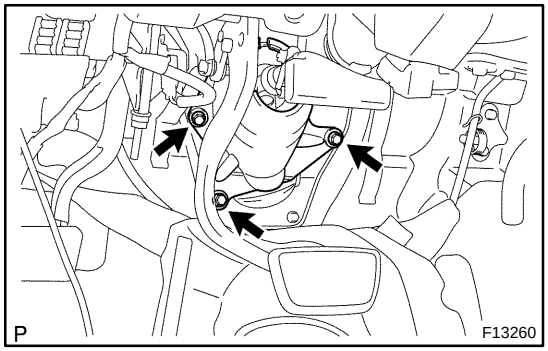
9. REMOVE NO. 2 HEATER TO REGISTER DUCT

10. REMOVE BRAKE PEDAL RETURN SPRING



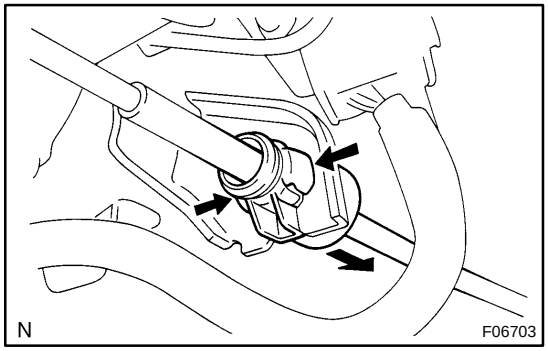
11. REMOVE SLIDING YOKE

(a) Put matchmarks on the sliding yoke and No. 2 intermediate shaft assembly.
(b) Remove the ”A” bolt.
(c) Remove the ”B” bolt.
(d) Slide the sliding yoke and remove it.



12. REMOVE COLUMN HOLE COVER NO. 2

Remove the 3 bolts and column hole cover No. 2.



13. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

Disconnect the cable assembly from the column shift lever assembly.

14. REMOVE STEERING COLUMN ASSEMBLY WITH NO. 2 UNIVERSAL JOINT ASSEMBLY

(a) Disconnect the connectors.
(b) Remove the 4 steering column set nuts.
(c) Pull out the steering column assembly with the No. 2 universal joint assembly connected.

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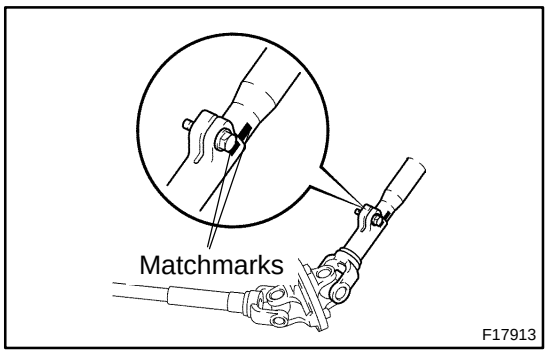
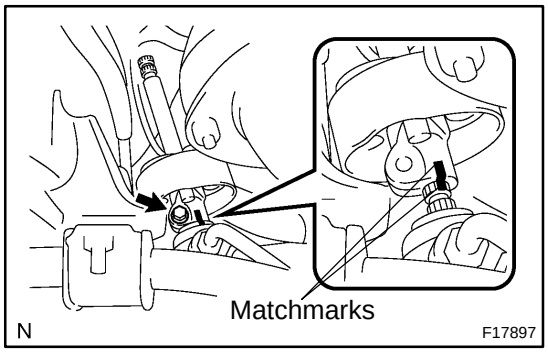


15. REMOVE NO. 2 UNIVERSAL JOINT ASSEMBLY

(a) Put matchmarks on the steering column assembly and No. 2 universal joint assembly.

(b) Remove the bolt and No. 2 universal joint assembly.



16. REMOVE NO. 2 INTERMEDIATE SHAFT ASSEMBLY

(a) Put matchmarks on the No. 2 intermediate shaft assembly and control valve shaft.

(b) Remove the bolt and No. 2 intermediate shaft assembly.

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SR0V1–06

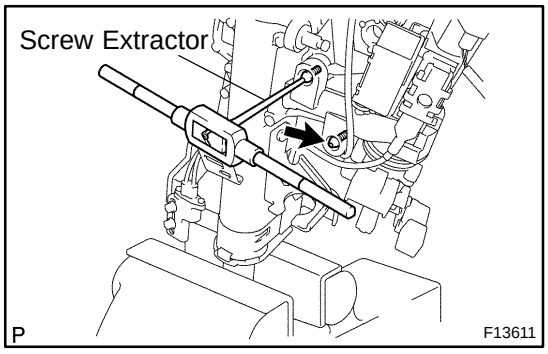
DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. REMOVE TRANSPONDER KEY COIL

2. REMOVE KEY CYLINDER LAMP ASSEMBLY



3. REMOVE COLUMN UPPER BRACKET

(a) Using a centering punch, mark the center of the 2 tapered–head bolts.

(b) Using a 3 to 4 mm (0.12 to 0.16 in.) drill, drill a hole into the 2 bolts.

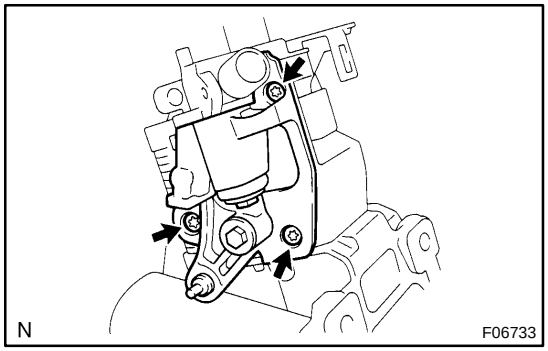
(c) Using a screw extractor, remove the 2 bolts and column upper bracket.

4. REMOVE SHIFT LEVER

Using a torx® socket wrench, remove the torx® screw and shift lever.

5. REMOVE PARK LOCK CABLE ASSEMBLY

(See page AT–20)



6. REMOVE SHIFT LEVER HOUSING

Using a torx® socket wrench, remove the 3 torx® screws and shift lever housing.

7. REMOVE RELEASE LEVER SPRING

8. REMOVE TURN SIGNAL BRACKET

Using a torx® socket wrench, remove the 2 torx® screws and turn signal bracket.

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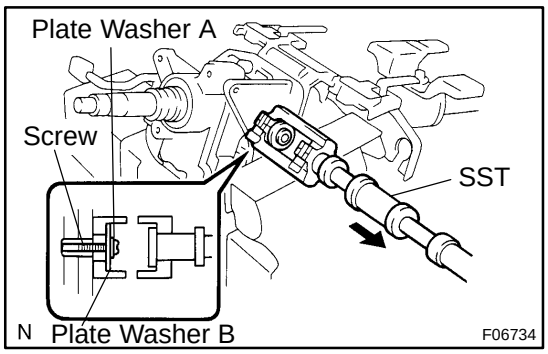


9. REMOVE STEERING COLUMN HOUSING WITH MAIN SHAFT ASSEMBLY

(a) Set SST, 2 plate washers (18 and 36 mm outer diameter) and a screw (4.0 mm diameter, 0.7 mm pitch, 15.0 mm length), as shown in the illustration. Then remove the 2 pivot pins.
SST 09910–00015 (09911–00011, 09912–00010)
Reference
Plate washer A (18 mm): 90562–04012
Plate washer B (36 mm): 90201–10201
Screw: 90154–40015

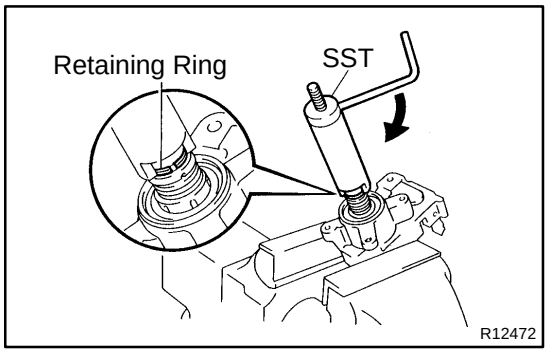
(b) Remove the column housing with the shaft assembly from the column tube assembly.

NOTICE:
Do not bend the universal joint of the main shaft assembly more than 15˚.

(c) Remove the tilt spring and spring guide.

10. REMOVE 2 TILT NO. 1 STOPPERS

11. REMOVE MAIN SHAFT STOPPER



12. REMOVE MAIN SHAFT ASSEMBLY

(a) Install SST to the main shaft assembly, as shown in the illustration.
SST 09612–07010

(b) Using SST, compress the compression spring.
SST 09612–07010

NOTICE:
Do not bend the universal joint of the shaft assembly more than 15˚.

HINT:
Hold the shaft assembly with your hand to prevent rotation.

(c) Using a screwdriver, remove the No. 2 steering column ring.

(d) Remove the spring retainer, compression spring, upper bearing inner race seat and inner race.

13. REMOVE TILT LEVER

Remove the tilt lever lock shaft and shift lever.

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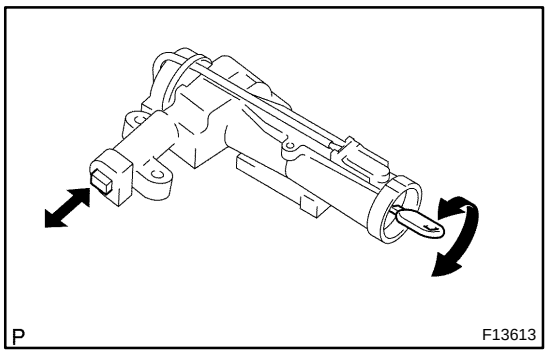
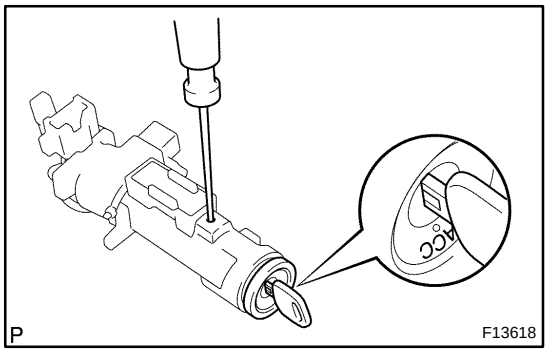
SR0V2–05

INSPECTION



1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



2. IF NECESSARY, REPLACE KEY CYLINDER

(a) Turn the ignition key to the ACC position.

(b) Push down the stop pin with a screwdriver, and pull out the cylinder.

(c) Install a new cylinder.

HINT:

Make sure that the key is in the ACC position.

3. INSPECT IGNITION SWITCH (See page BE–24)

4. IF NECESSARY, REPLACE IGNITION SWITCH

(a) Remove the 2 screws and ignition switch.

(b) Install a new ignition switch with the 2 screws.

5. INSPECT KEY UNLOCK WARNING SWITCH (See page BE–24)

6. IF NECESSARY, REPLACE KEY UNLOCK WARNING SWITCH

(a) Slide out the key unlock warning switch.

(b) Install a new key unlock warning switch.

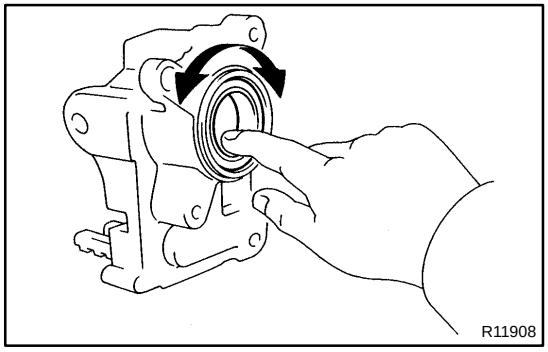
7. INSPECT TRANSPONDER KEY COIL (See page BE–143)

8. IF NECESSARY, REPLACE TRANSPONDER KEY COIL

9. IF NECESSARY, REPLACE TRANSPONDER KEY AMPLIFIER

(a) Remove the screw and transponder key amplifier.

(b) Install a new transponder key amplifier with the screw.



10. INSPECT BEARING

(a) Check that the bearing rotates smoothly without abnormal noise.

If it does not rotate smoothly or abnormal noise occurs, replace the column housing.

(b) Coat the bearing with molybdenum disulfide lithium base grease.

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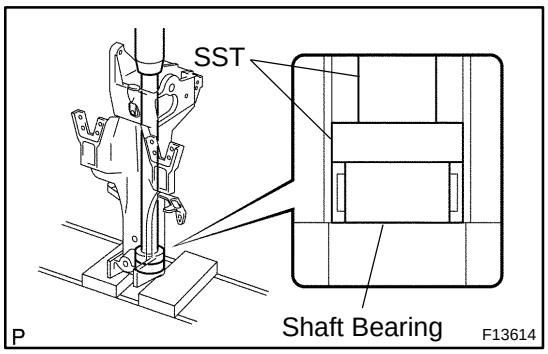
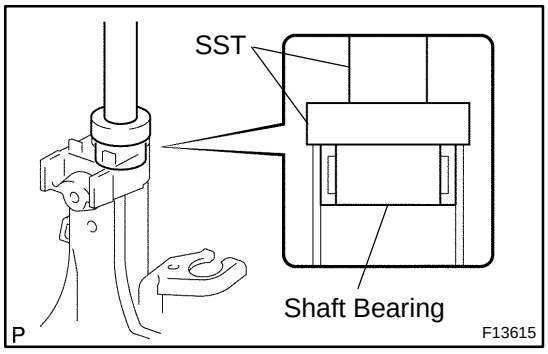


11. IF NECESSARY, REPLACE SHAFT BEARING

(a) Using SST and a press, press out the shaft bearing.
SST 09950–60010 (09951–00400),
09950–70010 (09951–07360)



(b) Coat a new shaft bearing with molybdenum disulfide lithium base grease.

(c) Using SST and a press, press in the shaft bearing.
SST 09950–60010 (09951–00460),
09950–70010 (09951–07150)

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SR0V3–05

REASSEMBLY

NOTICE:

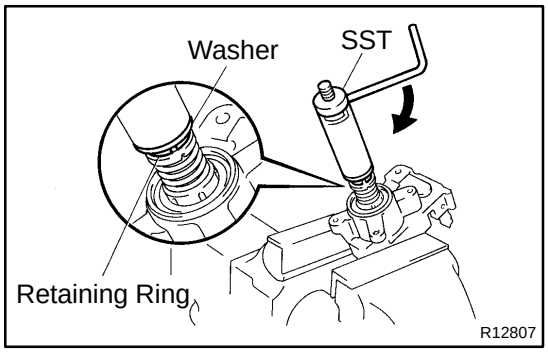
When using a vise, do not overtighten it.

1. COAT PARTS INDICATED BY ARROWS WITH MOLYBDENUM DISULFIDE LITHIUM BASE GREASE (See page SR–12)

2. INSTALL TILT LEVER

Install the tilt lever with a new tilt lever lock shaft.

Torque: 9.0 N·m (90 kgf·cm, 78 in.·lbf)



3. INSTALL MAIN SHAFT ASSEMBLY

(a) Install the inner race, upper bearing inner race seat, compression spring and spring retainer.

(b) Install a new No. 2 steering column ring to the main shaft assembly.

(c) Install the washer of SST on the main shaft assembly.
SST 09612–07010

(d) Set SST on the main shaft assembly, as shown in the illustration.
SST 09612–07010

(e) Using SST, push down the retaining ring until it fits into the shaft groove and install the main shaft assembly.

NOTICE:

Do not bend the universal joint of the shaft assembly more than 15°.

HINT:

Hold the main shaft assembly with your hand to prevent rotation.

4. INSTALL MAIN SHAFT STOPPER

5. INSTALL 2 NEW TILT NO. 1 STOPPERS

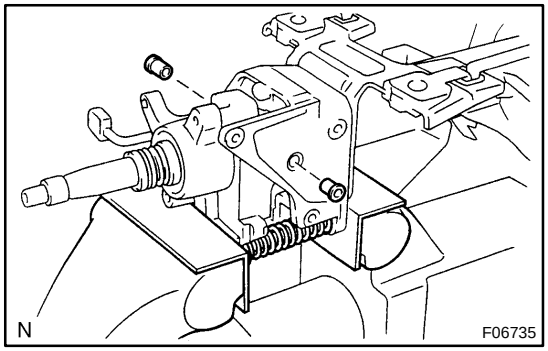
6. INSTALL STEERING COLUMN HOUSING WITH MAIN SHAFT ASSEMBLY

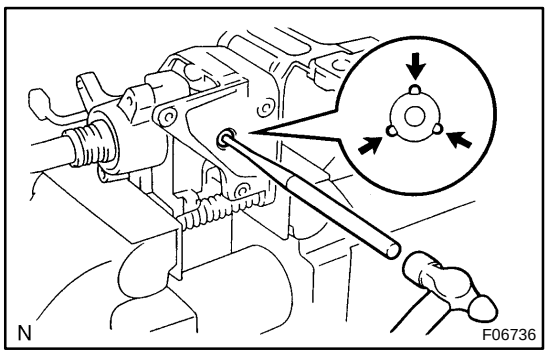
(a) Install the steering column housing with the main shaft assembly into the column tube assembly.

(b) Install the tilt spring and spring guide.

(c) Hold the steering column housing and steering column housing support in a vise.

(d) Temporarily install 2 new pivot pins.





(e) Using a punch and a hammer, tap in the pivot pin.

(f) Using a pin punch and a hammer, stake at 3 places evenly around the hole as shown in the illustration.

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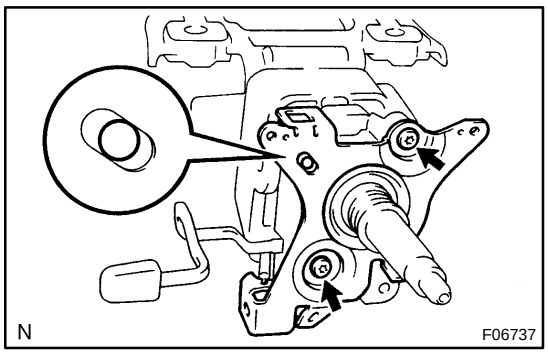


7. INSTALL TURN SIGNAL BRACKET

Using a torx® socket wrench, install the turn signal bracket with 2 new torx® screws.

Torque: 7.5 N·m (75 kgf·cm, 65 in.·lbf)

HINT:

Make sure that the protrusion on the steering column housing is fitted into the hole of the turn signal bracket.

8. INSTALL RELEASE LEVER SPRING

9. INSTALL SHIFT LEVER HOUSING

Using a torx® socket wrench, install the shift lever housing with 3 new torx® screws.

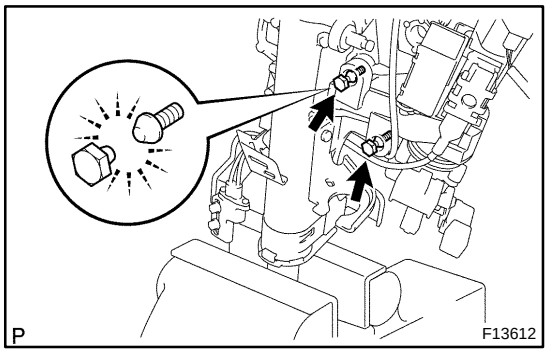
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

10. INSTALL PARK LOCK CABLE ASSEMBLY (See page AT–21)

11. INSTALL SHIFT LEVER

Using a torx® socket wrench, install the shift lever with a new torx® screw.

Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)



12. INSTALL COLUMN UPPER BRACKET

(a) Install the column upper bracket with 2 new tapered–head bolts.

HINT:

Insert the bracket pin into the column tube hole.

(b) Tighten the tapered–head bolts until the bolt heads break off.

13. INSTALL KEY CYLINDER LAMP ASSEMBLY

14. INSTALL TRANSPONDER KEY COIL

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SR1KE–01

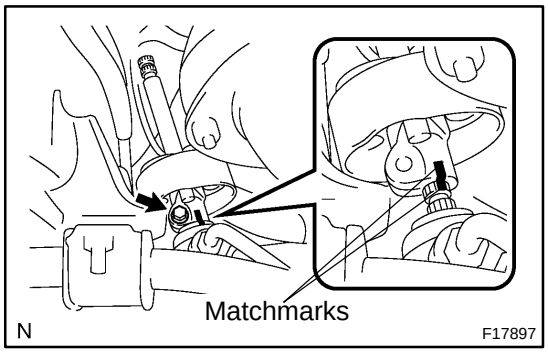
INSTALLATION

NOTICE:

When replacing the steering angle sensor, drive the vehicle straight ahead at a speed of 6.5 mph (10.5 km/h) or more. Accordingly, zero point calibration of the steering angle sensor is performed.

HINT:

If the steering angle sensor zero point calibration is not performed, its value will be fixed. Check after driving the vehicle straight ahead at a speed of 6.5 mph (10.5 km/h) or more (See page DI–946).

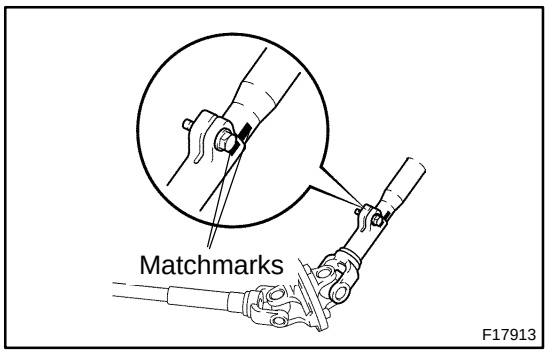


1. INSTALL NO. 2 INTERMEDIATE SHAFT ASSEMBLY

(a) Align the matchmark on the No. 2 intermediate shaft assembly with the one on the control valve shaft.

(b) Install the bolt.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)



2. CONNECT NO. 2 UNIVERSAL JOINT ASSEMBLY

(a) Align the matchmark on the column assembly with the one on the No. 2 universal joint assembly.

(b) Install the bolt.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

3. INSTALL STEERING COLUMN ASSEMBLY WITH NO. 2 UNIVERSAL JOINT ASSEMBLY

(a) Install the column assembly with the No. 2 universal joint assembly.

(b) Install the 4 steering column set nuts.

Torque: 26 N·m (260 kgf·cm, 19 ft·lbf)

NOTICE:

Take care not to rotate the steering shaft.

(c) Connect the connectors.

4. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

Connect the cable assembly to the shift lever assembly.

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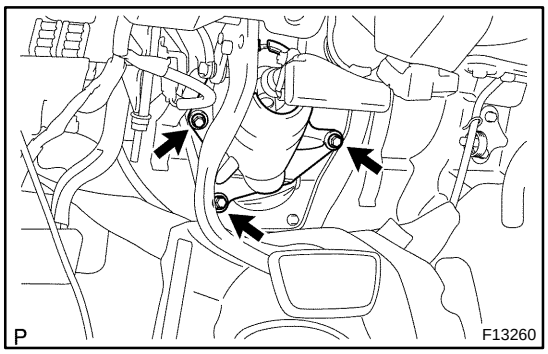
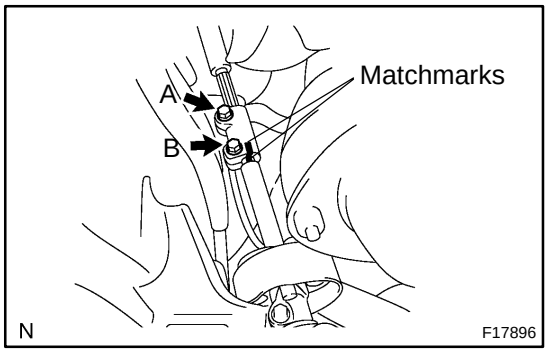


5. INSTALL COLUMN HOLE COVER NO. 2

Install the column hole cover No. 2 to the body with the 3 bolts.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



6. INSTALL SLIDING YOKE

(a) Align the matchmark on the sliding yoke with the one on the No. 2 intermediate shaft assembly.

(b) Install the ”B” bolt.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

(c) Install the ”A” bolt.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

7. INSTALL BRAKE PEDAL RETURN SPRING

8. INSTALL NO. 2 HEATER TO REGISTER DUCT

9. INSTALL LOWER LH FINISH PANEL

(a) Install the lower LH finish panel with the 4 bolts.

(b) Connect the hood lock release lever with the 2 screws.

10. INSTALL COWL SIDE TRIM AND FRONT DOOR SCUFF PLATE

11. INSTALL SPIRAL CABLE (See page BE–26)

12. INSTALL COMBINATION SWITCH WITH SPIRAL CABLE

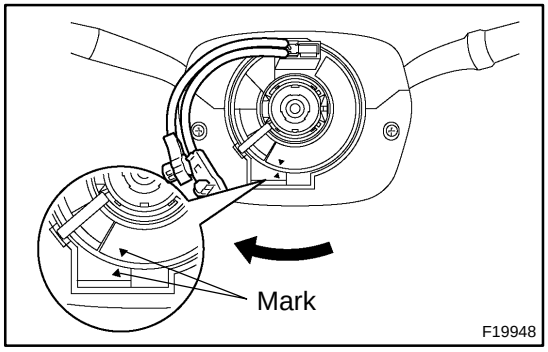
(a) Install the combination switch with the 3 screws.

(b) Connect the airbag connector.

(c) Connect the 4 connectors.

13. INSTALL UPPER AND LOWER COLUMN COVERS

Install the upper and lower column covers with the 3 screws.



14. CENTER SPIRAL CABLE

(a) Check that the front wheels are facing straight ahead.

(b) Turn the cable counterclockwise by hand until it feels firm.

(c) Then rotate the cable clockwise about 2.5 turns to align the marks.

HINT:

The cable will rotate about 2.5 turns to both the left and right from the center.

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15. INSTALL STEERING WHEEL

(a) Align the matchmark on the wheel with the one on the main shaft.

(b) Install the wheel set nut.

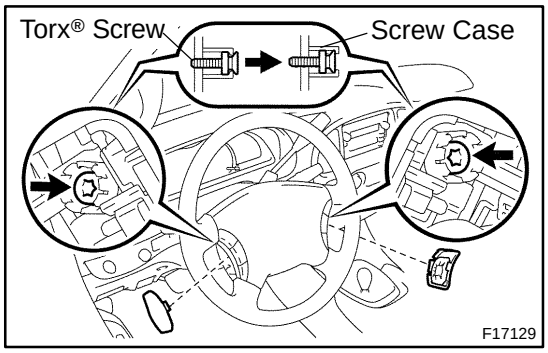
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

16. INSTALL STEERING WHEEL PAD

NOTICE:

- **Never use airbag parts from another vehicle. When replacing parts, replace with new ones.**
- **Make sure that the wheel pad is installed with the specified torque.**
- **If the wheel pad has been dropped, or there are cracks, dents or other defects on the case or connector, replace the wheel pad with a new one.**
- **When installing the wheel pad, take care that the wirings do not interfere with other parts and are not pinched between other parts.**

(a) Connect the horn terminal.



(b) Connect the airbag connectors.

(c) Install the wheel pad after confirming that the circumference groove of the torx® screw is caught on the screw case.

(d) Using a torx® socket wrench (T30), tighten the 2 torx® screws.

Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

(e) Install the steering wheel lower No. 2 cover.

(f) Install the steering wheel lower No. 3 cover.

17. CHECK STEERING WHEEL CENTER POINT

18. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

19. PERFORM INITIALIZATION (See page IN–20)

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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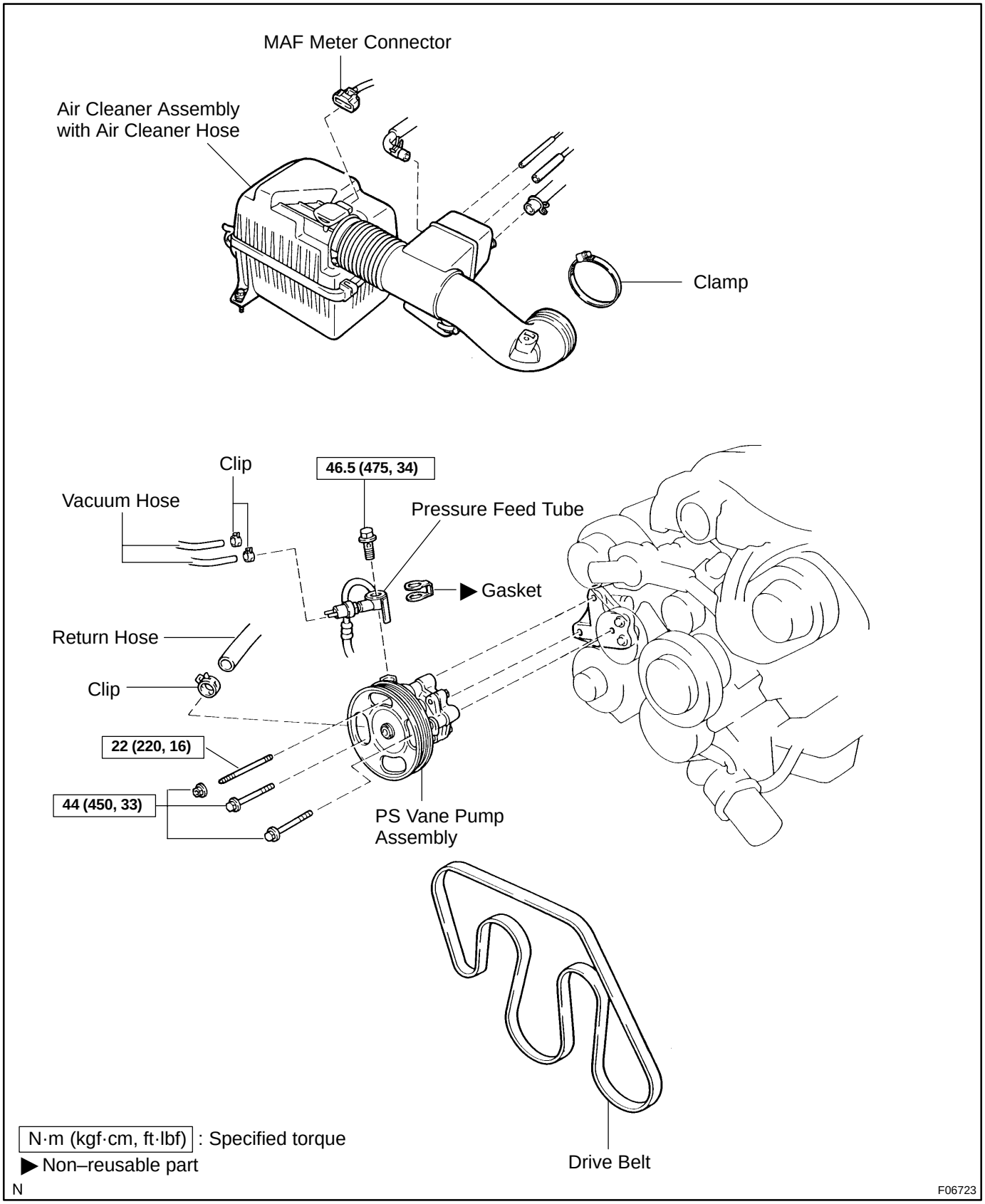
POWER STEERING VANE PUMP

COMPONENTS

SR0MD–08



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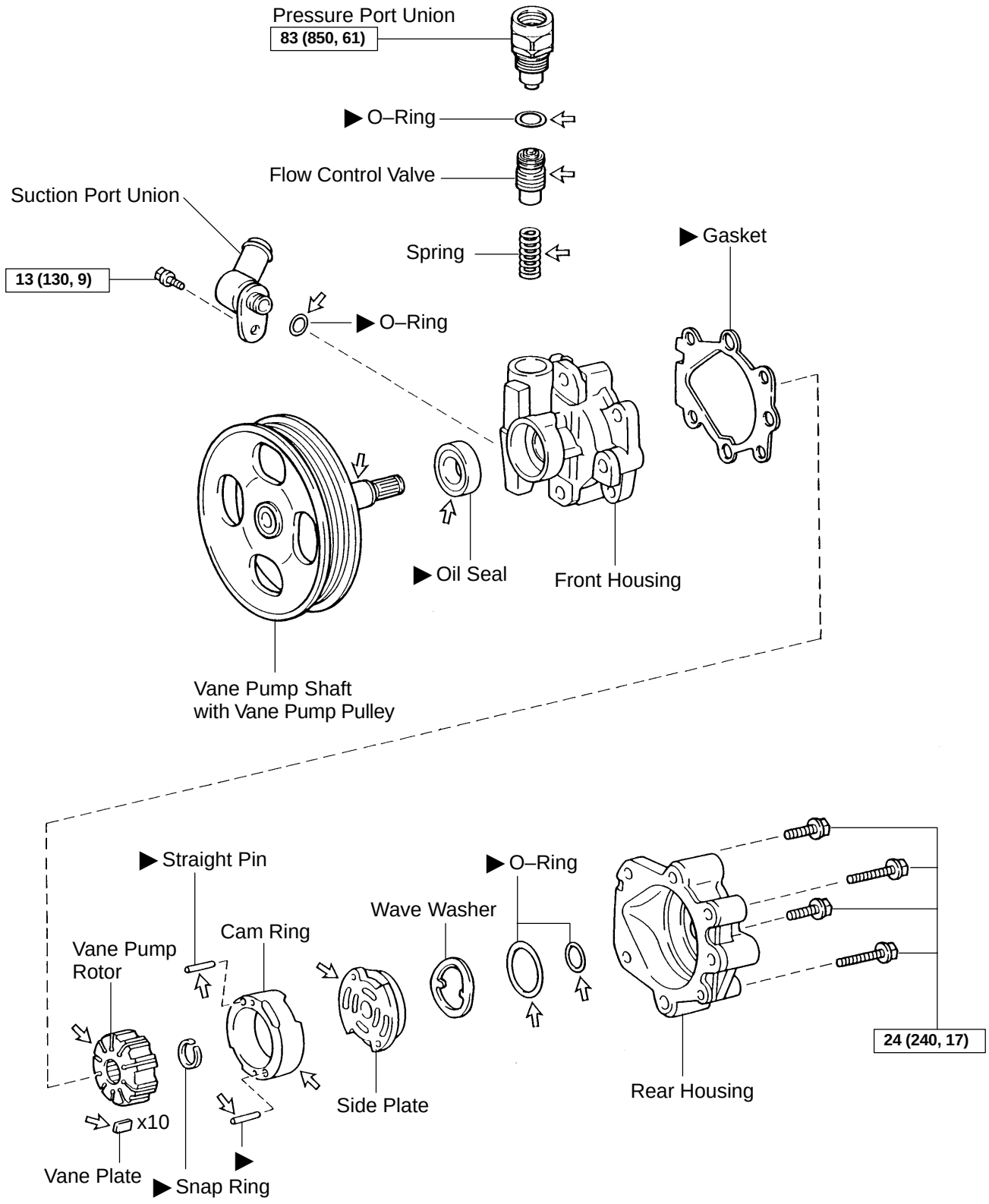
Pressure Port Union
83 (850, 61)
▶ O–Ring
Flow Control Valve
Suction Port Union
Spring
▶ Gasket
13 (130, 9)
▶ O–Ring
▶ Oil Seal
Front Housing
Vane Pump Shaft
with Vane Pump Pulley
▶ Straight Pin
▶ O–Ring
Wave Washer
Cam Ring
Vane Pump
Rotor
24 (240, 17)
Side Plate
Rear Housing
x10
Vane Plate
▶ Snap Ring
N·m (kgf·cm, ft·lbf) : Specified torque
▶ Non–reusable part
⇦ Power steering fluid
N
F06720

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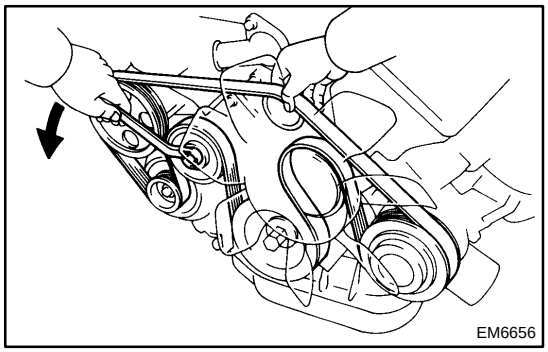
SR0ME–08

REMOVAL

1. REMOVE AIR CLEANER ASSEMBLY WITH AIR CLEANER HOSE

(a) Disconnect the MAF meter connector.
(b) Disconnect the hoses.
(c) Remove the clamp.
(d) Remove the 3 bolts and air cleaner assembly with air cleaner hose connected.


EM6656

2. REMOVE DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and remove the drive belt.

3. DISCONNECT 2 VACUUM HOSES

Remove the 2 clips and disconnect the 2 vacuum hoses.

4. DISCONNECT RETURN HOSE

Remove the clip and disconnect the return hose.

5. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket, disconnect the pressure feed tube.

6. REMOVE PS VANE PUMP ASSEMBLY

Remove the 2 bolts, nut, stud bolt and PS vane pump assembly.

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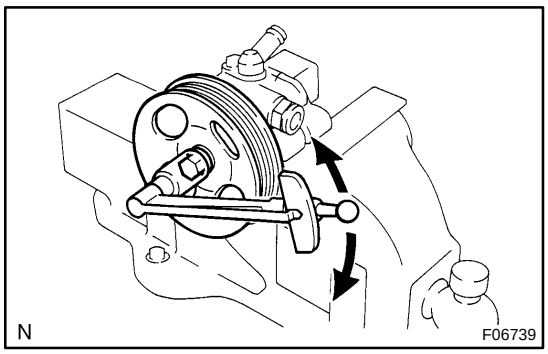
SR0V7–04



DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. MEASURE PS VANE PUMP ROTATING TORQUE

(a) Check that the pump rotates smoothly without abnormal noise.

(b) Temporarily install the bolt.

(c) Using a torque wrench, check the pump rotating torque.

Rotating torque:

0.28 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less

2. REMOVE SUCTION PORT UNION

(a) Remove the bolt and suction port union.

(b) Remove the O–ring from the union.

3. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING

(a) Remove the pressure port union, the flow control valve and spring.

(b) Remove the O–ring from the pressure port union.

4. REMOVE REAR HOUSING

(a) Remove the 4 bolts and rear housing.

HINT:

If the wave washer and side plate are stuck to the rear housing, lightly tap the rear housing with a plastic hammer, and remove the wave washer and side plate.

(b) Remove the 2 O–rings from the rear housing.

5. REMOVE WAVE WASHER

6. REMOVE SIDE PLATE

7. REMOVE GASKET

8. REMOVE CAM RING, 10 VANE PLATES AND VANE PUMP ROTOR

(a) Using a screwdriver, remove the snap ring from the vane pump shaft.

(b) Remove the cam ring, 10 vane plates and vane pump rotor.

NOTICE:

Be careful not to drop the plates.

9. REMOVE VANE PUMP SHAFT WITH VANE PUMP PULLEY

10. REMOVE STRAIGHT PINS

Remove the 2 pins from the front housing.

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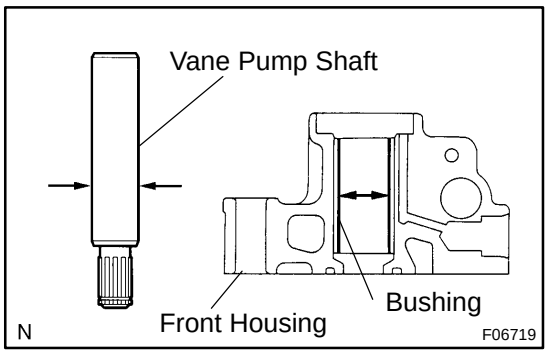
SR0RF–05

INSPECTION

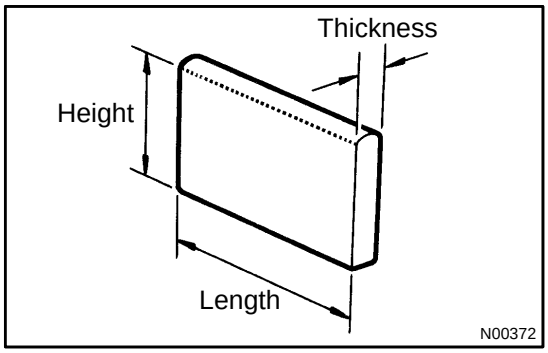


1. CHECK OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

Using a micrometer and caliper gauge, measure the oil clearance.

Standard clearance:
0.03 to 0.05 mm (0.0012 to 0.0020 in.)
Maximum clearance: 0.07 mm (0.0028 in.)

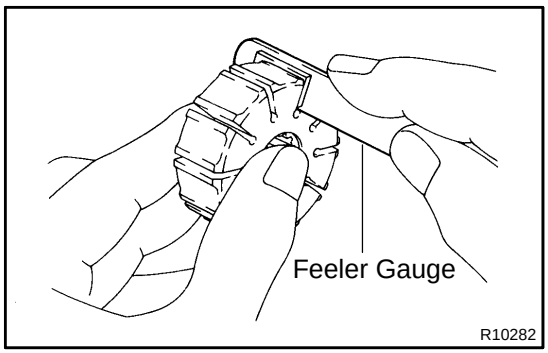
If it is more than the maximum, replace the shaft and front housing.



2. INSPECT VANE PUMP ROTOR AND VANE PLATES

(a) Using a micrometer, measure the height, thickness and length of the 10 plates.

Minimum height: 8.6 mm (0.339 in.)
Minimum thickness: 1.397 mm (0.0550 in.)
Minimum length: 14.991 mm (0.5902 in.)



(b) Using a feeler gauge, measure the clearance between the rotor groove and plate.

Maximum clearance: 0.033 mm (0.0013 in.)

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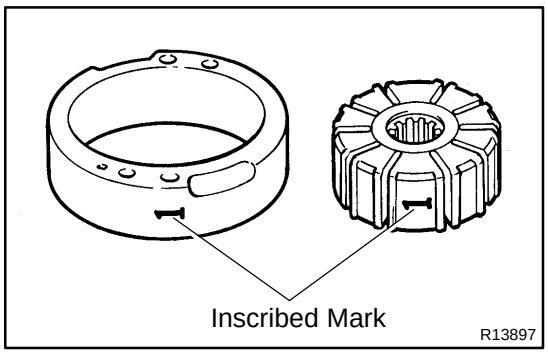


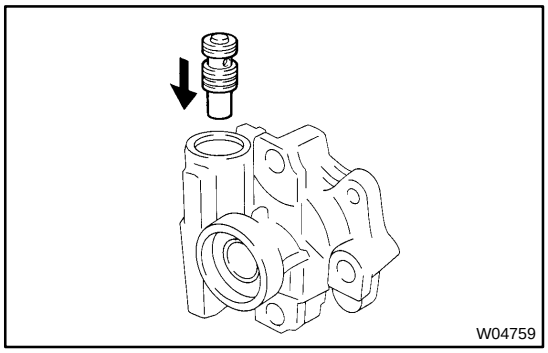
If it is more than the maximum, replace the plate and/or rotor with the one having the same mark stamped on the cam ring.

Inscribed mark: 1, 2, 3, 4 or None

HINT:

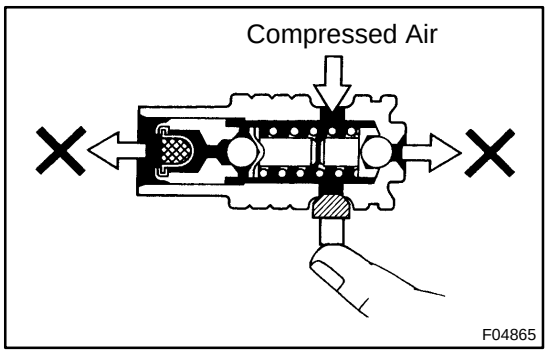
There are 5 vane plate lengths with the following rotor and cam ring marks:

Rotor and cam ring mark	Vane plate part number	Vane plate length mm (in.)
None	44345–04010	14.999–15.001 (0.59051–0.59059)
1	44345–04020	14.997–14.999 (0.59043–0.59051)
2	44345–04030	14.995–14.997 (0.59035–0.59043)
3	44345–04040	14.993–14.995 (0.59027–0.59035)
4	44345–04050	14.991–14.993 (0.59020–0.59027)

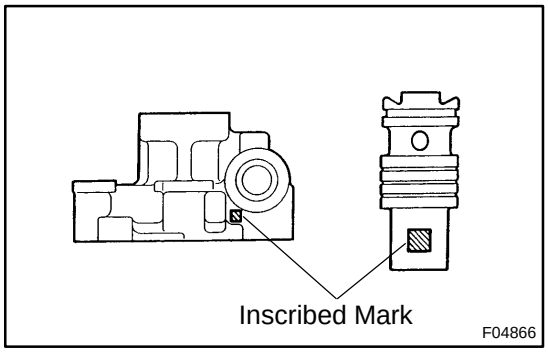


3. INSPECT FLOW CONTROL VALVE

(a) Coat the valve with power steering fluid and check that it falls smoothly into the valve hole under its own weight.



(b) Check the flow control valve for leakage.
Close one of the holes and apply compressed air 392 to 490 kPa (4 to 5 kgf/cm^2, 57 to 71 psi) into the opposite side, and confirm that air does not come out from the end holes.



If necessary, replace the valve with the one having the same letter inscribed on the front housing.

Inscribed mark: A, B, C, D, E or F

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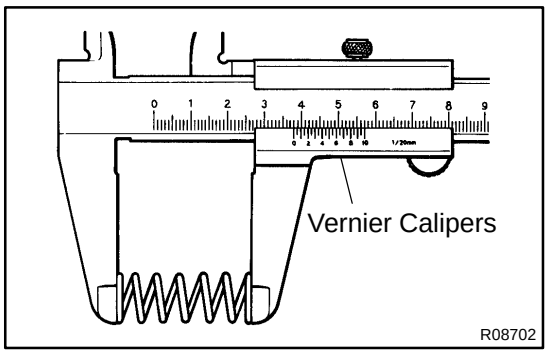


4. INSPECT SPRING

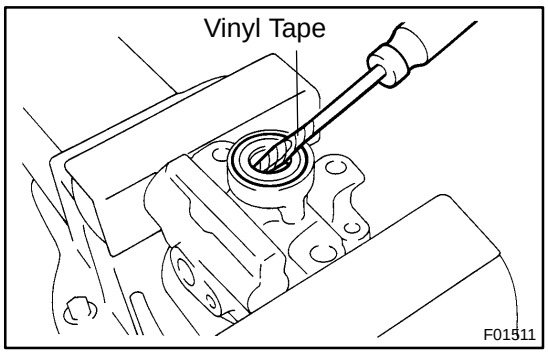
Using vernier calipers, measure the free length of the spring.

Minimum free length: 33.2 mm (1.307 in.)

If it is not within the specification, replace the spring.

Dardoor.com

SR0RG–09



REPLACEMENT

NOTICE:

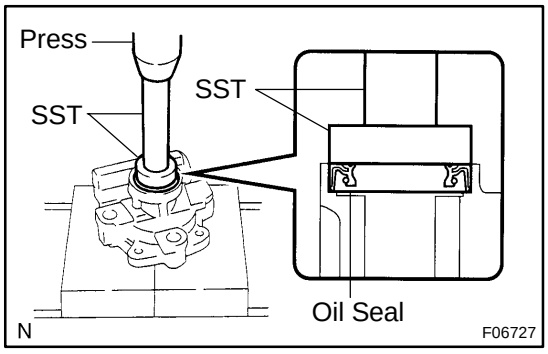
When using a vise, do not overtighten it.

IF NECESSARY, REPLACE OIL SEAL

(a) Using a screwdriver with vinyl tape wound around its tip, remove the oil seal.

NOTICE:

Be careful not to damage the front housing.



(b) Coat a new oil seal lip with power steering fluid.

(c) Using SST, press in the oil seal.

SST 09950–60010 (09951–00330),
09950–70010 (09951–07100)

NOTICE:

Make sure to install the oil seal in the correct direction.

Dardoor.com

SR0V8–04

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT PARTS INDICATED BY ARROWS WITH POWER STEERING FLUID (See page SR–26)

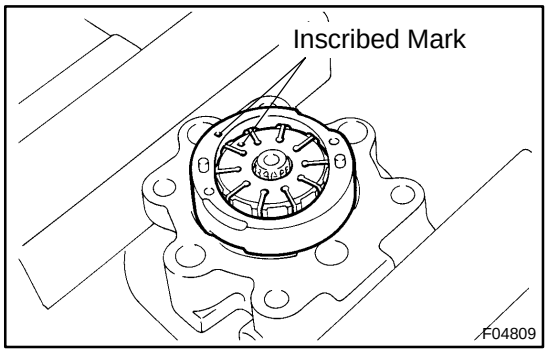
2. INSTALL VANE PUMP SHAFT WITH VANE PUMP PULLEY

3. INSTALL STRAIGHT PINS

Using a plastic hammer, tap in 2 new pins into the front housing.

NOTICE:

Be careful not to damage the pins.



4. INSTALL CAM RING

Install the cam ring with the inscribed mark facing outward.

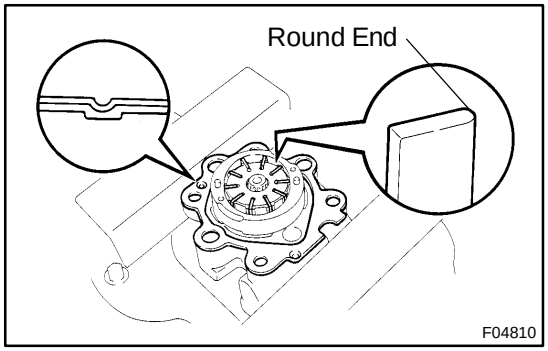
HINT:

Align the hole of the cam ring with the one of the straight pins.

5. INSTALL VANE PUMP ROTOR

(a) Install the vane pump rotor with the inscribed mark facing outward.

(b) Install a new snap ring to the vane pump shaft.



6. INSTALL VANE PLATES AND GASKET

(a) Install the 10 plates with the round end facing outward.

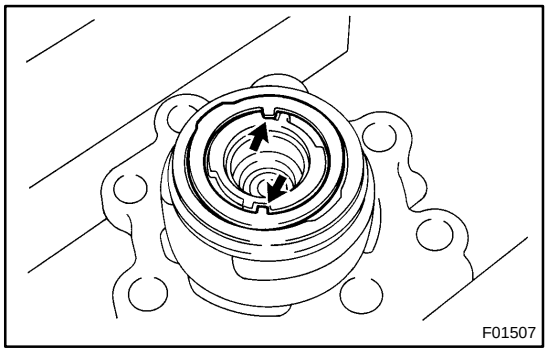
(b) Install a new gasket on the front housing.

NOTICE:

Be careful of the direction of the gasket.

7. INSTALL SIDE PLATE

Align the hole of the plate with the hole of the 2 straight pins.



8. INSTALL WAVE WASHER

Install the washer so that the protrusions fit into the slots in the side plate.

9. INSTALL REAR HOUSING

(a) Coat 2 new O–rings with power steering fluid and install them to the rear housing.

(b) Install the rear housing with the 4 bolts.

Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)

Dardoor.com

10. INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION

(a) Install the spring on the front housing.

(b) Install the flow control valve in the correct direction (See page SR–26).

(c) Coat a new O–ring with power steering fluid and install it on the pressure port union.

(d) Install the pressure port union.

Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

11. INSTALL SUCTION PORT UNION

(a) Coat a new O–ring with power steering fluid and install it on the suction port union.

(b) Install the suction port union with the bolt.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

12. MEASURE PS VANE PUMP ROTATING TORQUE (See page SR–29)

Dardoor.com

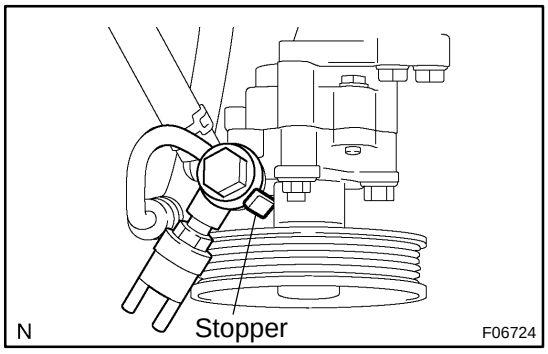
SR0MI–14

INSTALLATION

1. INSTALL PS VANE PUMP ASSEMBLY

(a) Install the PS vane pump assembly with the stud bolt.
Torque: 22 N·m (220 kgf·cm, 16 ft·lbf)

(b) Install the 2 bolt and nut.
Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)



2. INSTALL PRESSURE FEED TUBE

(a) Connect the pressure feed tube.

(b) Install a new gasket and the union bolt on the pressure feed tube.

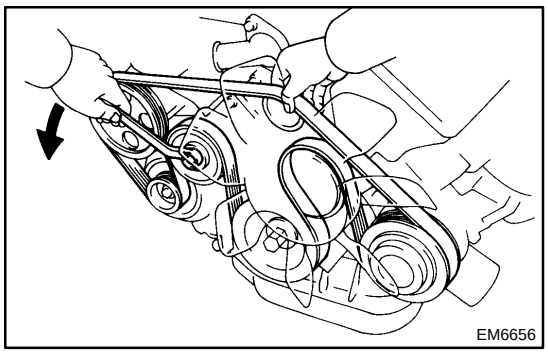
HINT:
Make sure that the stopper of the pressure feed tube contacts the PS vane pump body as shown in the illustration, then tighten the union bolt.
Torque: 46.5 N·m (475 kgf·cm, 34 ft·lbf)

3. CONNECT RETURN HOSE

Connect the return hose with the clip.

4. CONNECT 2 VACUUM HOSES

Connect the 2 vacuum hoses and install the 2 clips.



5. INSTALL DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and install the belt.

6. INSTALL AIR CLEANER ASSEMBLY WITH AIR CLEANER HOSE

(a) Install the air cleaner assembly with air cleaner hose and the 3 bolts.

(b) Install the clamp.

(c) Connect the hoses.

(d) Connect the MAF meter connector.

7. BLEED POWER STEERING SYSTEM
(See page SR–4)

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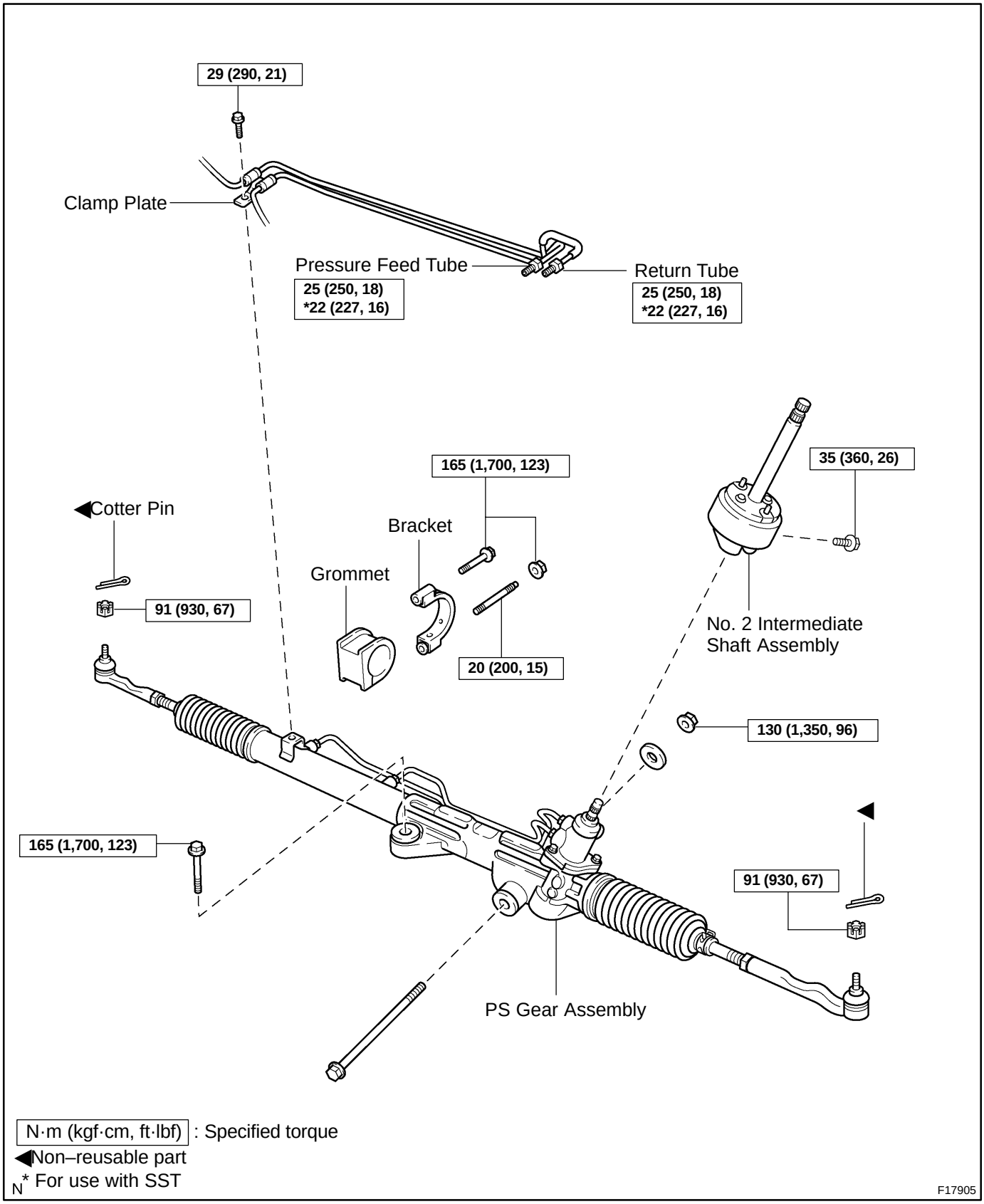
POWER STEERING GEAR

COMPONENTS

SR02N–08



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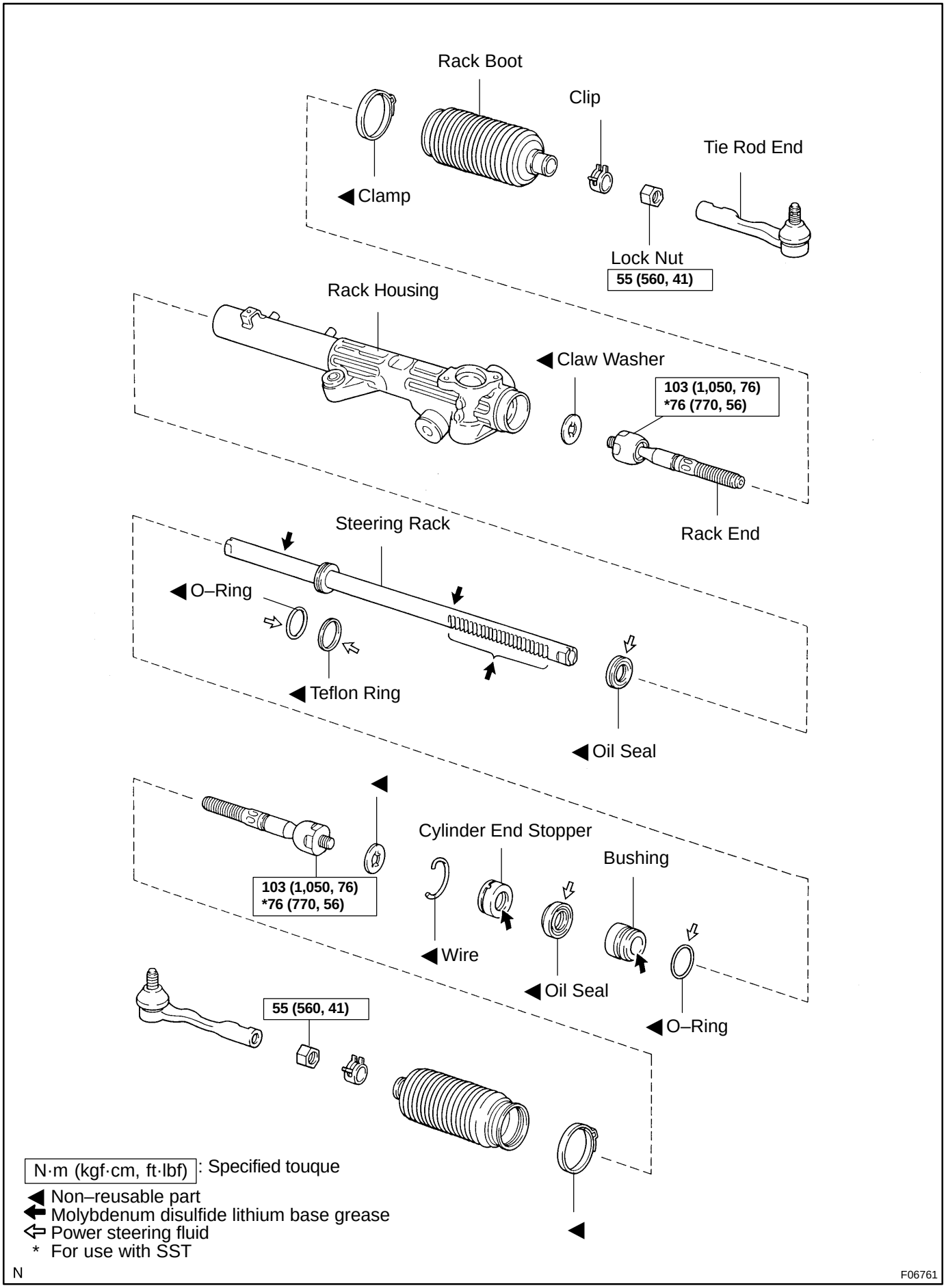
Rack Boot
Clip
Tie Rod End
◀ Clamp
Lock Nut
55 (560, 41)
Rack Housing
◀ Claw Washer
103 (1,050, 76)
*76 (770, 56)
Rack End
Steering Rack
◀ O–Ring
◀ Teflon Ring
◀ Oil Seal
103 (1,050, 76)
*76 (770, 56)
Cylinder End Stopper
Bushing
◀ Wire
◀ Oil Seal
◀ O–Ring
55 (560, 41)
N·m (kgf·cm, ft·lbf): Specified touque
◀ Non–reusable part
Molybdenum disulfide lithium base grease
Power steering fluid
* For use with SST
N
F06761

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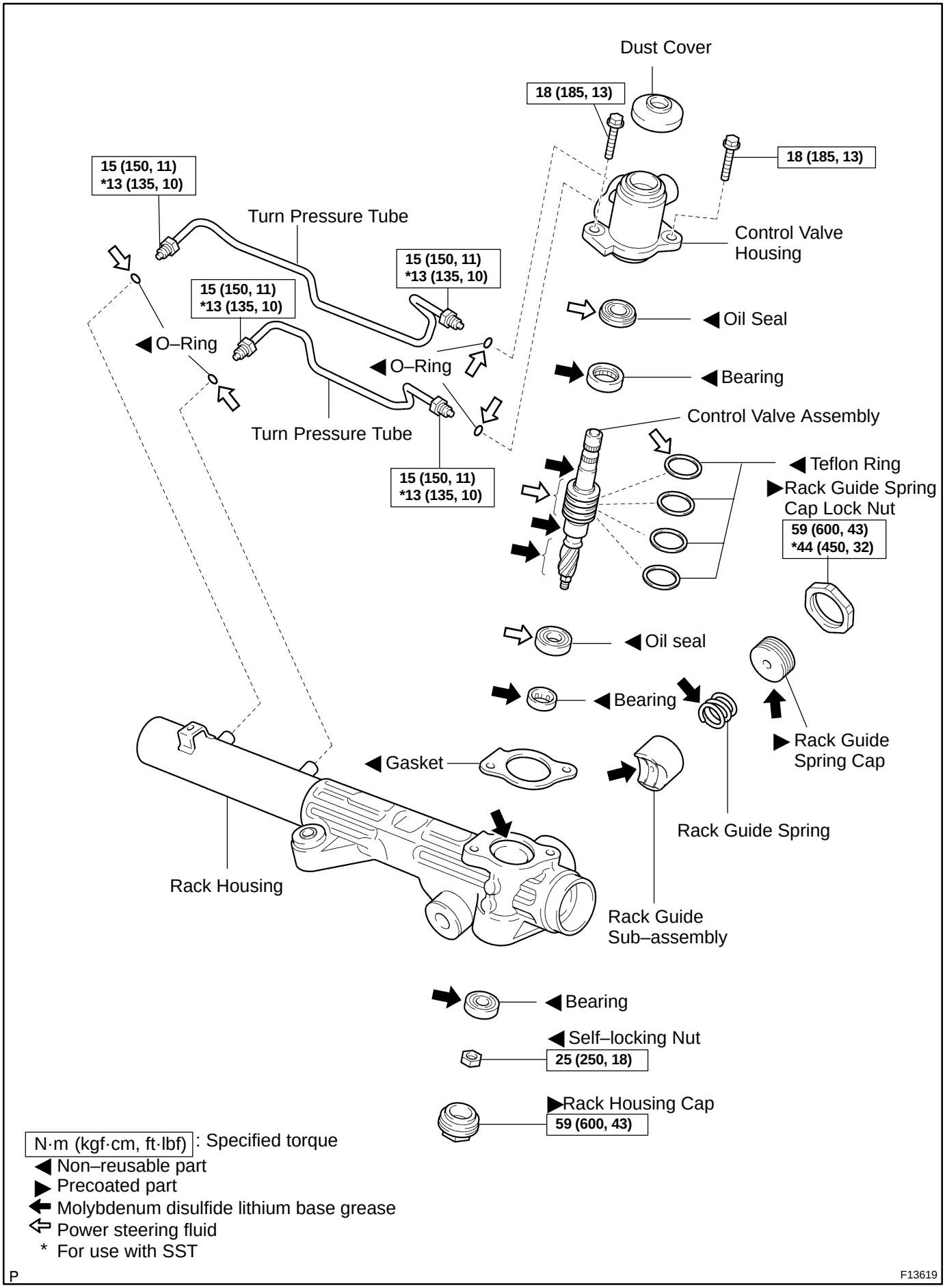

N·m (kgf·cm, ft·lbf) : Specified torque
◀ Non–reusable part
▶ Precoated part
⬅ Molybdenum disulfide lithium base grease
⇦ Power steering fluid
* For use with SST

P F13619

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SR02O–09

REMOVAL

NOTICE:

Remove the steering wheel assembly before the steering gear removal, because there is possibility of breaking of the spiral cable.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

2. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

3. REMOVE STEERING WHEEL PAD
(See page SR–14)

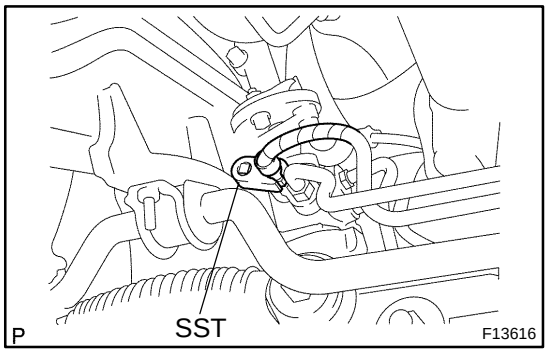
4. REMOVE STEERING WHEEL (See page SR–14)

5. DISCONNECT RH AND LH TIE ROD ENDS
(See page SA–86)

6. DISCONNECT NO. 2 INTERMEDIATE SHAFT ASSEMBLY (See page SR–14)

7. DISCONNECT CLAMP PLATE

Remove the bolt and disconnect the clamp plate.



8. DISCONNECT PRESSURE FEED AND RETURN TUBES

Using SST, disconnect the tubes.

SST 09023–12701

9. REMOVE PS GEAR ASSEMBLY

(a) Remove the bolt, nut and stud bolt from the bracket.

(b) Remove the 2 set bolts, nut, washer and PS gear assembly.

10. REMOVE BRACKET AND GROMMET

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SR0V9–05

DISASSEMBLY

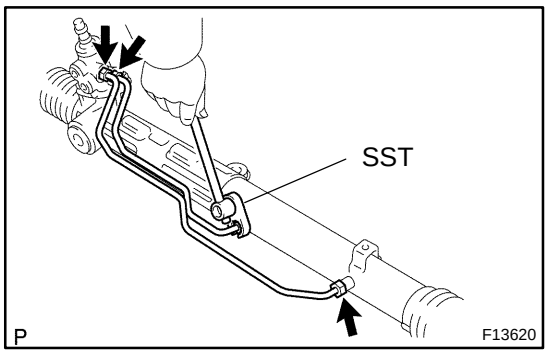
NOTICE:

When using a vise, do not overtighten it.

1. REMOVE 2 TURN PRESSURE TUBES

(a) Using SST, remove the 2 turn pressure tubes.
SST 09023–38401

(b) Remove the 4 O–rings from the tubes.



2. SECURE PS GEAR ASSEMBLY IN VISE

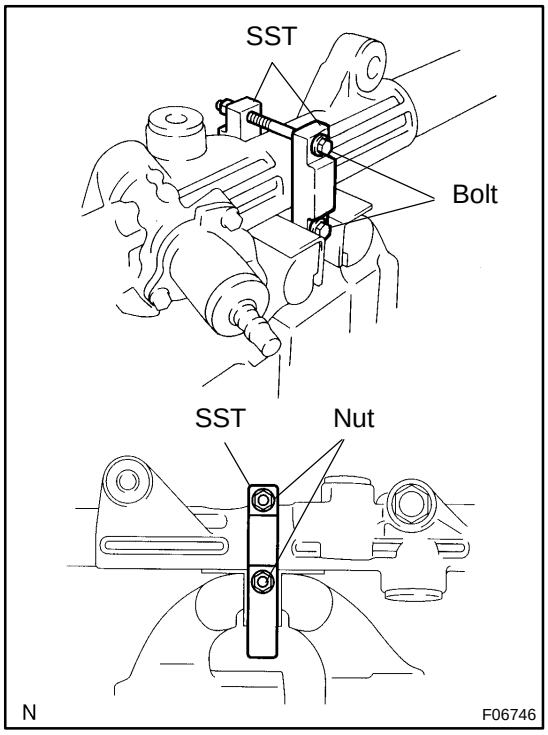
Using SST, 2 bolts and nuts, secure the gear assembly in a vise, as shown in the illustration.

SST 09612–00012

Reference:
Bolt: 90105–10346
Nut: 90170–10198

HINT:

Use 2 of the same type of SST.

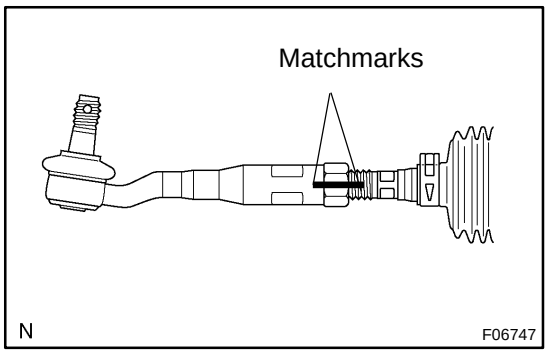


3. REMOVE RH AND LH TIE ROD ENDS AND LOCK NUTS

(a) Put matchmarks on the tie rod end, lock nut and rack end.

(b) Loosen the lock nut, remove the tie rod end and lock nut.

(c) Perform the same procedure on the other side.



4. REMOVE RH AND LH CLIPS, RACK BOOTS AND CLAMPS

(a) Using a screwdriver, loosen the 2 clamps.

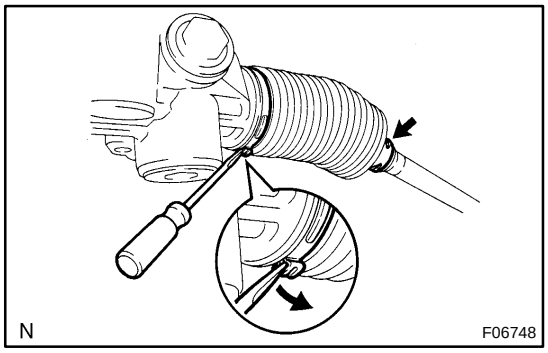
(b) Remove the 2 clips and boots.

HINT:

Mark the RH and LH boots.

NOTICE:

Be careful not to damage the boot.



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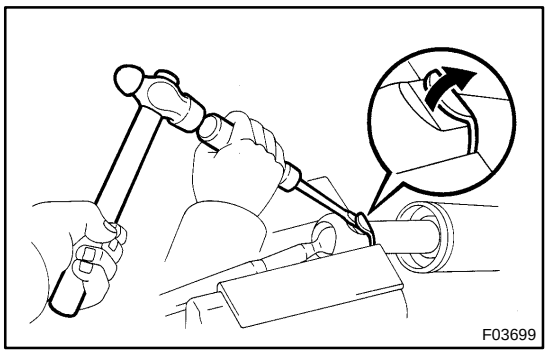
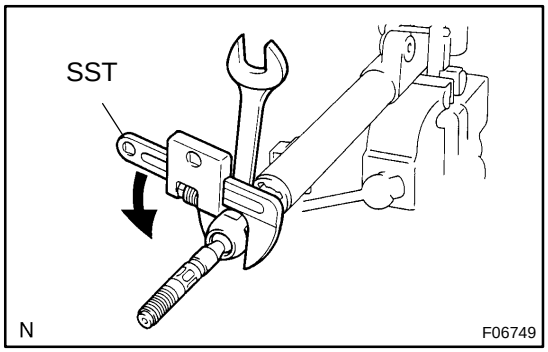


5. REMOVE RH AND LH RACK ENDS AND CLAW WASHERS

(a) Using a screwdriver and hammer, unstake the washer.

NOTICE:

Avoid any impact on the steering rack.



(b) Using a spanner, hold the steering rack steadily, and using SST, remove the rack end.

SST 09922–10010

HINT:

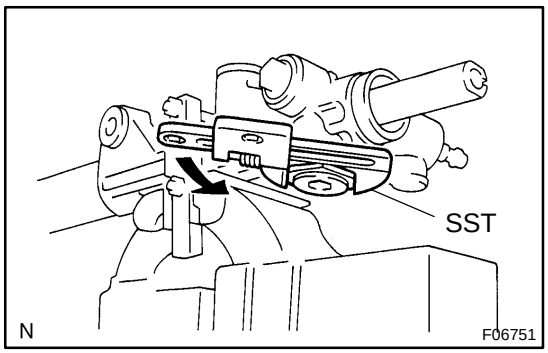
Mark the RH and LH rack ends.

NOTICE:

Use SST 09922–10010 in the direction shown in the illustration.

(c) Remove the washer from the rack end.

(d) Perform the same procedure on the other side.



6. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the lock nut.

SST 09922–10010

NOTICE:

Use SST 09922–10010 in the direction shown in the illustration.

7. REMOVE RACK GUIDE SPRING CAP, RACK GUIDE SPRING AND RACK GUIDE SUB–ASSEMBLY

(a) Using a hexagon wrench, remove the rack guide spring cap.

(b) Remove the rack guide spring and rack guide sub–assembly.

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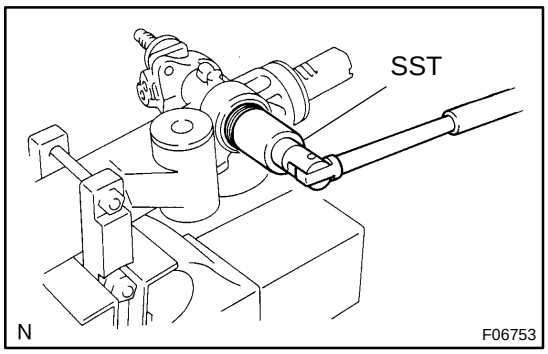
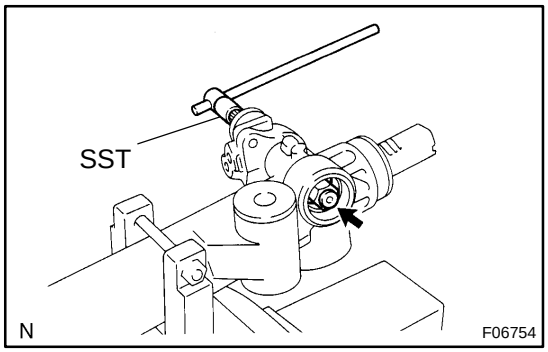


8. REMOVE RACK HOUSING CAP

Using SST, remove the rack housing cap.

SST 09816–30010

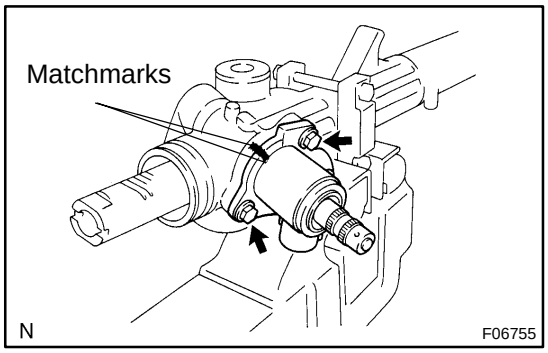


9. REMOVE SELF–SOCKING NUT

Using SST, stop the control valve shaft rotation, and remove the nut.

SST 09616–00011

10. REMOVE DUST COVER

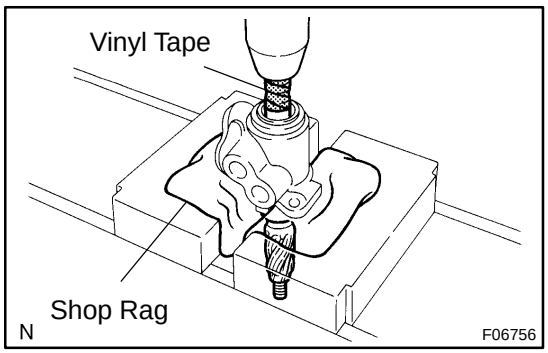


11. REMOVE CONTROL VALVE HOUSING WITH CONTROL VALVE ASSEMBLY

(a) Put matchmarks on the control valve housing and rack housing.

(b) Remove the 2 bolts and control valve housing with control valve assembly attached.

(c) Remove the gasket from the rack housing.



12. REMOVE CONTROL VALVE ASSEMBLY

(a) To prevent oil seal lip damage, wind vinyl tape around the serrated part of the valve shaft.

(b) Press out the valve assembly with the oil seal.

NOTICE:

- **Place a shop rag between the valve housing and the blocks.**
- **Be careful not to drop the valve assembly.**
- **Be careful not to damage the oil seal lip.**

13. REMOVE OIL SEAL

Remove the oil seal from the control valve assembly.

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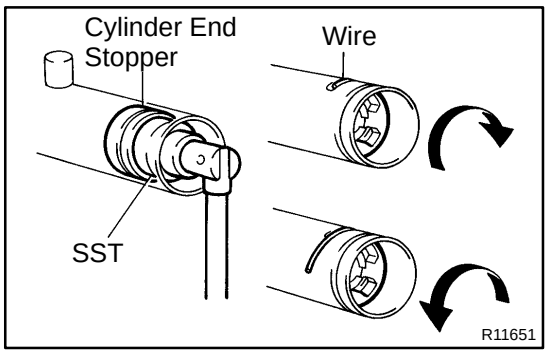
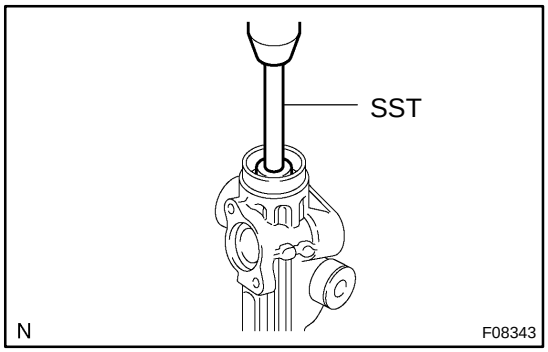


14. REMOVE CYLINDER END STOPPER

(a) Using SST, turn the stopper clockwise until the wire end can be seen through the service hole.
SST 09631–16010

(b) Using SST, turn the stopper counterclockwise, and remove the wire.
SST 09631–16010



15. REMOVE STEERING RACK AND BUSHING

(a) Using SST, press out the steering rack with the bushing.

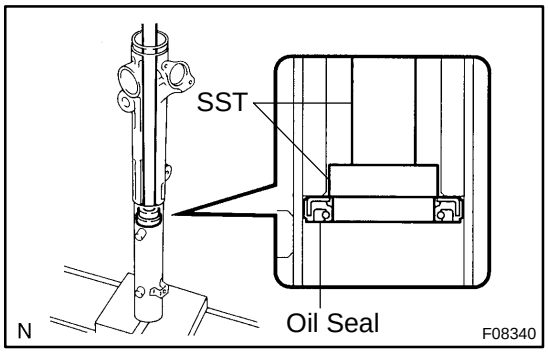
NOTICE:

Take care not to drop the rack.

SST 09950–70010 (09951–07200)

(b) Remove the bushing from the rack.

(c) Remove the O–ring from the bushing.



16. REMOVE OIL SEAL

Using SST, press out the oil seal.

SST 09950–60010 (09951–00360),
09950–70010 (09951–07360)

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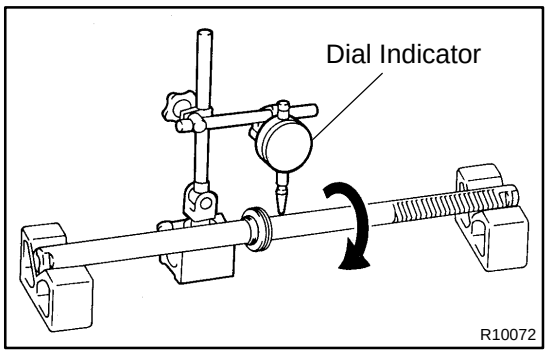
SR0VA–04



INSPECTION

INSPECT STEERING RACK

(a) Using a dial indicator, check the rack for runout, teeth wear and damage.

Maximum runout: 0.03 mm (0.0012 in.)

(b) Check the back surface for wear and damage.

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SR0VB–04

REPLACEMENT

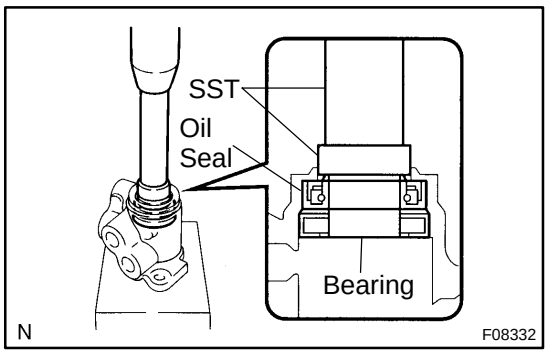
NOTICE:

When using a vise, do not overtighten it.

1. IF NECESSARY, REPLACE OIL SEAL AND BEARING

(a) Using SST, press out the oil seal and bearing from the control valve housing.

SST 09950–60010 (09951–00250), 09950–70010 (09951–07150)



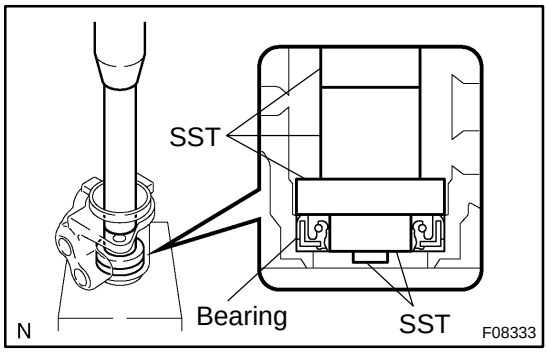
(b) Coat a new oil seal lip with power steering fluid.

(c) Using SST, press in the oil seal.

SST 09950–60010 (09951–00180, 09951–00320, 09952–06010), 09950–70010 (09951–07150)

NOTICE:

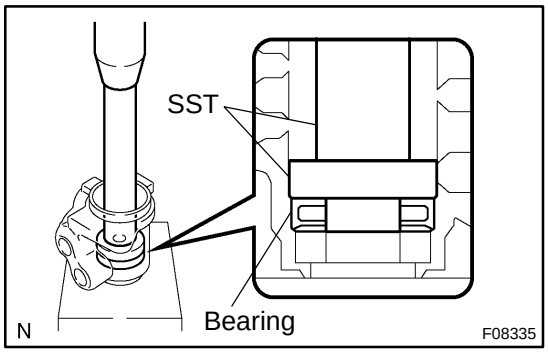
Make sure to install the oil seal in the correct direction.



(d) Coat a new bearing with molybdenum disulfide lithium base grease.

(e) Using SST, press in the bearing.

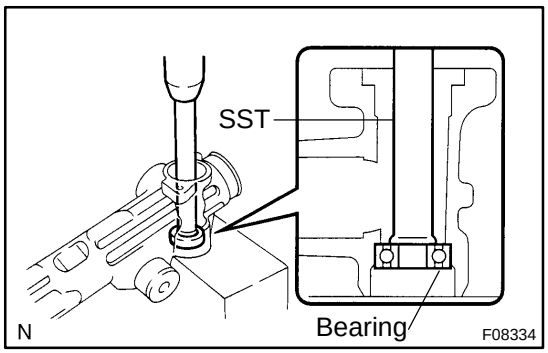
SST 09950–60010 (09951–00340), 09950–70010 (09951–07150)



2. IF NECESSARY, REPLACE 2 BEARINGS

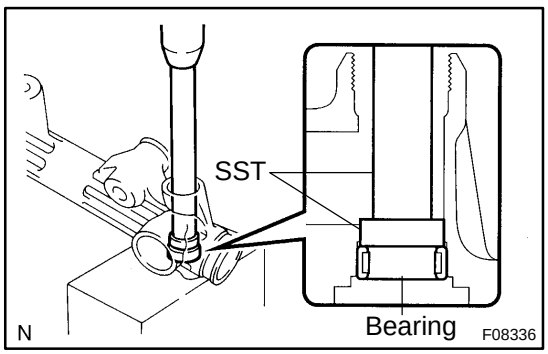
(a) Using SST, press out the bearing.

SST 09950–60010 (09951–00260), 09950–70010 (09951–07150)



(b) Using SST, press out the bearing from the rack housing.

SST 09950–60010 (09951–00260), 09950–70010 (09951–07150)



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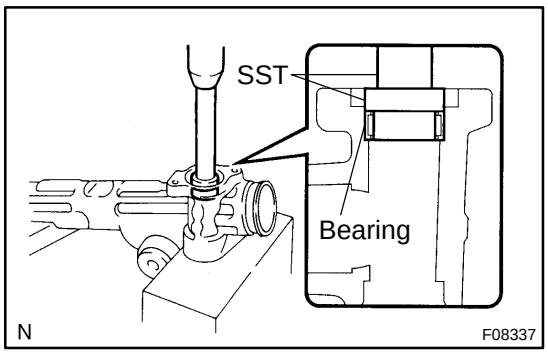
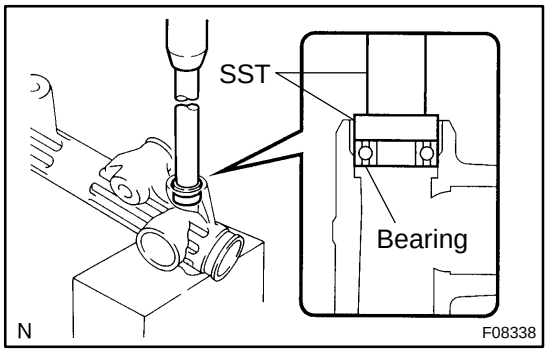
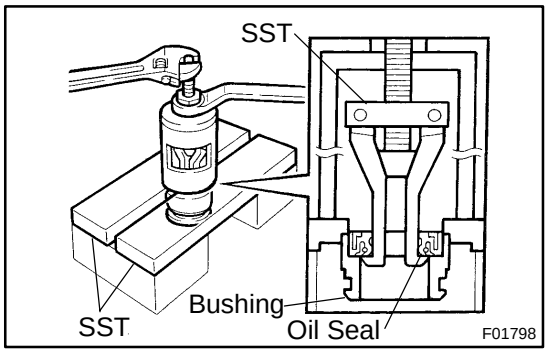


(c) Coat a new bearing with molybdenum disulfide lithium base grease.
(d) Using SST, press in the bearing.
SST 09950–60010 (09951–00310), 09950–70010 (09951–07150)



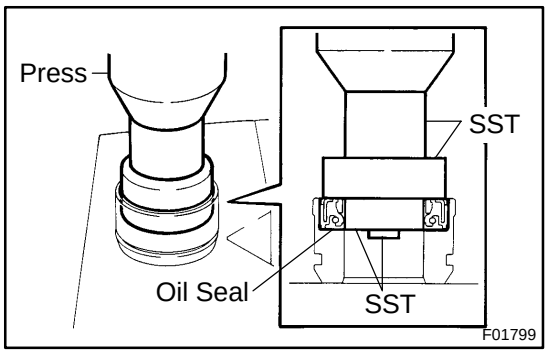
(e) Coat a new bearing with molybdenum disulfide lithium base grease.
(f) Using SST, press in the bearing.
SST 09950–60010 (09951–00320), 09950–70010 (09951–07150)



3. IF NECESSARY, REPLACE OIL SEAL

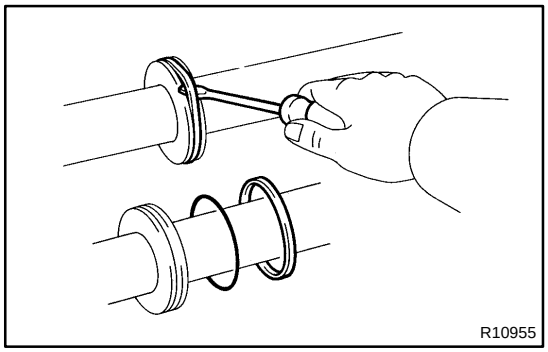
(a) Using SST, remove the oil seal from the bushing.
SST 09527–20011, 09612–24014 (09613–22011)

NOTICE:
Be careful not to damage the bushing.



(b) Coat a new oil seal lip with power steering fluid.
(c) Using SST, press in the oil seal.
SST 09950–60010 (09951–00300, 09951–00460, 09952–06010)

NOTICE:
Make sure to install the oil seal in the correct direction.



4. IF NECESSARY, REPLACE TEFLON RING AND O–RING

(a) Using a screwdriver, remove the teflon ring and O–ring from the steering rack.

NOTICE:
Be careful not to damage the groove for the teflon ring.

(b) Coat a new O–ring with power steering fluid and install it on steering rack.

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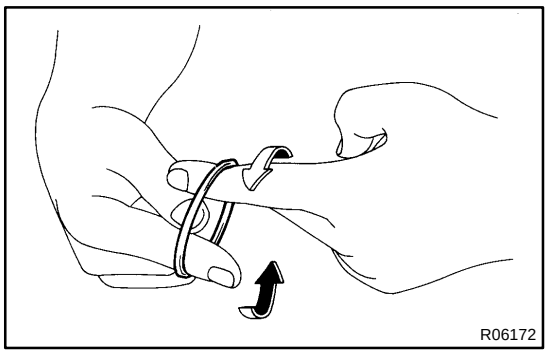
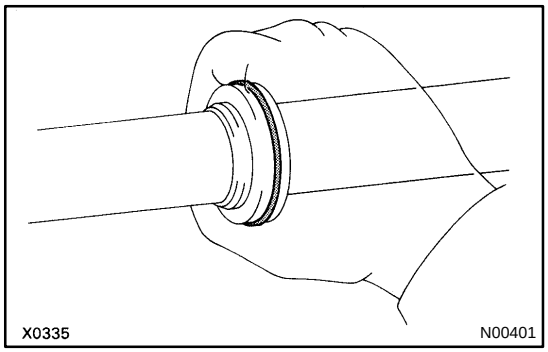


(c) Expand a new teflon ring with your fingers.

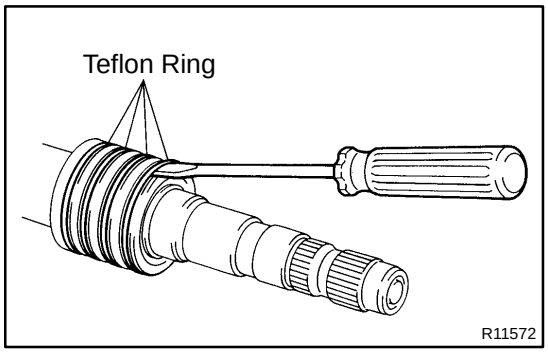
NOTICE:

Be careful not to over–expand the teflon ring.



(d) Coat the teflon ring with power steering fluid.

(e) Install the teflon ring on the steering rack, and settle it down with your fingers.



5. IF NECESSARY, REPLACE TEFLON RINGS

(a) Using a screwdriver, remove the 4 teflon rings from the control valve assembly.

NOTICE:

Be careful not to damage the grooves for the teflon ring.

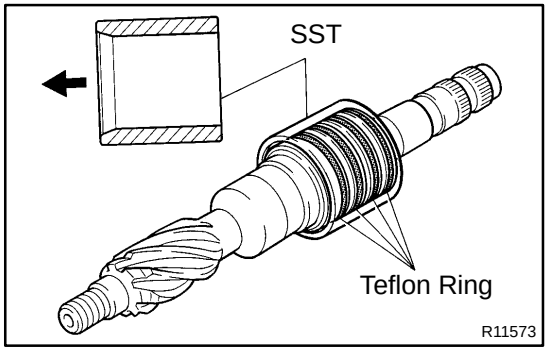
(b) Expand 4 new teflon rings with your fingers.

NOTICE:

Be careful not to expand the teflon ring excessively.

(c) Coat the teflon rings with power steering fluid.

(d) Install the teflon rings on the control valve assembly, and settle them down with your fingers.



(e) Carefully slide the tapered end of SST over the teflon rings until they fit to the control valve assembly.

SST 09631–20081

NOTICE:

Be careful not to damage the teflon rings.

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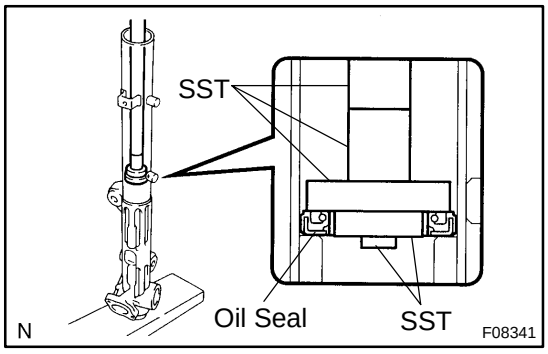
SR02R–09

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT PARTS INDICATED BY ARROWS WITH POWER STEERING FLUID OR MOLYBDENUM DISULFIDE LITHIUM BASE GREASE (See pages SR–37)



2. INSTALL OIL SEAL

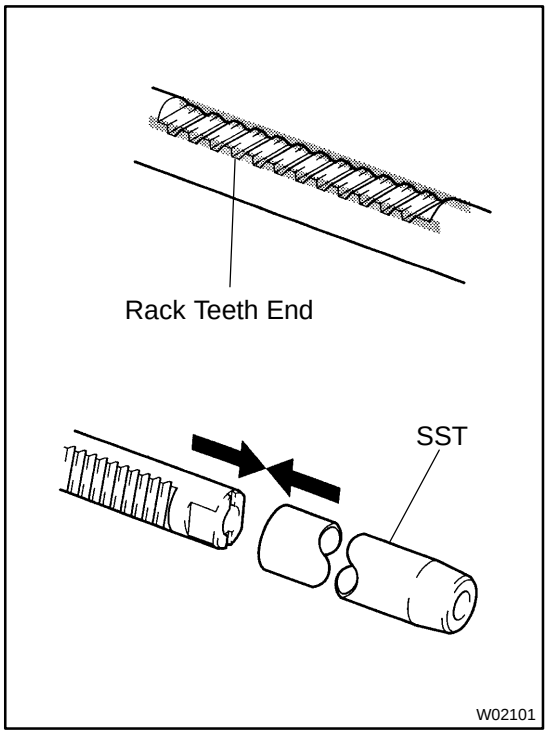
(a) Coat a new oil seal lip with power steering fluid.

(b) Using SST, press in the oil seal.

SST 09950–60010 (09951–00330, 09951–00490, 09952–06010), 09950–70010 (09951–07360)

NOTICE:

- **Make sure to install the oil seal in the correct direction.**
- **Take care that the oil seal does not get reversed as you install it.**



3. INSTALL STEERING RACK

(a) Install SST to the rack.

SST 09631–20051

HINT:

If necessary, scrape the burrs off the rack teeth end and burnish.

(b) Coat the SST with power steering fluid.

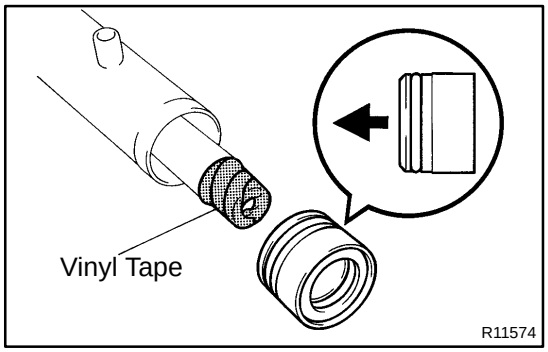
(c) Install the steering rack into the rack housing.

NOTICE:

Be careful not to damage the oil seal lip.

(d) Remove the SST.

SST 09631–20051



4. INSTALL BUSHING

(a) Coat a new O–ring with power steering fluid and install it on the bushing.

(b) To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.

(c) Install the bushing.

NOTICE:

- **Make sure to install the bushing in the correct direction.**
- **Be careful not to damage the oil seal lip.**

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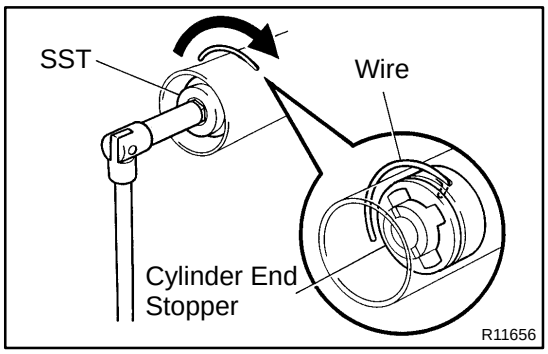
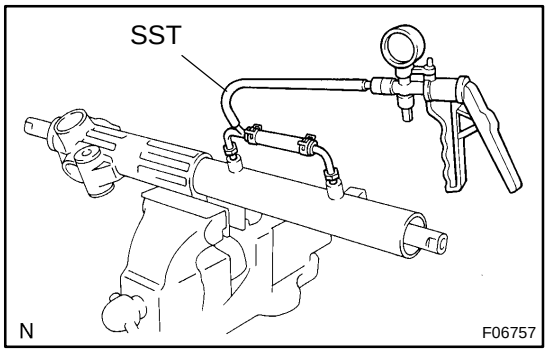


5. INSTALL CYLINDER END STOPPER

(a) Align the installation hole for the wire of the stopper with the slot of the rack housing.

(b) Install a new wire into the stopper.

(c) Using SST, turn the stopper clockwise 400˚ to 500˚.
SST 09631–16010



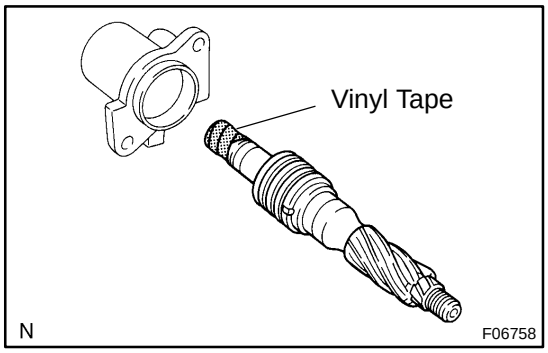
6. AIR TIGHTNESS TEST

(a) Install SST to the rack housing.
SST 09631–12071

(b) Apply 53 kPa (400 mmHg, 15.75 in.Hg) of vacuum for about 30 seconds.

(c) Check that there is no change in the vacuum.

If there is change in the vacuum, check the installation of the oil seals.



7. INSTALL CONTROL VALVE ASSEMBLY

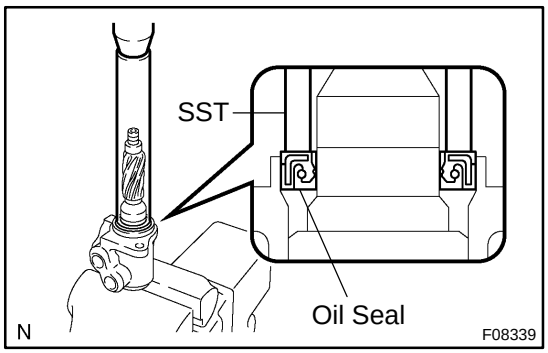
(a) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the valve shaft.

(b) Coat the teflon rings with power steering fluid.

(c) Install the valve assembly into the valve housing.

NOTICE:

Be careful not to damage the teflon rings and oil seal.



8. INSTALL OIL SEAL

(a) Coat a new oil seal lip with power steering fluid.

(b) Using SST, press in the oil seal.
SST 09612–22011

NOTICE:

Make sure to install the oil seal in the correct direction.

9. INSTALL CONTROL VALVE HOUSING WITH CONTROL VALVE ASSEMBLY

(a) Place a new gasket on the rack housing.

(b) Align the matchmarks on the control valve housing with the one on the rack housing.

(c) Install the 2 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

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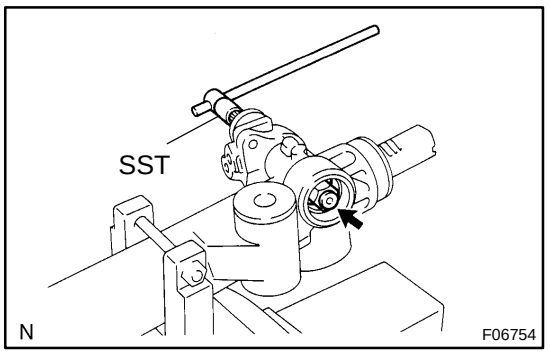


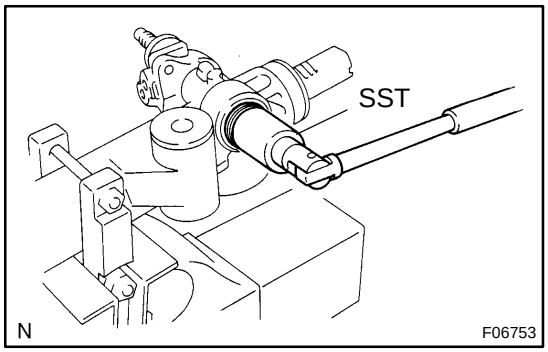
10. INSTALL SELF–LOCKING NUT

Using SST, stop the control valve shaft rotation, install a new nut.

SST 09616–00011

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

11. INSTALL DUST COVER



12. INSTALL RACK HOUSING CAP

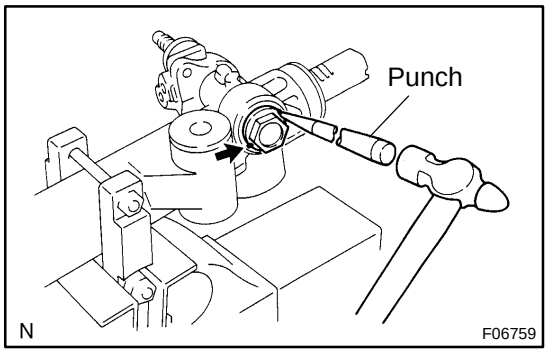
(a) Apply sealant to 2 or 3 threads of the rack housing cap.

Sealant:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using SST, install the rack housing cap.

SST 09816–30010

Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)



(c) Using a punch and hammer, stake the 2 parts of the cap.

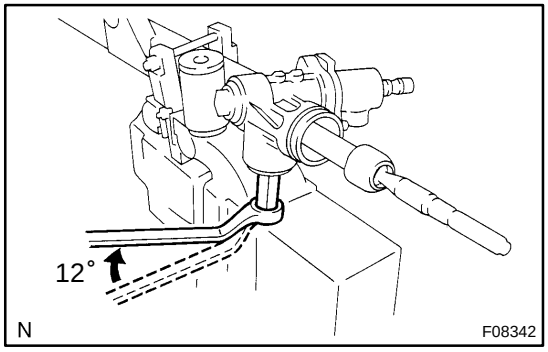
13. INSTALL RACK GUIDE SUB–ASSEMBLY, RACK GUIDE SPRING AND RACK GUIDE SPRING CAP

(a) Install the rack guide sub–assembly and rack guide spring.

(b) Apply sealant to 2 or 3 threads of the rack guide spring cap.

Sealant:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Temporarily install the rack guide spring cap.



14. ADJUST TOTAL PRELOAD

(a) To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH rack ends.

(b) Using a hexagon wrench, install the rack guide spring cap.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(c) Using a hexagon wrench, return the rack guide spring cap 12 °.

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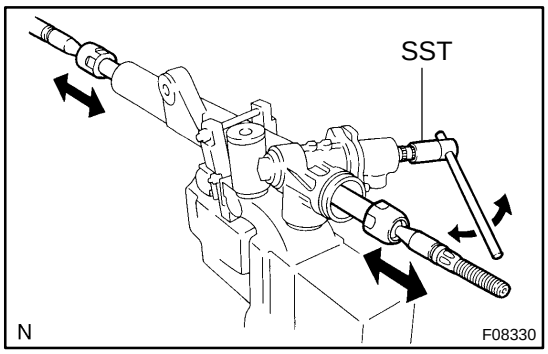
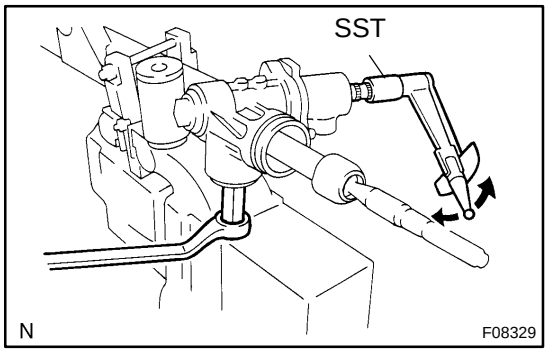
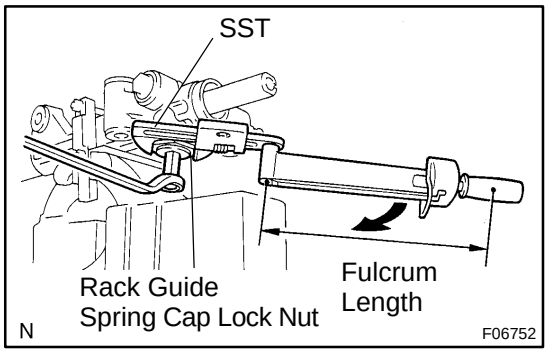


(d) Using SST, turn the control valve shaft right and left 1 or 2 turns.
SST 09616–00011

(e) Using a hexagon wrench, loosen the rack guide spring cap until the rack guide spring does not functioning.



(f) Using SST, torque wrench and hexagon wrench, tighten the rack guide spring cap until the preload becomes within specification.
SST 09616–00011
Preload (turning):
1.2 to 1.6 N·m (12 to 16 kgf·cm, 10.4 to 13.9 in.·lbf)



15. INSTALL RACK GUIDE SPRING CAP LOCK NUT

(a) Apply sealant to 2 or 3 threads of the lock nut.
Sealant:
Part No.08833–00080, THREE BOND 1344,
LOCTITE 242 or equivalent

(b) Temporarily install the lock nut.

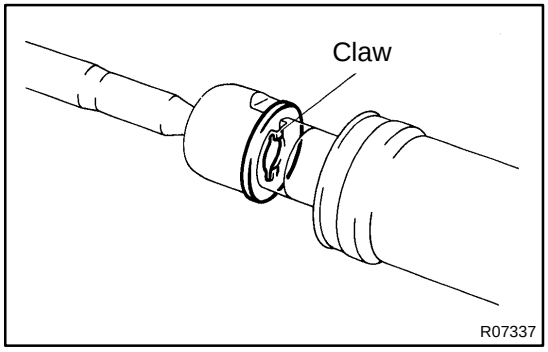
(c) Using a hexagon wrench, hold the rack guide spring cap, and using SST, tighten the lock nut.
SST 09922–10010
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

NOTICE:
Use SST in the direction shown in the illustration.
SST 09922–10010

HINT:
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

(d) Recheck the total preload.
Preload (turning):
1.2 to 1.6 N·m (12 to 16 kgf·cm, 10.4 to 13.9 in.·lbf)

(e) Remove the RH and LH rack ends.



16. INSTALL RH AND LH CLAW WASHERS AND RACK ENDS

(a) Install a new claw washer, and temporarily install the rack end.

HINT:
Align the claws of the claw washer with the steering rack grooves.

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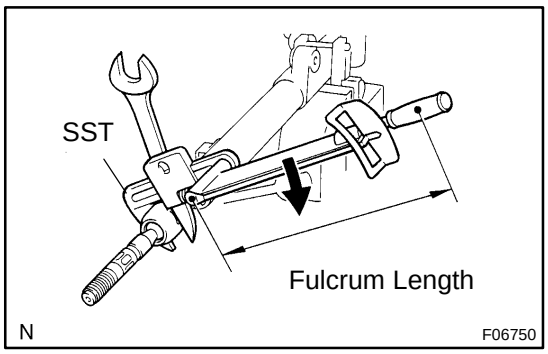
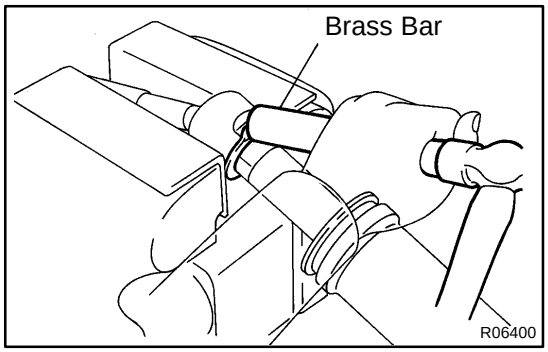


(b) Using a spanner, hold the steering rack steady, and using SST, tighten the rack end.
SST 09922–10010
Torque: 76 N·m (770 kgf·cm, 56 ft·lbf)

NOTICE:
Use SST in the direction shown in the illustration.
SST 09922–10010

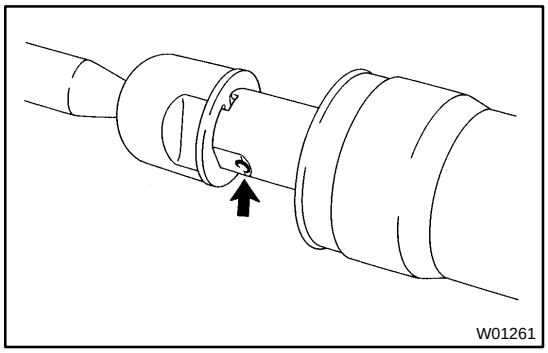
HINT:
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).



(c) Using a brass bar and hammer, stake the washer.

NOTICE:
Avoid any impact on the rack.

(d) Perform the same procedure on the other side.

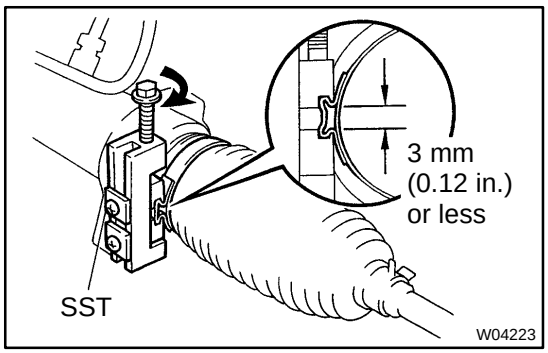


17. INSTALL RH AND LH RACK BOOTS, CLAMPS AND CLIPS

(a) Ensure that the steering rack hole is not clogged with grease.

HINT:
If the hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.

(b) Set a new clamp to the groove of the rack boot.



(c) Install the boot.

NOTICE:
Be careful not to damage or twist the boot.

(d) Using SST, tighten the clamp as shown in the illustration.
SST 09521–24010

(e) Install the clip to the rack boot.

(f) Perform the same procedure on the other side.

18. INSTALL RH AND LH TIE ROD ENDS AND LOCK NUTS

(a) Screw the lock nut and tie rod end onto the rack end until the matchmarks are aligned.

(b) After adjusting toe–in, tighten the nut
(See page SA–4).
Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

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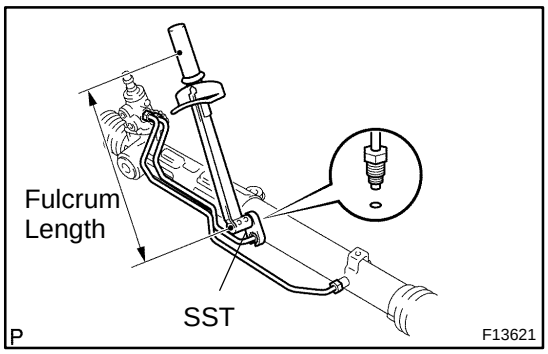

19. INSTALL 2 TURN PRESSURE TUBES

(a) Coat 4 new O–rings with power steering fluid and install them on the turn pressure tubes.

(b) Using SST, install the 2 turn pressure tubes.

SST 09023–38401

Torque: 13 N·m (135 kgf·cm, 10 ft·lbf)

HINT:

- ▶ Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- ▶ This torque value is effective in case that SST is parallel to a torque wrench.

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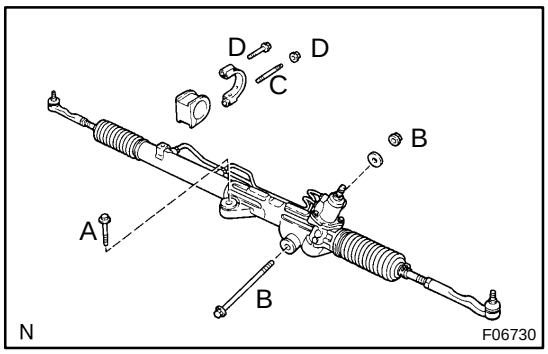
SR02S–08

INSTALLATION



1. INSTALL GROMMET AND BRACKET

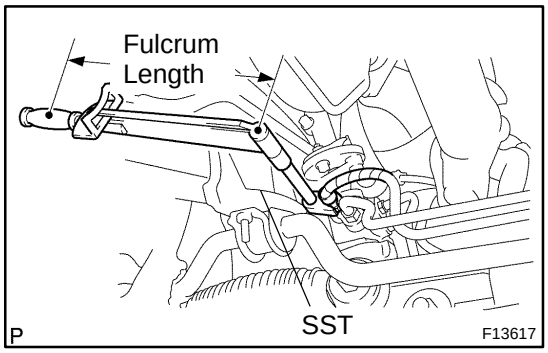
2. INSTALL PS GEAR ASSEMBLY

(a) Install the PS gear assembly with the gear assembly set bolt ”A”.
Torque: 165 N·m (1,700 kgf·cm, 123 ft·lbf)

(b) Install the gear assembly set bolt ”B”, washer and nut ”B”.
Torque: 130 N·m (1,350 kgf·cm, 96 ft·lbf)

(c) Install the stud bolt ”C” to the bracket.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

(d) Install the bolt ”D” and nut ”D” to the bracket.
Torque: 165 N·m (1,700 kgf·cm, 123 ft·lbf)



3. CONNECT PRESSURE FEED AND RETURN TUBES

Using SST, connect the tubes.
SST 09023–12701
Torque: 22 N·m (227 kgf·cm, 16 ft·lbf)

HINT:

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.

4. CONNECT CLAMP PLATE

Connect the clamp plate and install the bolt.
Torque: 29 N·m (290 kgf·cm, 21 ft·lbf)

5. CONNECT NO. 2 INTERMEDIATE SHAFT ASSEMBLY (See page SR–23)

6. CONNECT RH AND LH TIE ROD ENDS (See page SA–86)

7. POSITION FRONT WHEEL FACING STRAIGHT AHEAD

HINT:
Do it with the front of the vehicle jacked up.

8. CENTER SPIRAL CABLE (See page SR–23)

9. INSTALL STEERING WHEEL

(a) Align the matchmark on the wheel with the one on the steering column main shaft.

(b) Temporarily tighten the wheel set nut.

(c) Connect the connector.

10. BLEED POWER STEERING SYSTEM (See page SR–4)

11. CHECK STEERING WHEEL CENTER POINT

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12. **TORQUE STEERING WHEEL SET NUT**
    Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)
13. **INSTALL STEERING WHEEL PAD (See page SR–23)**
14. **CHECK FRONT WHEEL ALIGNMENT**
    (See page SA–4)
15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
16. **PERFORM YAW RATE AND DECELERATION SENSOR ZERO POINT CALIBRATION (See page DI–897)**
17. **PERFORM INITIALIZATION (See page IN–20)**

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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SRS AIRBAG

RS0B6–09

PRECAUTION

CAUTION:

- **The vehicle is equipped with SRS, which consists of a driver airbag, front passenger airbag, side airbag and curtain shield airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Further, if a mistake is made in servicing the SRS, it is possible that the SRS may fail to operate when required. Before performing servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedures indicated in the repair manual.**
- **Wait at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.**
  (The SRS is equipped with a back–up power source, so that if work is started within 90 seconds after disconnecting the negative (–) terminal cable of the battery, the SRS may be deployed.)
- **Do not expose the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor, side airbag sensor assembly, curtain shield airbag sensor assembly, seat position sensor assembly or occupant classification ECU directly to hot air or flames.**
- **Be sure to perform the initialization of the occupant classification ECU if any of the following conditions occur (see page DI–1128). If the initialization is not performed, the SRS may not operate properly.**
  - **The occupant classification ECU is replaced.**
  - **Accessories (seatback tray, seat cover, etc.) are installed to the vehicle.**
  - **The passenger seat is removed from the vehicle, and then reinstalled or replaced.**
  - **The passenger airbag ON/OFF indicator light ("OFF") comes on when the passenger seat is not occupied.**
  - **The vehicle is brought to the workshop for repair due to an accident or collision.**

NOTICE:

- **Malfunction symptoms of the SRS are difficult to confirm, so DTCs are the most important source of information when troubleshooting. When troubleshooting the SRS, always inspect DTCs before disconnecting the battery.**
- **Even in the case of a minor collision when the SRS does not deploy, the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor, side airbag sensor assembly, curtain shield airbag sensor assembly, seat position sensor assembly and occupant classification ECU should be inspected. (see page RS–22, RS–35, RS–49, RS–64, RS–72, RS–83, RS–88, RS–93, RS–98, RS–106 and RS–112).**
- **Before repair work, remove the airbag sensor if any kind of shock is likely to occur to the airbag sensor during the operation.**
- **Never use SRS parts from another vehicle. When replacing the parts, replace them with new ones.**
- **Never disassemble or repair the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor, side airbag sensor assembly, curtain shield airbag sensor assembly, seat position sensor assembly or occupant classification ECU in order to reuse it.**

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- **If the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor, side airbag sensor assembly, curtain shield airbag sensor assembly, seat position sensor assembly or occupant classification ECU has been dropped, or if there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting the electrical circuits.**
- **Information labels are attached to the periphery of the SRS components. Follow the instructions in the caution.**
- **After work on the SRS is completed, perform the SRS warning light check (see page DI–1137).**
- **When the negative (–) terminal cable is disconnected from the battery, the memory will be cleared. Because of this, be sure to make a record of the contents memorized in each system before starting work. When work is finished, adjust each system as it was before. Never use a back–up power supply from outside the vehicle to avoid erasing the memory in any system.**

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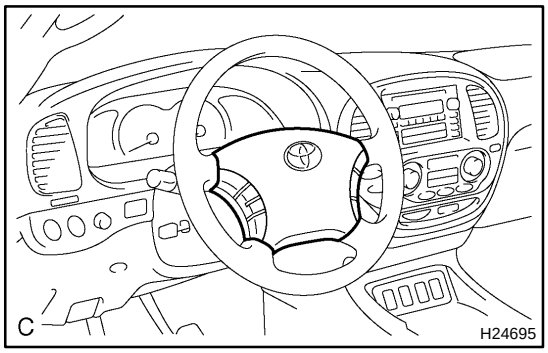
RS116–01

OPERATION

CAUTION:

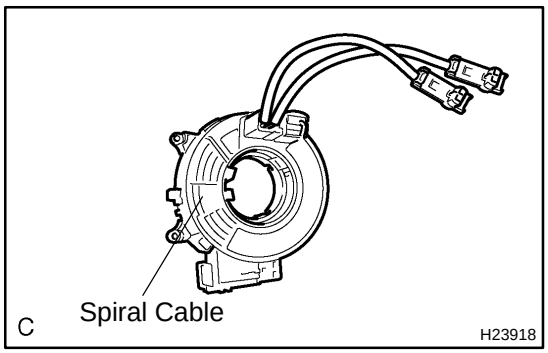
Be sure to perform the initialization of the occupant classification ECU if any of the following conditions occur (see page DI–1128). If the initialization is not performed, the SRS may not operate properly.

- **The occupant classification ECU is replaced.**
- **Accessories (seatback tray, seat cover, etc.) are installed to the vehicle.**
- **The passenger seat is removed from the vehicle, and then reinstalled or replaced.**
- **The passenger airbag ON/OFF indicator light ("OFF") comes on when the passenger seat is not occupied.**
- **The vehicle is brought to the workshop for repair due to an accident or collision.**



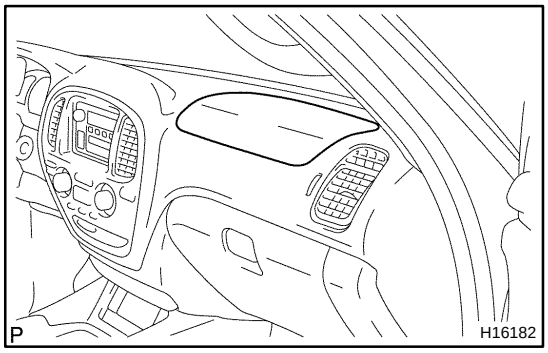
1. STEERING WHEEL PAD

The inflator and bag of the SRS are stored in the steering wheel pad and cannot be disassembled. The inflator contains a squib, igniter charge, and gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly. The steering wheel pad cannot be disassembled.



2. SPIRAL CABLE

A spiral cable is used as an electrical joint from the vehicle body side to the steering wheel. The spiral cable cannot be disassembled.



3. FRONT PASSENGER AIRBAG ASSEMBLY

The inflator and bag of the SRS are stored in the front passenger airbag assembly and cannot be disassembled. The inflator contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly. The front passenger airbag assembly cannot be disassembled.

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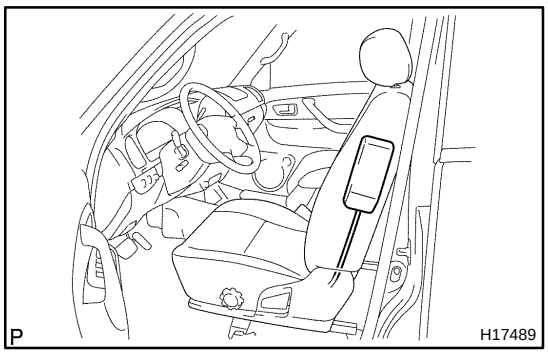
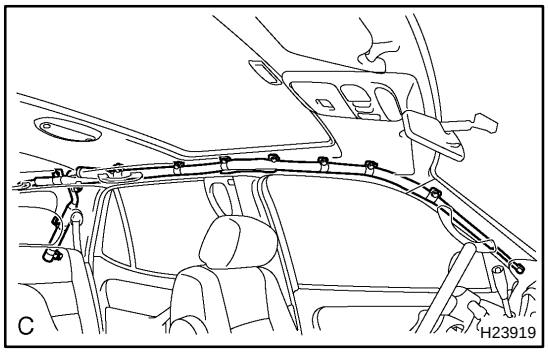


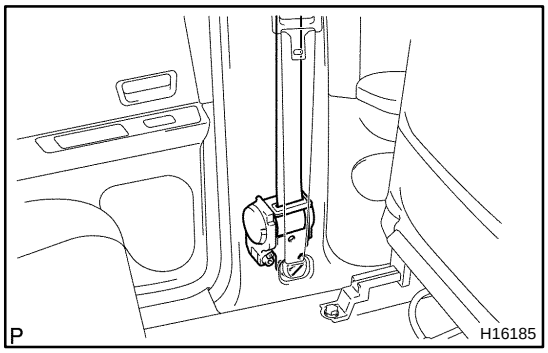
4. SIDE AIRBAG ASSEMBLY

The inflator and bag of the SRS are stored in the side airbag assembly and cannot be disassembled. The inflator contains a squib, igniter charge and gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly. The side airbag assembly cannot be disassembled.



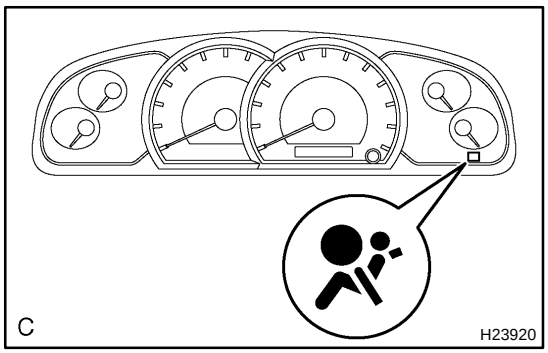
5. CURTAIN SHIELD AIRBAG ASSEMBLY

The inflator and bag of the SRS are stored in the curtain shield airbag assembly and cannot be disassembled. The inflator contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly. The curtain shield airbag assembly cannot be disassembled.



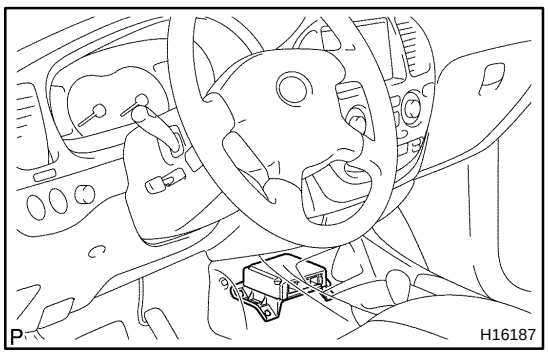
6. SEAT BELT PRETENSIONER

The front seat outer belt has the seat belt pretensioner system. The pretensioner operates in the event of a frontal collision. The seat belt pretensioner cannot be disassembled.



7. SRS WARNING LIGHT

The SRS warning light is located on the combination meter. It comes on to alert the driver of trouble in the system when a malfunction is detected in the airbag sensor assembly. In normal operation conditions when the ignition switch is turned to the ON position, the light comes on for approximately 6 seconds and then goes off.



8. AIRBAG SENSOR ASSEMBLY

The airbag sensor assembly is mounted on the floor inside the lower center finish panel. The airbag sensor assembly consists of an airbag sensor, safing sensor, diagnosis circuit, ignition control, drive circuit, etc. It receives signals from the airbag sensor, front airbag sensor, side and curtain shield airbag sensor and curtain shield airbag sensor, and judges whether the SRS must be activated or not. The airbag sensor assembly cannot be disassembled.

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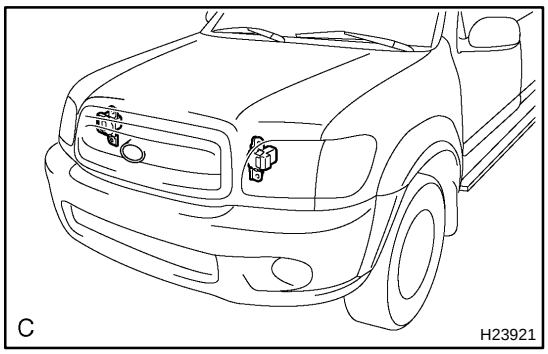
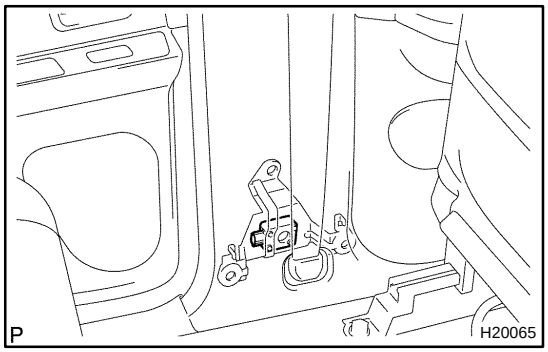


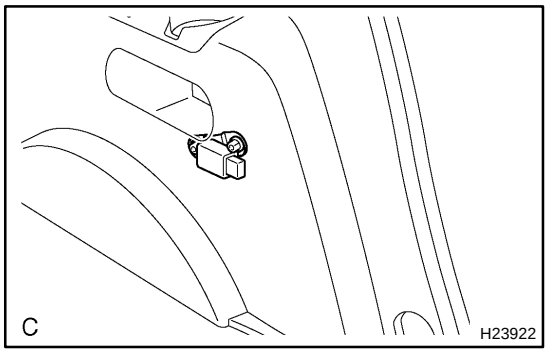
9. FRONT AIRBAG SENSOR

The front airbag sensor is mounted inside each of the radiator support. The front airbag sensor consists of an airbag sensor, diagnosis circuit, etc. It sends signals to the airbag sensor assembly to judge whether the SRS must be activated or not. The front airbag sensor cannot be disassembled.



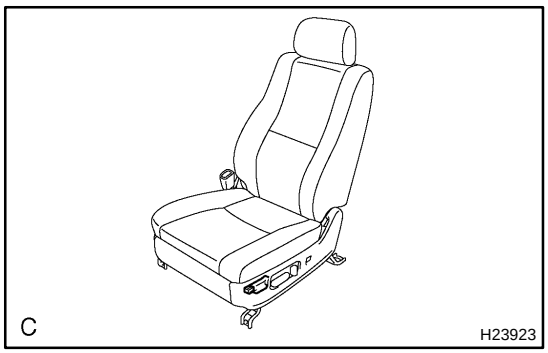
10. SIDE AIRBAG SENSOR ASSEMBLY

The side airbag sensor assembly is mounted in the LH and RH center pillars. The side airbag sensor assembly consists of an airbag sensor, diagnosis circuit, etc. It sends signals to the airbag sensor assembly to judge whether the SRS must be activated or not. The side airbag sensor assembly cannot be disassembled.



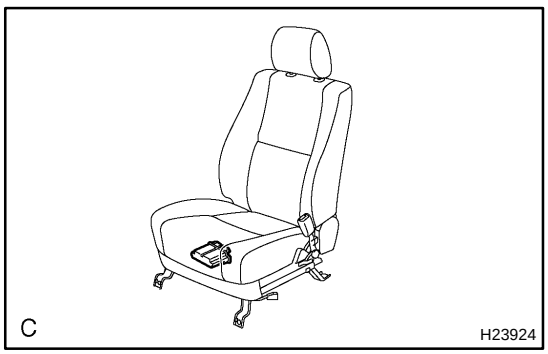
11. CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

The curtain shield airbag sensor assembly is mounted in the LH and RH quarter panels. The curtain shield airbag sensor assembly consists of an airbag sensor, diagnosis circuit, etc. It sends signals to the airbag sensor assembly to judge whether the SRS must be activated or not. The curtain shield airbag sensor assembly cannot be disassembled.



12. SEAT POSITION SENSOR ASSEMBLY

The seat position sensor assembly is mounted in the driver's seat. The sensor unit consists of a magnet sensor, etc. It judges the seat sliding position and sends the signal to the airbag sensor assembly. The seat position sensor assembly cannot be disassembled.



13. OCCUPANT CLASSIFICATION ECU

The occupant classification ECU is mounted in the passenger seat. Based on the information sent from the occupant classification ECU, the airbag sensor assembly determines whether the SRS should be activated or not. The occupant classification ECU cannot be disassembled.

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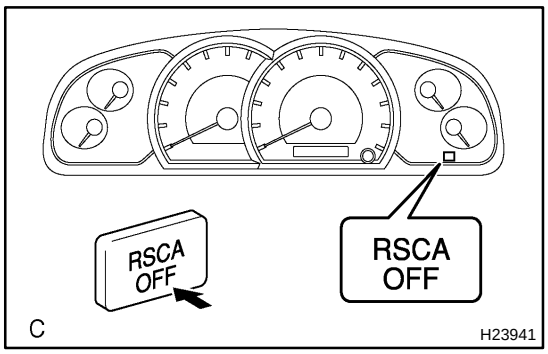

14. RSCA OFF SWITCH

The RSCA OFF switch is located on the switch base. The curtain shield airbag can be switched ON and OFF by pushing the RCSA OFF switch. Also, the RCSA OFF indicator lamp comes on to inform the passenger that the curtain shield airbag is disabled.

Switch Position	Curtain Shield Airbag	Indicator Light
ON	Operative	OFF
OFF	Disabled	ON

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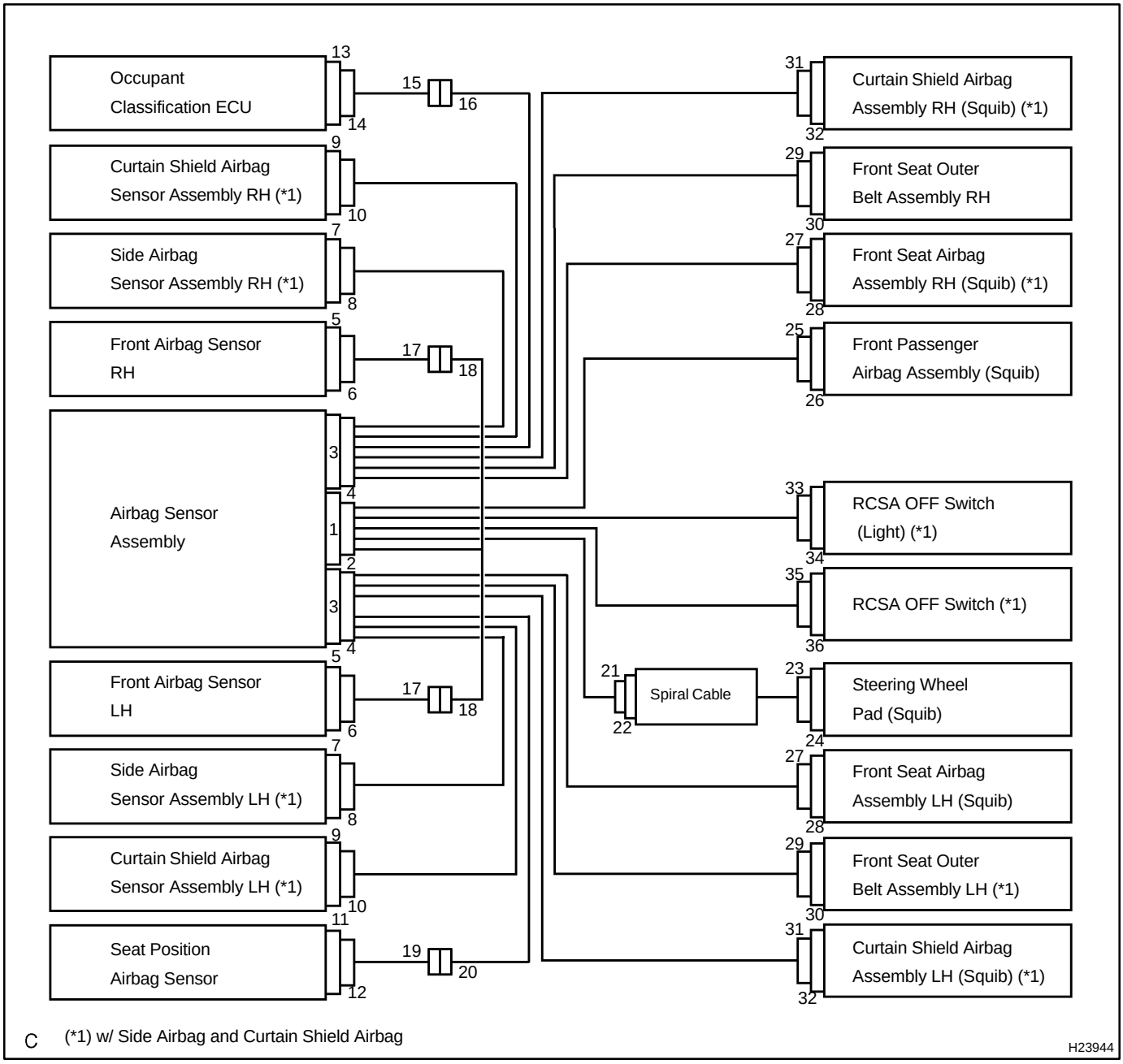
15. SRS CONNECTORS

HINT:

SRS connectors are located as shown in the following illustration.



No.	Connector Type	Application
(1)	Terminal Twin–Lock Mechanism	Connectors 2, 4, 6, 8, 10, 18, 21, 25, 26, 27, 28
(2)	Activation Prevention Mechanism	Connectors 2, 4, 22, 24, 26, 28, 30, 32
(3)	Half Connection Prevention Mechanism	Connectors 6, 8, 10, 17, 21, 25, 27
(4)	Connector Lock Mechanism (1)	Connectors 23, 29, 31
(5)	Connector Lock Mechanism (2)	Connectors 2, 4
(6)	Improper Connection Prevention Lock Mechanism	Connectors 1, 3

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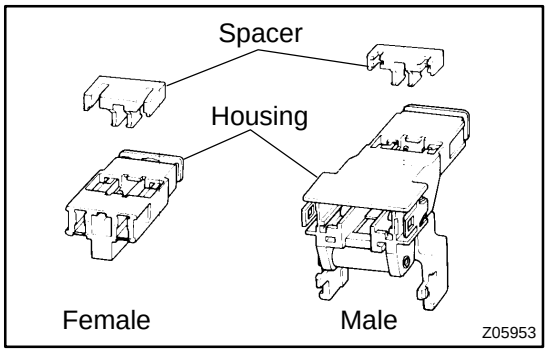
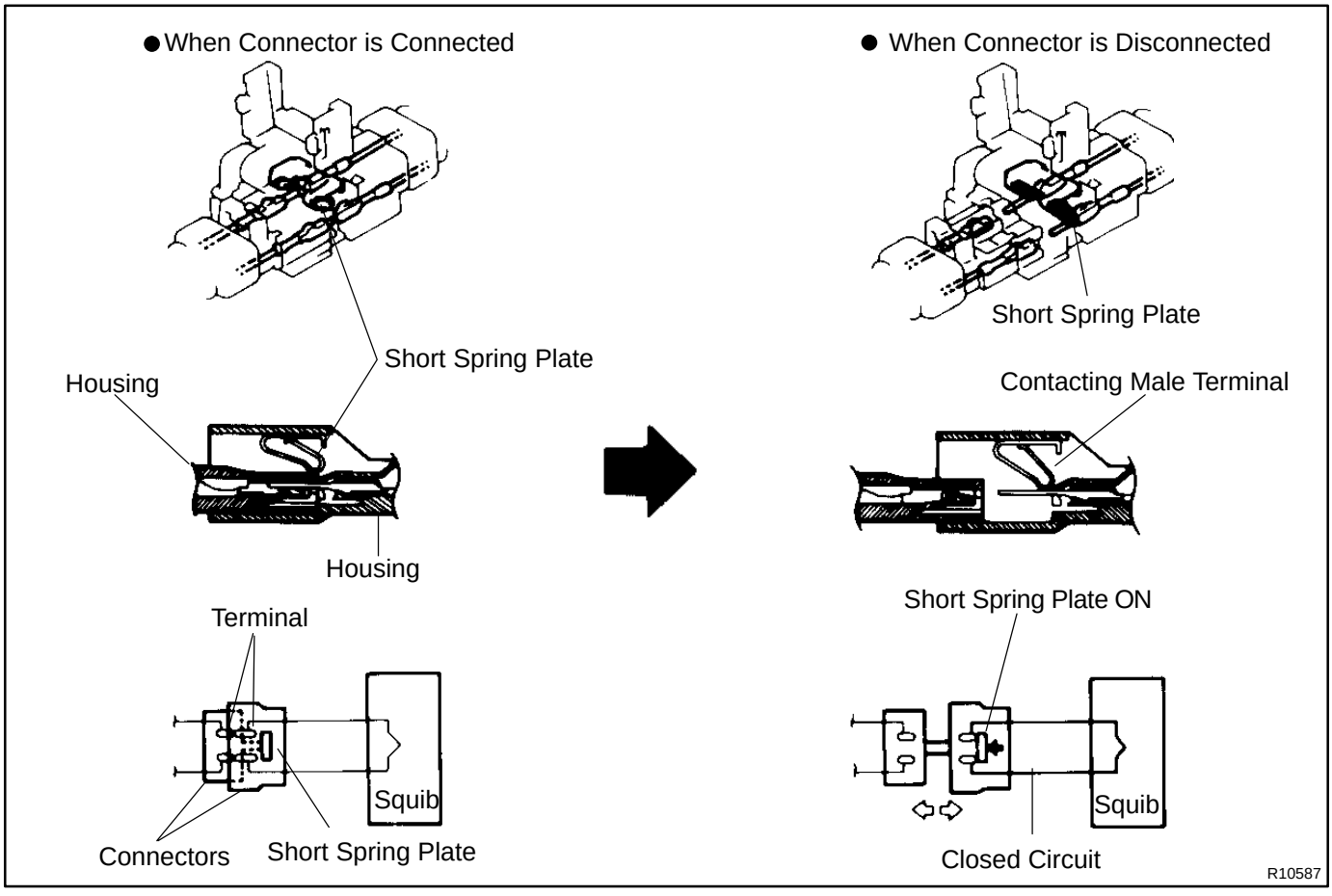
(a) All connectors in the SRS, except the seat position airbag sensor connector and occupant classification ECU connectors, are colored yellow to distinguish them from other connectors. These connectors have special functions, and are specially designed for the SRS. All SRS connectors use durable gold–plated terminals, and are placed in the locations shown on the previous page to ensure high reliability.



(1) Terminal Twin–Lock Mechanism
Each connector has a two–piece component consisting of a housing and a spacer. This design allows the terminal to be locked securely by two locking devices (the retainer and the lance) to prevent terminals from coming out.

(2) Activation Prevention Mechanism
Each connector contains a short spring plate. When the connector is disconnected, the short spring plate automatically connects the positive (+) terminal and negative (–) terminal of the squib.



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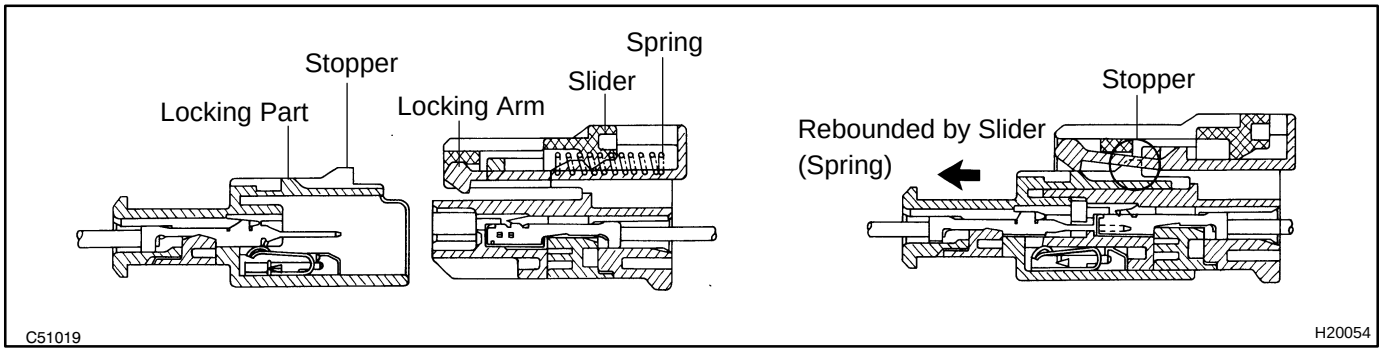
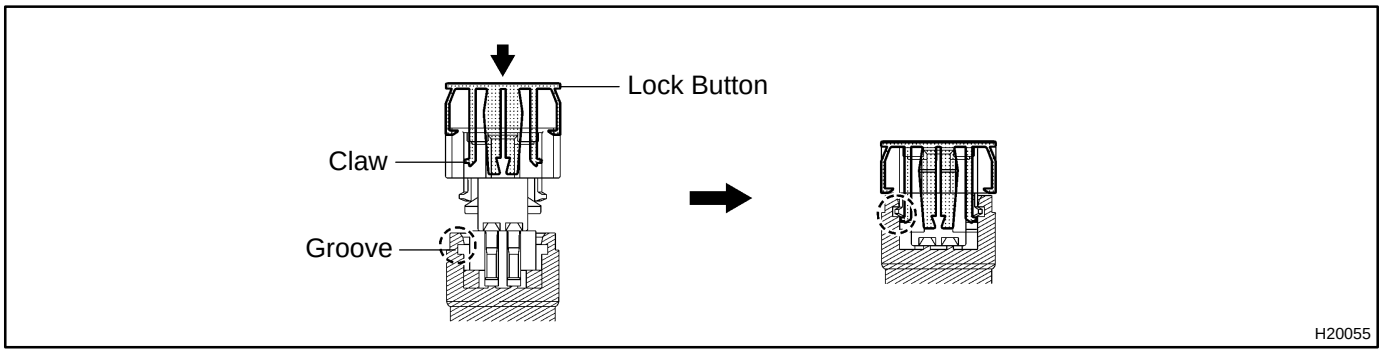
(3) Half connection prevention mechanism:
If the connector is not completely connected, the connector is disconnected due to the spring operation to the extent that no continuity exists.



(4) Connector lock mechanism (1):
Locking the connector lock button securely connects the connector.



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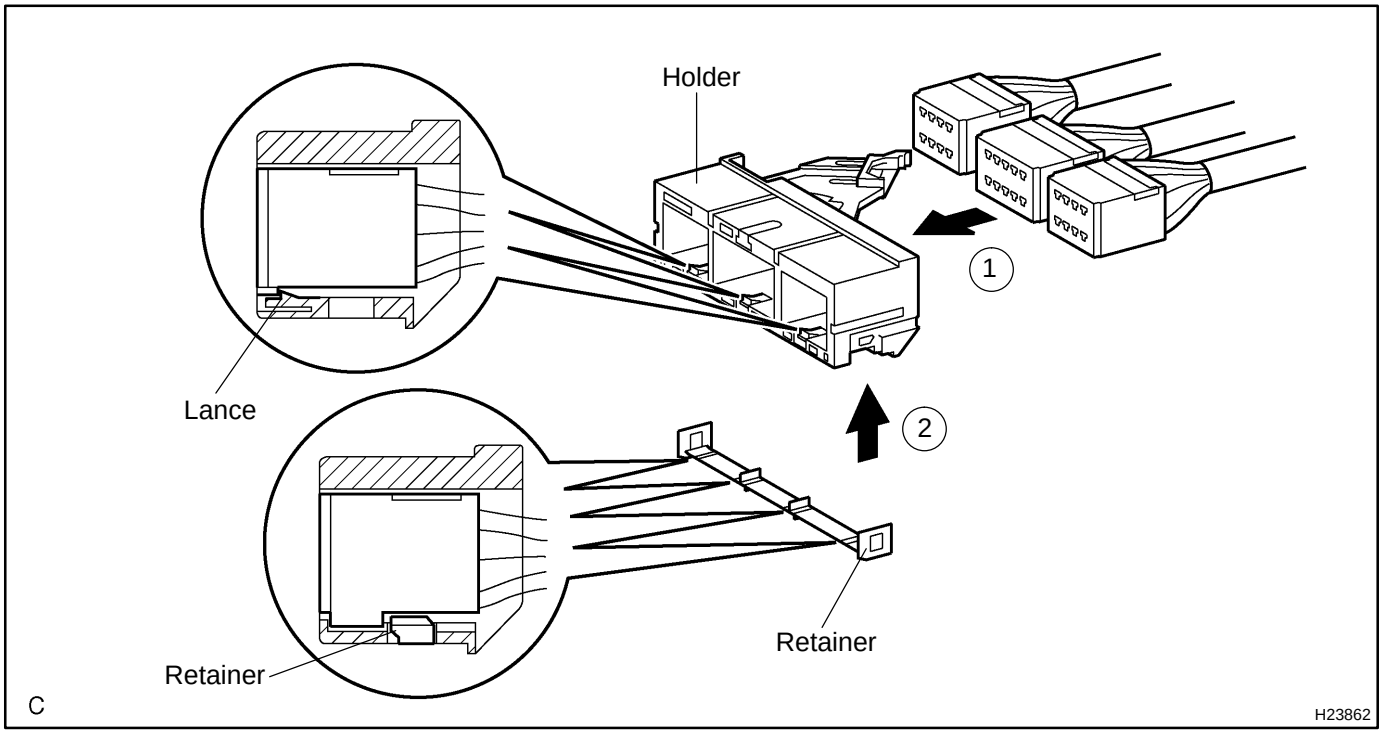
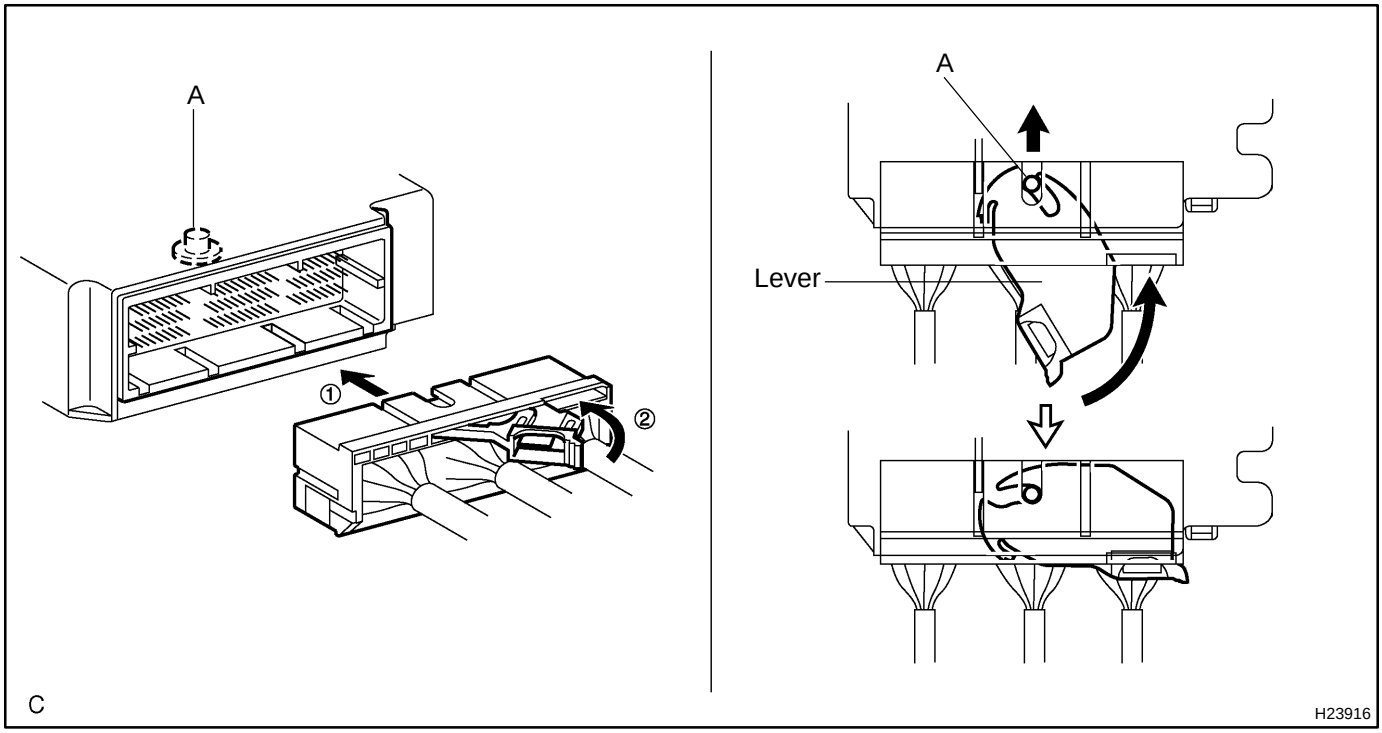
(5) Connector lock mechanism (2):
Both the primary lock with holder lances and the secondary lock with retainer prevent the connectors from becoming disconnected.



(6) Improper connection prevention lock mechanism:
When connecting the holder, the lever is pushed into the end by rotating around the A axis to lock the holder securely.



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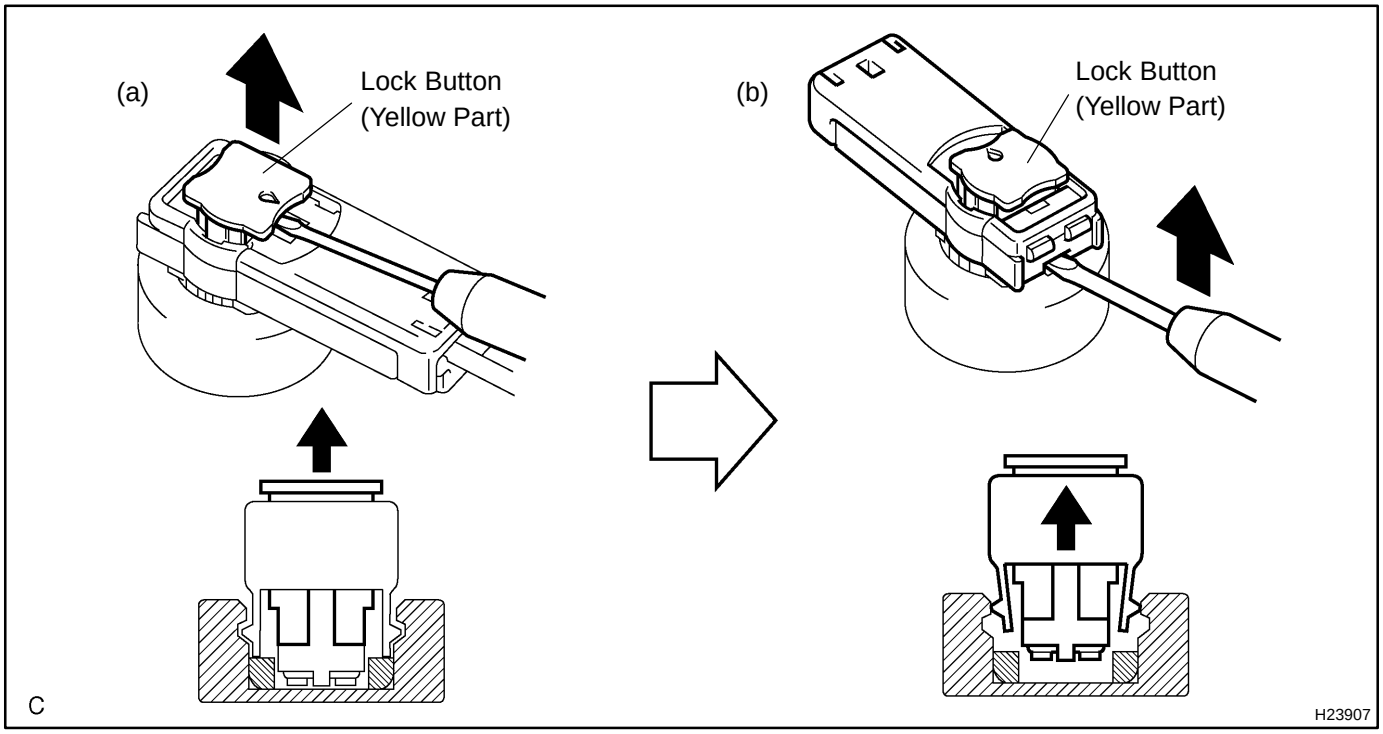
16. DISCONNECTION OF CONNECTORS FOR STEERING WHEEL PAD AND CURTAIN SHIELD AIRBAG ASSEMBLY

(a) Release the lock button (yellow part) of the connector using a screwdriver.

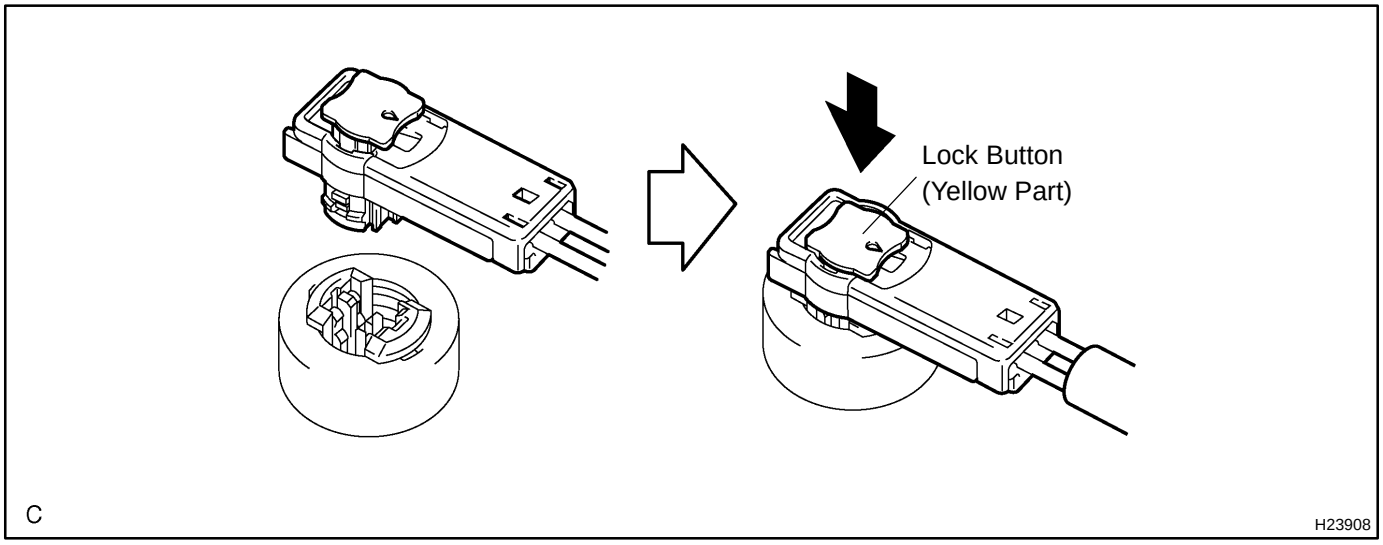
(b) Insert the screwdriver tip between the connector and the base, and then raise the connector.



17. CONNECTION OF CONNECTORS FOR STEERING WHEEL PAD AND CURTAIN SHIELD AIRBAG ASSEMBLY

(a) Connect the connector.

(b) Push down securely on the lock button (yellow part) of the connector. (When locking, a click sound can be heard.)



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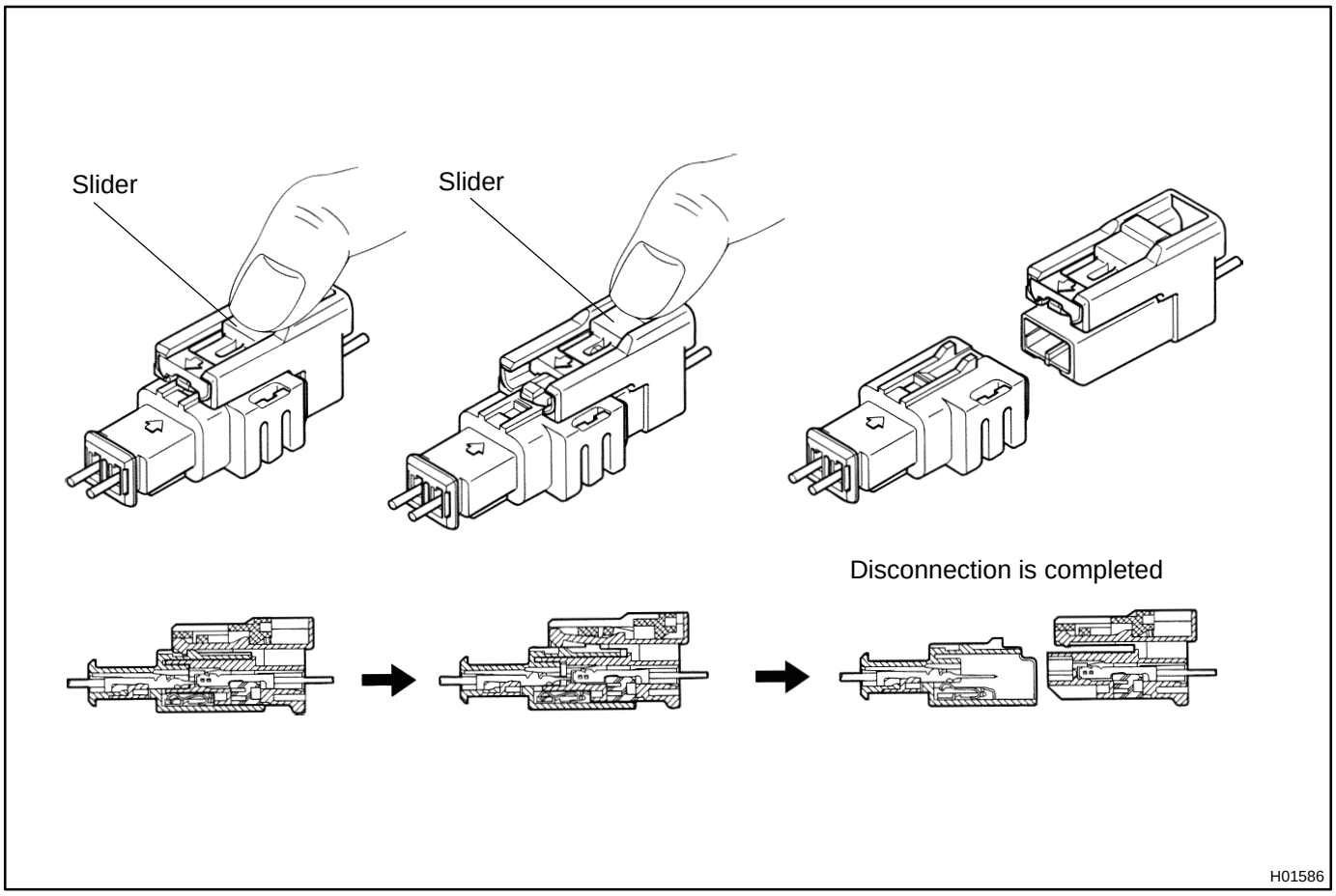
18. DISCONNECTION OF FRONT PASSENGNR AIRBAG ASSEMBLY

(a) Place a finger on the slider, slide the slider to release the lock, and then disconnect the connector.

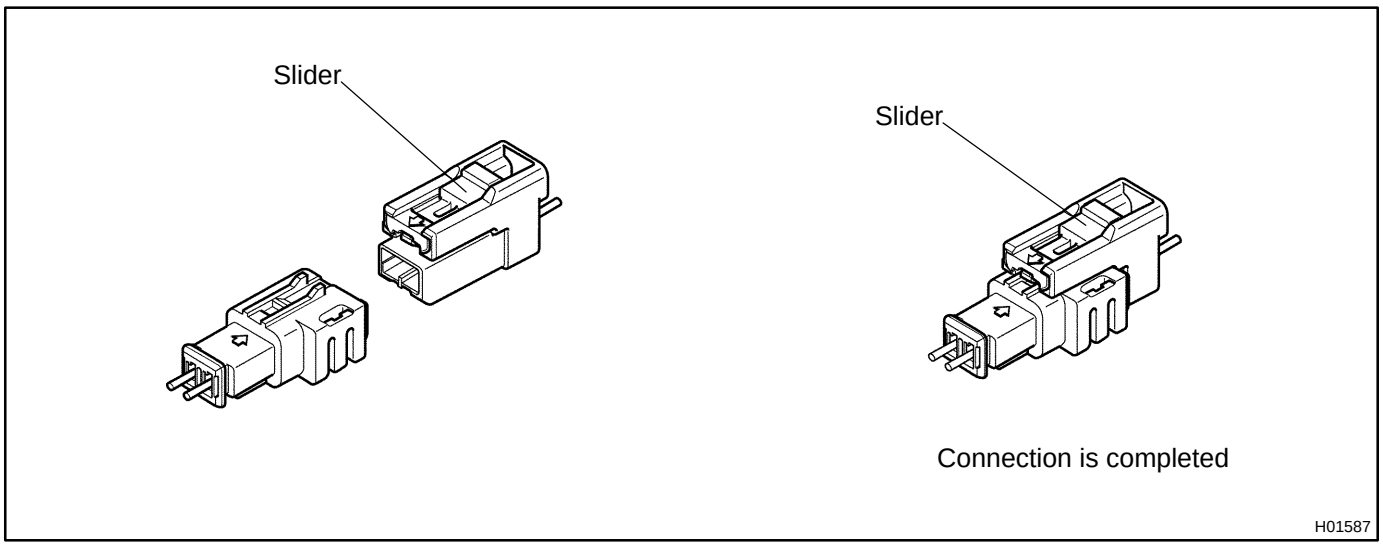


19. CONNECTION OF FRONT PASSENGNR AIRBAG ASSEMBLY

(a) Connect the connector as shown in the illustration. (When locking, make sure that the slider returns to its original position and a click sound can be heard.)

HINT:

When connecting, the slider will slide. Be sure not to touch the slider while connecting, as it may result in an insecure fit.



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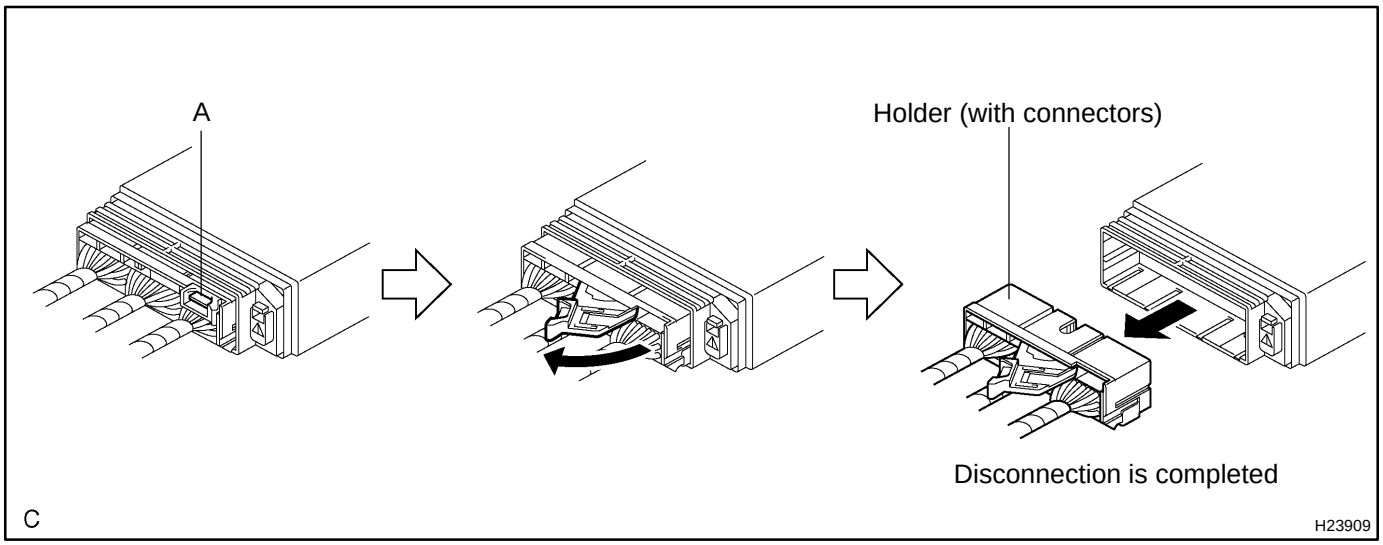
20. DISCONNECTION OF CONNECTOR FOR AIRBAG SENSOR ASSY CENTER

(a) Pull the lever by pushing part A as shown in the illustration and disconnect the holder (with connectors).

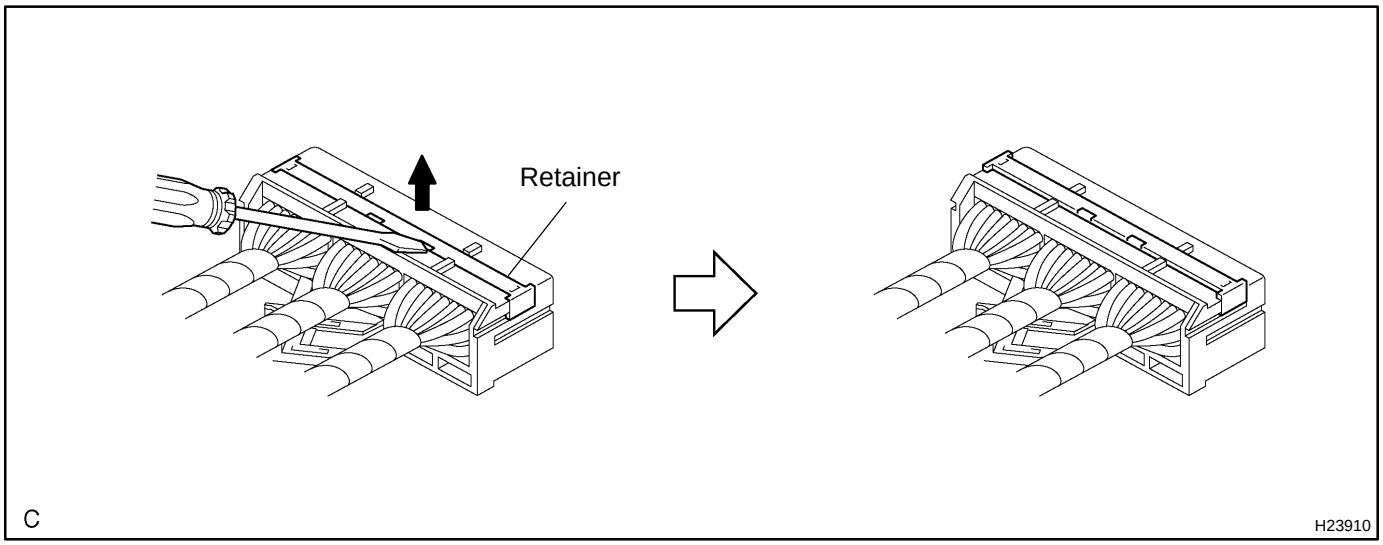


HINT:

Perform the following procedures when replacing the holder.

(b) Remove the holder.

(1) Using a screwdriver, unlock the retainer.



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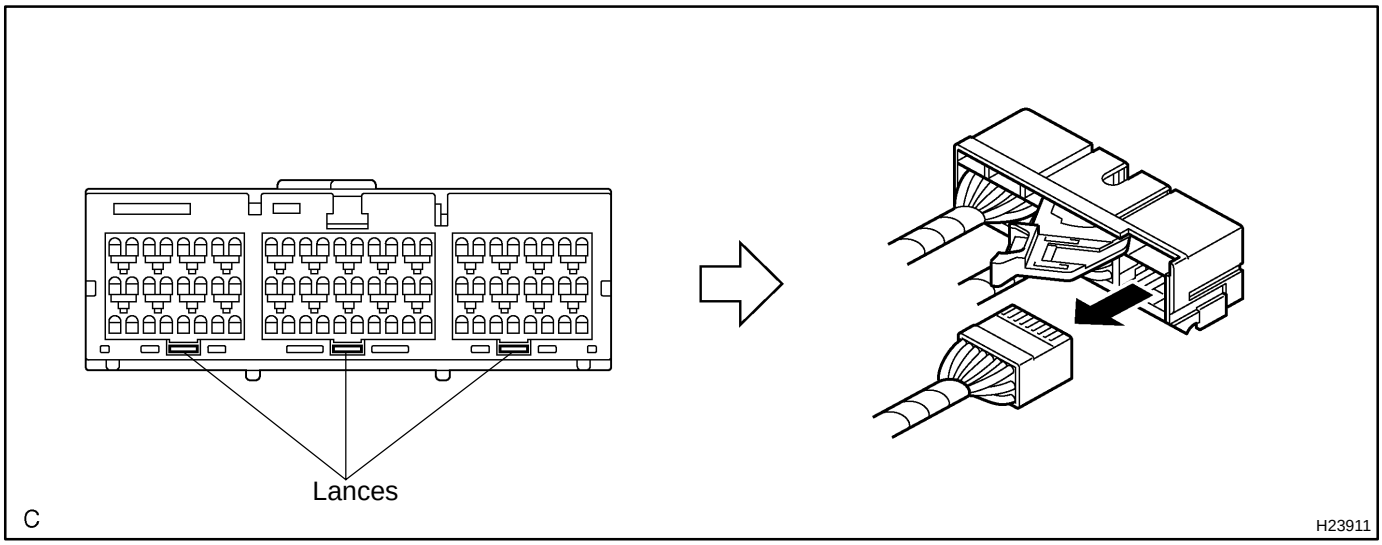
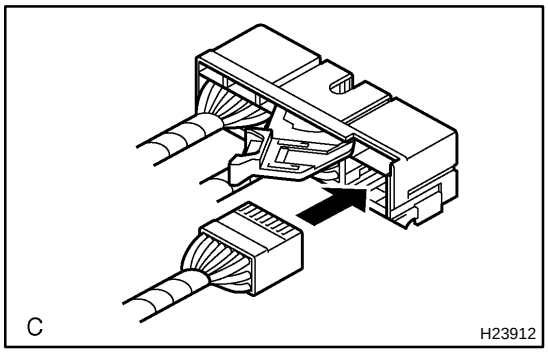
(2) Release the fitting lances and remove the holder.





(c) Install the holder.
(1) Install the connectors to the holder. (When locking, a click sound can be heard.)

HINT:
The retainer is locked when the holder is connected.

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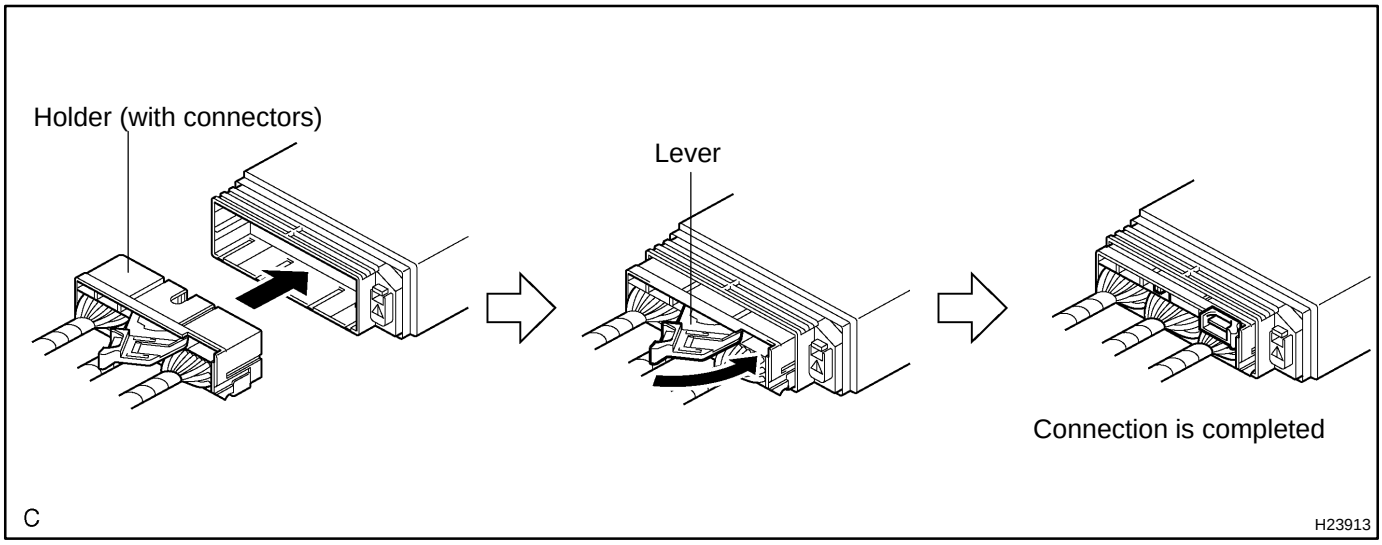
21. CONNECTION OF CONNECTOR FOR AIRBAG SENSOR ASSY CENTER

(a) Firmly insert the holder (with connectors) until it can not be pushed any further.

(b) Push the lever to connect the holder (with connectors). (When locking, a click sound can be heard.)

HINT:

The holder slides when connecting. Be sure not to hold the holder while connecting, as it may result in an insecure fit.



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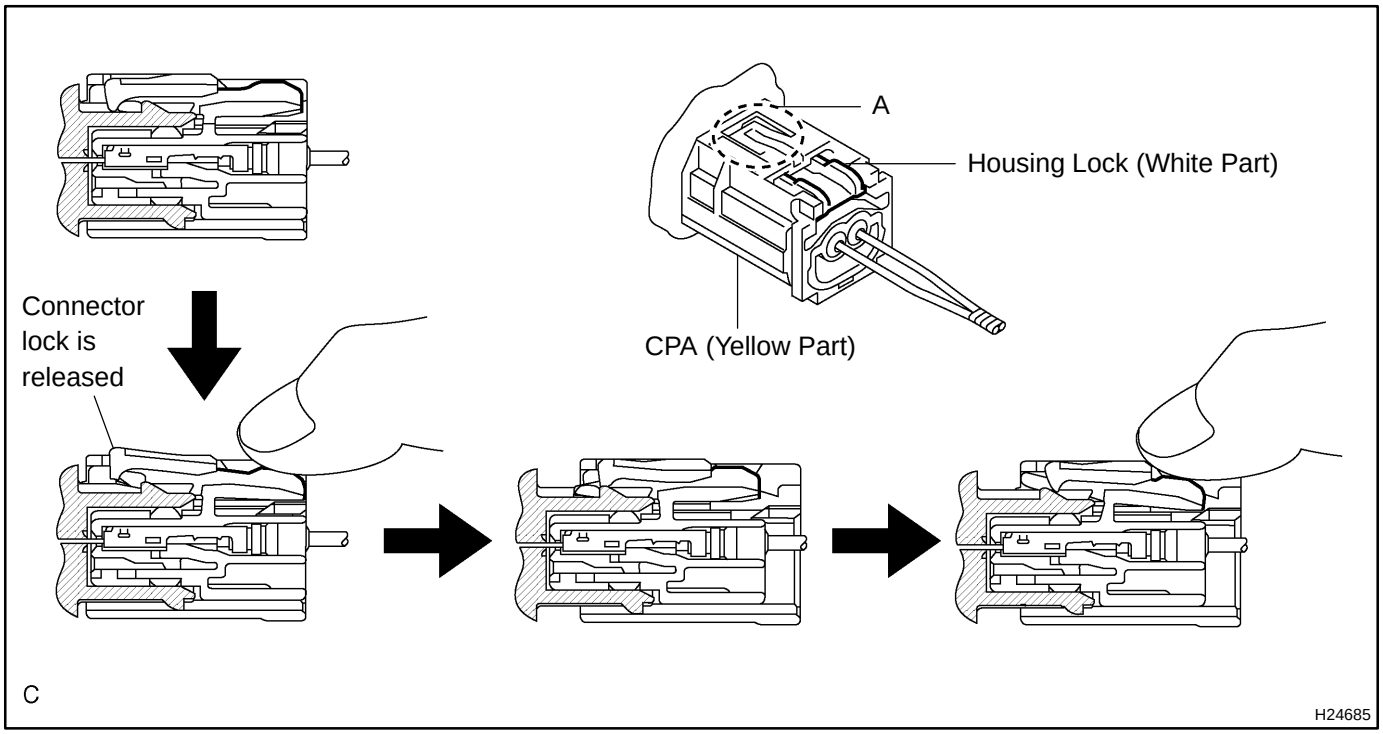
22. DISCONNECTION OF CONNECTOR FOR FRONT AIRBAG SENSOR

(a) Push down the housing lock (white part) and slide the CPA (yellow part). (At this time, the connector cannot be disconnected yet).

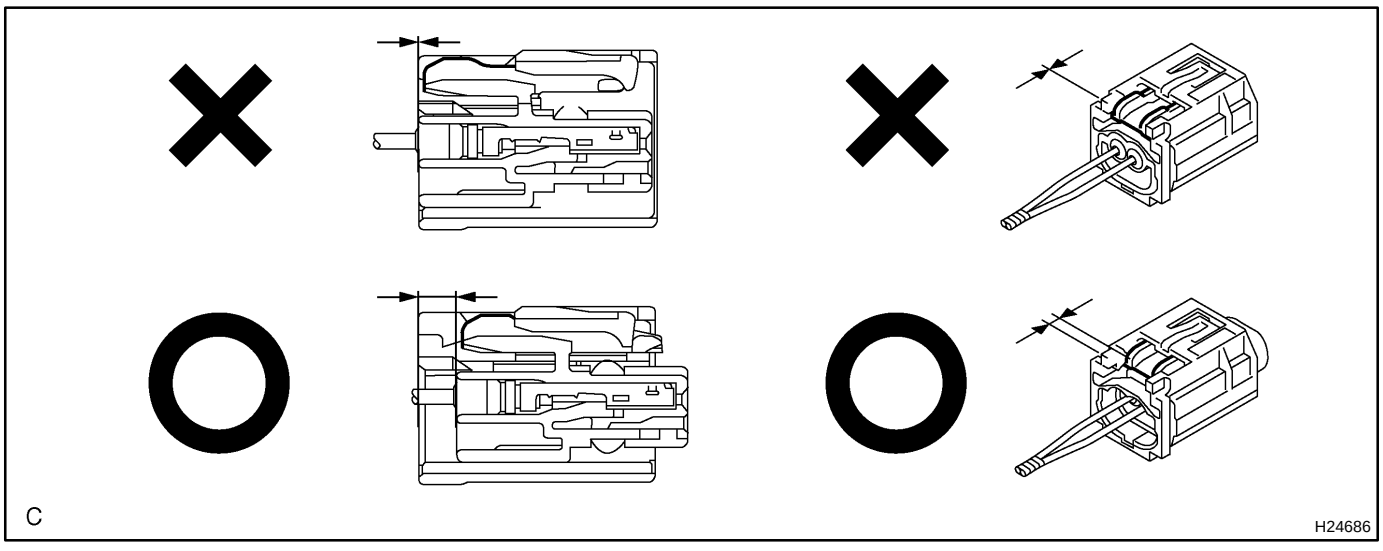
(b) Push down the housing lock (white part) again and disconnect the connector.

HINT:

Do not push down the A part shown in the illustration when disconnecting.



(c) After disconnecting the connector, check that the position of the housing lock (the white part) is as shown in the illustration.



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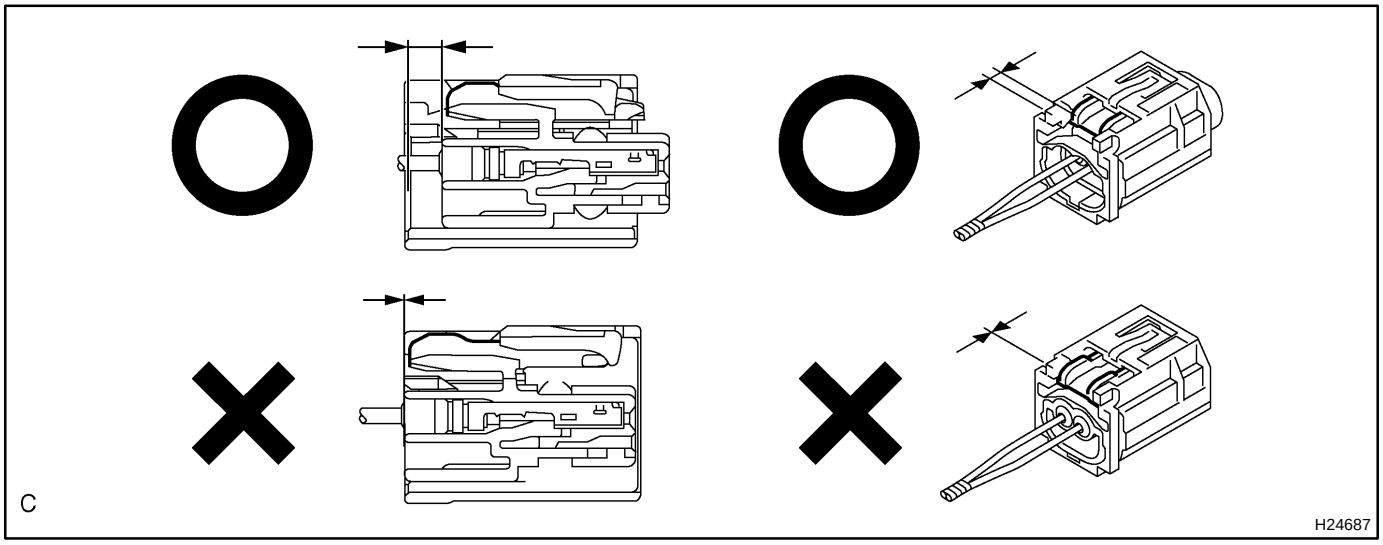
23. CONNECTION OF CONNECTOR FOR FRONT AIRBAG SENSOR

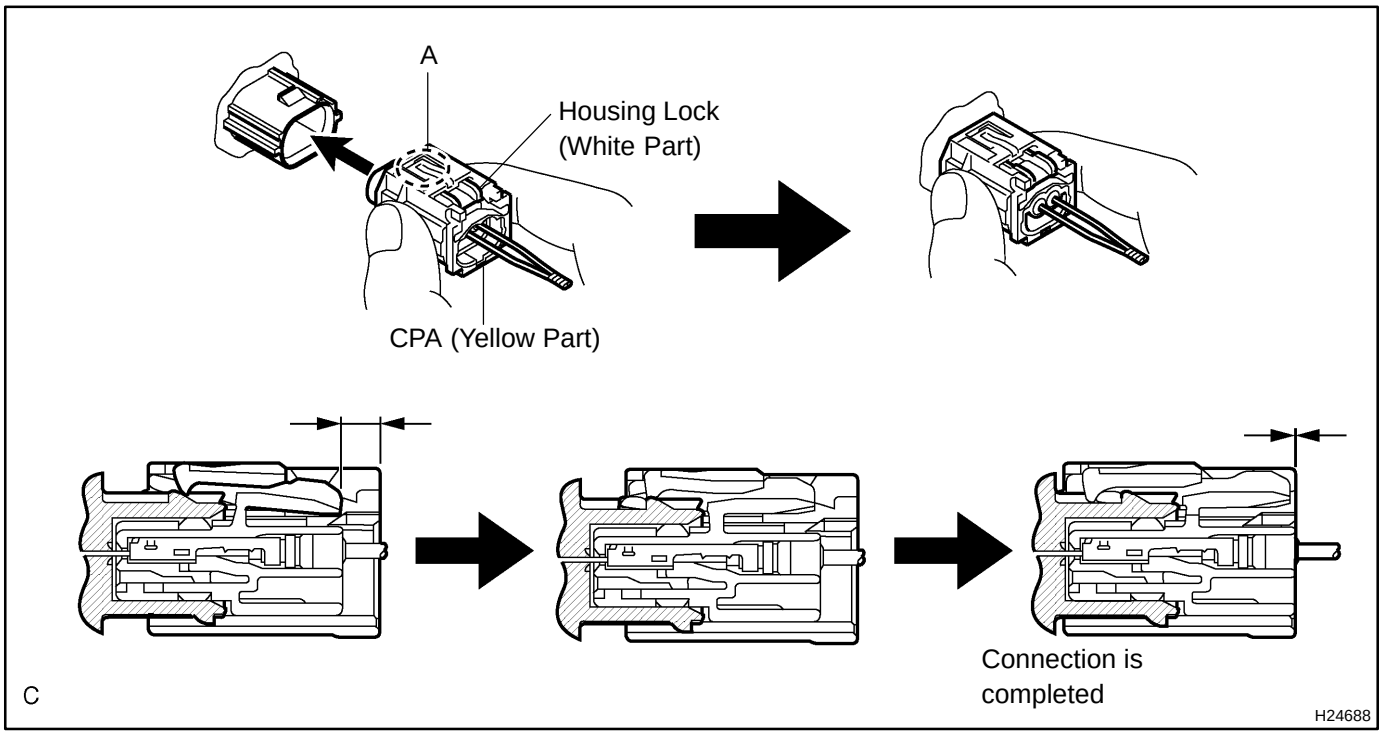
(a) Before connecting the connectors, check that the position of the housing lock (the white part) is as shown in the illustration.



(b) Be sure to engage the connectors until they are locked. (When locking, make sure that a click sound can be heard.)

HINT:

When connecting them, the housing lock (white part) slides. Be sure not to hold the housing lock (white part) and A part, as it may result in an insecure fit.



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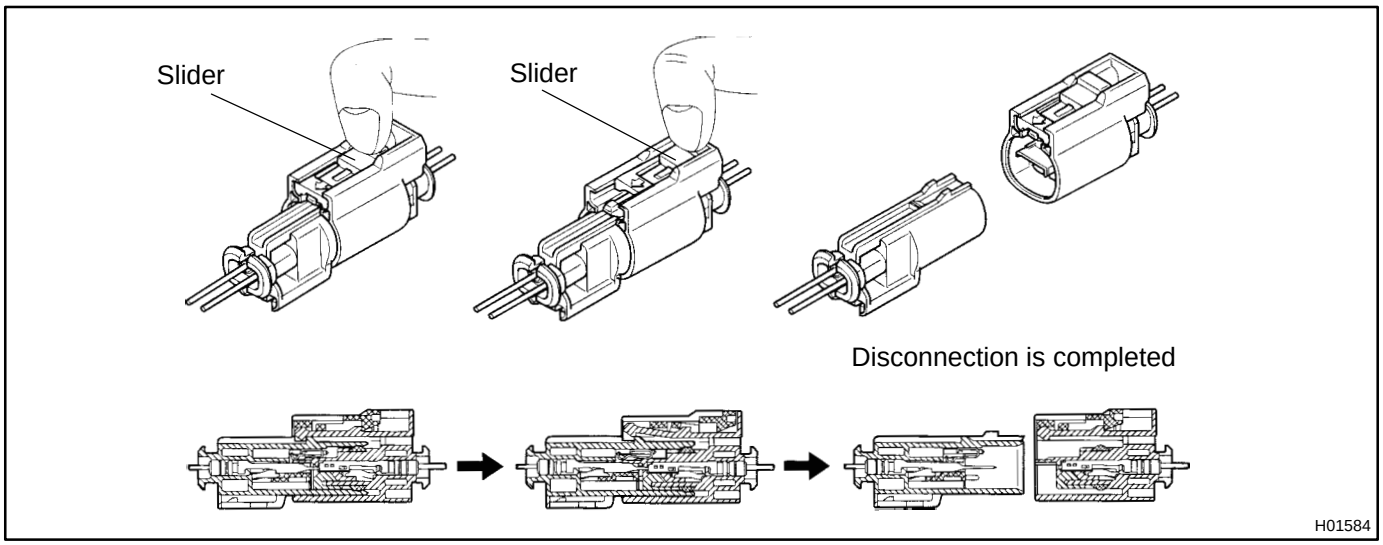
24. DISCONNECTION OF CONNECTOR FOR SIDE AIRBAG ASSEMBLY

(a) Place a finger on the slider, slide the slider to release the lock, and then disconnect the connector.

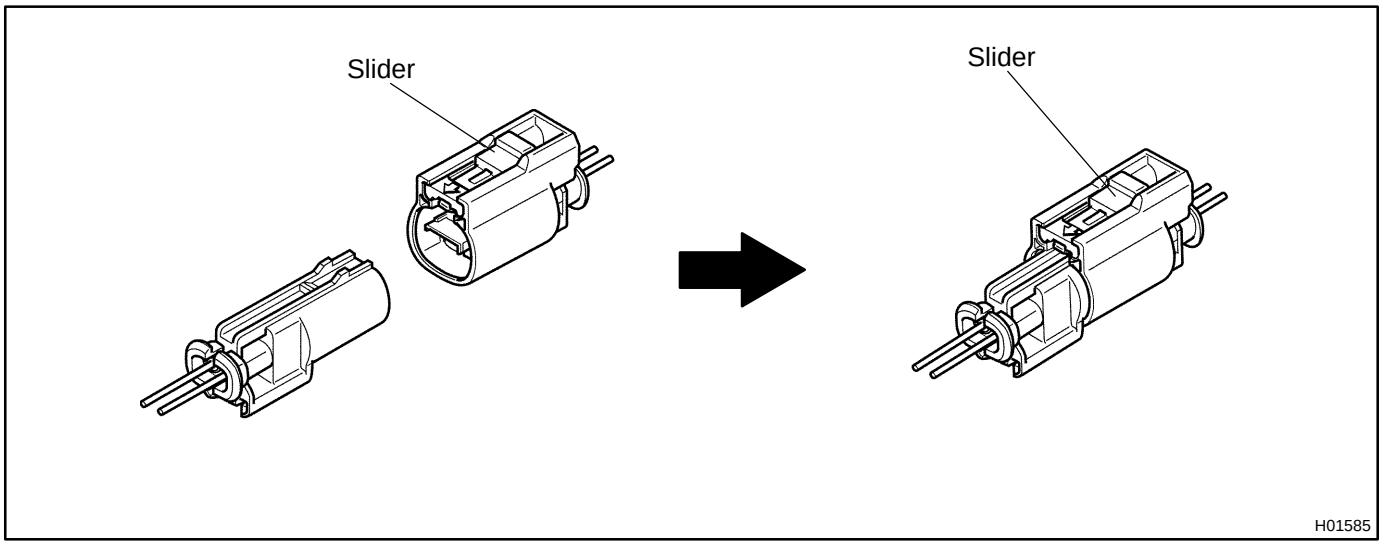


25. CONNECTION OF CONNECTOR FOR SIDE AIRBAG ASSEMBLY

(a) Connect the connector as shown in the illustration. (When locking, make sure that the slider returns to its original position and a click sound can be heard.)

HINT:

When connecting, the slider will slide. Be sure not to touch the slider while connecting, as it may result in an insecure fit.



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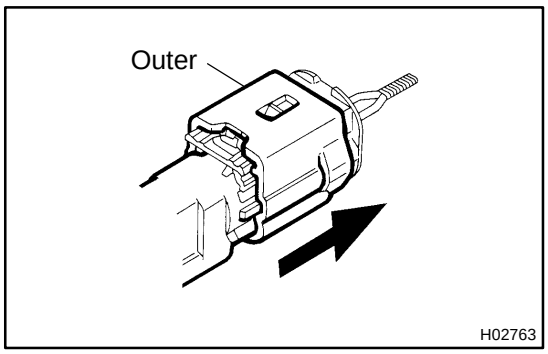


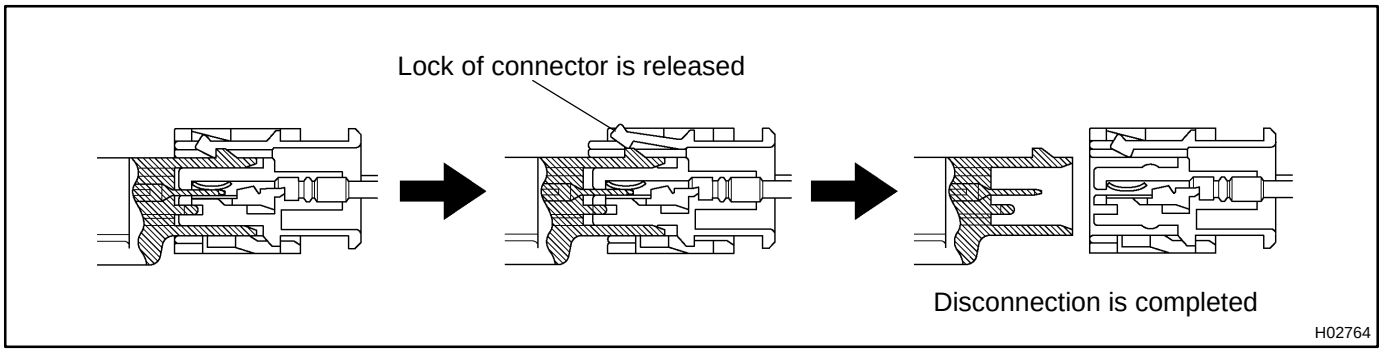
26. DISCONNECTION OF CONNECTORS FOR SIDE AIRBAG SENSOR AND CURTAIN SHIELD AIRBAG SENSOR

(a) While holding both outer flank sides, slide the outer in the direction shown by the arrow.

(b) When the connector lock is released, the connectors are disconnected.

HINT:

Be sure to hold both outer flank sides. Holding the top and bottom sides will make disconnection difficult.

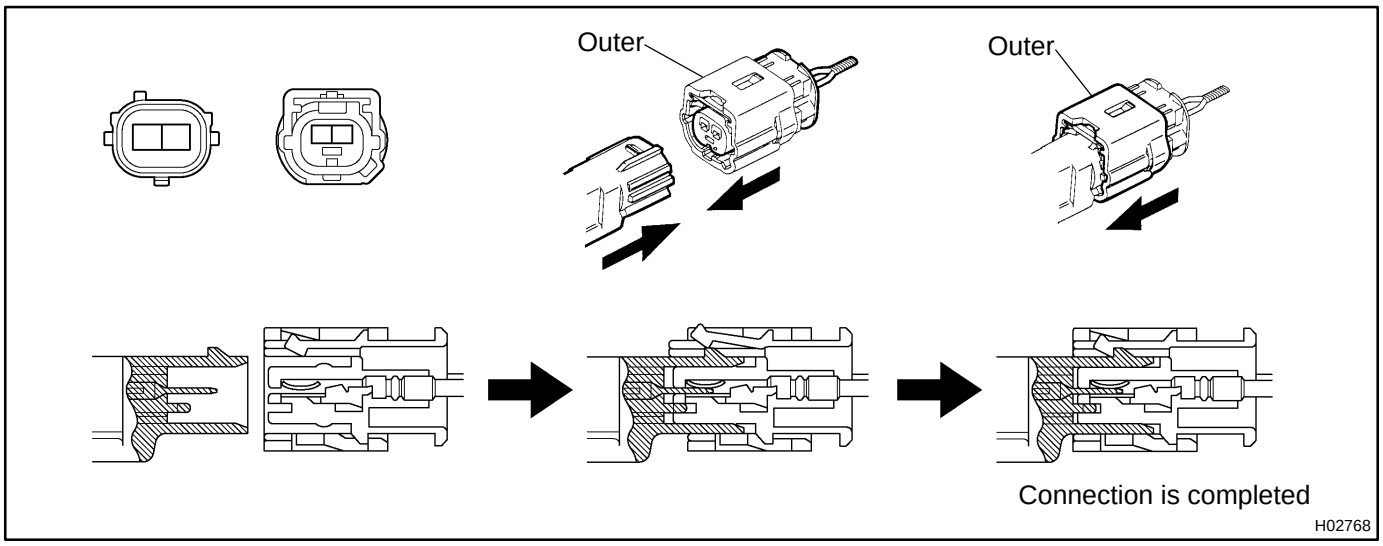


27. CONNECTION OF CONNECTORS FOR SIDE AIRBAG SENSOR AND CURTAIN SHIELD AIRBAG SENSOR

(a) Connect the connector as shown in the illustration. (When locking, make sure that the outer returns to its original position and a click sound can be heard.)

HINT:

When connecting, the outer will slide. Be sure not to hold the outer while connecting, as it may result in an insecure fit.



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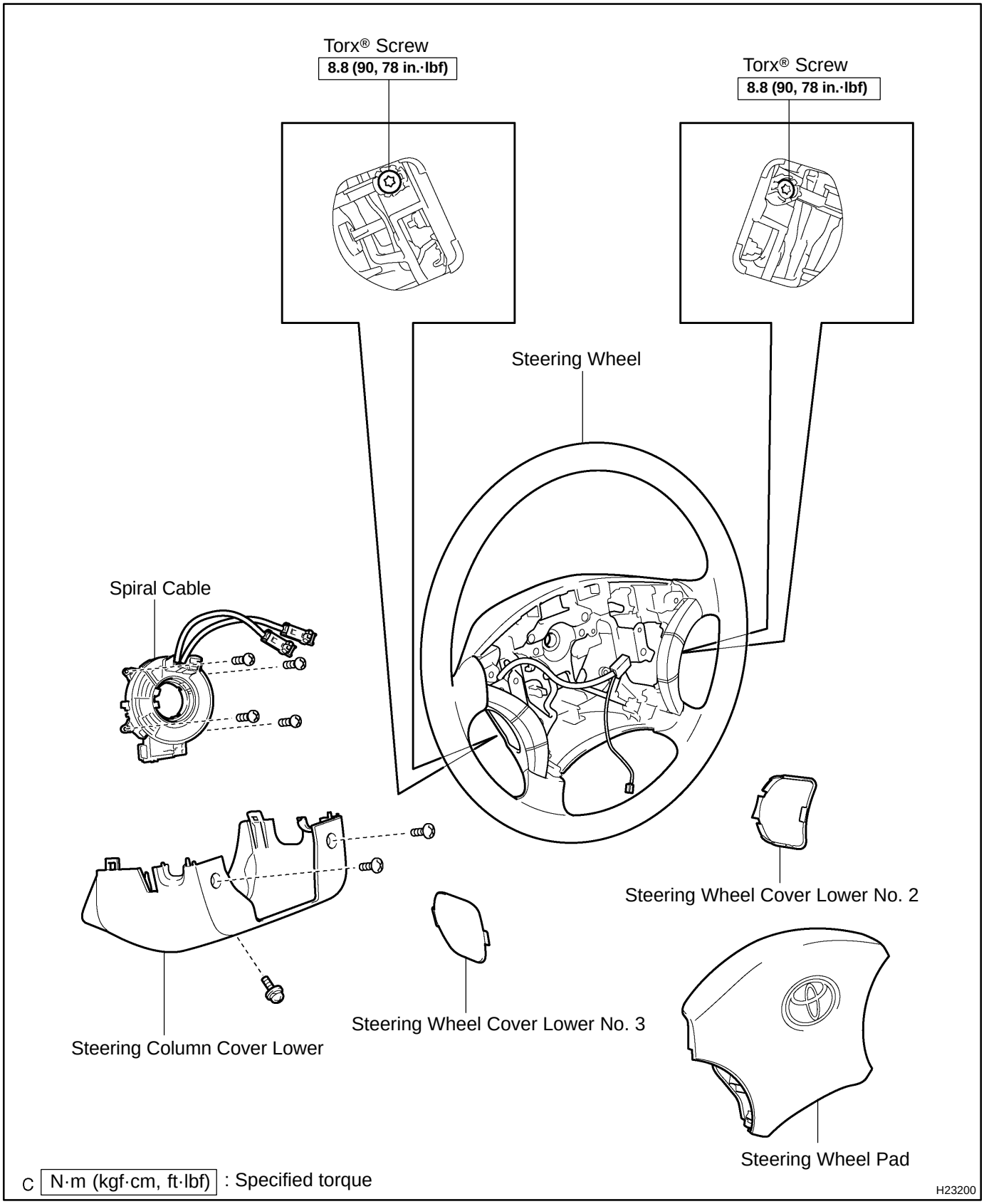
STEERING WHEEL PAD AND SPIRAL CABLE

COMPONENTS

RS0B8–15



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RS0B9–13

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is in the ON or ACC position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. **PRECAUTION (SEE PAGE RS–1 and RS–3)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. **REMOVE STEERING WHEEL PAD (SEE PAGE SR–14)**
4. **REMOVE STEERING WHEEL (SEE PAGE SR–14)**
5. **REMOVE STEERING COLUMN COVER LOWER (SEE PAGE SR–14)**
6. **REMOVE SPIRAL CABLE (SEE PAGE SR–14)**

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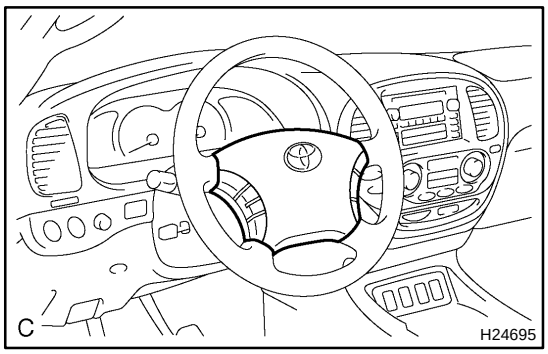
RS117–01

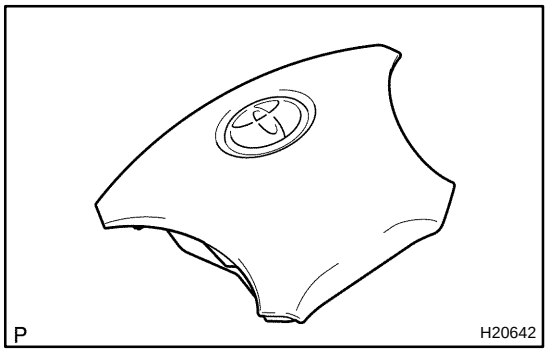
INSPECTION



1. VEHICLE NOT INVOLVED IN COLLISION

(a) Perform a diagnostic system check (see page DI–1147).

(b) With the steering wheel pad installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the steering wheel pad with a new one:
Cuts, minute cracks or marked discoloration on the steering wheel pad top surface or in the grooved portion.

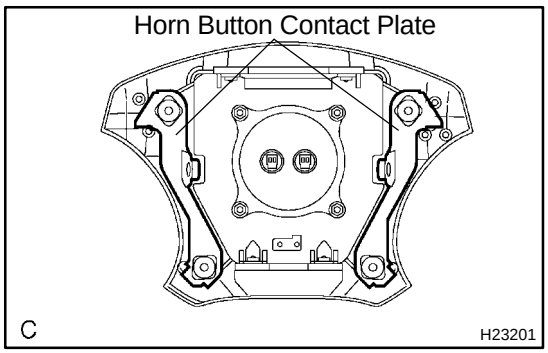


2. VEHICLE INVOLVED IN A COLLISION AND AIRBAG IS NOT DEPLOYED

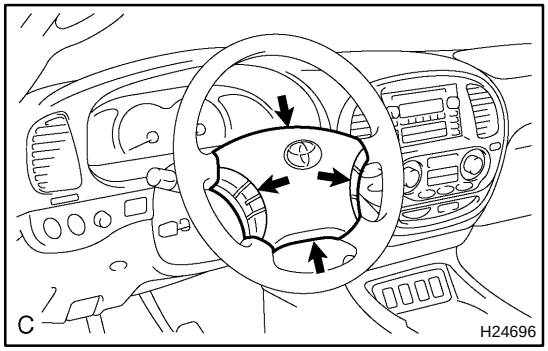
(a) Perform a diagnostic system check (see page DI–1147).

(b) With the steering wheel pad removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the steering wheel pad or steering wheel assembly with a new one:

- ▶ Cuts, minute cracks or marked discoloration on the steering wheel pad top surface or in the grooved portion.
- ▶ Cracks or other damage to the connectors.
- ▶ Deformation of the steering wheel assembly.



- ▶ Deformation of the horn button contact plate of the horn button assembly.



- ▶ There should be no interference between the steering wheel pad and steering wheel assembly, and the clearance should be uniform all the way around when a new steering wheel pad is installed on the steering wheel assembly.

CAUTION:
For removal and installation procedures of the steering wheel pad, see page RS–21 and RS–31. Be sure to follow the correct procedure.

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RS118–01

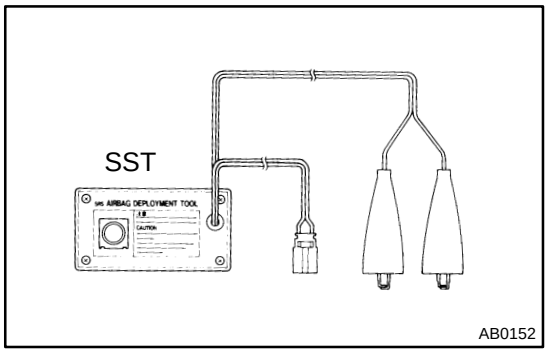
DISPOSAL

HINT:

When scrapping a vehicle equipped with SRS or disposing of the steering wheel pad, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, USA, INC.

CAUTION:

- **Never dispose of a steering wheel pad which has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**

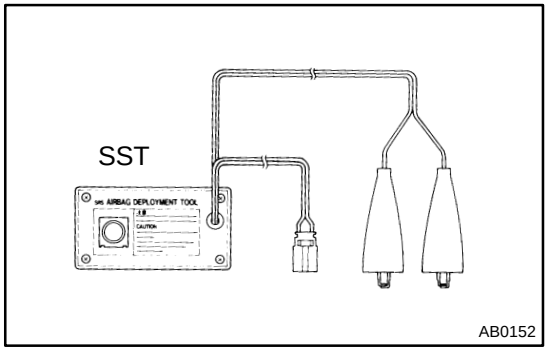


- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the steering wheel pad.**
- **The steering wheel pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with the deployed airbag.**
- **Do not apply water, etc. to a steering wheel pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Prepare a battery as the power source to deploy the airbag.



(a) Check the function of the SST.

SST 09082–00700

CAUTION:

When deploying the airbag, always use the specified SST: SRS Airbag Deployment Tool.

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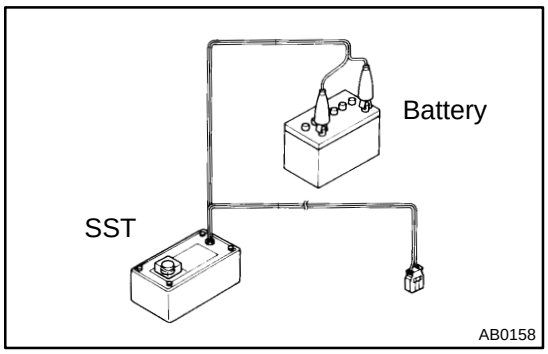
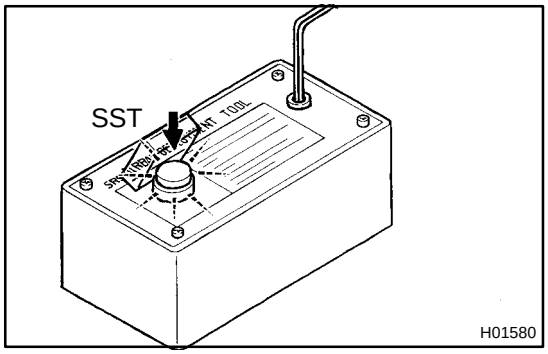


(1) Connect the SST to the battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (–) terminal.



(2) Check the function of the SST.
Press the SST activation switch, and check that the LED of the SST activation switch comes on.

CAUTION:

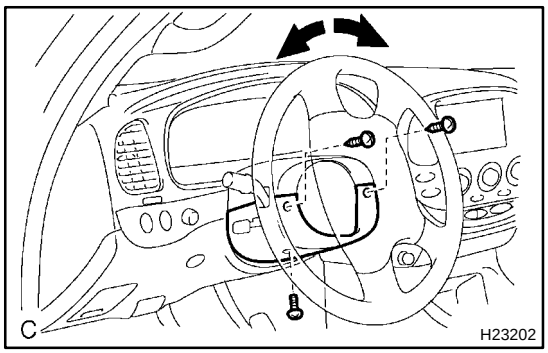
- **Do not connect the SST connector (yellow colored one) to the airbag.**
- **If the LED comes on when the activation switch is not being pressed, SST malfunction is possible, so replace the SST with a new one.**

(3) Disconnect the SST from the battery.

(b) Precaution (see page RS–1 and RS–3).

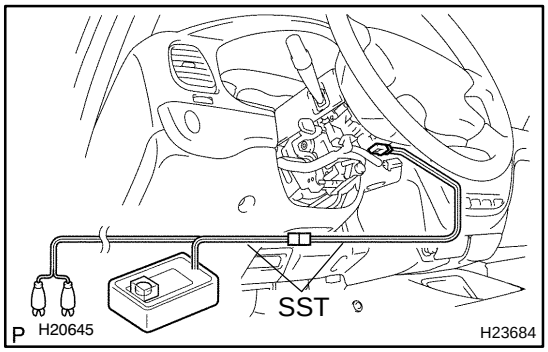
(c) Disconnect the cable from the negative battery terminal.

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.



(d) Remove the steering column cover lower.

(1) While turning the steering wheel assembly to the right and left, remove the 3 screws and steering column cover lower.



(e) Install the SST.

CAUTION:

Check that there is no looseness in the steering wheel assembly and steering wheel pad.

(1) Disconnect the airbag connector (yellow colored one) from the spiral cable.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

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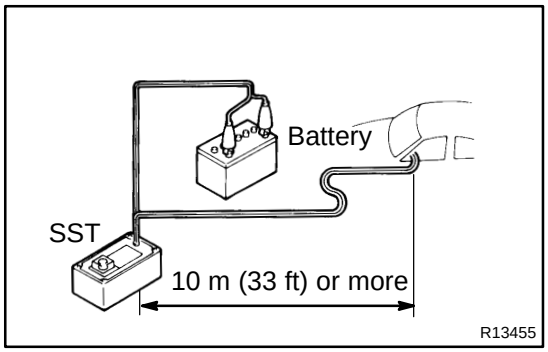
(2) Connect the SST connector to the airbag connector of the spiral cable.

SST 09082–00700, 09082–00780

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(3) Move the SST at least 10 m (33 ft) away from the vehicle front side window.

(4) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (–) terminal.

(f) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The steering wheel pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with a deployed airbag.**
- **Do not apply water, etc. to a steering wheel pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

2. DEPLOYMENT WHEN DISPOSING OF STEERING WHEEL PAD ONLY

NOTICE:

- **When disposing of the steering wheel pad, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

HINT:

Prepare a battery as the power source to deploy the airbag.

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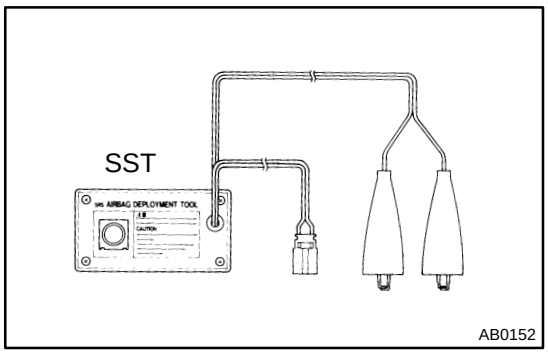
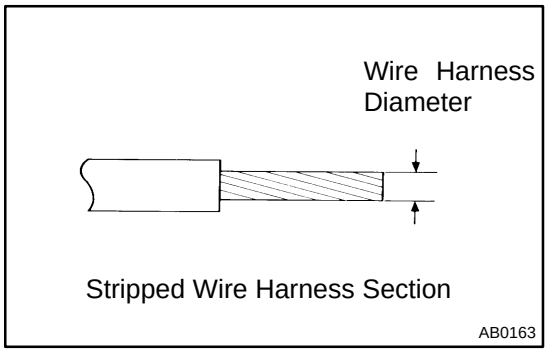


(a) Check the function of the SST (see step 1–(a)).

(b) Remove the steering wheel pad (see page SR–14).

CAUTION:

- **When removing the steering wheel pad, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.**
- **When storing the steering wheel pad, keep the airbag deployment side facing upward.**



(c) Using a service–purpose wire harness for the vehicle, tie down the steering wheel pad to the disc wheel.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2. or more).

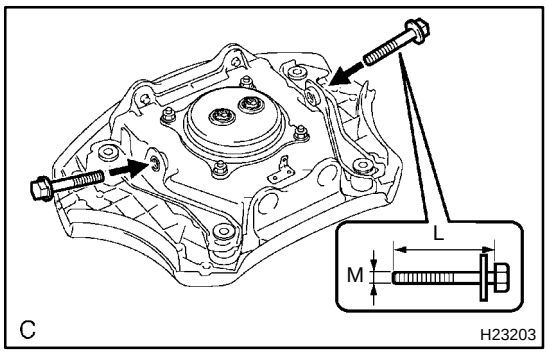
CAUTION:

If the wire harness is too thin or an alternative object is used to tie down the steering wheel pad, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).

HINT:

To calculate the area of the stripped wire harness section:

Area = 3.14 x (Diameter)^2 divided by 4



(1) Install the 2 bolts with washers into the 2 bolt holes on the steering wheel pad.

Bolt:

L: 35.0 mm (1.378 in.)

M: 6.0 mm (0.236 in.)

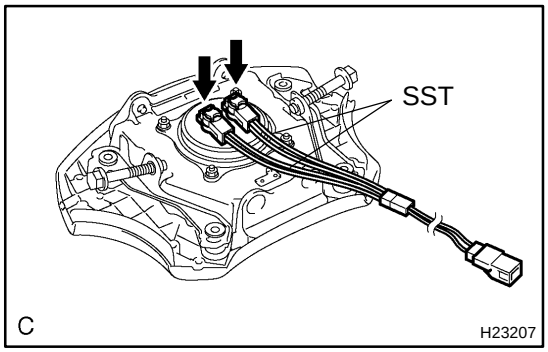
Pitch: 1.0 mm (0.039 in.)

NOTICE:

- **Tighten the bolts by hand until the bolts become difficult to turn.**
- **Do not tighten the bolts excessively.**

(2) After connecting the SST below to each other, connect them to the steering wheel pad connectors.

SST 09082–00802 (09082–10801, 09082–30801)



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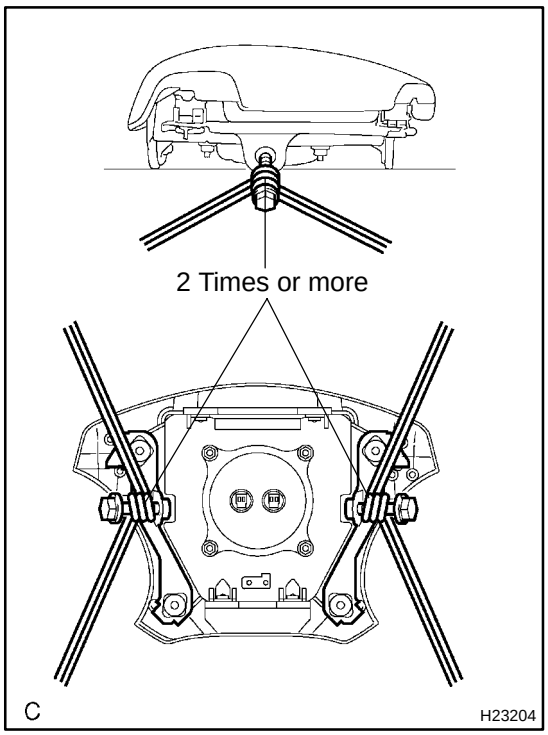
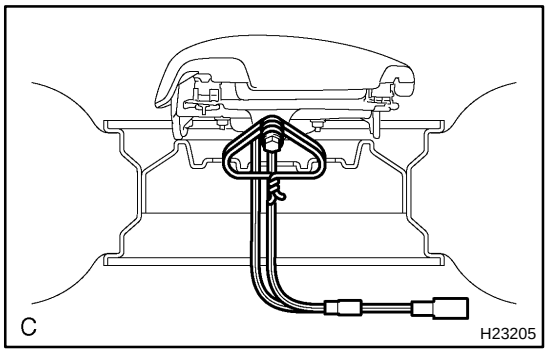


(3) Using 3 wire harnesses, wind wire harness at least 2 times each around the bolts installed on the left and right sides of the steering wheel pad.

CAUTION:

- **Tightly wind the wire harness around the bolts so that there is no slack.**
- **Make sure that the wire harness is tight. If there is slack in wire harness, the steering wheel pad may become loose due to the shock when the airbag is deployed.**



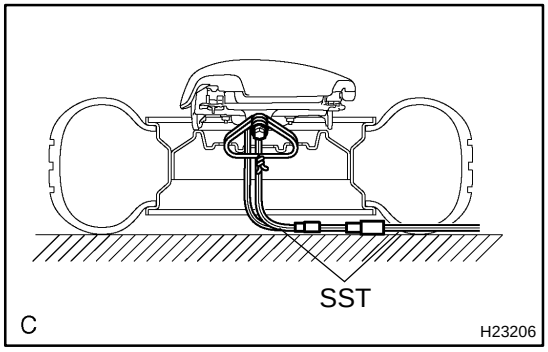
(4) Face the airbag deployment side of the steering wheel pad upward. Separately tie the left and right sides of the steering wheel pad to the disc wheel through the hub nut holes. Position the SST connector so that it hangs downward through the hub hole in the disc wheel.

CAUTION:

- **Make sure that the wire harness is tight. If there is slack in wire harness, the steering wheel pad may become loose due to the shock when the airbag is deployed.**
- **Always tie down the steering wheel pad with the airbag deployment side facing upward.**

NOTICE:

The disc wheel will be marked by the airbag deployment, so use an extra disc wheel.



(d) Install the SST.

CAUTION:

Place the disc wheel on level ground.

(1) Connect the SST connector.

SST 09082–00700

CAUTION:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the disc wheel.

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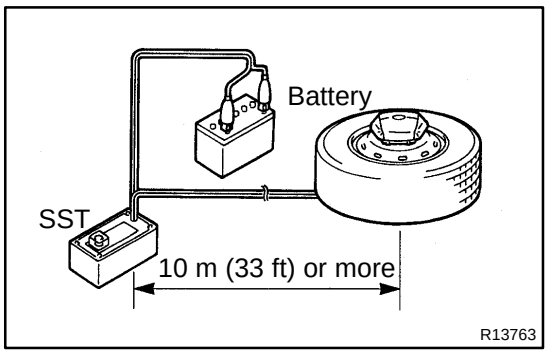
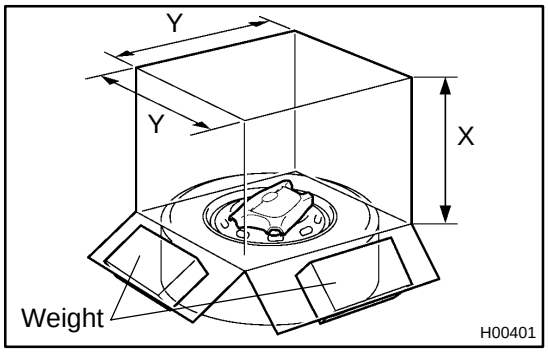


(2) Move the SST at least 10 m (33 ft) away from the steering wheel pad tied down to the disc wheel.



(e) Cover the steering wheel pad with a cardboard box or tires.

Covering method using cardboard box:

Cover the steering wheel pad with the cardboard box and place the weights on the cardboard box in 4 places totalling at least 190 N (19 kg, 43 lb).

Cardboard box size:

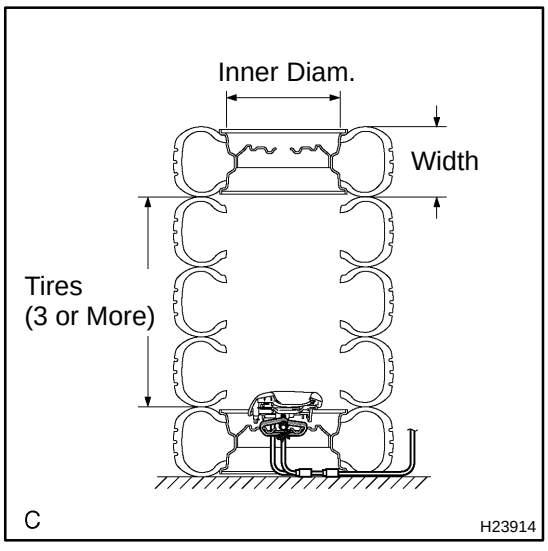
Must exceed the following dimensions:

X = 460 mm (18.11 in.)

Y = 650 mm (25.59 in.)

NOTICE:

- **When dimension Y of the cardboard box exceeds the diameter of the disc wheel with tire which the steering wheel pad is tied to, X should be the following size.**
  X = 460 mm (18.11 in.) + width of tire
- **If a cardboard box smaller than the specified size is used, the cardboard box will be broken by the shock from the airbag deployment.**



- Covering method using tires:
  Place at least 3 tires without disc wheels on the tire with disc wheel which the steering wheel pad is tied to. Place the tire with disc wheel on them.

Tire size: Must exceed the following dimensions:

Width: 185 mm (7.28 in.)

Inner diameter: 360 mm (14.17 in.)

CAUTION:

Do not use tires with disc wheels except on the top and bottom.

NOTICE:

- **The tires may be marked by the airbag deployment, so use the redundant tires.**
- **Do not place the SST connector under the tire because it could be damaged.**

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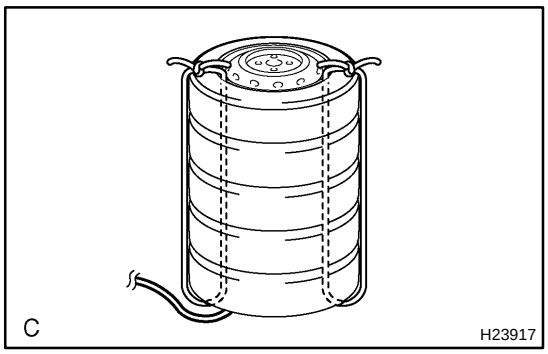
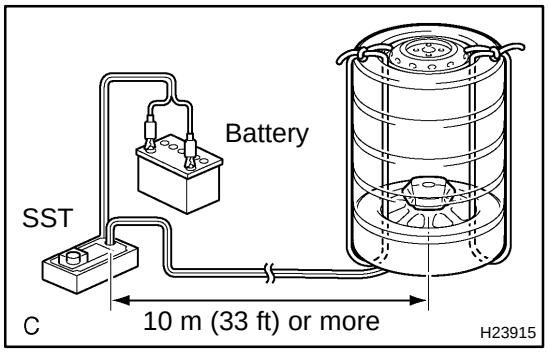


(1) Tie the tires together with 2 wire harnesses.

CAUTION:

Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(f) Deploy the airbag.

(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (–) terminal.

(2) Check that no one is within a 10 m (33 ft) radius of the disc wheel which the steering wheel pad is tied to.

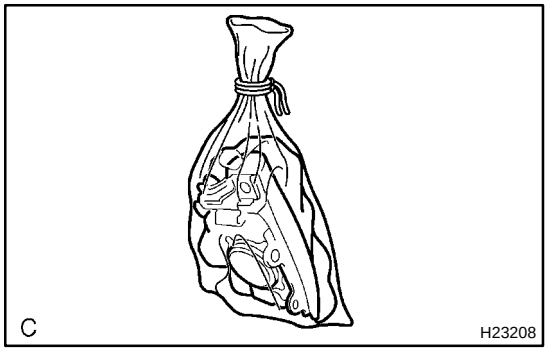
(3) Press the SST activation switch and deploy the airbag.

CAUTION:

When deploying the airbag, make sure that no one is near the tire.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.



(g) Dispose of the steering wheel pad.

CAUTION:

- **The steering wheel pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with a deployed airbag.**
- **Do not apply water, etc. to a steering wheel pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the steering wheel pad from the disc wheel.

(2) Place the steering wheel pad in a plastic bag, tie it tightly and dispose of it as other general part disposal.

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RS0BC–08

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the steering wheel pad, steering wheel or spiral cable with a new one.

Case	Replacing part
The airbag has been deployed.	Steering wheel pad
The steering wheel pad has been found to be faulty in troubleshooting.	Steering wheel pad
The spiral cable has been found to be faulty in troubleshooting.	Spiral cable
The steering wheel pad has been found to be faulty while checking items. (see page RS–22)	Steering wheel pad
The steering wheel has been found to be faulty while checking items. (see page RS–22)	Steering wheel
The spiral cable has been found to be faulty while checking items. (see page RS–22)	Spiral cable
The steering wheel pad has been dropped.	Steering wheel pad

CAUTION:

For removal and installation of the steering wheel pad, see page SR–14 and SR–23. Be sure to follow the correct procedure.

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RS0BD–11

INSTALLATION

CAUTION:

- **If the steering wheel pad has been dropped, or there are cracks, dents or other defects in the case or connector, replace the steering wheel pad with a new one.**
- **When installing the steering wheel pad, take care it is not pinched between other parts.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. **INSTALL SPIRAL CABLE (SEE PAGE SR–23)**
2. **INSTALL STEERING COLUMN COVER LOWER (SEE PAGE SR–23)**
3. **INSTALL STEERING WHEEL (SEE PAGE SR–23)**
4. **INSTALL STEERING WHEEL PAD (SEE PAGE SR–23)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **PERFORM INITIALIZATION (SEE PAGE SR–23)**

Some system need initialization when disconnecting the cable from the negative battery terminal.

7. **INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)**

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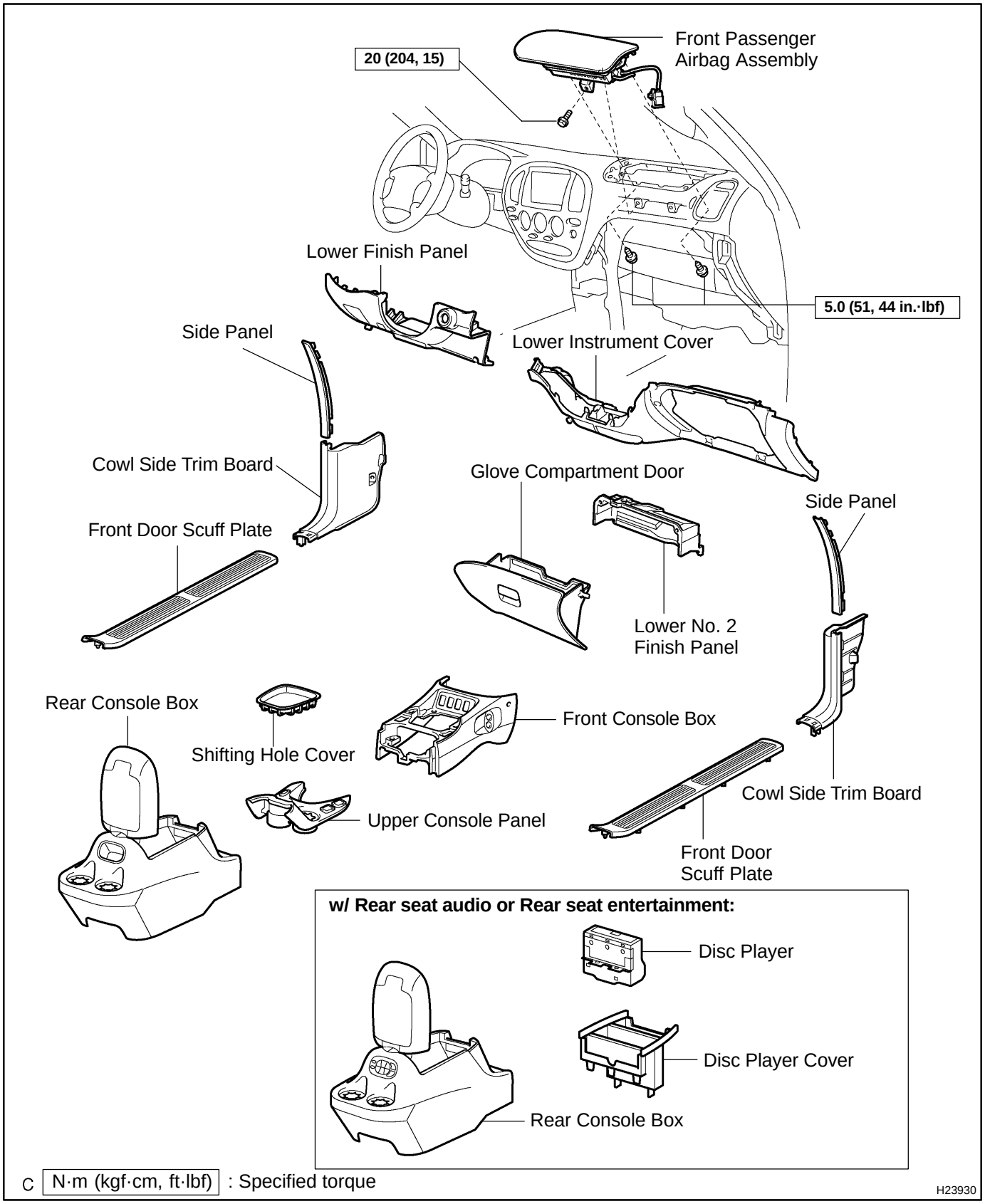
FRONT PASSENGER AIRBAG ASSEMBLY

COMPONENTS

RS0BE–11



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RS0T6–03

REMOVAL

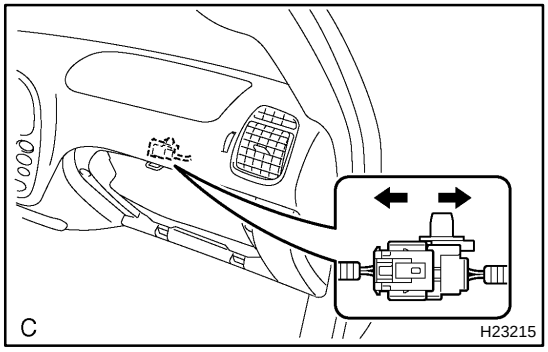
NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is in the ON or ACC position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. **PRECAUTION (SEE PAGE RS–1 and RS–3)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. **REMOVE FRONT DOOR SCUFF PLATES (SEE PAGE BO–89)**
4. **REMOVE COWL SIDE TRIM BOARDS (SEE PAGE BO–89)**
5. **REMOVE SIDE PANELS (SEE PAGE BO–89)**
6. **REMOVE LOWER FINISH PANEL (SEE PAGE BO–89)**
7. **REMOVE GLOVE COMPARTMENT DOOR (SEE PAGE BO–89)**
8. **REMOVE LOWER NO. 2 FINISH PANEL (SEE PAGE BO–89)**
9. **REMOVE SHIFTING HOLE COVER (SEE PAGE BO–89)**
10. **REMOVE UPPER CONSOLE PANEL (SEE PAGE BO–89)**
11. **REMOVE REAR CONSOLE BOX (SEE PAGE BO–89)**
12. **REMOVE FRONT CONSOLE BOX (SEE PAGE BO–89)**
13. **REMOVE LOWER INSTRUMENT COVER (SEE PAGE BO–89)**



14. **REMOVE FRONT PASSENGER AIRBAG ASSEMBLY**

(a) Using a clip remover, disengage the connector clamp.

(b) Disconnect the airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

(c) Remove the bolt holding the front passenger airbag assembly and instrument panel.

(d) Remove the 2 bolts holding the front passenger airbag assembly and instrument panel reinforcement.

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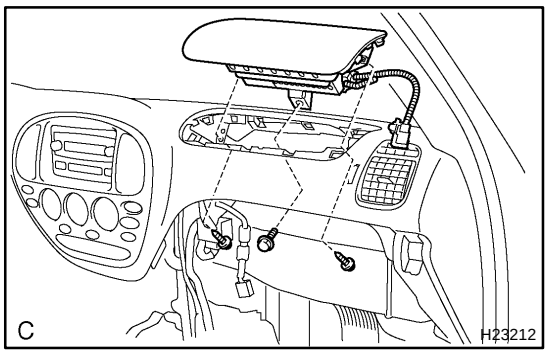

(e) Remove the front passenger airbag assembly.

CAUTION:

- **Do not store the front passenger airbag assembly with the airbag deployment side facing downward.**
- **Never disassemble the front passenger airbag assembly.**

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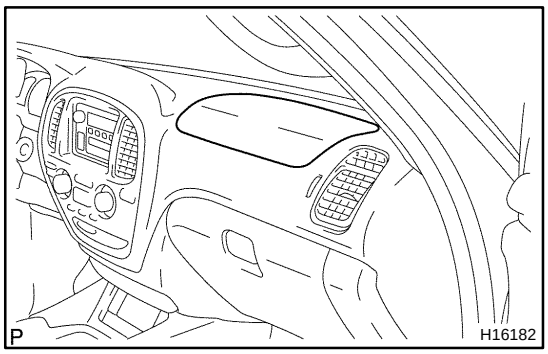
RS119–01



INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

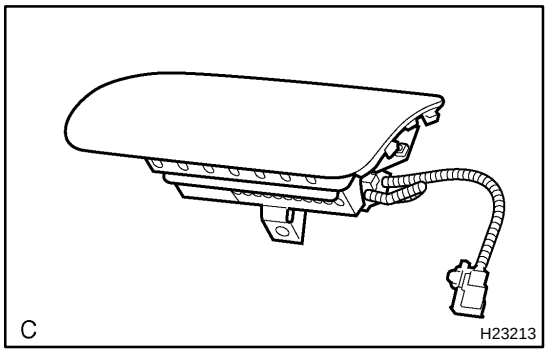
(a) Perform a diagnostic system check (see page DI–1147).

(b) With the front passenger airbag assembly installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front passenger airbag assembly with a new one:

Cuts, minute cracks or marked discoloration on the instrument panel around the front passenger airbag assembly.

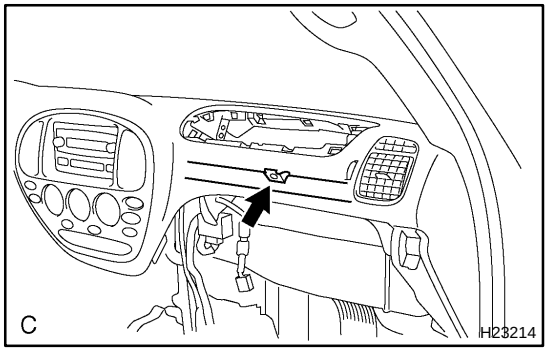
2. VEHICLE INVOLVED IN A COLLISION AND AIRBAG IS NOT DEPLOYED

(a) Perform a diagnostic system check (see page DI–1147).



(b) With the front passenger airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front passenger airbag assembly, instrument panel or instrument panel reinforcement with a new one:

- ▶ Cuts, minute cracks or marked discoloration on the front passenger airbag assembly.
- ▶ Cracks or other damage to the connectors.



- ▶ Deformation or cracks on the instrument panel or instrument panel reinforcement.

CAUTION:

For removal and installation procedures of the front passenger airbag assembly, see page RS–33 and RS–43. Be sure to follow the correct procedure.

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RS11A–01

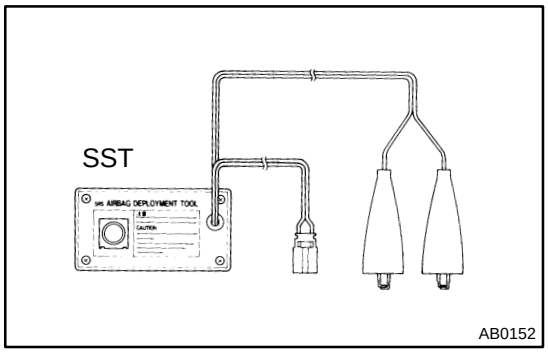
DISPOSAL

HINT:

When scrapping a vehicle equipped with the SRS or disposing of the front passenger airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of the TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a front passenger airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**



- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the front passenger airbag assembly.**
- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:

Prepare a battery as the power source to deploy the airbag.

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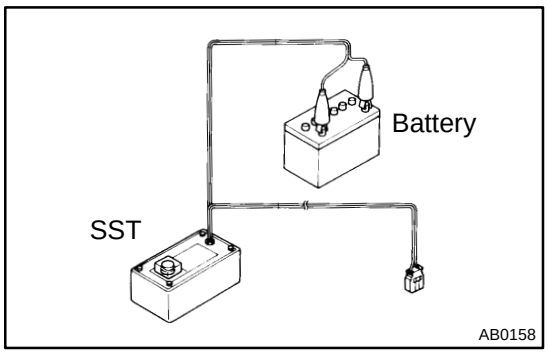


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

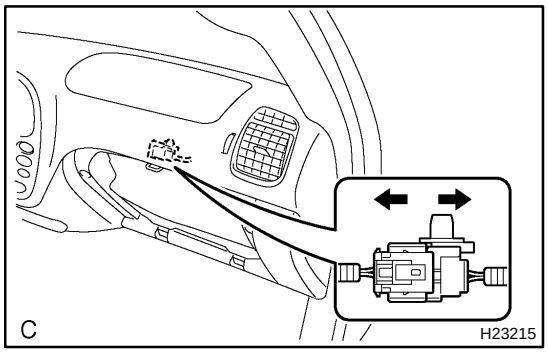
(a) Check the function of the SST (see step 1–(a) on page RS–23).

(b) Precaution (see page RS–1 and RS–3).

(c) Disconnect the cable from the negative battery terminal. Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

(d) Remove the glove compartment door (see page BO–89).

(e) Remove the lower No. 2 finish panel (see page BO–89).



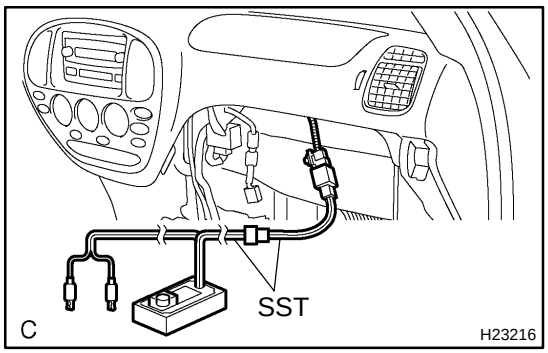
(f) Disconnect the airbag connector (yellow colored one) from the front passenger airbag assembly.

(1) Using a clip remover, disengage the connector clamp.

(2) Disconnect the airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



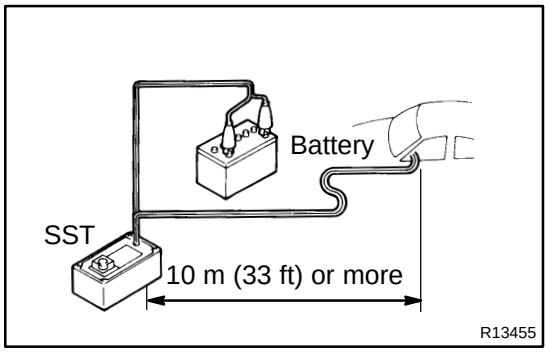
(g) Install the SST.

(1) Connect the SST connector to the front passenger airbag assembly.

SST 09082–00700, 09082–00780

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Move the SST at least 10 m (33 ft) away from the vehicle side window.

(3) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (–) terminal.

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(h) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.

CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

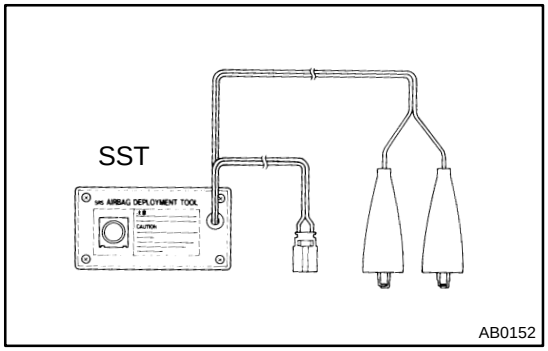
HINT:
The airbag deploys as the LED of the SST activation switch comes on.

2. DEPLOYMENT WHEN DISPOSING OF FRONT PASSENGER AIRBAG ASSEMBLY ONLY

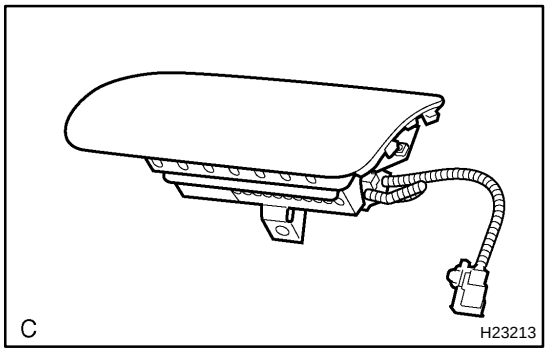
NOTICE:
- **When disposing of the front passenger airbag assembly, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

(a) Check the function of the SST (see step 1–(a)).



(b) Remove the front passenger airbag assembly (see page RS–33).



CAUTION:
- **When removing the front passenger airbag assembly, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.**
- **When storing the front passenger airbag assembly, keep the airbag deployment side facing upward.**

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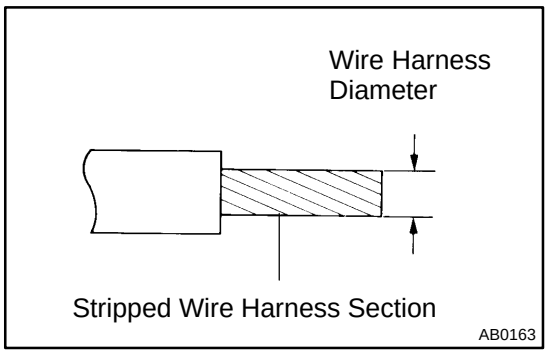


(c) Using a service–purpose wire harness for the vehicle, tie down the front passenger airbag assembly to the tire.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in.^{2} or more)

CAUTION:

If the wire harness is too thin or an alternative object is used to tie down the front passenger airbag assy, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 in.^{2}).

HINT:

To calculate the area of the stripped wire harness section:

Area = 3.14 X (Diameter)^2 divided by 4

(1) Position the front passenger airbag assembly inside the tire with the airbag deployment side facing inside.

Tire size: Must exceed the following dimensions:

Width: 185 mm (7.28 in.)

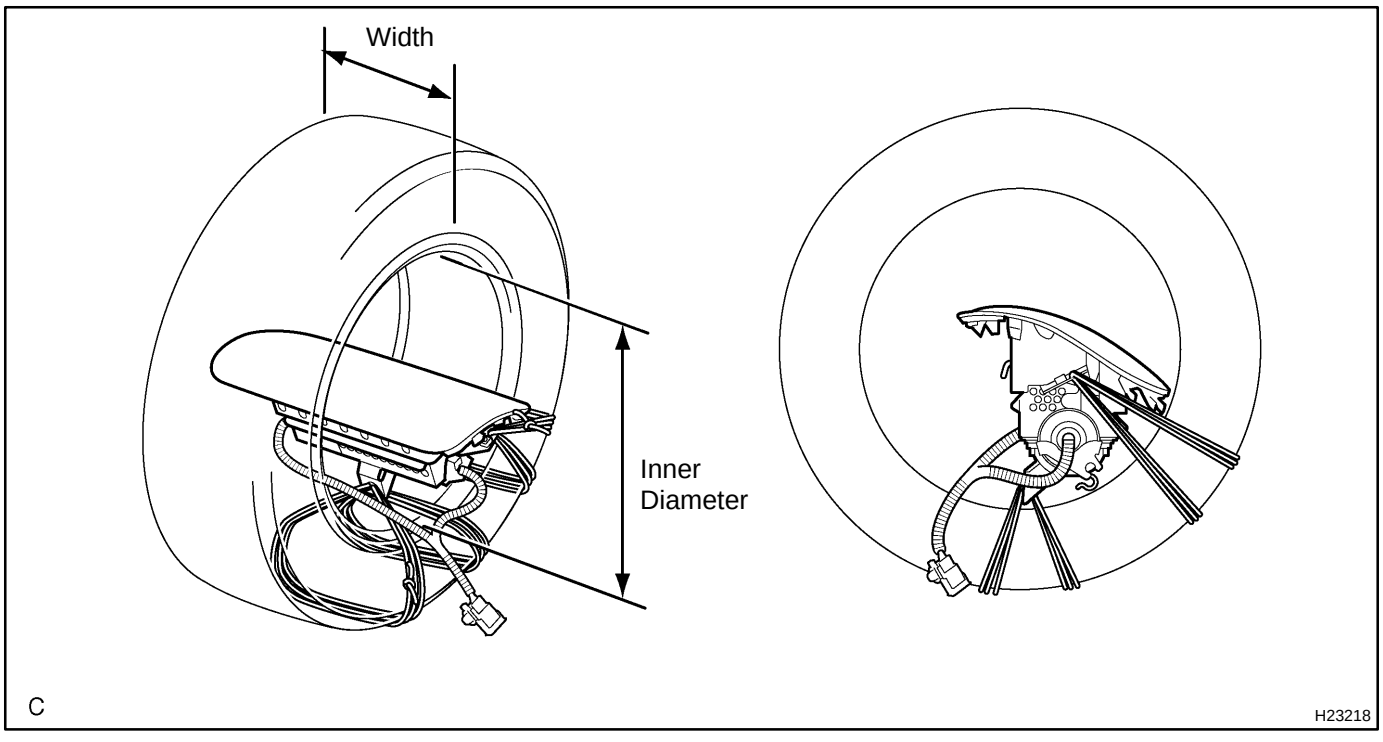
Inner diameter: 360 mm (14.17 in.)

CAUTION:

- **Make sure that the wire harness is tight. If there is slack in wire harness, the front passenger airbag assembly may become loose due to the shock when the airbag is deployed.**
- **Always tie down the front passenger airbag assembly with the airbag deployment side facing inside.**

NOTICE:

The tire will be marked by the airbag deployment, so use an extra tire.



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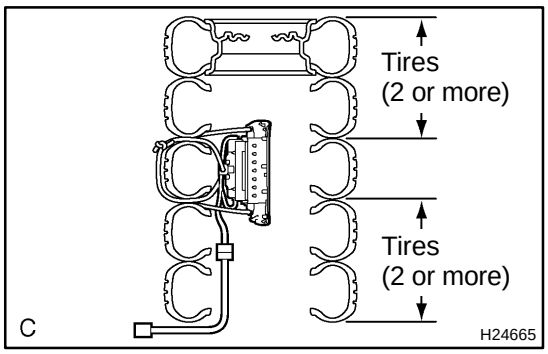
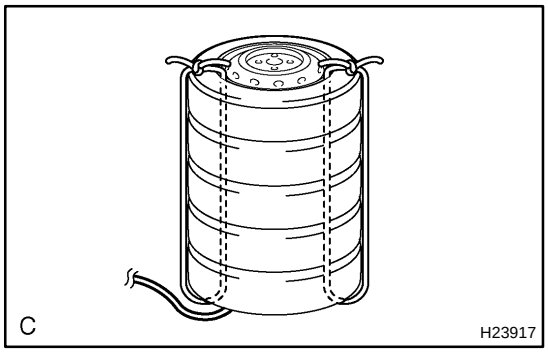
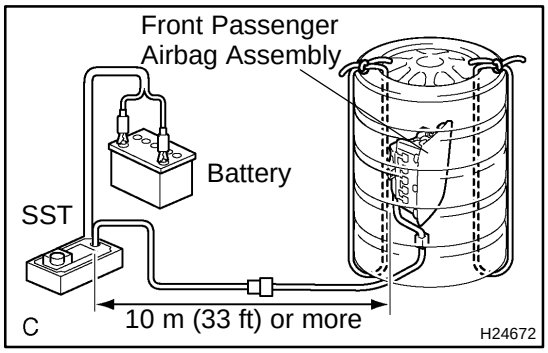


(d) Place the tires.
(1) Place at least 2 tires under the tire which the front passenger airbag assembly is tied to.
(2) Place at least 2 tires over the tire which the front passenger airbag assembly is tied to. The top tire should have the disc wheel installed.



(3) Tie the tires together with 2 wire harness.

CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(e) Install the SST.
Connect the SST connector.
SST 09082–00700, 09082–00780

NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(f) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (–) terminal.
(2) Check that no one is within a 10 m (33 ft) radius of the tire which the front passenger airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.

CAUTION:
When deploying the airbag, make sure that no one is near the tire.

HINT:
The airbag deploys as the LED of the SST activation switch comes on.

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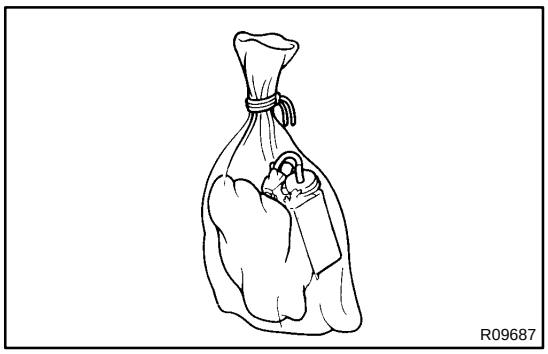

(g) Dispose of the front passenger airbag assembly.

CAUTION:

- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the front passenger airbag assembly from the tire.

(2) Place the front passenger airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

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RS0BI–07

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the front passenger airbag assembly, instrument panel or instrument panel reinforcement with a new one.

Case	Replacing part
The airbag has been deployed.	Front passenger airbag assembly
The front passenger airbag assembly has been found to be faulty in trouble-shooting.	Front passenger airbag assembly
The front passenger airbag assembly has been found to be faulty while checking items (see page RS–35).	Front passenger airbag assembly
The instrument panel has been found to be faulty while checking items (see page RS–35).	Instrument panel
The instrument panel reinforcement has been found to be faulty while checking items (see page RS–35).	Instrument panel reinforcement
The front passenger airbag assembly has been dropped.	Front passenger airbag assembly

CAUTION:

For replacement of the front passenger airbag assembly, see page RS–33 and RS–43, Be sure to follow the correct procedure.

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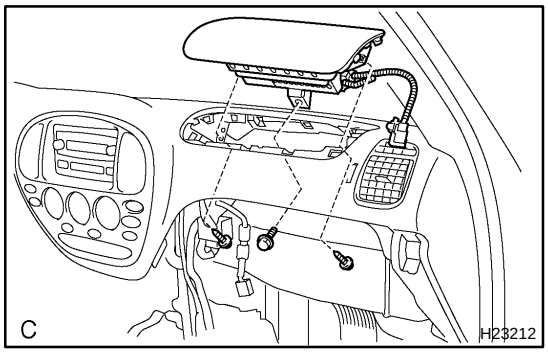
RS0T8–03

INSTALLATION

NOTICE:

- **If the front passenger airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front passenger airbag assembly with a new one.**
- **When installing the front passenger airbag assembly, take care it is not pinched between other parts.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**



1. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY

(a) Install the bolt to hold the front passenger airbag assembly and instrument panel reinforcement.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(b) Install the 2 bolts to hold the front passenger airbag assembly and instrument panel.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

2. INSTALL LOWER INSTRUMENT COVER (SEE PAGE BO–97)

3. INSTALL FRONT CONSOLE BOX (SEE PAGE BO–97)

4. INSTALL REAR CONSOLE BOX (SEE PAGE BO–97)

5. INSTALL UPPER CONSOLE PANEL (SEE PAGE BO–97)

6. INSTALL SHIFTING HOLE COVER (SEE PAGE BO–97)

7. INSTALL LOWER NO. 2 FINISH PANEL (SEE PAGE BO–97)

8. INSTALL GLOVE COMPARTMENT DOOR (SEE PAGE BO–97)

9. INSTALL LOWER FINISH PANEL (SEE PAGE BO–97)

10. INSTALL SIDE PANELS (SEE PAGE BO–97)

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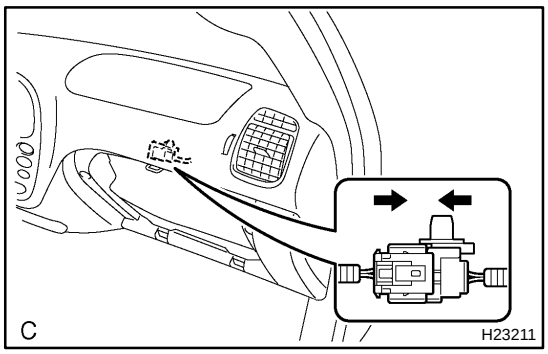

11. CONNECT AIRBAG CONNECTOR

(a) Connect the airbag connector as shown in the illustration.

(b) Attach the connector clamp to the reinforcement.

12. INSTALL COWL TRIM BOARDS (SEE PAGE BO–97)

13. INSTALL FRONT DOOR SCUFF PLATES (SEE PAGE BO–97)

14. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

15. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

16. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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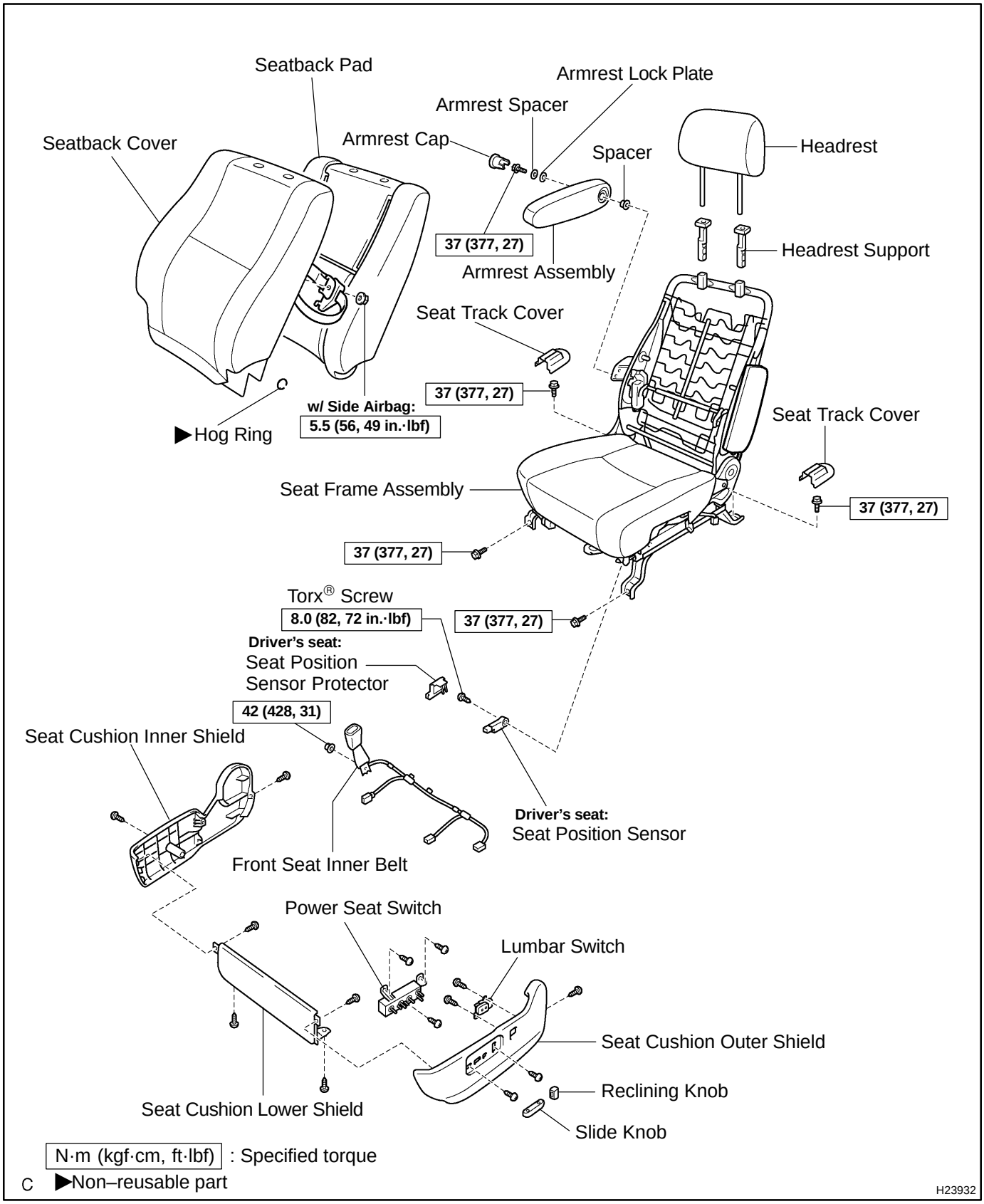
SIDE AIRBAG ASSEMBLY (Power Adjuster Type)

RS0T9–06

COMPONENTS



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RS0TA–03

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is in the ON or ACC position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. PRECAUTION (SEE PAGE RS–1 and RS–3)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. REMOVE SEAT TRACK COVERS

Using a screwdriver, remove the 2 seat track covers.

HINT:

Tape the screwdriver tip before use.

4. REMOVE FRONT SEAT

(a) Remove the 4 bolts.

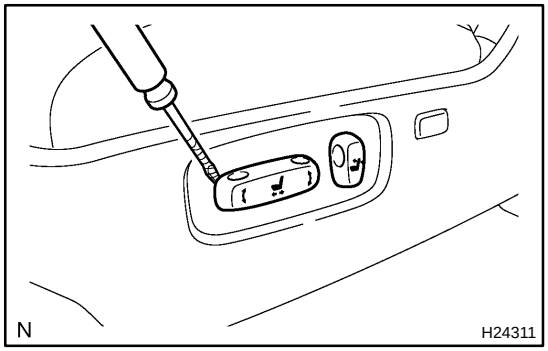
(b) w/ Side airbag:
Disconnect the connectors.

(c) Remove the front seat.

CAUTION:

Be careful not to damage the body.

5. REMOVE HEADREST

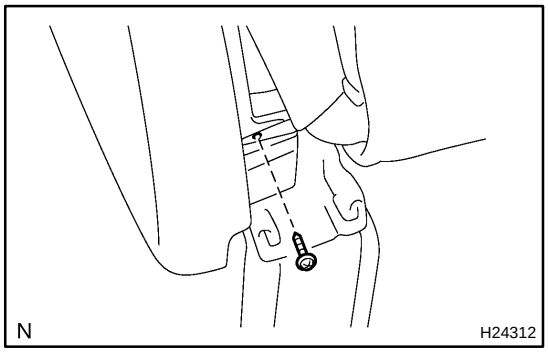


6. REMOVE SLIDE KNOB AND RECLINING KNOB

Using a screwdriver, remove the slide knob and reclining knob.

HINT:

Tape the screwdriver tip before use.



7. REMOVE SEAT CUSHION LOWER SHIELD, SEAT CUSHION OUTER SHIELD AND SEAT CUSHION INNER SHIELD

(a) Remove the screw from the seat cushion outer shield.

(b) Perform the same procedure as for the seat cushion inner shield.

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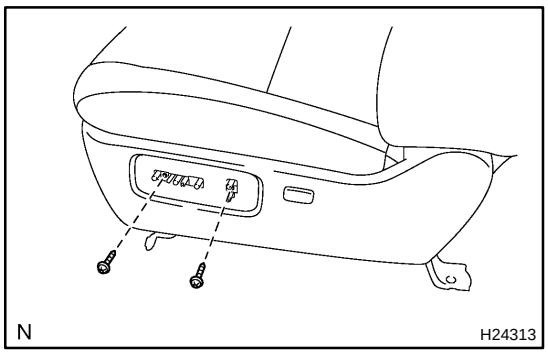
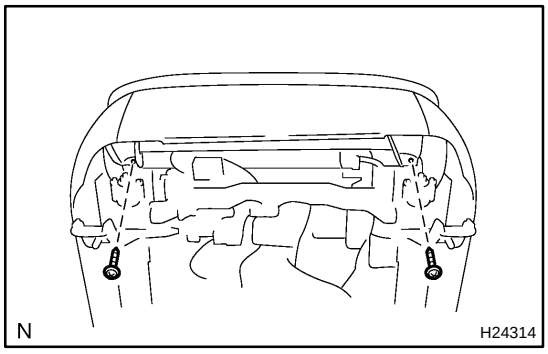
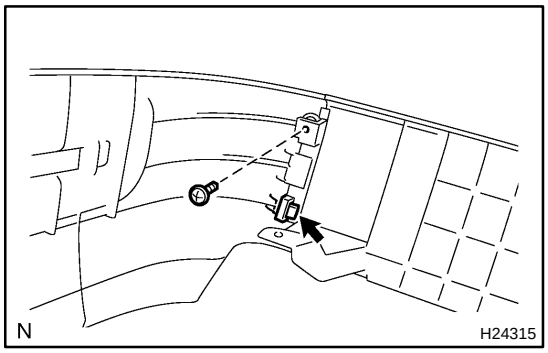


(c) Remove the 2 screws from the seat cushion outer shield.
(d) Remove the screw form the seat cushion inner shield.



(e) Remove the 2 screws from the seat cushion lower shield.
(f) Disconnect the lumbar switch connector from the lumbar switch, and remove the seat cushion lower shield, outer shield and inner shield.



(g) Remove the screw and separate the seat cushion lower shield and seat cushion outer shield.
(h) Perform the same procedure on the other side.

8. REMOVE FRONT SEAT INNER BELT

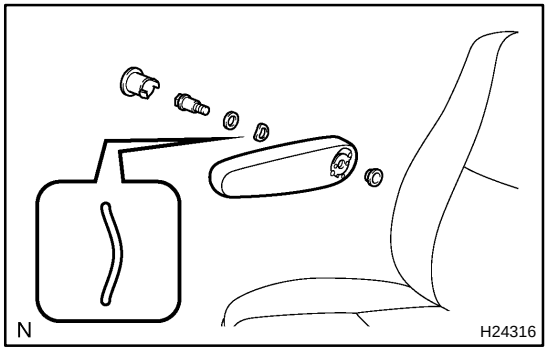
(a) Disconnect the wire harness clamps and connectors.
(b) Remove the nut and front seat inner belt.

9. REMOVE LUMBAR SWITCH

Remove the 2 screws and lumbar switch from the seat cushion outer shield.

10. REMOVE POWER SEAT SWITCH

Remove the 3 screws and power seat switch.



11. REMOVE ARMREST ASSEMBLY

(a) Using a screwdriver, remove the armrest cap.
(b) Remove the bolt, armrest spacer, armrest lock plate and armrest assembly.
(c) Remove the spacer from the armrest assembly.

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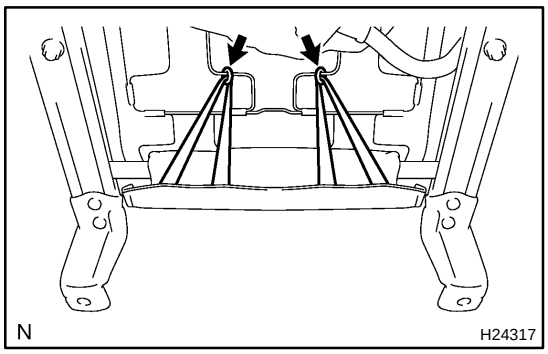
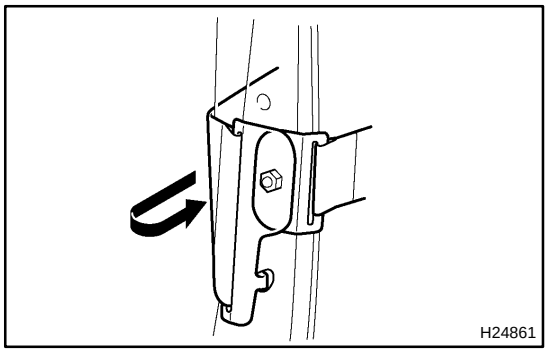


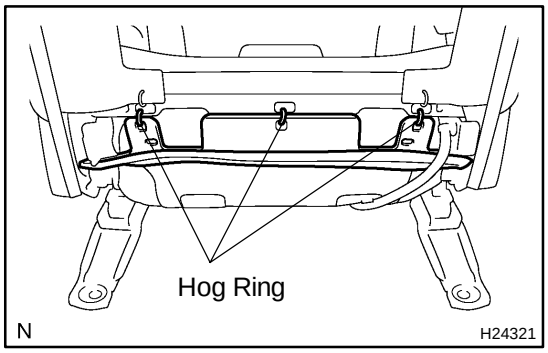
12. REMOVE SEATBACK COVER AND PAD

(a) Remove the hog rings from the seat frame assembly.

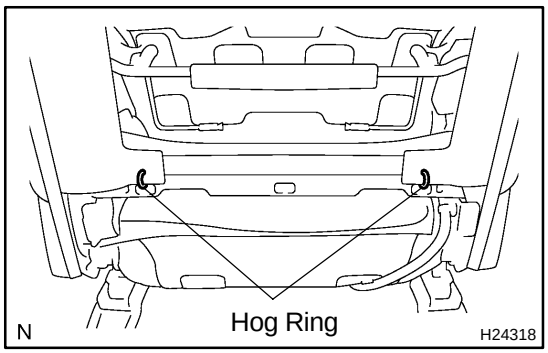
(b) Open the fastener.



(c) w/ Side airbag:
Remove the nut and disconnect the seatback cover bracket from the seat frame assembly.

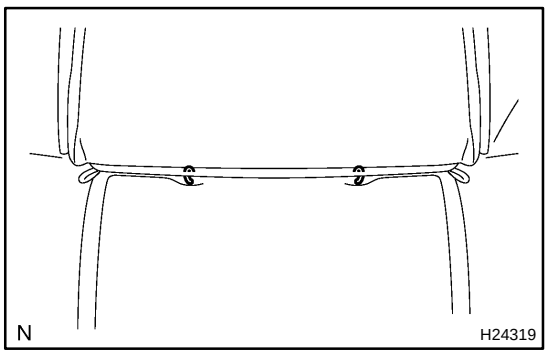


(d) Remove the hog rings from the seat frame assembly.



(e) Remove the hog rings from the seat frame assembly.

(f) Remove the seatback cover and pad from the seat frame assembly.



13. REMOVE SEATBACK COVER

(a) Turn up the seatback cover and remove the hog rings.

(b) Remove the 2 headrest supports.

(c) Remove the seatback cover from the seatback pad.

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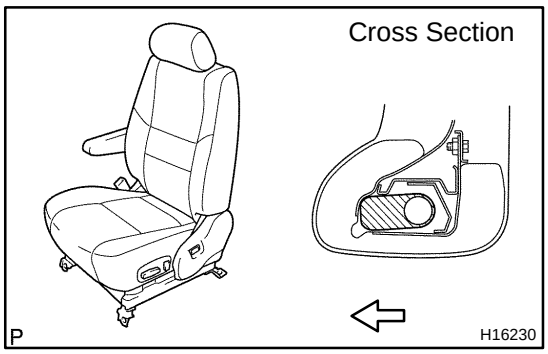
RS0LB–07



INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

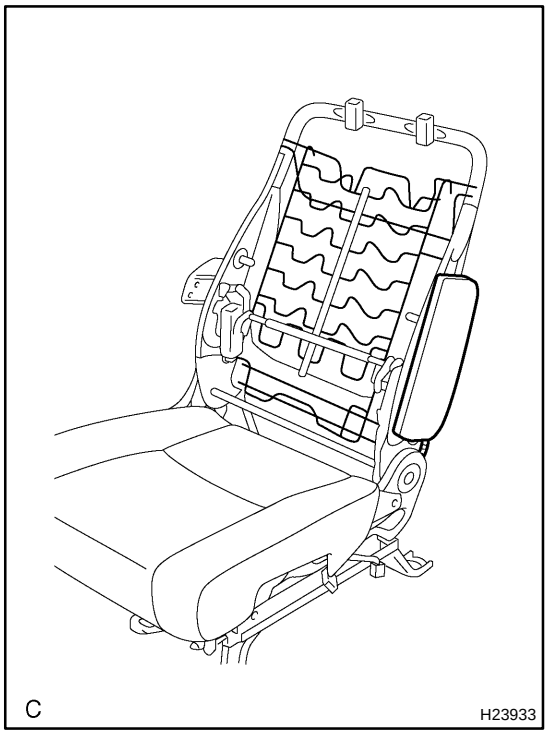
(a) Perform a diagnostic system check (see page DI–1147).

(b) With the front seat airbag assy installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front seatback assy with a new one:

Cuts, minute cracks or marked discoloration on the front seatback assy around the front seat airbag assy.

2. VEHICLE INVOLVED IN A COLLISION AND AIRBAG IS NOT DEPLOYED

(a) Perform a diagnostic system check (see page DI–1147).



(b) Perform a visual check which includes the following items with the seatback assembly removed from the vehicle.

- ▶ Cuts, tears and cracks on the side airbag assembly.
- ▶ Cuts and cracks in wire harness, and chipping in connectors.

CAUTION:

For removal and installation of the front seatback assembly, see page RS–46 and RS–57. Be sure to follow the correct procedure.

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RS11B–01

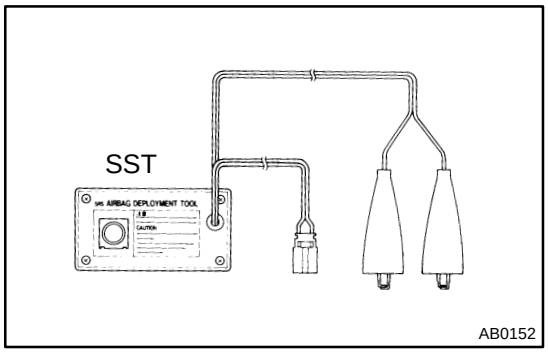
DISPOSAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.
- When scrapping a vehicle equipped with the SRS or disposing of the front seat airbag assembly LH, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a front seat airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**



- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the front seat airbag assembly.**
- **The front seat airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front seat airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat airbag assembly with a deployed airbag.**

HINT:

Prepare a battery as the power source to deploy the airbag.

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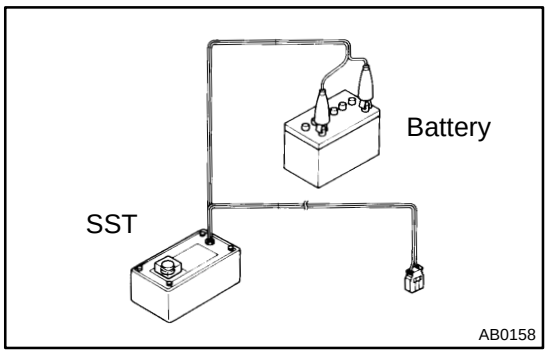


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

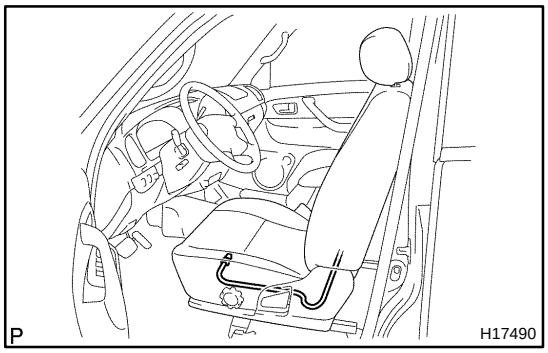
(a) Check the function of the SST (see step 1–(a) on page RS–23).
SST 09082–00700

(b) Precaution (see page RS–1 and RS–3).

(c) Disconnect the cable from the negative battery terminal.
Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

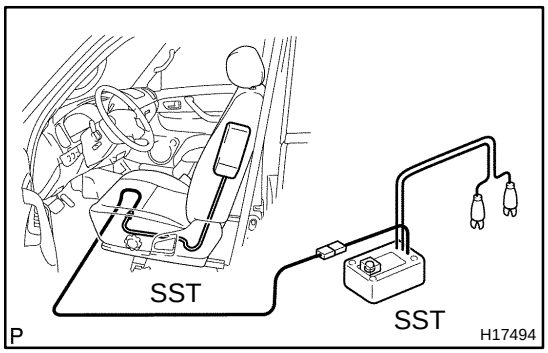
(d) Remove the 4 bolts from the front seat assembly (see page BO–111 (power adjuster type) and BO–125 (manual adjuster type)).

HINT:
Keep the front seat assembly LH in the cabin.



(e) Disconnect the connector (yellow colored one) from the front seat airbag assembly LH.

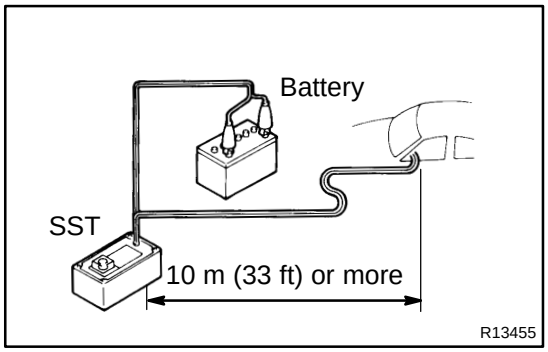
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.



(f) Install the SST.

(1) Connect the connectors of the SST to the airbag connector.
SST 09082–00700, 09082–00750

NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Move the SST at least 10 m (33 ft) away from the vehicle side window.

(3) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:
Take care not to damage the SST wire harness.

(4) Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (–) terminal.

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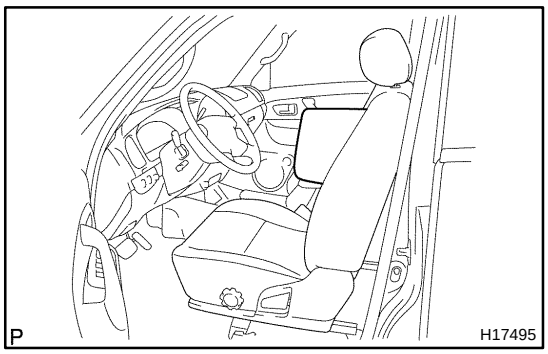


(g) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The front seat airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front seat airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front seat airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

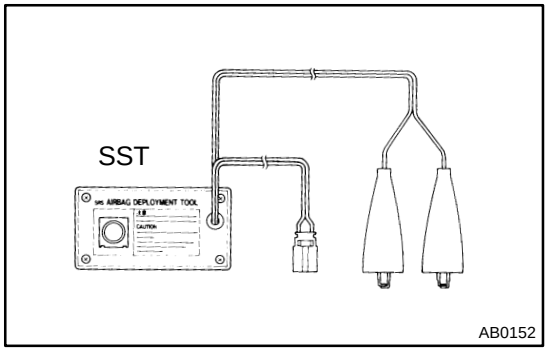
HINT:
The airbag deploys as the LED of the SST activation switch comes on.

2. DEPLOYMENT WHEN DISPOSING OF SIDE AIRBAG ASSEMBLY

NOTICE:

- **When disposing of the side airbag assembly, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.



(a) Check the function of the SST (see step 1–(a)).
(b) Remove the front seat airbag assembly
(see page BO–111 (power adjuster type) and BO–125 (manual adjuster type)).
(c) Remove the seatback assembly (see page RS–46).

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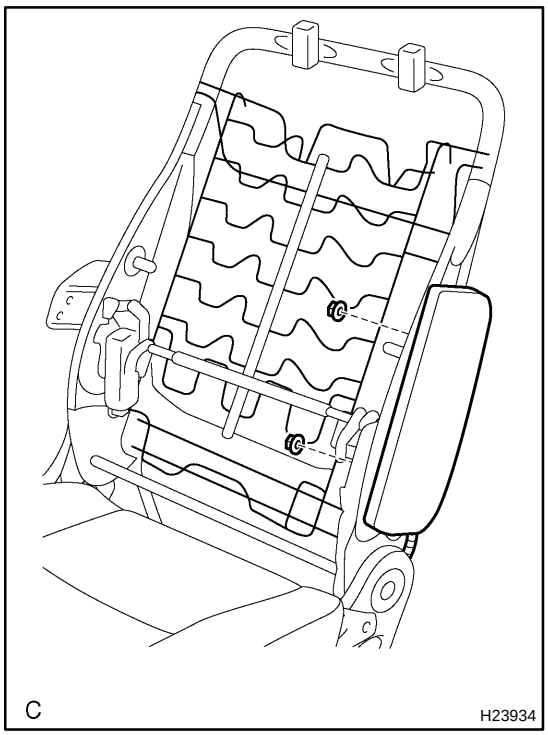
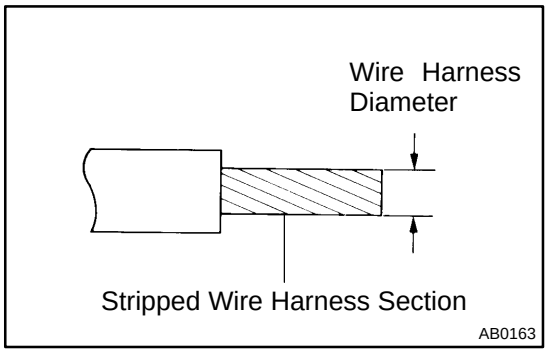


(d) Remove the 2 nuts and side airbag assembly from the seatback assembly.

CAUTION:

- **When removing the front seat airbag assembly, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.**
- **When storing the front passenger airbag assembly, keep the airbag deployment side facing upward.**



(e) Using a service–purpose wire harness for the vehicle, tie down the front passenger airbag assembly to the tire.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2. or more)

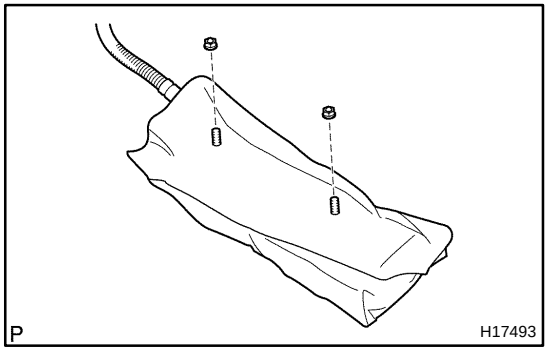
HINT:

To calculate the area of the stripped wire harness section:

Area = 3.14 x $(Diameter)^2$ divided by 4

CAUTION:

If the wire harness is too thin or an alternative object is used to tie down the front passenger airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).



(1) Install the 2 nuts to the side airbag assembly.

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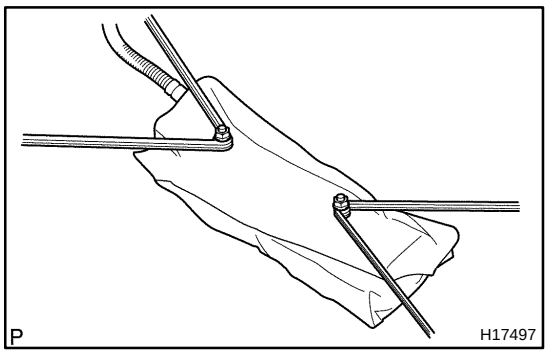
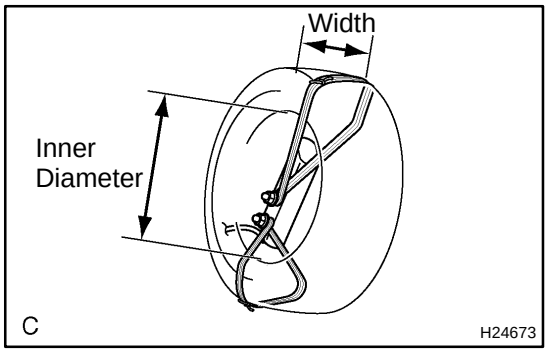


(2) Wind the wire harness around the stud bolts of the side airbag assembly as shown in the illustration.



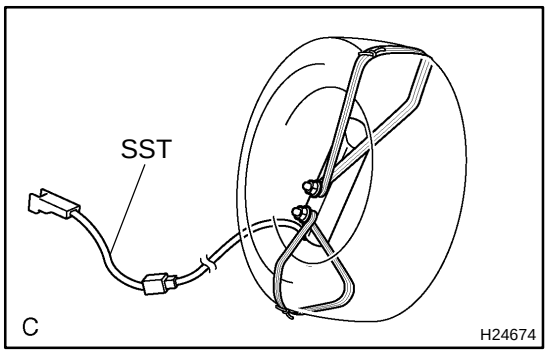
(3) Position the side airbag assembly inside the tire with the airbag deployment direction facing inside.

Tire size: Must exceed the following dimensions:
Width: 185 mm (7.28 in.)
Inner diameter: 360 mm (14.17 in.)

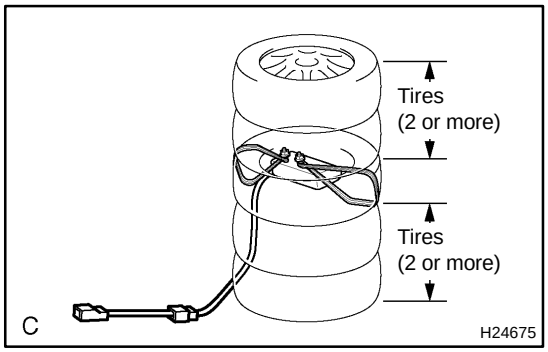
CAUTION:

- **Make sure that the wire harness is tight. If there is slack in wire harness, the side airbag assembly may become loose due to the shock when the airbag is deployed.**
- **Always tie down the side airbag assembly with the airbag deployment side facing inside the tire.**

NOTICE:
The tire will be marked by the airbag deployment, so use an extra tire.



(f) Install the SST.
(1) Connect the SST connector to the side airbag assembly connector.
SST 09082–00750



(g) Place the tires.
(1) Place at least 2 tires under the tire which the front seat airbag assembly is tied to.
(2) Place at least 2 tires over the tire which the front seat airbag assembly is tied to. The top tire should have the disc wheel installed.

NOTICE:
Do not place the SST connector under the tire because it could be damaged.

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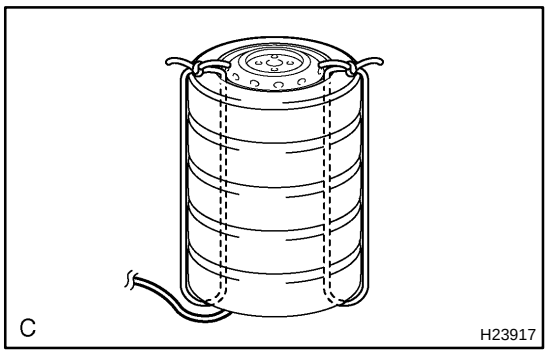
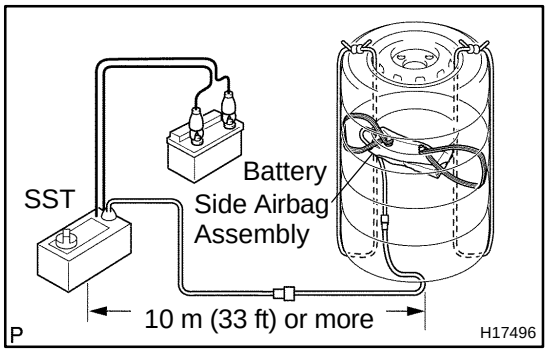


(3) Tie the tires together with 2 wire harness.

CAUTION:

Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



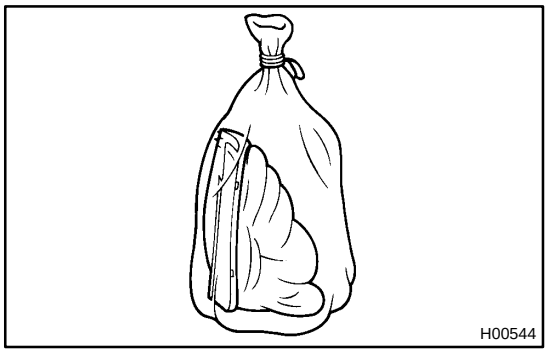
(h) Install the SST.

Connect the connectors of the 2 SST to the side airbag assembly connector.

SST 09082–00700

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.



(i) Deploy the airbag.

(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (–) terminal.

(2) Check that no one is within a 10 m (33 ft) radius of the tire which the front seat airbag assembly LH is tied to.

(3) Press the SST activation switch and deploy the airbag.

CAUTION:

When deploying the airbag, make sure that no one is near the tire.

HINT:

The airbag deploys as the LED of the SST activation switch comes on.

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RS0LD–06

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the seat frame assembly or seatback cover with a new one.

Case	Replacing part
The side airbag has been deployed.	Seat assembly
The side airbag assembly has been found to be faulty in troubleshooting.	Seat frame assembly
The side airbag assembly has been found to have cuts while checking items (see page RS–49).	Seat frame assembly
The seatback cover has been found to have cuts and frayed seams while checking items (see page RS–49).	Seatback cover
The side airbag assembly has been found to be faulty while checking items (See page RS–49).	Seat frame assembly
The seatback cover has been found to be faulty while checking items (see page RS–49).	Seatback cover
The seatback assembly has been dropped.	Seat frame assembly

CAUTION:

For removal and installation of the seat frame assembly, see page RS–46 and RS–57. Be sure to follow the correct procedure.

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RS11C–01

INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

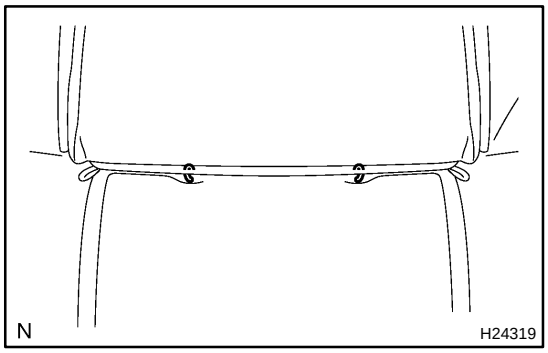
NOTICE:

- **If the side airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the side airbag assembly with a new one.**
- **When installing the side airbag assembly, take care it is not pinched between other parts.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. INSTALL SEATBACK COVER

(a) Install the seatback cover to the seatback pad.

(b) Install the 2 headrest supports.

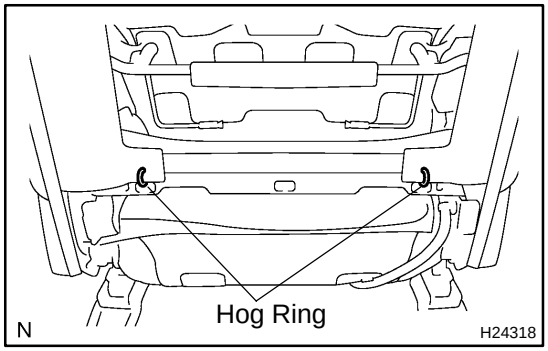


(c) Turn up the seatback cover and install the hog rings.

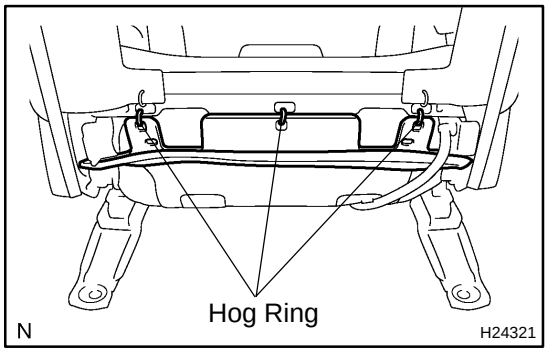
2. INSTALL SEATBACK COVER AND PAD

(a) Install the seatback cover and pad to the seat frame assembly.

(b) Install the 2 headrest supports to the seat frame assembly.



(c) Install the hog rings to the seat frame assembly.



(d) Install the hog rings to the seat frame assembly.

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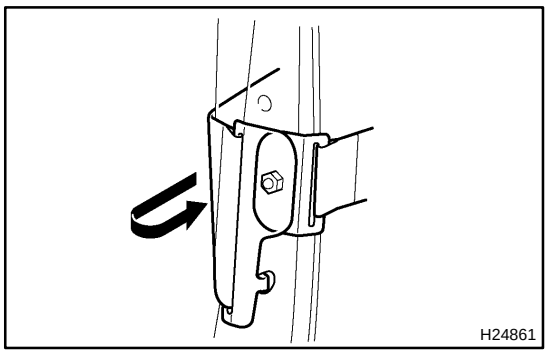
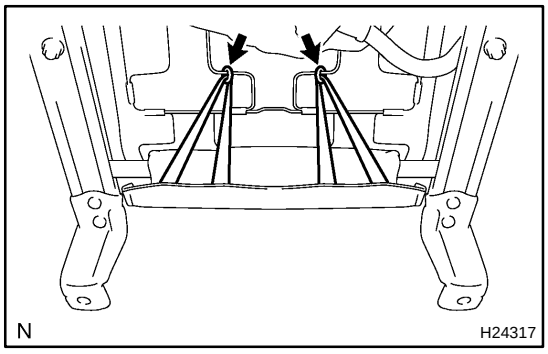
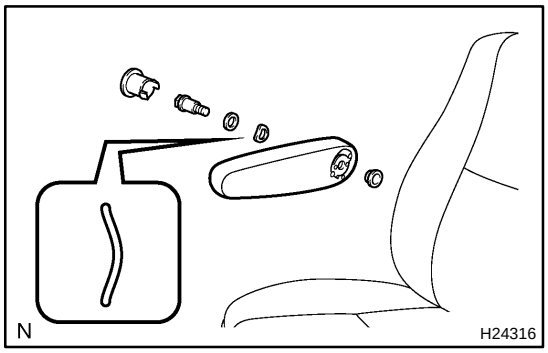


(e) w/ Side airbag:
Connect the seatback cover bracket to the seat frame assembly with the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(f) Close the fastener.



(g) Install the hog rings to the seat frame assembly.



3. INSTALL ARMREST ASSEMBLY

(a) Install the spacer to the armrest assembly.

(b) Install the armrest assembly, armrest lock plate and armrest spacer with the bolt.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

HINT:
Install the armrest lock plate as shown in the illustration.

(c) Install the armrest cap.

4. INSTALL POWER SWITCH

Install the power switch with the 3 screws.

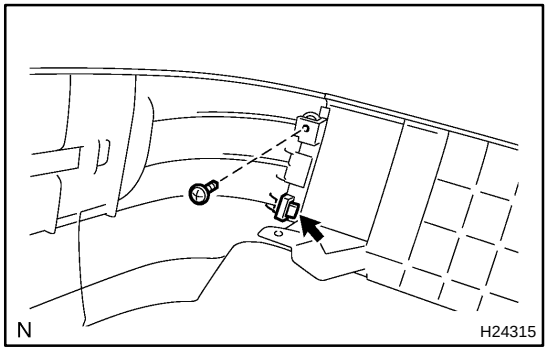
5. INSTALL LUMBAR SWITCH

Install the lumbar switch with the 2 screws to the seat cushion outer shield.

6. INSTALL FRONT SEAT INNER BELT

(a) Install the front seat inner belt with the nut.
Torque: 42 N·m (428 kgf·cm, 31 ft·lbf)

(b) Connect the connectors and wire harness clamps.



7. INSTALL SEAT CUSHION LOWER SHIELD, SEAT CUSHION OUTER SHIELD AND SEAT CUSHION INNER SHIELD

(a) Assemble the seat cushion lower shield and seat cushion outer shield with the screw.

(b) Perform the same procedure on the other side.

(c) Connect the lumbar switch connector to the lumbar switch, and install the seat cushion lower shield, outer shield and inner shield.

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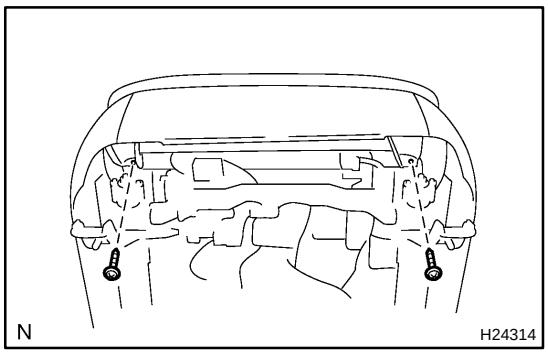
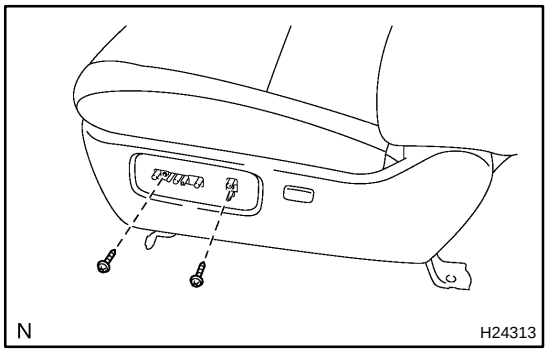
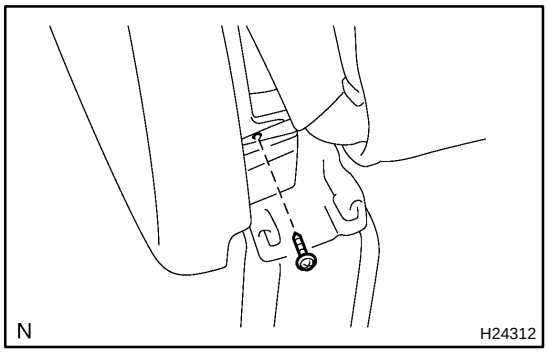


(d) Install the 2 screws to the seat cushion lower shield.
(e) Install the 2 screws to the seat cushion inner shield.



(f) Install the 2 screws to the seat cushion outer shield.



(g) Install the screw to the seat cushion outer shield.

8. INSTALL SLIDE KNOB AND RECLINING KNOB

9. INSTALL HEADREST

10. INSTALL FRONT SEAT

Mount the front seat to the vehicle.

NOTICE:

Be careful not to damage the body.

(a) w/ Side airbag:
Connect the connectors.
(b) Connect the connectors.
(c) Slide the front seat to the rearmost position.
(d) Tighten the bolts on the front side temporarily, starting from the bolt on the inner side.
(e) Tighten them completely.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)
(f) Slide the front seat to the foremost position.
(g) Tighten the bolts on the rear side temporarily, starting from the bolt on the inner side.
(h) Tighten them completely.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

11. INSTALL SEAT TRACK COVERS

12. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

13. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

14. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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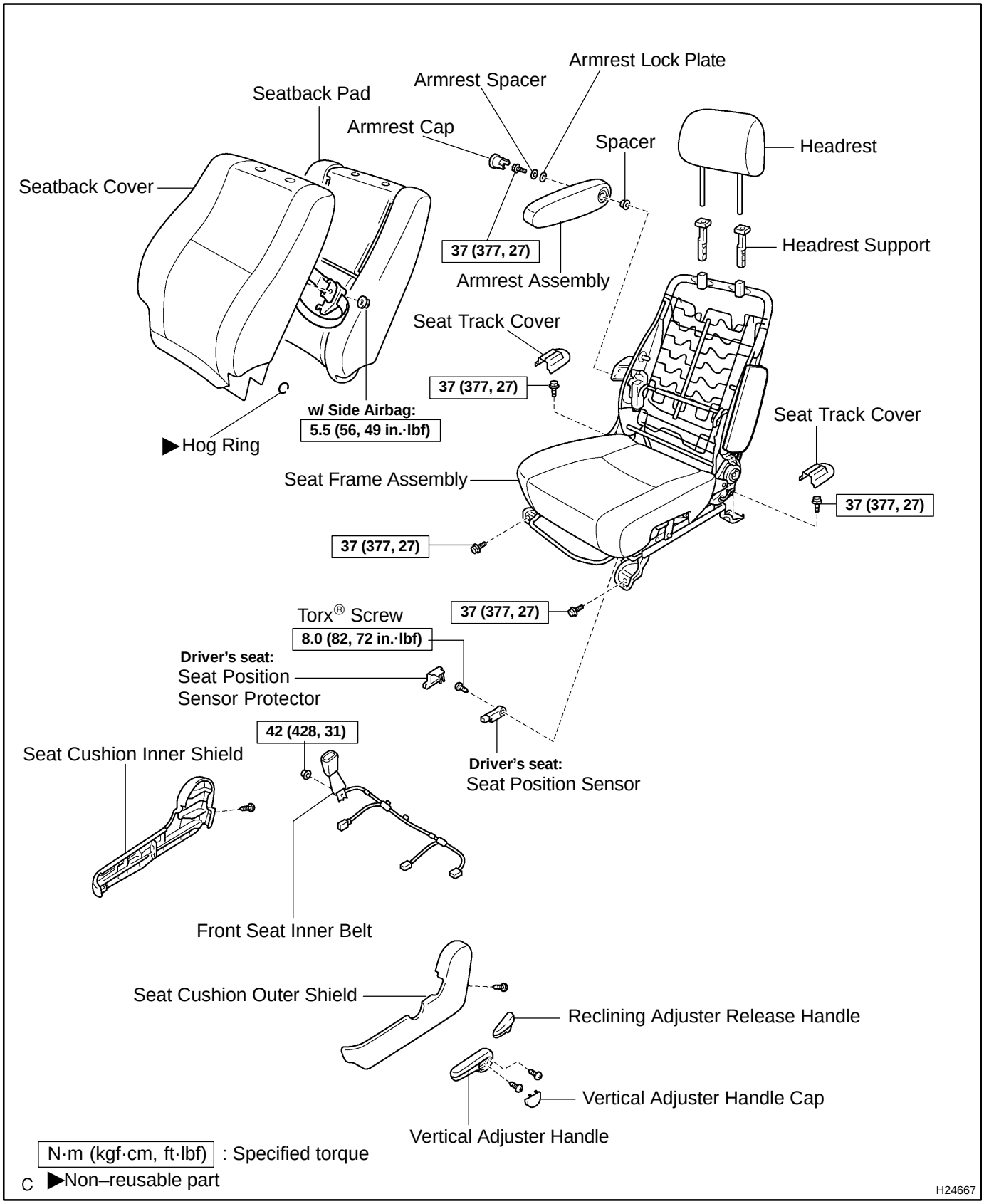
SIDE AIRBAG ASSEMBLY (Manual Adjuster Type)

RS0TD–04

COMPONENTS



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RS11D–01

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is in the ON or ACC position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. PRECAUTION (SEE PAGE RS–1 and RS–3)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. REMOVE SEAT TRACK COVERS

Using a screwdriver, remove the 2 seat track covers.

HINT:

Tape the screwdriver tip before use.

4. REMOVE FRONT SEAT

(a) Remove the 4 bolts.

(b) Disconnect the connectors.

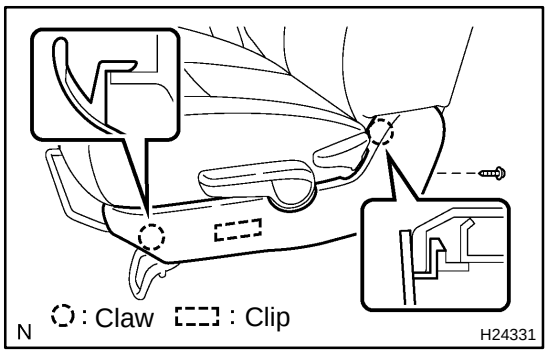
(c) w/ Side airbag:
Disconnect the airbag connector.

(d) Remove the front seat.

NOTICE:

Be careful not to damage the body.

5. REMOVE HEADREST



6. REMOVE SEAT CUSHION OUTER SHIELD

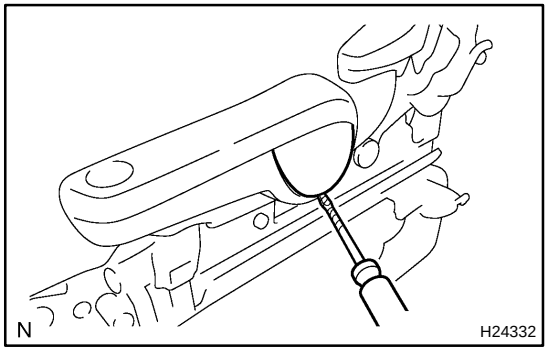
(a) Remove the screw from the seat cushion outer shield.

(b) Using a screwdriver, remove the seat cushion outer shield.

HINT:

Tape the screwdriver tip before use.

7. REMOVE RECLINING ADJUSTER RELEASE HANDLE



8. REMOVE VERTICAL ADJUSTER HANDLE

(a) Using a screwdriver, remove the vertical adjuster handle cap.

HINT:

Tape the screwdriver tip before use.

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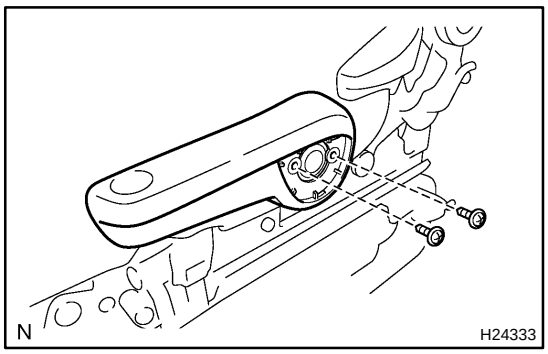
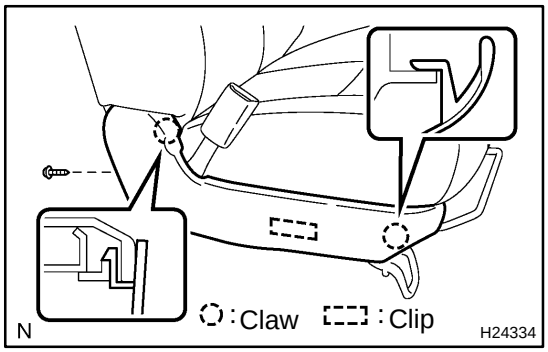


(b) Remove the 2 screws and vertical adjuster handle.



9. REMOVE SEAT CUSHION INNER SHIELD

(a) Remove the screw from the seat cushion inner shield.

(b) Using a screwdriver, remove the seat cushion inner shield.

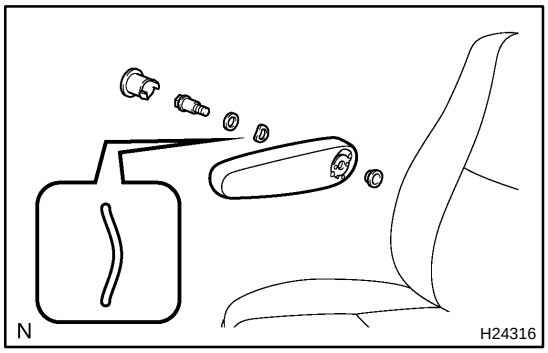
HINT:

Tape the screwdriver tip before use.

10. REMOVE FRONT SEAT INNER BELT

(a) Disconnect the wire harness clamps and connectors.

(b) Remove the nut and front seat inner belt.

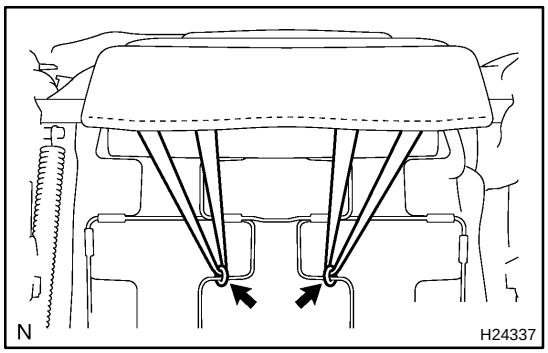


11. REMOVE ARMREST ASSEMBLY

(a) Using a screwdriver, remove the armrest cap.

(b) Remove the bolt, armrest spacer, armrest lock plate and armrest assembly.

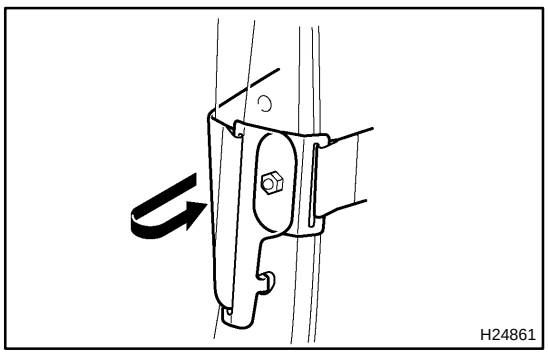
(c) Remove the spacer from the armrest assembly.



12. REMOVE SEATBACK COVER AND PAD

(a) Remove the hog rings from the seat frame assembly.

(b) Open the fastener.



(c) w/ Side airbag:

Remove the nut and disconnect the seatback cover bracket from the seat frame assembly.

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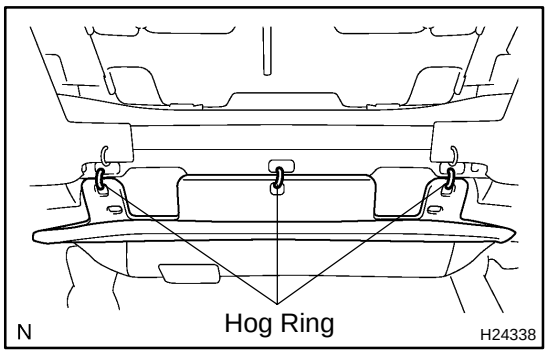
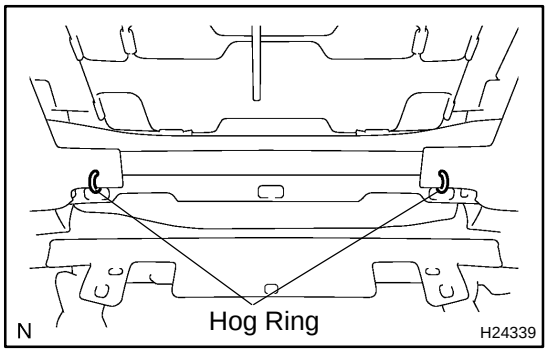
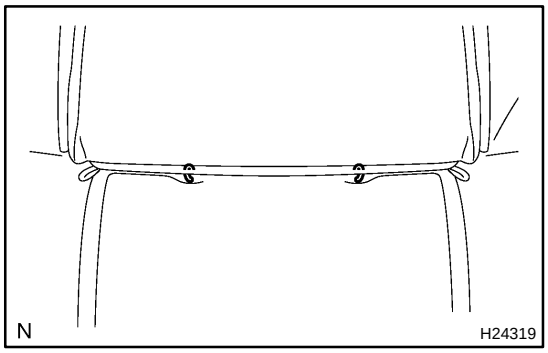


(d) Remove the hog rings shown in the illustration from the seat frame assembly.



(e) Remove the hog rings from the seat frame assembly.
(f) Remove the seatback cover and pad from the seat frame assembly.



13. REMOVE SEATBACK COVER

(a) Turn up the seatback cover and remove the hog rings.
(b) Remove the 2 headrest supports.
(c) Remove the seatback cover from the seatback pad.

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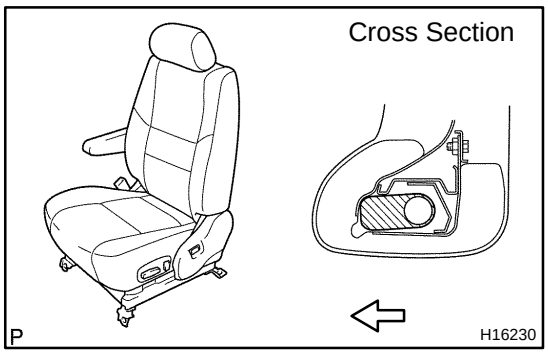
RS0LH–05



INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

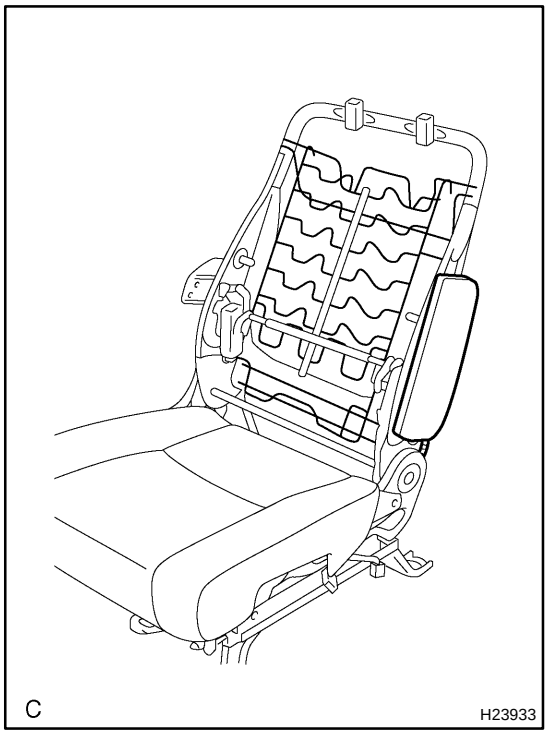
(a) Perform a diagnostic system check (see page DI–1147).

(b) With the front seat airbag assy installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front seatback assy with a new one:

Cuts, minute cracks or marked discoloration on the front seatback assy around the front seat airbag assy.

2. VEHICLE INVOLVED IN A COLLISION AND AIRBAG IS NOT DEPLOYED

(a) Perform a diagnostic system check (see page DI–1147).



(b) Perform a visual check which includes the following items with the seatback assembly removed from the vehicle.

- ▶ Cuts, tears and cracks on the side airbag assembly.
- ▶ Cuts and cracks in wire harness, and chipping in connectors.

CAUTION:

For removal and installation of the front seatback assembly, see page RS–61 and RS–67. Be sure to follow the correct procedure.

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RS0LI–03

DISPOSAL

See page RS–50.

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RS0LJ–03

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the seat frame assembly or seatback cover with a new one.

Case	Replacing part
The side airbag has been deployed.	Seat assembly
The side airbag assembly has been found to be faulty in troubleshooting.	Seat frame assembly
The side airbag assembly has been found to have cuts while checking items (See page RS–64).	Seat frame assembly
The seatback cover has been found to have cuts and frayed seams while checking items (See page RS–64).	Seatback cover
The side airbag assembly has been found to be faulty while checking items (See page RS–64).	Seat frame assembly
The seatback cover has been found to be faulty while checking items (See page RS–64).	Seatback cover
The seatback assembly has been dropped.	Seat frame assembly

CAUTION:

For removal and installation of the seat frame assembly, see page RS–61 and RS–67. Be sure to follow the correct procedure.

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RS11E–01

INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

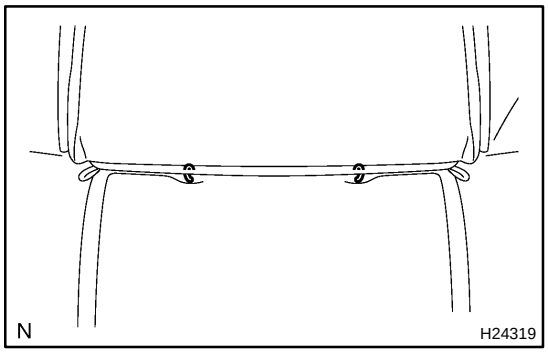
NOTICE:

- **If the side airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the side airbag assembly with a new one.**
- **When installing the side airbag assembly, take care it is not pinched between other parts.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. INSTALL SEATBACK COVER

(a) Install the seatback cover to the seatback pad.

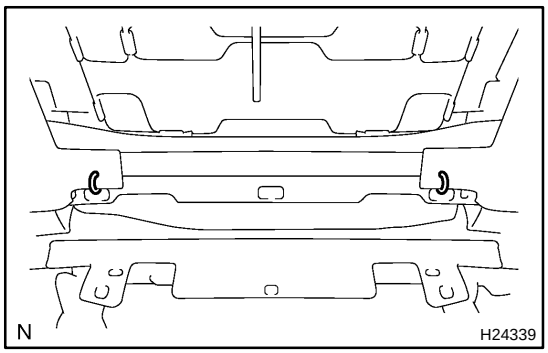
(b) Install the 2 headrest supports.



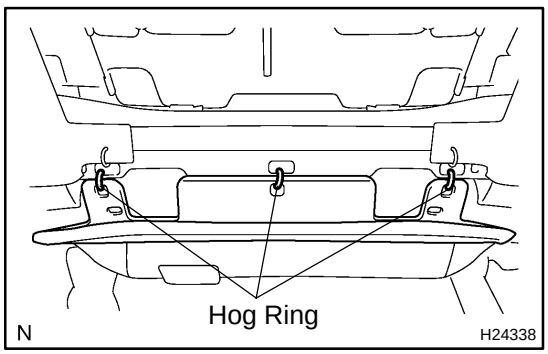
(c) Turn up the seatback cover and install the hog rings.

2. INSTALL SEATBACK COVER AND PAD

(a) Install the seatback cover and pad to the seat frame assembly.



(b) Install the hog rings to the seat frame assembly.



(c) Install the hog rings to the seat frame assembly.

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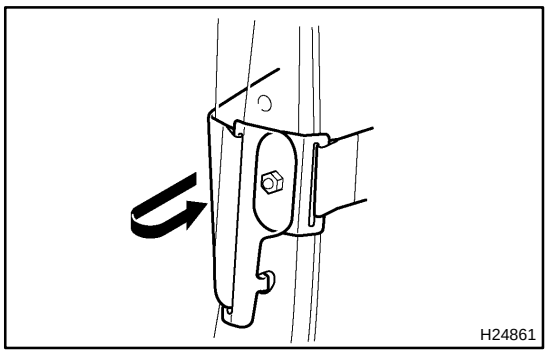
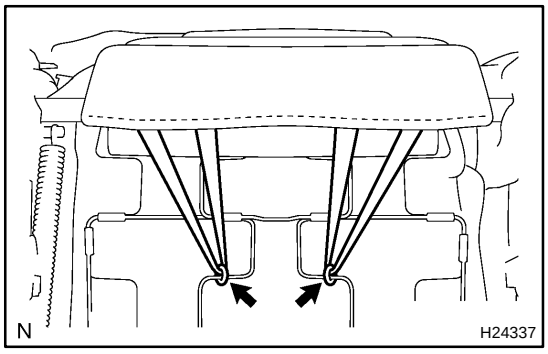
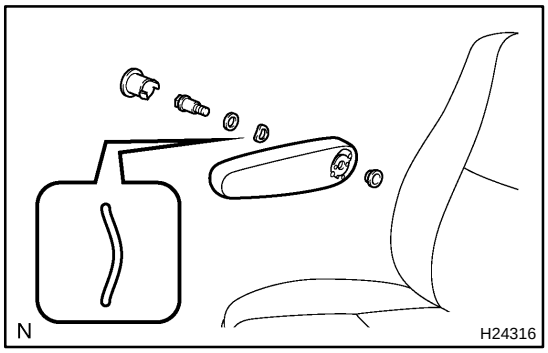


(d) w/ Side airbag:
Connect the seatback cover bracket to the seat frame assembly with the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(e) Close the fastener.



(f) Install the hog rings to the seat frame assembly.



3. INSTALL ARMREST ASSEMBLY

(a) Install the spacer to the armrest assembly.

(b) Install the armrest assembly, armrest lock plate and armrest spacer with the bolt.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

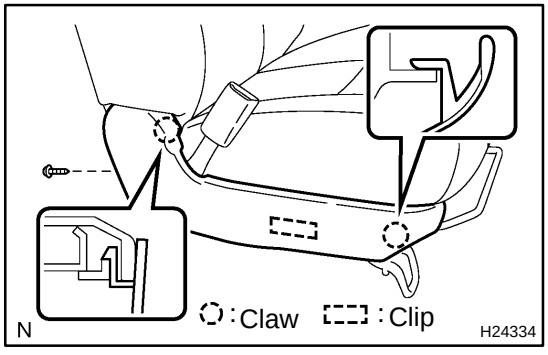
HINT:
Install the armrest lock plate as shown in the illustration.

(c) Install the armrest cap.

4. INSTALL FRONT SEAT INNER BELT

(a) Install the front seat inner belt with the nut.
Torque: 42 N·m (428 kgf·cm, 31 ft·lbf)

(b) Connect the connectors and wire harness clamps.



5. INSTALL SEAT CUSHION INNER SHIELD

Install the seat cushion inner shield with the screw.

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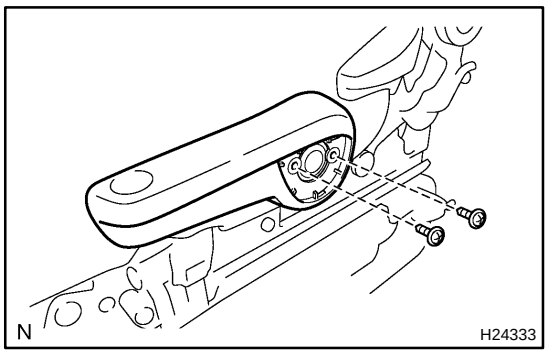
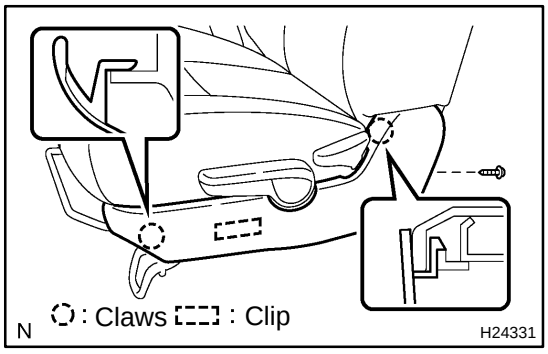


6. INSTALL VERTICAL ADJUSTER HANDLE

(a) Install the vertical adjuster handle with the 2 screws.

(b) Install the vertical adjuster handle cap.

7. INSTALL RECLINING ADJUSTER RELEASE HANDLE



8. INSTALL SEAT CUSHION OUTER SHIELD

Install the seat cushion outer shield with the screw.

9. INSTALL HEADREST

10. INSTALL FRONT SEAT

Mount the front seat to the vehicle.

NOTICE:

Be careful not to damage the body.

(a) w/ Side airbag:
Connect the airbag connector.

(b) Connect the connectors.

(c) Slide the front seat to the rearmost position.

(d) Tighten the bolts on the front side temporarily, starting from the bolt on the inner side.

(e) Tighten them completely.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

(f) Slide the front seat to the foremost position.

(g) Tighten the bolts on the rear side temporarily, starting from the bolt on the inner side.

(h) Tighten them completely.
Torque: 37 N·m (377 kgf·cm, 27 ft·lbf)

11. INSTALL SEAT TRACK COVERS

12. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

13. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

14. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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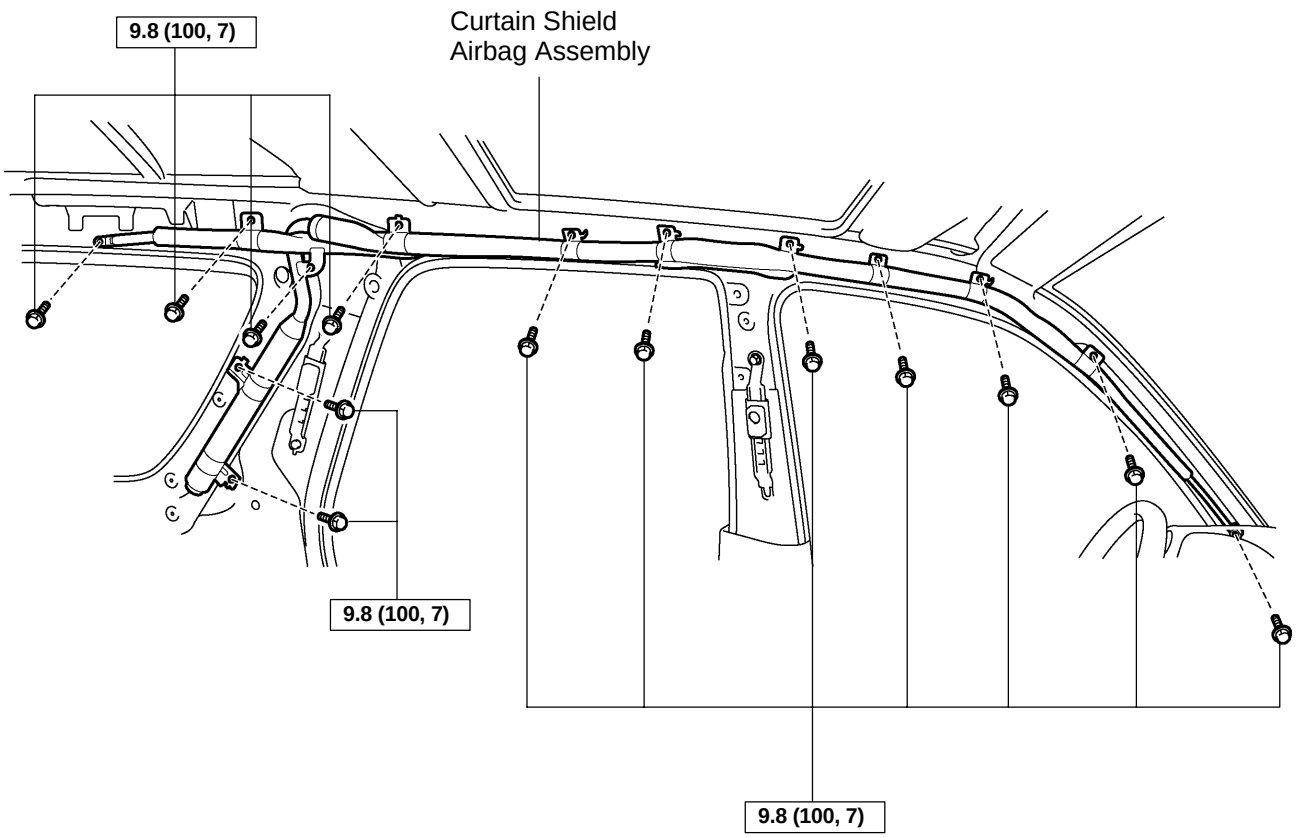
CURTAIN SHIELD AIRBAG ASSEMBLY

RS0N2–16

COMPONENTS



C N·m (kgf·cm, ft·lbf) : Specified torque

H23896

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RS11F–01

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is in the ACC or ON position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. PRECAUTION (SEE PAGE RS–1 and RS–3)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. REMOVE ROOF HEADLINING (SEE PAGE BO–101)

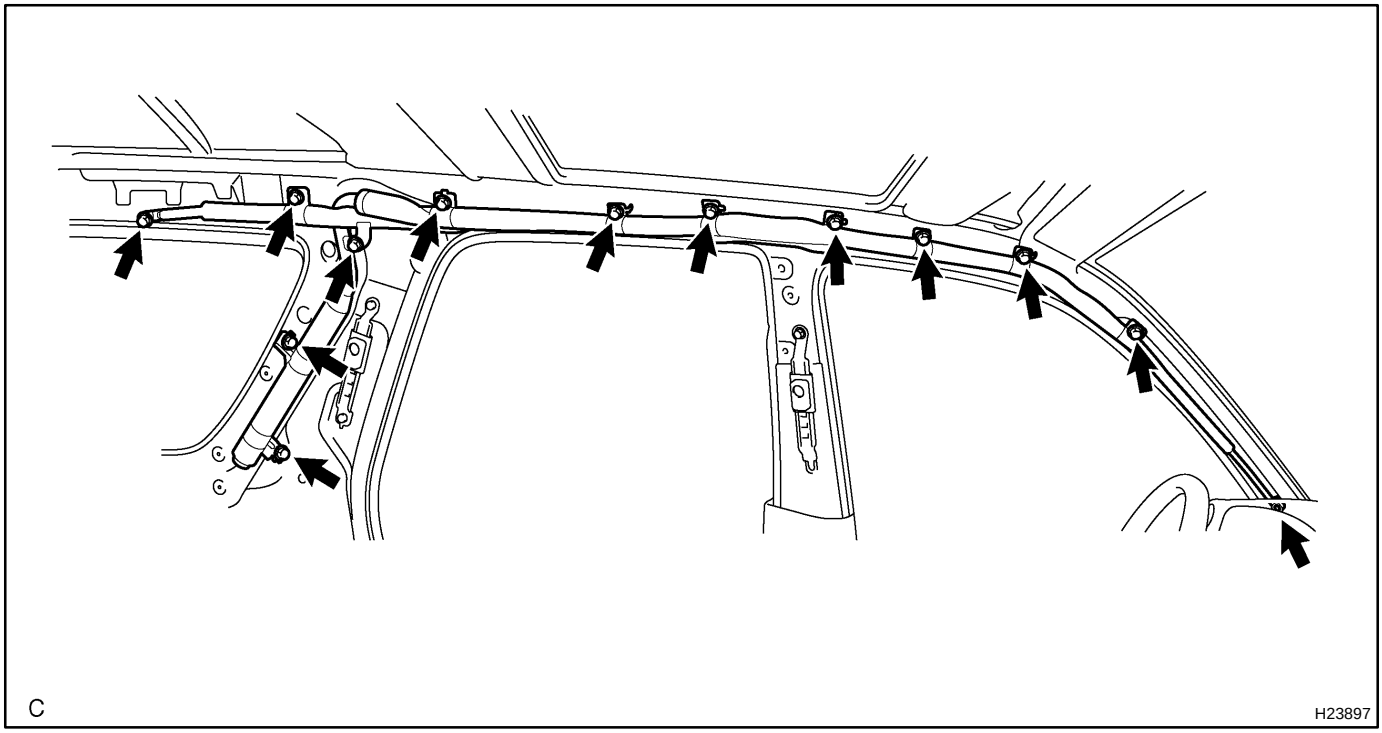
4. REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY

(a) Disconnect the curtain shield airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

(b) Remove the 13 bolts and the curtain shield airbag assembly.



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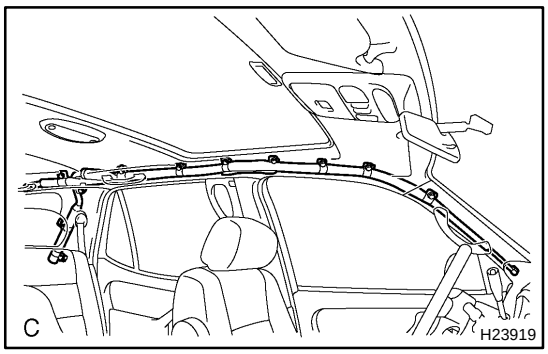
RS0N4–12

INSPECTION



1. VEHICLE NOT INVOLVED IN COLLISION

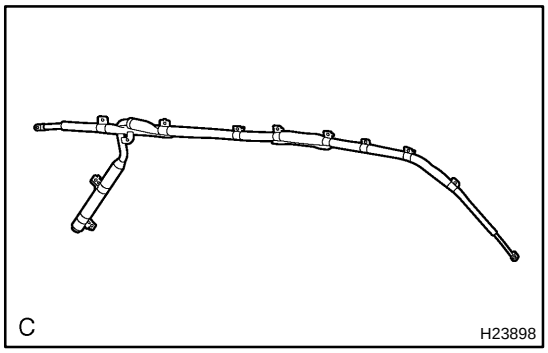
(a) Perform a diagnostic system check (see page DI–1147).

(b) With the curtain shield airbag assembly installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front pillar garnish or roof headlining assy with a new one:

Cuts, minute cracks or marked discoloration on the front pillar garnish or roof headlining assy around the curtain shield airbag assembly.

2. VEHICLE INVOLVED IN A COLLISION AND AIRBAG IS NOT DEPLOYED

(a) Perform a diagnostic system check (see page DI–1147).



(b) With the curtain shield airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the curtain shield airbag assembly with a new one:

- ▶ Cuts, tears and cracks, or marked discoloration on the curtain shield airbag assembly.
- ▶ Cracks or other damage to connector.

CAUTION:

For removal and installation of the curtain shield airbag assembly, see page RS–71 and RS–80. Be sure to follow the correct procedure.

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RS11G–01

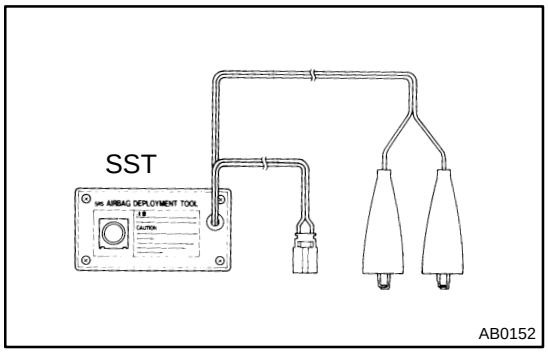
DISPOSAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.
- When scrapping a vehicle equipped with the SRS or disposing of the curtain shield airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a curtain shield airbag assembly which has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**



- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the curtain shield airbag assembly.**
- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:

Prepare a battery as the power source to deploy the airbag.

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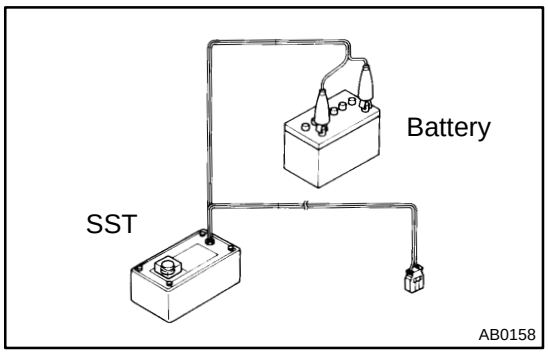


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

(a) Check the function of the SST (see step 1–(a) on page RS–23).
SST 09082–00700

(b) Precaution (see page RS–1 and RS–3).

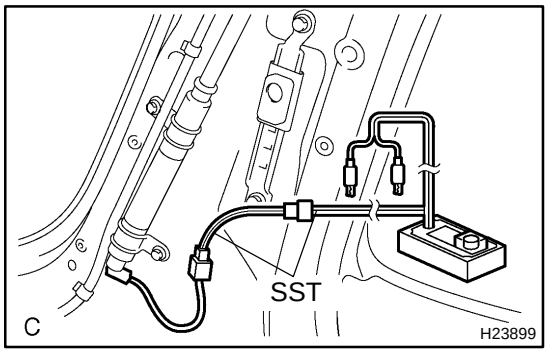
(c) Disconnect the cable from the negative battery terminal. Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

(d) Remove the roof headlining (see page BO–101).

(e) Disconnect the curtain shield airbag connector.

NOTICE:

When handling the airbag connector, be careful not to damage the airbag wire harness.

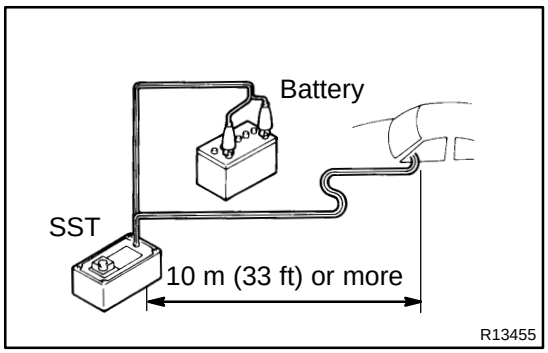


(f) Install the SST.

(1) Connect the connectors of the SST to the curtain shield airbag assembly.
SST 09082–00700, 09082–00802 (09082–10801, 09082–20801)

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Move the SST at least 10 m (33 ft) away from the vehicle rear side window.

(3) Maintaining enough clearance for the SST wire harness in the rear side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (–) terminal.

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(g) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.

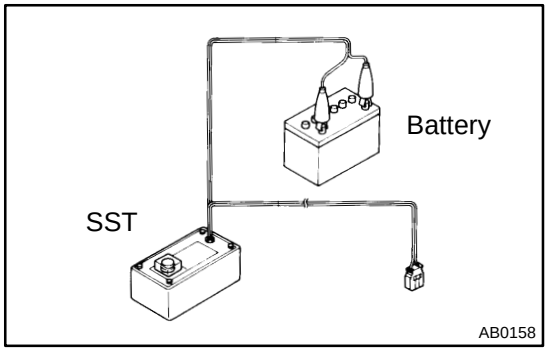
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a curtain shield airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:
The airbag deploys as the LED of the SST activation switch comes on.

2. DEPLOYMENT WHEN DISPOSING OF CURTAIN SHIELD AIRBAG ASSEMBLY

NOTICE:
- **When disposing of the curtain shield airbag assembly, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.



(a) Check the function of the SST (see step 1–(a) on page RS–23).
(b) Remove the curtain shield airbag assembly (see page RS–97).

- **When removing the front passenger airbag assembly, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.**
- **When storing the front passenger airbag assembly, keep the airbag deployment side facing upward.**

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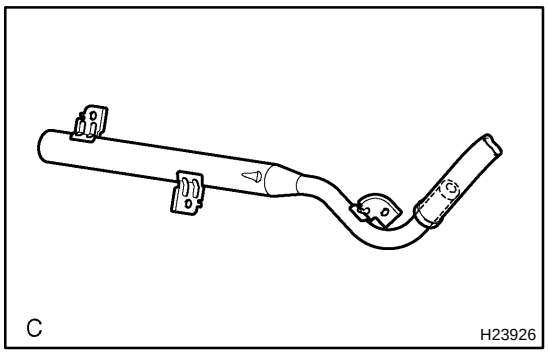
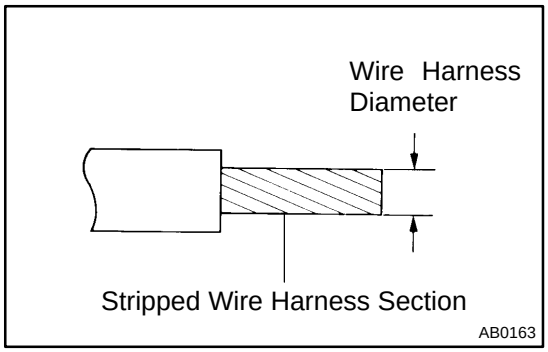


(c) Cut off the deployment section of the curtain shield airbag assembly.

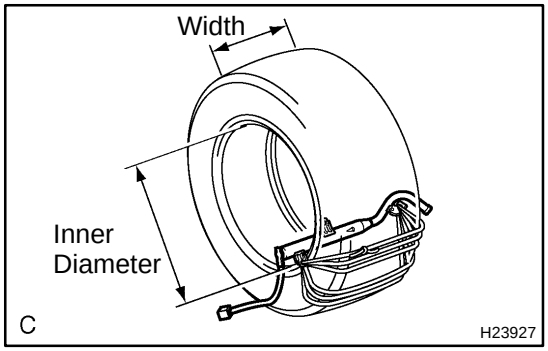


(d) Using a service–purpose wire harness for the vehicle, tie down the front passenger airbag assembly to the tire.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2. or more)

CAUTION:

If the wire harness is too thin or an alternative object is used to tie down the curtain shield airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 in^2.).



HINT:

To calculate the area of the stripped wire harness section:

Area = 3.14 x (Diameter)^2 divided by 4

(1) Position the curtain shield airbag assembly inside the tire with the airbag deployment side facing inside.

Tire size: Must exceed the following dimensions:

Width: 185 mm (7.28 in.)

Inner diameter: 360 mm (14.17 in.)

CAUTION:

- **Make sure that the wire harness is tight. If there is slack in wire harness, the curtain shield airbag assembly may become loose due to the shock when the airbag is deployed.**
- **Always tie down the curtain shield airbag assembly with the airbag deployment side facing inside.**

NOTICE:

The tire will be marked by the airbag deployment, so use an extra tire.

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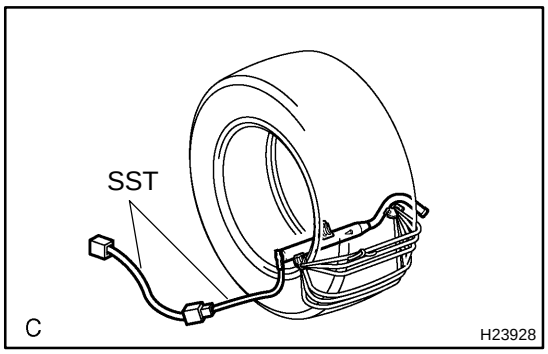
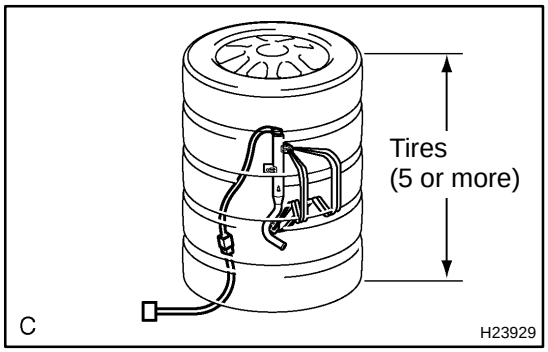
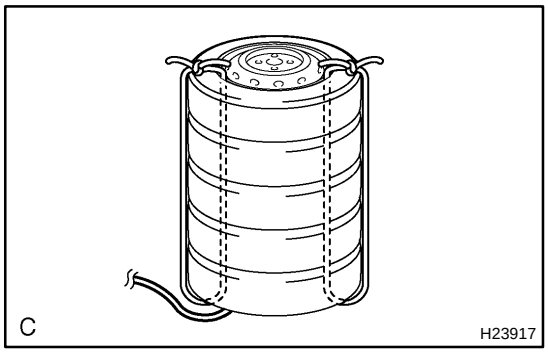


(e) Install the SST.
After connecting the SST below to each other, connect them to the curtain shield airbag assembly.
SST 09082–00802 (09082–10801, 09082–20801)



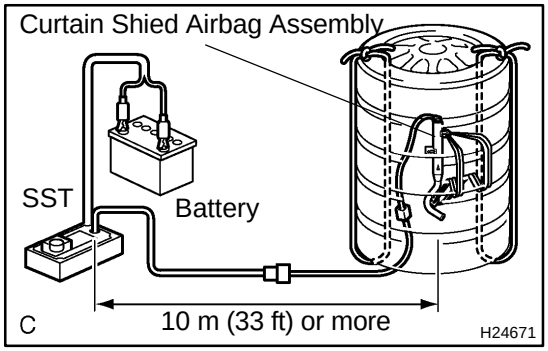
(f) Place tires.
(1) Place at least 2 tires under the tire which the curtain shield airbag assembly is tied to.
(2) Place at least 2 tires over the tire which the curtain shield airbag assembly is tied to. The top tire should have the disc wheel installed.

NOTICE:
Do not place the SST connector under the tire because it could be damaged.



(3) Tie the tires together with 2 wire harness.

CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(g) Install the SST.
Connect the SST connector.
SST 09082–00700

NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(h) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (–) terminal.
(2) Check that no one is within a 10 m (33 ft) radius of the tire which the shield airbag assembly is tied to.

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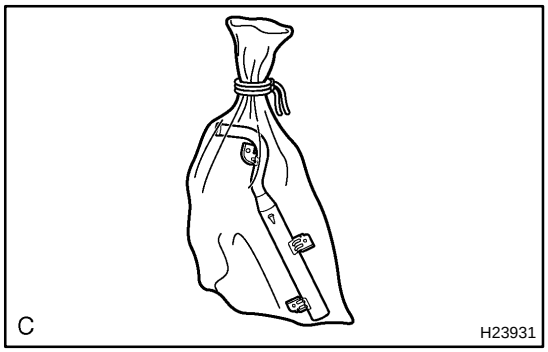
(3) Press the SST activation switch and deploy the airbag.

CAUTION:

When deploying the airbag, make sure that no one is near the tire.

HINT:

The airbag deploys as the LED of the SST activation switch comes on.



(i) Dispose of the curtain shield airbag assembly.

CAUTION:

- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a curtain shield airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the curtain shield airbag assembly from the tire.

(2) Place the curtain shield airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

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RS0N6–10

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the curtain shield airbag assembly or curtain shield airbag cover with a new one.

Case	Replacing part
The curtain shield airbag has been deployed.	Curtain shield airbag assembly
The curtain shield airbag assembly has been found to be faulty in trouble-shooting.	Curtain shield airbag assembly
The curtain shield airbag assembly has been found to be faulty while check-ing items (See page RS–72).	Curtain shield airbag assembly
The front pillar garnish has been found to be faulty while checking items (See page RS–72).	Front pillar garnish
The roof headlining has been found to be faulty while checking items (See page RS–72).	Roof headlining
The curtain shield airbag assembly has been dropped.	Curtain shield airbag assembly

CAUTION:

For removal and installation of the curtain shield airbag assembly, see page RS–71 and RS–80. Be sure to follow the correct procedure.

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RS0TH–07

INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY

(a) Install the curtain shield airbag assembly with the 13 bolts.

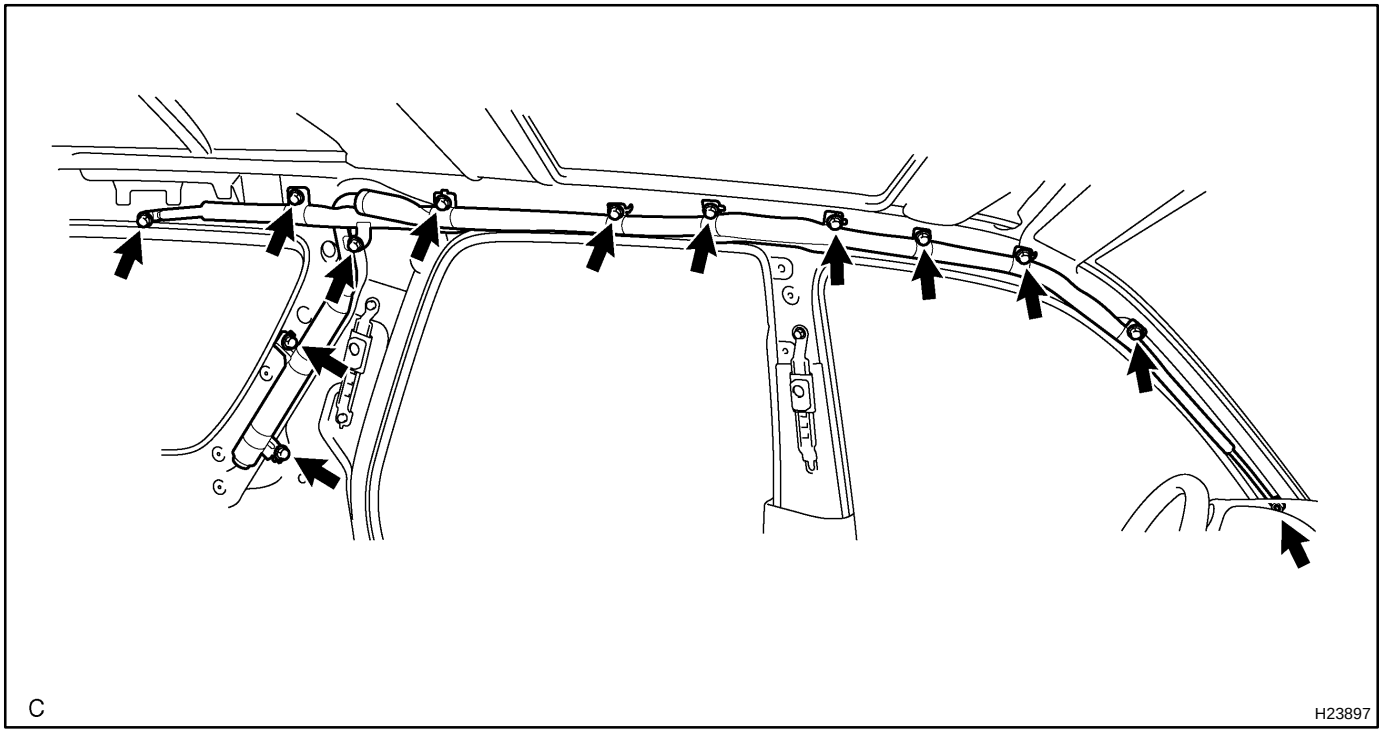
Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)

CAUTION:

Pay attention not to twist the deployment section of the curtain shield airbag assembly.

NOTICE:

- **If the curtain shield airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the curtain shield airbag assembly with a new one.**
- **When installing the curtain shield airbag assembly, take care it is not pinched between other parts.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**



(b) Connect the connector of the curtain shield airbag assembly.

2. INSTALL ROOF HEADLINING (SEE PAGE BO–108)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

5. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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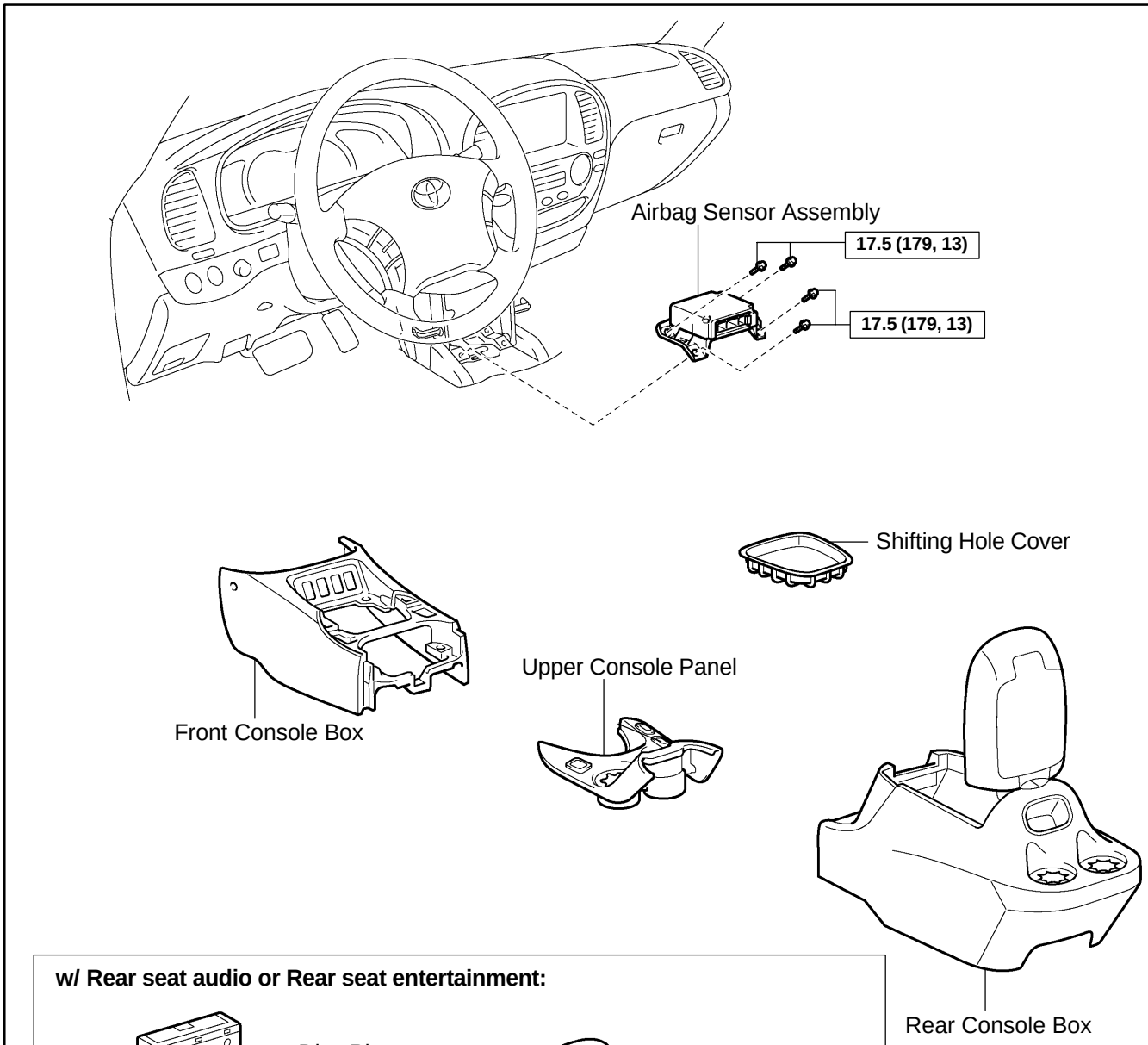
AIRBAG SENSOR ASSEMBLY

COMPONENTS

RS0BK–11



C N·m (kgf·cm, ft·lbf): Specified torque

H24668

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RS0BL–11

REMOVAL

NOTICE:

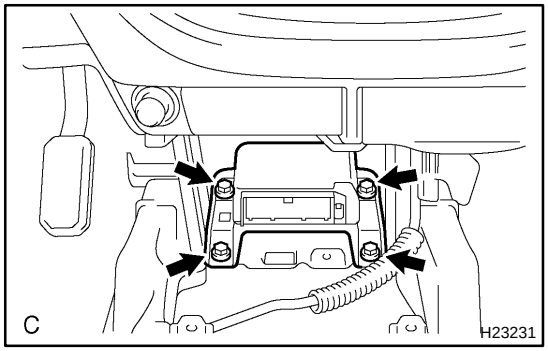
- **If the wiring connector of the SRS is disconnected with the ignition switch in the ON position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. **PRECAUTION (SEE PAGE RS–1 and RS–3)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

- **Never reuse an airbag sensor assembly if the airbag has previously deployed in a collision.**

3. **REMOVE SHIFTING HOLE COVER (SEE PAGE BO–89)**
4. **REMOVE UPPER CONSOLE PANEL (SEE PAGE BO–89)**
5. **REMOVE REAR CONSOLE BOX (SEE PAGE BO–89)**
6. **REMOVE FRONT CONSOLE BOX (SEE PAGE BO–89)**



7. **REMOVE AIRBAG SENSOR ASSEMBLY**

(a) Disconnect the holder (with connectors) from the airbag sensor assembly.

(b) Remove the 4 bolts and airbag sensor assembly.

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RS0BM–06

INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

Perform a diagnostic system check (see page DI–1147).

2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

Perform a diagnostic system check (see page DI–1147).

3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED

Replace the airbag sensor assembly (see page DI–1147).

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RS0BN–05

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the airbag sensor assembly with a new one.

- The SRS has been deployed in a collision.
- The airbag sensor assembly has been found to be faulty in troubleshooting.
- The airbag sensor assembly has been dropped.

CAUTION:

For removal and installation of the airbag sensor assembly, see page RS–82 and RS–85. Be sure to follow the correct procedure.

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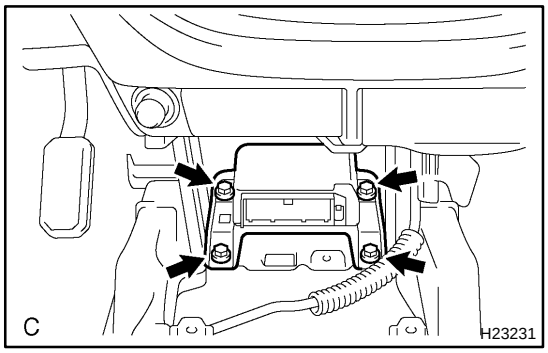
RS0BO–11

INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the airbag sensor assembly involved in a collision when the airbag has deployed.**
- **If the airbag sensor assembly center has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **When installing the airbag sensor assembly center, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
- **After installing, shake the airbag sensor assembly to check that there is no looseness.**



1. INSTALL AIRBAG SENSOR ASSEMBLY

(a) Install the airbag sensor assembly with the 4 bolts.
Torque: 17.5 N·m (179 kgf·cm, 13 ft·lbf)

(b) Connect the airbag sensor holder (with connectors).

2. INSTALL FRONT CONSOLE BOX ASSEMBLY (SEE PAGE BO–89)

3. INSTALL REAR CONSOLE BOX ASSEMBLY (SEE PAGE BO–89)

4. INSTALL UPPER CONSOLE PANEL (SEE PAGE BO–89)

5. INSTALL SHIFTING HOLE COVER (SEE PAGE BO–89)

6. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

7. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

8. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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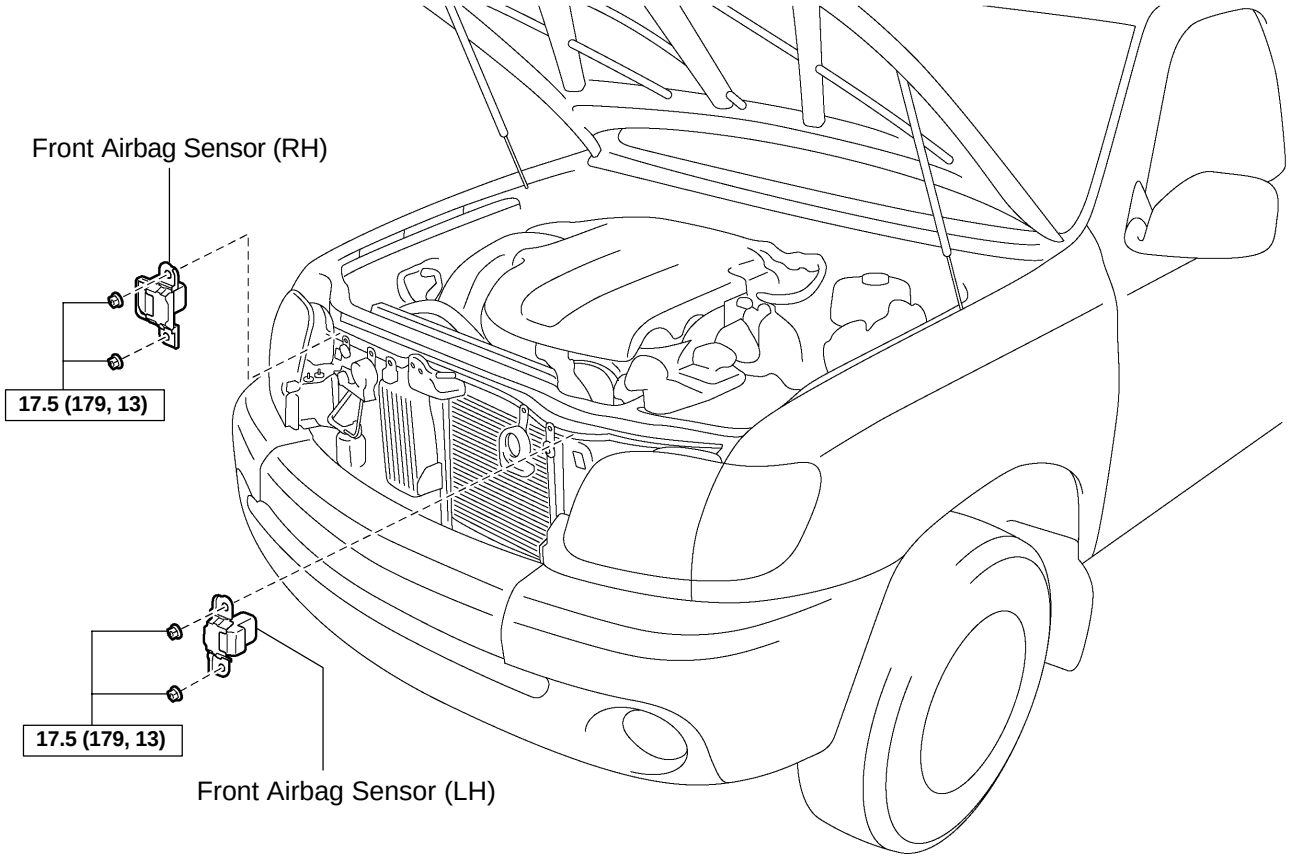
FRONT AIRBAG SENSOR

COMPONENTS

RS0BP–11



C N·m (kgf·cm, ft·lbf): Specified torque

H23878

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RS0TI–03

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

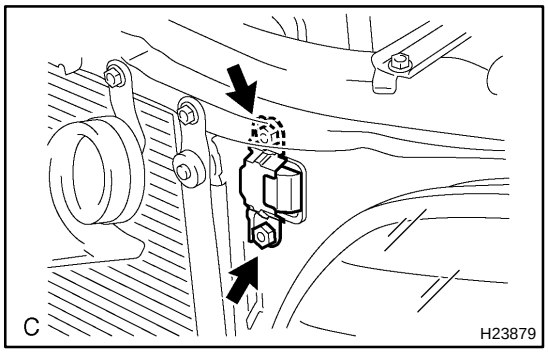
NOTICE:

- **If the wiring connector of the SRS is disconnected with the ignition switch in the ON position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse a front airbag sensor if the airbag has previously deployed in a collision.**

1. PRECAUTION (SEE PAGE RS–1 and RS–3)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.



3. REMOVE FRONT AIRBAG SENSOR LH

(a) Disconnect the front airbag sensor LH connector.

NOTICE:

Disconnect the connector with the sensor assembly installed.

(b) Remove the 2 nuts and front airbag sensor LH.

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RS11H–01

INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

Perform a diagnostic system check (see page DI–1147).

2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

Perform a diagnostic system check (see page DI–1147).

3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED

Replace the front airbag sensor LH and RH (see page DI–1147).

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RS0BS–07

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the front airbag sensor with a new one.

- The SRS has been deployed in a collision. (replace both the left and right airbag sensors.)
- The front airbag sensor has been found to be faulty in troubleshooting.
- The front airbag sensor has been found to be faulty while checking items (see page RS–88).
- The front airbag sensor has been dropped.

CAUTION:

For removal and installation of the front airbag sensor, see page RS–87 and RS–90. Be sure to follow the correct procedure.

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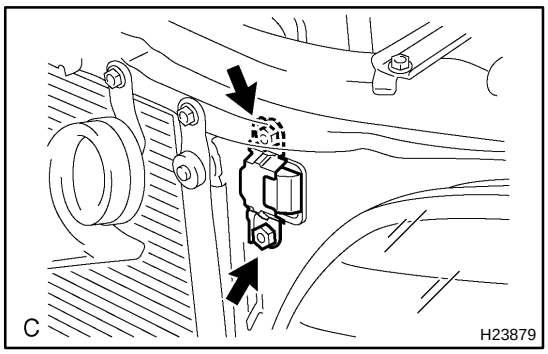

RS11I–01

INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the front airbag sensor involved in a collision when the airbag has deployed.**
- **If the front airbag sensor center has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **When installing the front airbag sensor center, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
- **After installing, shake the front airbag sensor to check that there is no looseness.**

1. INSTALL FRONT AIRBAG SENSORS LH

(a) Install the front airbag sensors LH with the 2 nuts.

Torque: 17.5 N·m (179 kgf·cm, 13 ft·lbf)

(b) Connect the front airbag sensor connectors.

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

3. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

4. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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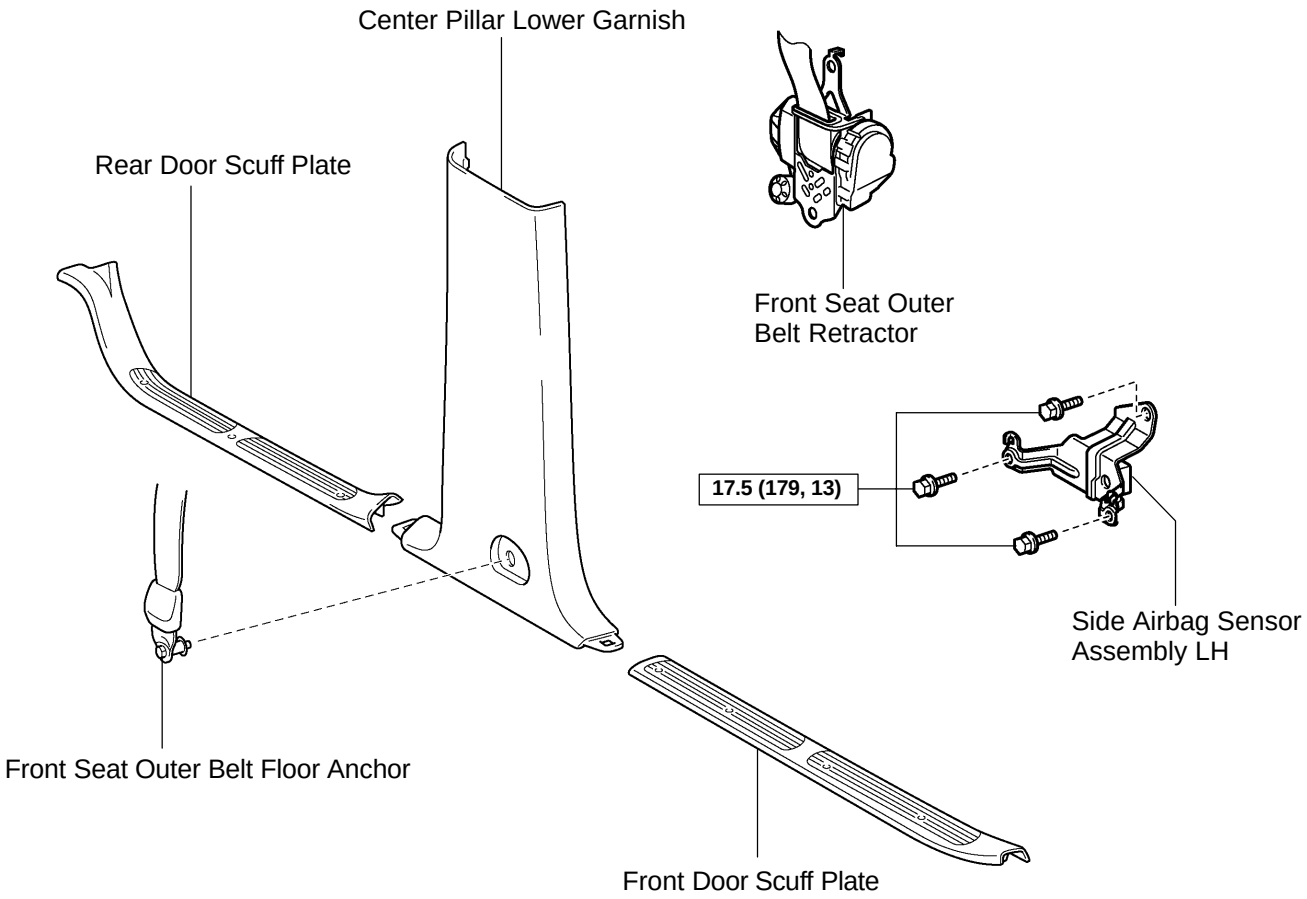
SIDE AIRBAG SENSOR ASSEMBLY

RS11J–01

COMPONENTS



C N·m (kgf·cm, ft·lbf) : Specified torque

H23903

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RS11K–01

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

NOTICE:

- **If the wiring connector of the SRS is disconnected with the ignition switch in the ON position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the side airbag sensor assembly if the airbag has previously deployed in a collision.**

1. PRECAUTION (SEE PAGE RS–1 and RS–3)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

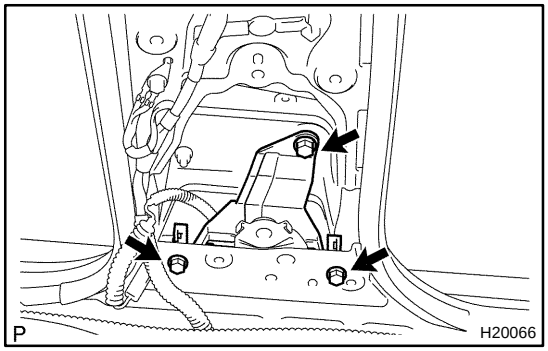
3. REMOVE FRONT DOOR SCUFF PLATE (SEE PAGE BO–89)

4. REMOVE REAR DOOR SCUFF PLATE (SEE PAGE BO–89)

5. REMOVE FRONT SEAT OUTER BELT FLOOR ANCHOR (SEE PAGE BO–101)

6. REMOVE CENTER PILLAR LOWER GARNISH (SEE PAGE BO–101)

7. REMOVE FRONT SEAT OUTER BELT RETRACTOR (SEE PAGE BO–163)



8. REMOVE SIDE AIRBAG SENSOR ASSEMBLY LH

(a) Disconnect the connector from the side airbag sensor assembly LH.

(b) Remove the 3 bolts and the side airbag sensor assembly LH.

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RS11L–01

INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

Perform a diagnostic system check (see page DI–1147).

2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

Perform a diagnostic system check (see page DI–1147).

3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED

Replace the side airbag sensor assembly (see page DI–1147).

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RS11M–01

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the side airbag sensor assembly with a new one.

- The side airbag assembly has been deployed in a collision.
- The side airbag sensor assembly has been found to be faulty in troubleshooting.
- The side airbag sensor assembly has been dropped.

CAUTION:

For removal and installation of the side airbag sensor assembly, see page RS–92 and RS–95. Be sure to follow the correct procedure.

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RS11N–01

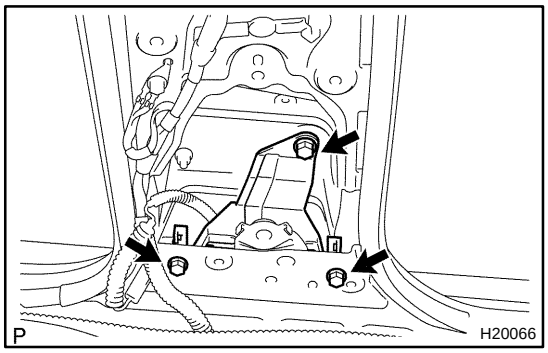
INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the side airbag sensor assembly involved in a collision when the airbag has deployed.**
- **If the side airbag sensor assembly center has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **When installing the side airbag sensor assembly, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
- **After installing, shake the side airbag sensor assembly to check that there is no looseness.**



1. INSTALL SIDE AIRBAG SENSOR ASSEMBLY LH

(a) Install the side airbag sensor assembly LH with the 3 bolts.

Torque: 17.5 N·m (179 kgf·cm, 13 ft·lbf)

(b) Connect the connector to the side airbag sensor assembly LH.

2. INSTALL FRONT SEAT OUTER BELT RETRACTOR (SEE PAGE BO–172)

3. INSTALL CENTER PILLAR LOWER GARNISH (SEE PAGE BO–108)

4. INSTALL FRONT SEAT OUTER BELT FLOOR ANCHOR (SEE PAGE BO–108)

5. INSTALL REAR DOOR SCUFF PLATE (SEE PAGE BO–97)

6. INSTALL FRONT DOOR SCUFF PLATE (SEE PAGE BO–97)

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

8. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

9. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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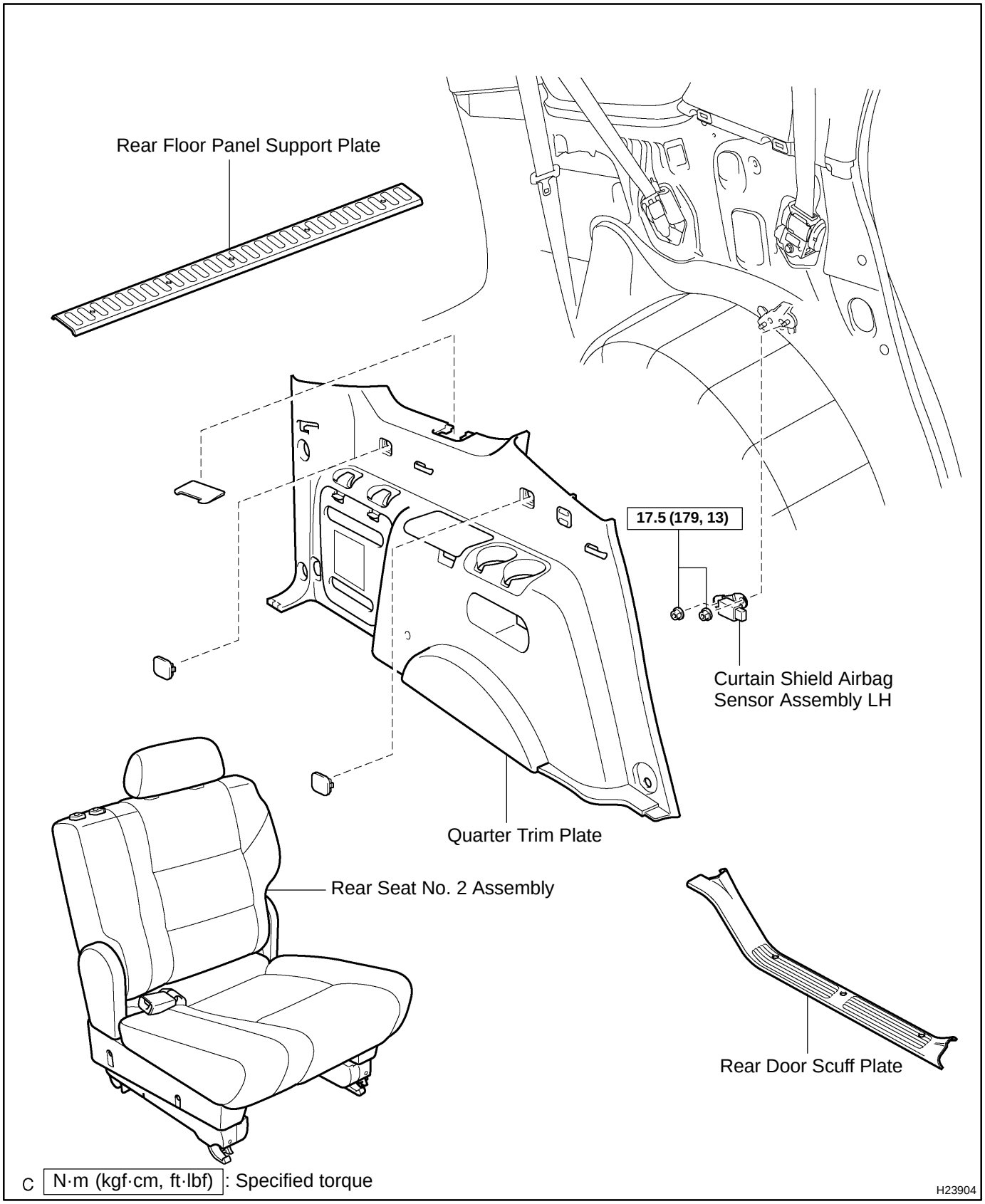
CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

RS11O–01

COMPONENTS



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RS11P–01

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

NOTICE:

- **If the wiring connector of the SRS is disconnected with the ignition switch in the ON position, DTCs will be recorded.**
- **Never use airbag parts from another vehicle. When replacing parts, replace them with new ones.**

1. PRECAUTION (SEE PAGE RS–1 and RS–3)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

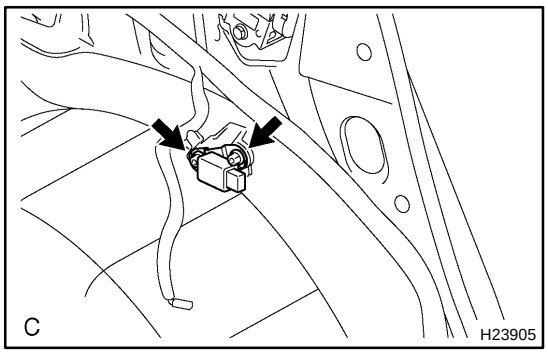
Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. REMOVE REAR SEAT NO. 2 ASSEMBLY (SEE PAGE BO–157)

4. REMOVE REAR DOOR SCUFF PLATE (SEE PAGE BO–101)

5. REMOVE REAR FLOOR PANEL SUPPORT PLATE (SEE PAGE BO–101)

6. REMOVE QUARTER TRIM PLATE (SEE PAGE BO–101)



7. REMOVE CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY LH

(a) Disconnect the curtain shield airbag sensor assembly LH connector.

NOTICE:

Disconnect the connector with the sensor assembly installed.

(b) Remove the 2 nuts and curtain shield airbag sensor assembly LH.

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RS11Q–01

INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

Perform a diagnostic system check (see page DI–1147).

2. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS NOT DEPLOYED

Perform a diagnostic system check (see page DI–1147).

3. VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED

Replace the curtain shield airbag sensor assembly (see page DI–1147).

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RS11R–01

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the curtain shield airbag sensor assembly with a new one.

- The curtain shield airbag assembly has been deployed in a collision.
- The curtain shield airbag sensor assembly has been found to be faulty in troubleshooting.
- The curtain shield airbag sensor assembly has been dropped.

CAUTION:

For removal and installation of the curtain shield airbag sensor assembly, see page RS–97 and RS–100. Be sure to follow the correct procedure.

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RS11S–01

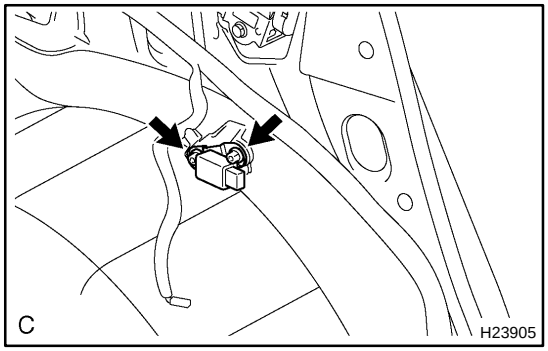
INSTALLATION

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the curtain shield airbag sensor assembly involved in a collision when the airbag has deployed.**
- **If the curtain shield airbag sensor assembly center has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **When installing the curtain shield airbag sensor assembly center, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
- **After installing, shake the curtain shield airbag sensor assembly to check that there is no looseness.**



1. INSTALL CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY LH

(a) Install the curtain shield airbag sensor assembly LH with the 2 nuts.

Torque:17.5 N·m (179 kgf·cm, 13 ft·lbf)

(b) Connect the curtain shield airbag sensor assembly LH connector.

2. INSTALL RETRACTOR OF FRONT SEAT OUTER BELT

3. INSTALL QUARTER TRIM PLATE
(SEE PAGE BO–108)

4. INSTALL REAR FLOOR PANEL SUPPORT PLATE
(SEE PAGE BO–108)

5. INSTALL REAR DOOR SCUFF PLATE
(SEE PAGE BO–108)

6. INSTALL REAR SEAT NO. 2 ASSEMBLY
(SEE PAGE BO–158)

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

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8. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

9. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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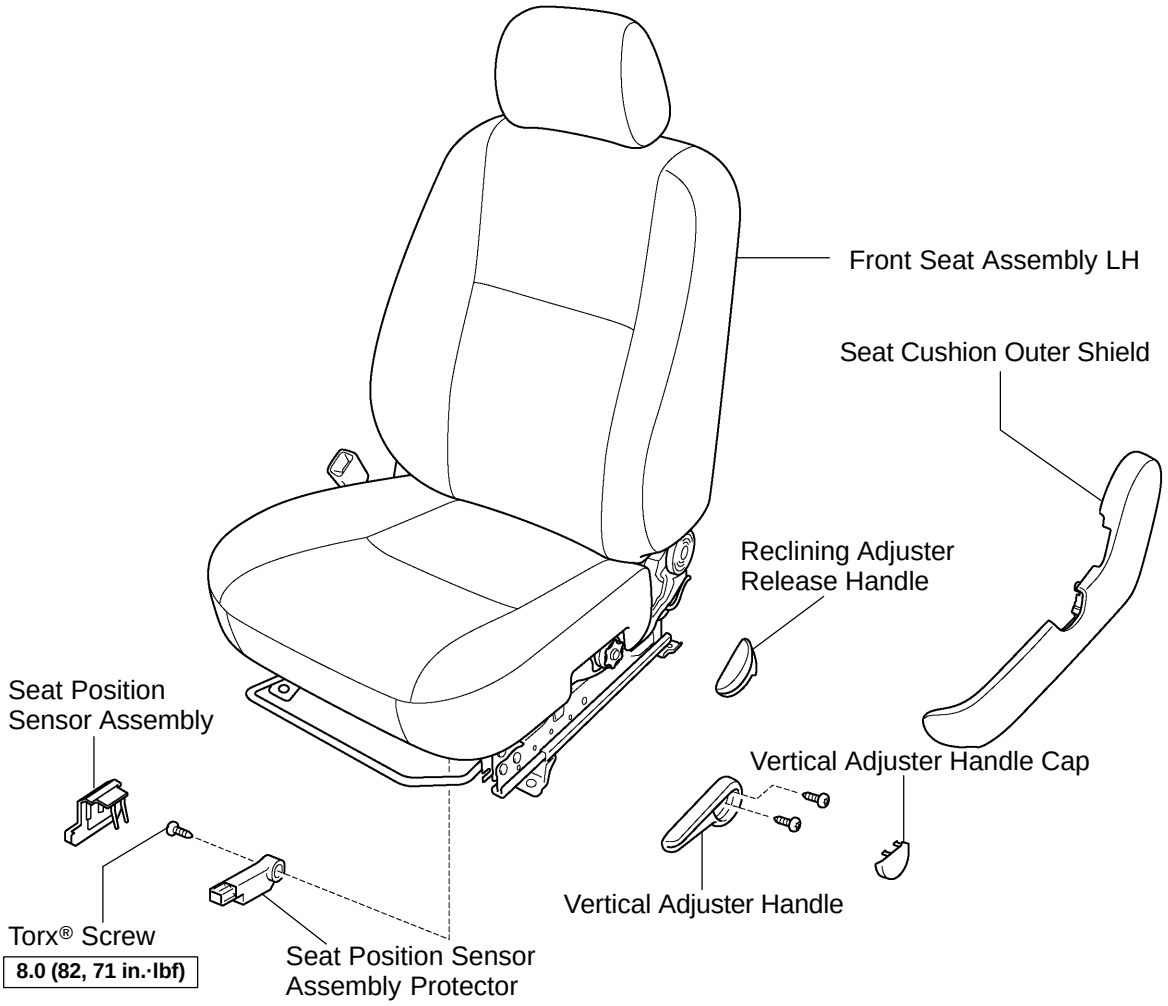
SEAT POSITION SENSOR ASSEMBLY

COMPONENTS

RS11T–01

Separate Type (Manual Adjuster):



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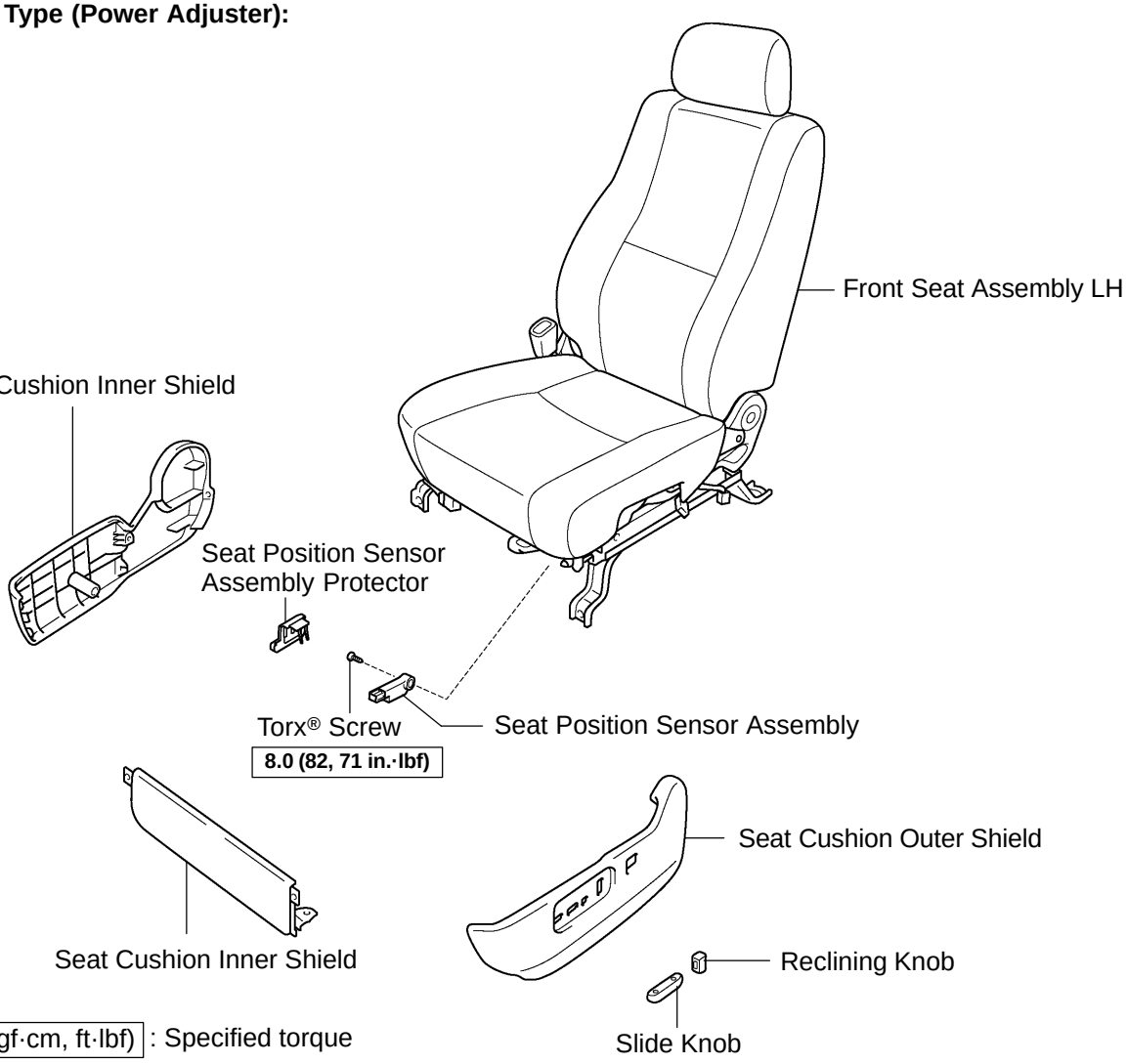
Separate Type (Power Adjuster):



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RS0UV–05

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected with the ignition switch in the ON position, DTCs will be recorded.**
- **Never use SRS parts from another vehicle. When replacing the parts, replace them with new ones.**
- **Never reuse the seat position sensor assembly if the airbag has previously deployed in a collision.**

1. **PRECAUTION (SEE PAGE RS–1 and RS–3)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. **Separate type (Manual adjuster): REMOVE FRONT SEAT ASSEMBLY LH (SEE PAGE BO–111)**
4. **Separate type (Manual adjuster): REMOVE VERTICAL ADJUSTER HANDLE (SEE PAGE BO–125)**
5. **Separate type (Manual adjuster): REMOVE SEAT CUSHION OUTER SHIELD (SEE PAGE BO–125)**
6. **Separate type (Power adjuster): REMOVE FRONT SEAT ASSEMBLY LH (SEE PAGE BO–111)**
7. **Separate type (Power adjuster): REMOVE SLIDE KNOB AND RECLINING KNOB (SEE PAGE BO–112)**
8. **Separate type (Power adjuster): REMOVE SEAT CUSHION LOWER SHIELD, SEAT CUSHION OUTER SHIELD AND SEAT CUSHION INNER SHIELD (SEE PAGE BO–112)**

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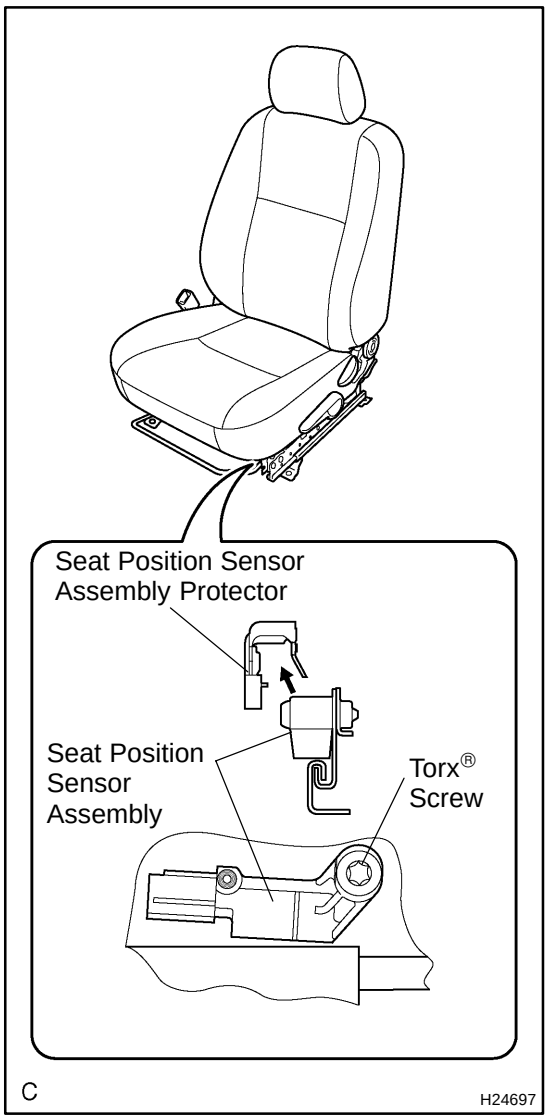

9. REMOVE SEAT POSITION SENSOR ASSEMBLY PROTECTOR

Remove the seat position sensor assembly protector from the seat position sensor assembly.

10. REMOVE SEAT POSITION SENSOR ASSEMBLY

(a) Disconnect the connector from the seat position sensor assembly.

(b) Using a torx® socket wrench (T30), remove the torx® screw and the seat position sensor assembly.

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RS0UW–05

INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

Perform a diagnostic system check (see page DI–1147).

2. VEHICLE INVOLVED IN COLLISION

(a) Perform a diagnostic system check (see page DI–1147).

(b) Even if the airbag was not deployed, perform a visual check for damage to the seat position sensor assembly. If there are any defects mentioned below, replace the seat position sensor assembly with a new one:

- Cracks, dents or chips in the case.
- Cracks or other damage to the connector.

CAUTION:

For removal and installation procedures of the seat position sensor assembly, see page RS–104 and RS–108. Be sure to follow the correct procedure.

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RS0UX–04

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the seat position sensor assembly with a new one.

- The seat position sensor assembly has been found to be faulty in troubleshooting.
- The seat position sensor assembly has been dropped.

CAUTION:

For removal and installation procedures of the seat position sensor assembly, see page RS–104 and RS–108. Be sure to follow the correct procedure.

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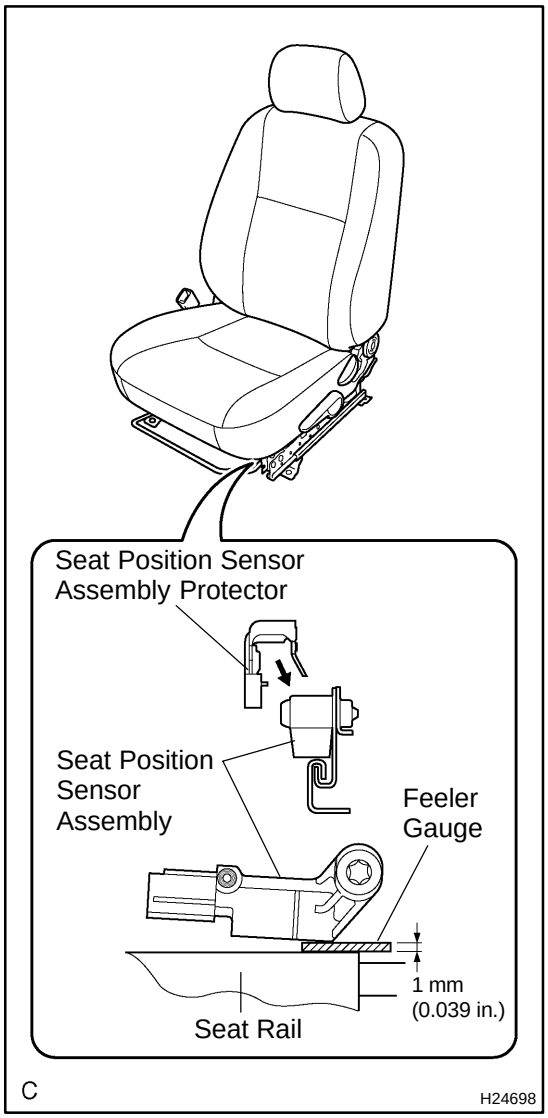
RS0UY–05

INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the seat position sensor assembly involved in a collision when the airbag has deployed.**
- **If the seat position sensor assembly center has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **When installing the seat position sensor assembly center, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
- **After installing, shake the seat position sensor assembly to check that there is no looseness.**



1. INSTALL SEAT POSITION SENSOR ASSEMBLY

(a) Using a feeler gauge 1 mm (0.039 in.), install the seat position sensor assembly.

HINT:

Be sure that a clearance between the seat position sensor assembly and the seat rail is between 0.6 mm (0.023 in.) and 2 mm (0.079 in.).

(b) Using a torx® socket wrench, tighten the torx® screw to install the seat position sensor assembly.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(c) Make sure that a clearance between the seat position sensor assembly and the seat rail is between 0.6 mm (0.023 in.) and 2 mm (0.079 in.).

(d) Connect the connector to the seat position sensor assembly.

2. INSTALL SEAT POSITION SENSOR ASSEMBLY PROTECTOR

Install the seat position sensor assembly protector to the seat position sensor assembly.

3. Separate type (Power adjuster): INSTALL SEAT CUSHION LOWER SHIELD, SEAT CUSHION OUTER SHIELD AND SEAT CUSHION INNER SHIELD (SEE PAGE BO–117)

4. Separate type (Power adjuster): INSTALL SLIDE KNOB AND RECLINING KNOB (SEE PAGE BO–117)

5. Separate type (Power adjuster): INSTALL FRONT SEAT ASSEMBLY LH (SEE PAGE BO–123)

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6. **Separate type (Manual adjuster): INSTALL SEAT CUSHION OUTER SHIELD (SEE PAGE BO–130)**
7. **Separate type (Manual adjuster): INSTALL VERTICAL ADJUSTER HANDLE (SEE PAGE BO–130)**
8. **Separate type (Manual adjuster): INSTALL FRONT SEAT ASSEMBLY LH (SEE PAGE BO–134)**
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
10. **PERFORM INITIALIZATION (SEE PAGE BE–77)**

Some system need initialization when disconnecting the cable from the negative battery terminal.

11. **INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)**

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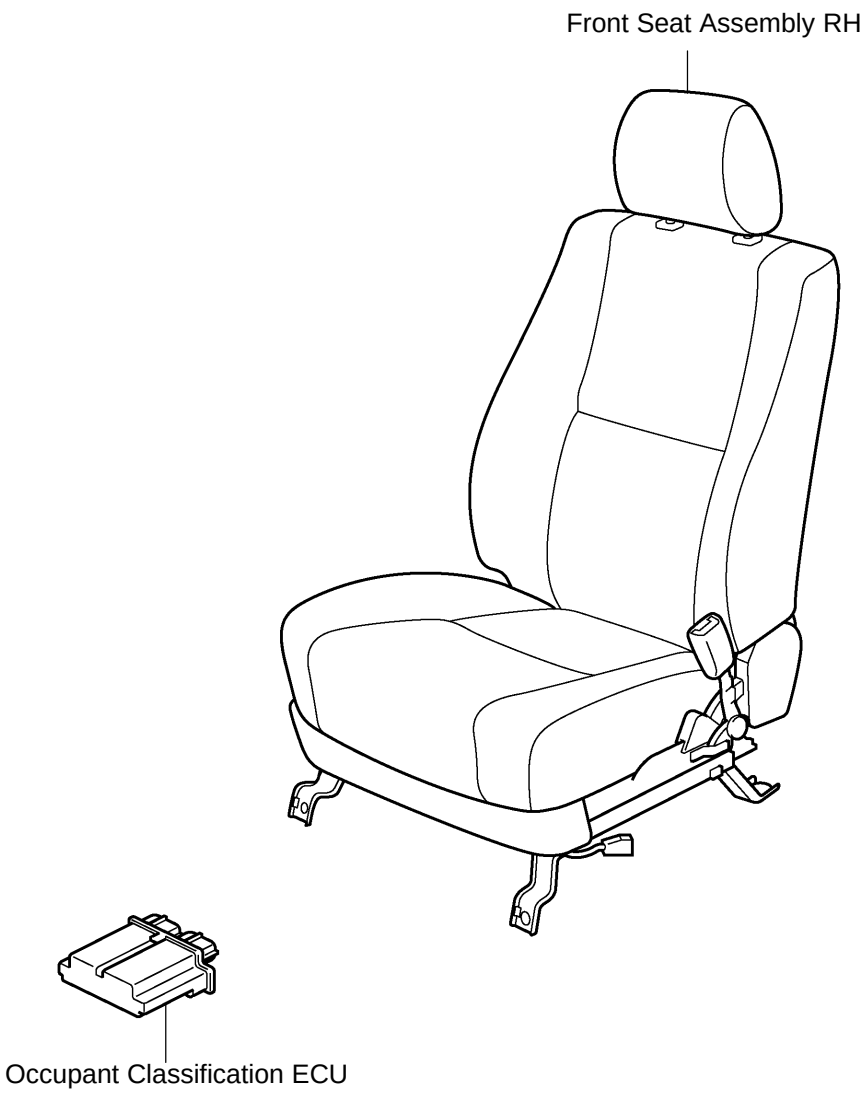
OCCUPANT CLASSIFICATION ECU

COMPONENTS

RS0UU–05



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RS0UV–06

REMOVAL

NOTICE:

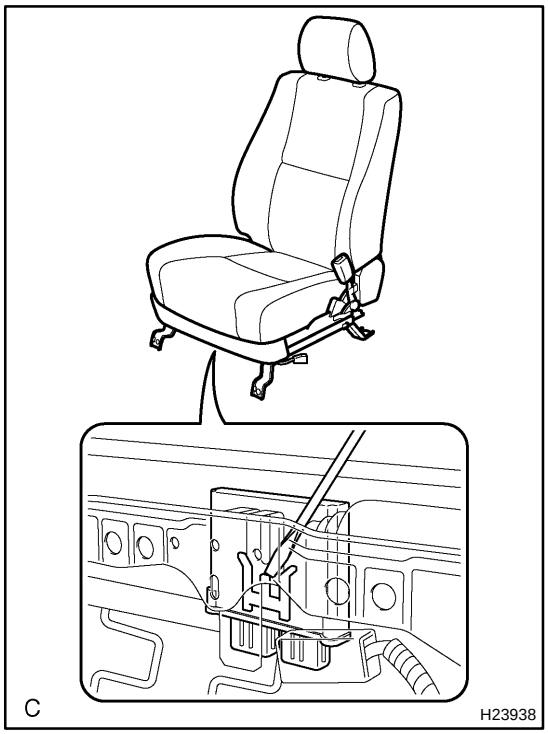
- **If the wiring connector of the SRS is disconnected with the ignition switch in the ON position, DTCs will be recorded.**
- **Never use SRS parts from another vehicle. When replacing the parts, replace them with new ones.**
- **Never reuse an occupant classification ECU if the airbag has previously deployed in a collision.**

1. PRECAUTION (SEE PAGE RS–1 and RS–3)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. REMOVE FRONT SEAT ASSEMBLY RH (SEE PAGE BO–111)



4. REMOVE OCCUPANT CLASSIFICATION ECU

(a) Disconnect the 2 connectors from the occupant classification ECU.

(b) Using a screwdriver, remove the occupant classification ECU.

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RS0UW–06

INSPECTION

1. VEHICLE NOT INVOLVED IN COLLISION

Perform a diagnostic system check (see page DI–1147).

2. VEHICLE INVOLVED IN COLLISION

(a) Perform a diagnostic system check (see page DI–1147).

(b) Even if the airbag was not deployed, perform a visual check for damage to the occupant classification ECU. If there are any defects mentioned below, replace the occupant classification ECU with a new one:

- Cracks, dents or chips in the case.
- Cracks or other damage to the connector.

CAUTION:

For removal and installation procedures of the occupant classification ECU, see page RS–111 and RS–114. Be sure to follow the correct procedure.

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RS0UX–05

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the occupant classification ECU with a new one.

- The occupant classification ECU has been found to be faulty in troubleshooting.
- The occupant classification ECU has been dropped.

CAUTION:

For removal and installation procedures of the occupant classification ECU, see page RS–111 and RS–114. Be sure to follow the correct procedure.

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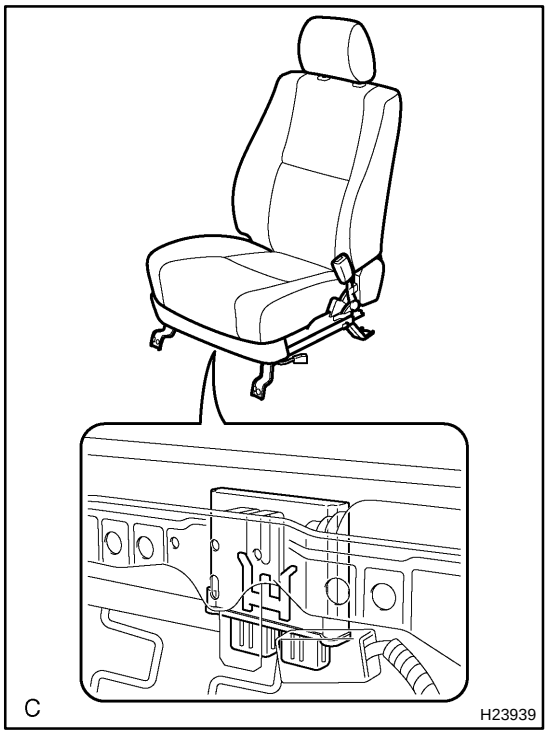
RS0UY–06

INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the occupant classification ECU involved in a collision when the airbag has deployed.**
- **If the occupant classification ECU center has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **When installing the seat position sensor assembly center, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**



1. INSTALL OCCUPANT CLASSIFICATION ECU

(a) Install the occupant classification ECU.

(b) Connect the 2 connectors to the occupant classification ECU.

2. INSTALL FRONT SEAT ASSEMBLY RH (SEE PAGE BO–123)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

5. INITIALIZE OCCUPANT CLASSIFICATION ECU (SEE PAGE DI–1137)

6. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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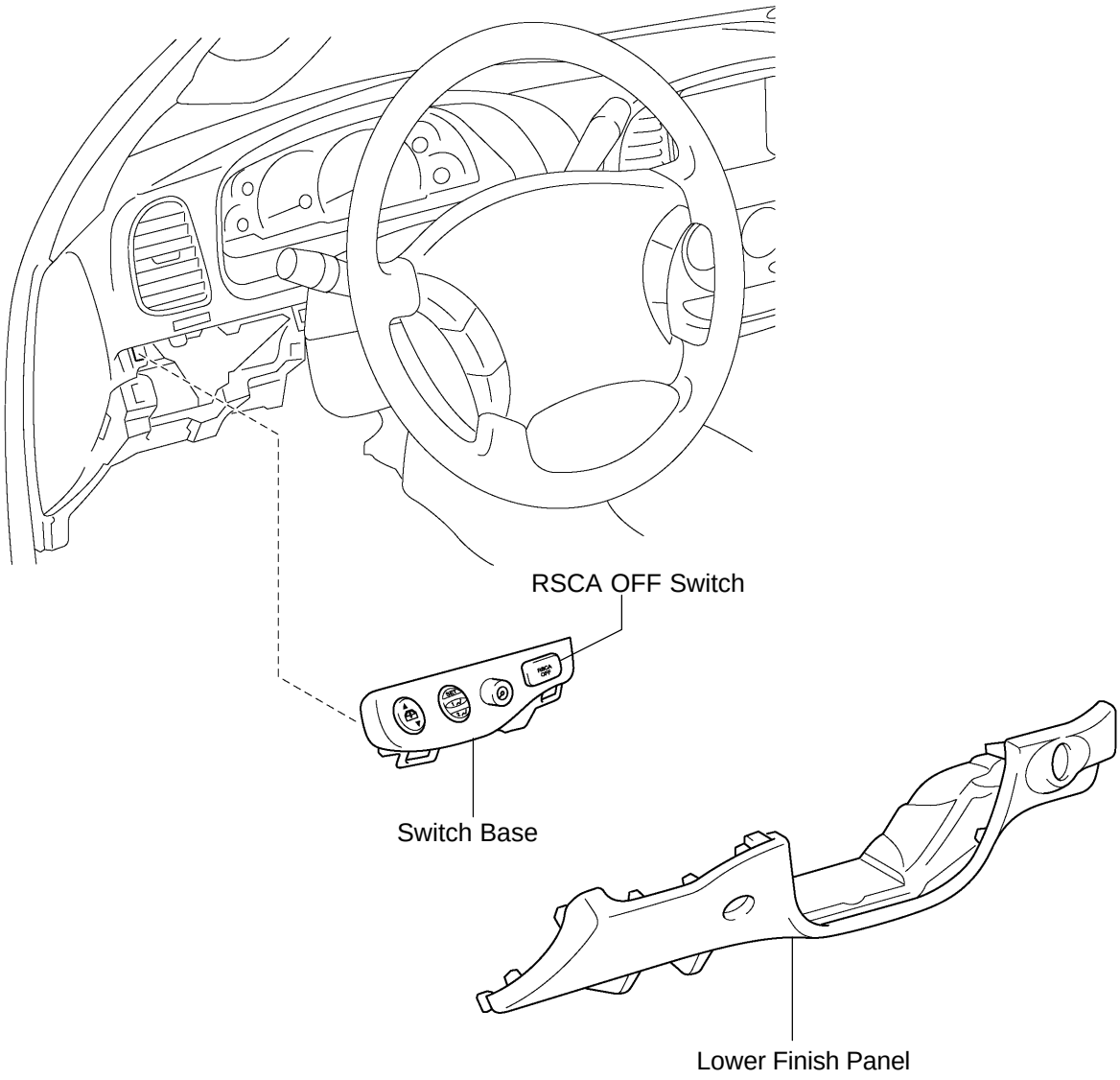
RSCA OFF SWITCH

COMPONENTS

RS11U–01



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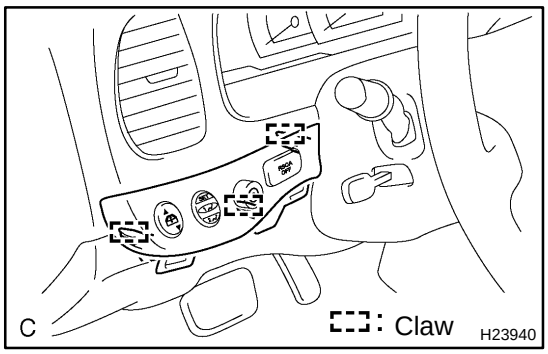
RS11V–01



REMOVAL

1. PRECAUTION (SEE PAGE RS–1 and RS–3)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

3. REMOVE LOWER FINISH PANEL (SEE PAGE BO–89)

4. REMOVE SWITCH BASE

(a) Using a screwdriver, release the 3 claws and remover the switch base.

HINT:

Tape up the screwdriver tip before use.

(b) Disconnect the connectors.

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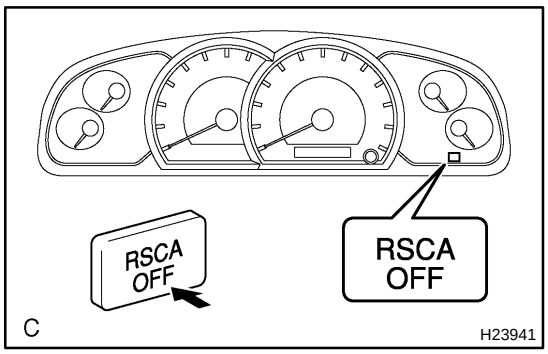
RS11X–01

INSPECTION

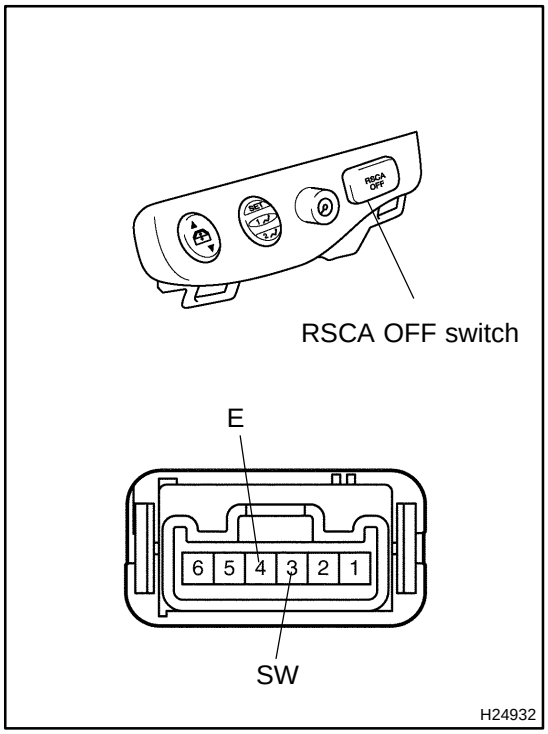


1. INSPECT RSCA OFF INDICATOR LIGHT

(a) Turn the ignition switch ON.

(b) Check that the RSCA OFF indicator light goes off after it comes on for 3 seconds.

(c) Check that the RSCA OFF indicator light comes on after pressing the RSCA OFF switch for approx. 2 seconds.



2. INSPECT RSCA OFF SWITCH CONTINUITY

(a) Inspect the continuity between each terminal.

Switch Position	Tester Connection	Specified Condition
OFF	SW (3) ↔ E (4)	No continuity
Hold ON	SW (3) ↔ E (4)	Continuity

If continuity is not as specified, replace the RSCA OFF switch.

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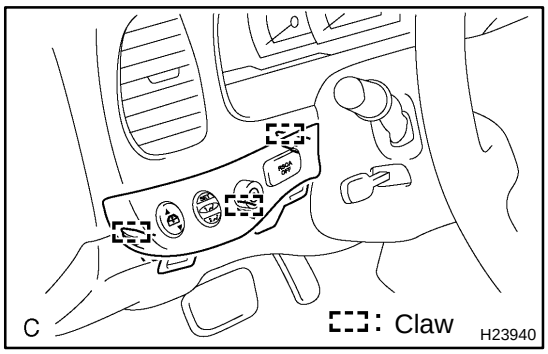
RS11Z–01



INSTALLATION

1. INSTALL SWITCH BASE

(a) Connect the connectors.

(b) Engage the 3 claws to install the switch base.

2. INSTALL LOWER FINISH PANEL (SEE PAGE BO–97)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. PERFORM INITIALIZATION (SEE PAGE BE–77)

Some system need initialization when disconnecting the cable from the negative battery terminal.

5. INSPECT SRS WARNING LIGHT (SEE PAGE DI–1137)

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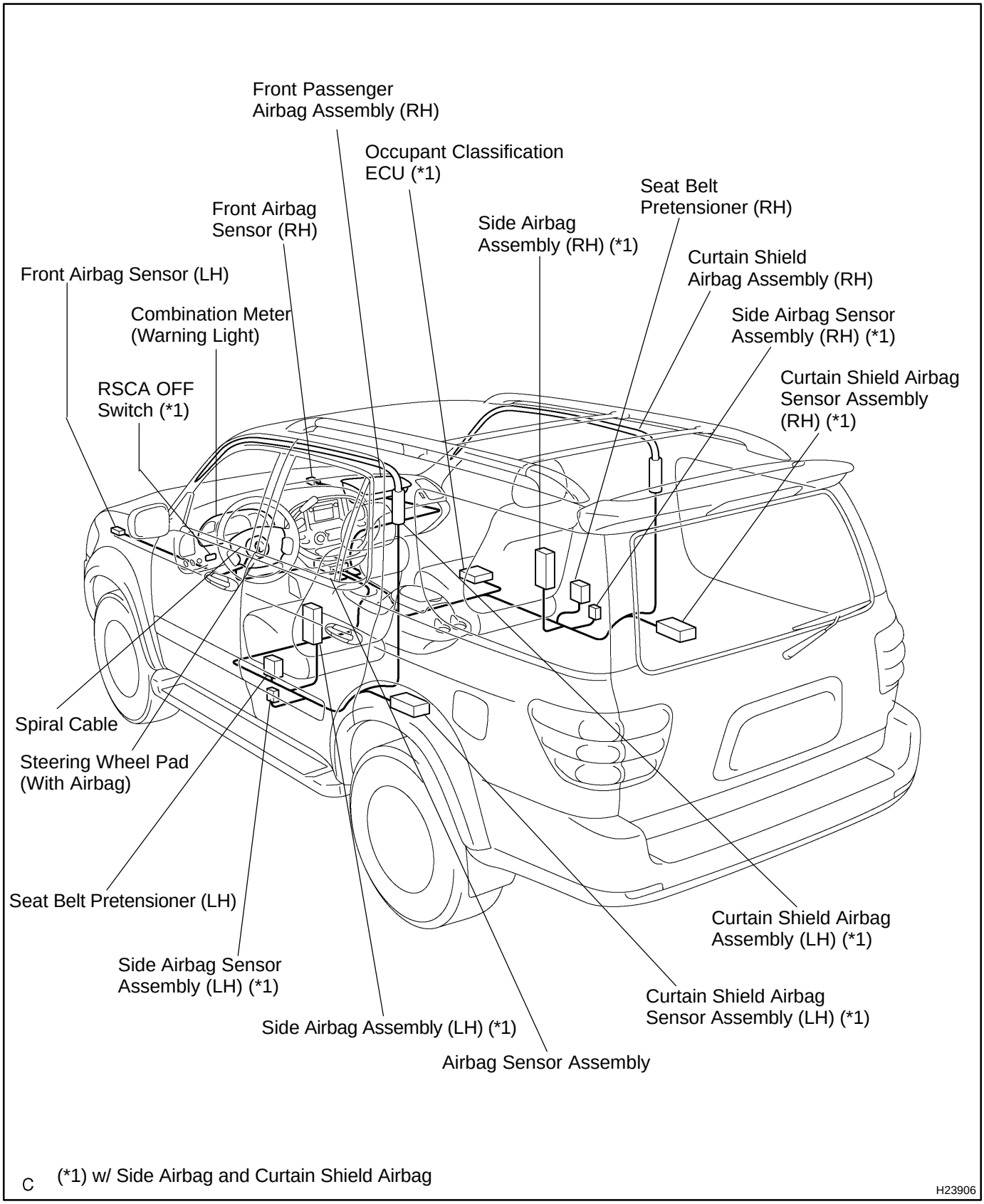
WIRE HARNESS AND CONNECTOR

RS0BU–10

LOCATION



C (*1) w/ Side Airbag and Curtain Shield Airbag

H23906

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RS0BV–08

INSPECTION

HINT:

The SRS wire harness is integrated with the cowl wire harness assembly. The wires for the SRS wire harness are encased in a yellow corrugated tube and all the connectors in the system except the seat position airbag sensor connector and occupant classification ECU connectors, colored are yellow.

1. VEHICLE NOT INVOLVED IN COLLISION

Perform a diagnostic system check (see page DI–1147).

2. VEHICLE INVOLVED IN COLLISION

(a) Perform a diagnostic system check (see page DI–1147).

(b) Check breaks in all wires of the SRS wire harness, and exposed conductors.

(c) Check if the SRS wire harness connectors are cracked or chipped.

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RS0BW–07

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the wire harness or connector with a new one.

- ▶ Any part of the SRS wire harness or any connector has been found to be faulty in troubleshooting.
- ▶ Any part of the SRS wire harness or any connector has been found to be faulty while checking items (see page RS–120).

CAUTION:

If the wire harness used in the SRS is damaged, replace the whole SRS wire harness assembly.

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BODY ELECTRICAL SYSTEM

BE01E–12

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

Take care to observe the following precautions when performing inspections or removal and replacement of body electrical related parts.

1. LIGHTING SYSTEM

Halogen bulbs have pressurized gas inside and require special handling.

They may burst or shatter if scratched or the bulb is dropped. Hold a bulb only by its plastic or metal case. Don't touch the glass part of a bulb with bare hands.

2. SRS (SUPPLEMENTAL RESTRAINT SYSTEM)

The SEQUOIA is equipped with an SRS (Supplemental Restraint System) such as the driver airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal and installation of parts, inspection or replacement), be sure to read the precautions in the RS section (See page xx–xxx).

3. AUDIO SYSTEM

If the battery negative (–) terminal is disconnected, the preset AM, FM 1 and FM 2 stations stored in the memory are erased, so be sure to make a memo of the stations and reset them after the battery terminal is reconnected.

4. MOBILE COMMUNICATION SYSTEM

If the vehicle is equipped with a mobile communication system, refer to precautions in the IN section.

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TROUBLESHOOTING

BE19B–08

PROBLEM SYMPTOMS TABLE

POWER OUTLET

Symptom	Suspect Area	See page
Electric power source cannot be out of the power outlet.	1. PWR OUTLET Fuse 2. INVERTER Relay 3. Main Switch 4. Voltage Inverter 5. Wire Harness	BE–14 BE–20 BE–20 BE–20 –
IPO system does not operate. Power source cannot be supplied from the power outlet socket when the ignition switch is off.	1. PWR OUTLET Fuse 2. INVERTER Relay 3. Instrument panel J/B (IPO) circuit 4. Wire Harness	BE–14 BE–20 BE–20 –

IGNITION SWITCH

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Ignition switch is not set to each position.	1. Ignition Switch 2. Power Source Circuit (Body ECU) 3. Power Source Circuit (Driver door ECU) 4. Power Source Circuit (Passenger door ECU)	BE–24 DI–1700 BE–34 DI–1849

KEY UNLOCK WARNING SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Key unlock warning system does not operate. (The buzzer does not sound when the driver's door is opened with the ignition OFF and key inserted)	1. Key Unlock Warning Switch 2. Driver Door Courtesy Light Switch 3. Wire Harness 4. Combination Meter	BE–24 BE–40 – –
Key unlock warning system does not operate. (The buzzer sounds when the ignition key is ACC or ON)	1. Ignition Switch 2. Wire Harness 3. Combination Meter	BE–24 – –

w/o Daytime Running Light:

HEADLIGHT AND TAILLIGHT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Only one headlight comes on.	1. Bulb 2. Wire Harness	– –
"LO–Beam" does not light (All).	1. HEAD Relay 2. Headlight Dimmer Switch 3. Wire Harness 4. Body ECU	BE–27 BE–27 – –
"LO–Beam" does not light (One side).	1. Bulb 2. H–LP LH Fuse 3. H–LP RH Fuse 4. Wire Harness	– BE–14 BE–14 –

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”HI–Beam” does not light (All).	1. HEAD Relay 2. Headlight Dimmer Switch 3. Wire Harness 4. Body ECU	BE–27 BE–27 – –
”HI–Beam” does not light (One side).	1. Bulb 2. H–LP LH Fuse 3. H–LP RH Fuse 4. Wire Harness	– BE–14 BE–14 –
”Flash” does not light.	1. H–LP LH Fuse 2. H–LP RH Fuse 3. Bulb 4. Headlight Dimmer Switch 5. Wire Harness 6. Body ECU	BE–14 BE–14 – BE–27 – –
Headlight does not come on.	1. Bulb 2. HEAD Relay 3. Light Control Switch 4. Wire Harness 5. Body ECU	– BE–27 DI–1750 – –
Headlight flickers.	1. Bulb 2. Wire Harness 3. Body ECU	– – –
Headlight is dark.	1. Bulb 2. Body ECU 3. Wire Harness	– – –
Only one taillight comes on.	1. Bulb 2. Wire Harness	– –
Taillight does not come on. (Headlight is normal)	1. TAIL Fuse 2. TAILLIGHT Relay 3. Light Control Switch 4. Wire Harness 5. Body ECU	BE–14 BE–27 BE–27 – –
Taillight does not come on. (Headlight does not come on)	1. TAIL Fuse 2. TAILLIGHT Relay 3. Light Control Switch 4. Wire Harness 5. Body ECU	BE–14 BE–27 BE–27 – –
Rear combination light does not come on.	1. Bulb 2. TAIL Fuse 3. TAILLIGHT Relay 4. Wire Harness 5. Body ECU	– BE–14 BE–27 – –

w/ Daytime Running Light:

HEADLIGHT AND TAILLIGHT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Only one headlight comes on.	1. Bulb 2. Wire Harness	– –

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”LO–Beam” does not light (All).	1. HEAD Relay 2. DRL Fuse 3. DIMMER Relay 4. DRL No. 4 Relay 5. Wire Harness 6. Body ECU	BE–27 BE–14 BE–27 BE–27 – –
”LO–Beam” does not light (One side).	1. Bulb 2. H–LP LL Fuse 3. H–LP LP Fuse 4. Wire Harness	– BE–14 BE–14 –
”HI–Beam” does not light (All).	1. HEAD Relay 2. Headlight Dimmer Switch 3. DRL Fuse 4. DIMMER Relay 5. DRL No. 4 Relay 6. Wire Harness 7. Body ECU	BE–27 BE–27 BE–14 BE–27 BE–27 – –
”HI–Beam” does not light (One side).	1. Bulb 2. H–LP LL Fuse 3. H–LP LP Fuse 4. Wire Harness	– BE–14 BE–14 –
”Flash” does not light.	1. Headlight Dimmer Switch 2. Wire Harness 3. Body ECU	BE–27 – –
Headlight does not come on.	1. Bulb 2. HEAD Relay 3. DIMMER Relay 4. DRL No. 4 Relay 5. Headlight Dimmer Switch 6. Light Control Switch 7. Wire Harness 8. Body ECU	– BE–27 BE–27 BE–27 BE–27 BE–27 – –
Headlight does not go off when light control switch is in OFF position.	1. Power Source Circuit (Body ECU) 2. HEAD Relay 3. DIMMER Relay 4. Light Control Switch 5. Wire Harness 6. Body ECU	DI–1700 BE–27 BE–27 BE–27 – –
Headlight flickers.	1. Bulb 2. Wire Harness 3. Body ECU	– – –
Headlight is dark.	1. Bulb 2. Wire Harness 3. Body ECU	– – –
Taillight does not come on when light control switch is in TAIL position.	1. TAIL Fuse 2. TAILLIGHT Relay 3. Light Control Switch 4. Wire Harness 5. Body ECU	BE–14 BE–27 BE–27 – –

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Taillight does not go off when light control switch is in OFF position.	1. TAILLIGHT Relay 2. Light Control Switch 3. Wire Harness 4. Body ECU	BE–27 BE–27 – –
Headlight does not come on when engine is running and light control switch is in OFF position .	1. ECU–B Fuse 2. MAIN Fuse 3. HEAD Relay 4. DRL Fuse 5. DRL No. 4 Relay 6. DIMMER Relay 7. Parking Brake Switch 8. Wire Harness 9. Body ECU	BE–14 BE–14 BE–27 BE–14 BE–27 BE–55 BE–55 – –

FOG LIGHT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Fog light does not come on with light control switch is in HEAD position. (Headlight is normal.)	1. FOG Fuse 2. FOG LIGHT Relay 3. Fog Light Switch 4. Wire Harness 5. Body ECU	BE–14 BE–27 BE–34 – –
Fog light does not come on with light control switch is in HEAD position. (Headlight does not light).	1. *1 Other Parts 2. Wire Harness	– –
Only one light does not come on.	1. Bulb 2. Wire Harness	– –

*1: Inspect Headlight System

TURN SIGNAL AND HAZARD WARNING SYSTEM

Symptom	Suspect Area	See page
”Hazard” and ”Turn” do not light up.	1. GAUGE Fuse 2. TURN–HAZ Fuse 3. Ignition Switch 4. Turn Signal Flasher Relay 5. Wire Harness	BE–14 BE–14 BE–24 BE–24 –
Hazard warning light does not light up. (Turn is normal)	1. Hazard Warning Switch 2. Wire Harness 3. Turn Signal Flasher Relay	BE–36 – BE–36
Turn signal does not light up. (Hazard is normal)	1. Turn Signal Switch 2. Wire Harness 3. Turn Signal Flasher Relay	BE–36 – BE–36
Turn signal does not light up in one direction.	1. Bulb 2. Wire Harness	– –
Only one bulb does not light up.	1. Bulb 2. Wire Harness	– –

INTERIOR LIGHT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the interior lights do not come on.	1. DOME Fuse 2. Illumination Circuit 3. Body ECU	BE–14 DI–1759 –

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The interior light does not come on when the driver's door is opened.	1. Driver's Door Courtesy Light Switch 2. Wire Harness 3. Body ECU	BE–40 – –
The light does not come on when the passenger's door is opened.	1. Passenger's Door Courtesy Light Switch 2. Wire Harness 3. Body ECU	BE–40 – –
The light does not come on when the rear–right door is opened.	1. Rear–Right Door Courtesy Light Switch 2. Wire Harness 3. Body ECU	BE–40 – –
The light does not come on when the rear–left door is opened.	1. Rear–Left Door Courtesy Light Switch 2. Wire Harness 3. Body ECU	BE–40 – –
Only one of the bulbs comes on.	Bulb	–
The illumination does not fade out when all the doors are closed.	1. Courtesy Light Switch 2. Body ECU	BE–40 –
The illumination does not fade out immediately when all the doors are locked within 15 seconds after they are closed.	1. Door Unlock Detection Switch 2. Body ECU	BE–79 –
Front personal light does not come on.	1. Bulb 2. Front Personal Light 3. Wire Harness	– BE–40 –
Room light does not come on.	1. Bulb 2. Room Light 3. Wire Harness	– BE–40 –
Vanity light does not come on.	1. Bulb 2. Vanity Light 3. Wire Harness	– BE–40 –
Luggage Room light does not come on.	1. Bulb 2. Back Door Courtesy Light Switch 3. Body ECU	– BE–40 –
Courtesy light does not come on.	1. Bulb 2. Door Courtesy Light Switch 3. Body ECU	– BE–40 –
Does not operate the illuminated entry	1. Illumination Circuit 2. Body ECU	DI–1759 –
All functions of the body control system do not operate.	1. Power Source Circuit 2. Body ECU	DI–1700 –

BACK–UP LIGHT SYSTEM

Symptom	Suspect Area	See page
Back–Up Light does not come on.	1. Bulb 2. GAUGE Fuse 3. BACK–UP LIGHT Relay 4. Instrument Panel J/B (IPO) Circuit 5. Ignition Switch 6. Wire Harness	– BE–14 BE–45 BE–20 BE–24 –
Back–Up Light always remains on.	1. Park/Neutral Position Switch 2. BACK–UP LIGHT Relay 3. Wire Harness	DI–576 BE–45 –
Only one light does not come on.	1. Bulb 2. Wire Harness	– –

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STOP LIGHT SYSTEM

Symptom	Suspect Area	See page
Stop light does not come on.	1. STOP Fuse 2. Stop Light Switch 3. Wire Harness	BE–14 BE–47 –
Stop light always come on.	1. Stop Light Switch 2. Wire Harness	BE–47 –
Only one light does not come on.	1. Bulb 2. Wire Harness	– –

WIPER AND WASHER SYSTEM

Symptom	Suspect Area	See page
Wipers and washer do not operate.	1. AM1 Fuse 2. Wiper Switch 3. Wire Harness	BE–14 BE–49 –
Wipers do not operate.	1. WIP Fuse 2. Wiper Switch 3. Wiper Motor 4. Wire Harness	BE–14 BE–49 BE–49 –
Washer motor does not operate.	1. WSH Fuse 2. Washer Switch 3. Washer Motor 4. Wire Harness	BE–14 BE–49 BE–49 –
Wipers do not operate when washer switch ON.	1. WSH Fuse 2. Washer Switch 3. Wiper Motor 4. Wire Harness	BE–14 BE–49 BE–49 –
Washer fluid is not injected.	Washer Hose and Nozzle	–
▶When wiper switch is in HI position, the wiper blade is in contact with the body. ▶When the wiper switch is OFF, the wiper blade does not retract or the retract position is wrong.	1. Wiper Motor *1 2. Wire harness *1	BE–49 –

*1: Inspect wiper arm and blade set positions.

REAR WIPER AND WASHER SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Rear Wiper does not operate.	1. Rear Wiper and Washer Switch 2. Rear Wiper Motor 3. Back Door ECU 4. Body ECU	BE–49 BE–49 – –
Rear Washer does not operate.	1. Rear Wiper and Washer Switch 2. Rear Washer Motor 3. Back Door ECU 4. Body ECU	BE–49 BE–49 – –

COMBINATION METER

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Combination meter system abnormal operation.	See DIAGNOSIS SYSTEM	DI–1610

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DEFOGGER SYSTEM

Symptom	Suspect Area	See page
Rear window defogger does not operate.	1. HTR Fuse 2. DEFOG Fuse 3. DEFOG Relay 4. Defogger Switch (in A/C Panel Switch) 5. Defogger Wire 6. Wire Harness	BE–14 BE–14 BE–14 BE–65 BE–65 –
Mirror defogger does not operate.	1. MIR–HTR Fuse 2. HTR Fuse 3. Mirror Heater Relay 4. Mirror Heater 5. Wire Harness	BE–14 BE–14 BE–65 BE–65 –

POWER WINDOW CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the power windows do not operate. (Power door lock system is normal.)	1. POWER MAIN Relay 2. Driver Door ECU (Power Window Master Switch) 3. Body ECU 4. Wire Harness	BE–69 DI–1788 – –
Only the driver's window does not operate.	1. Power Window Motor 2. Power Window Pulse Sensor Circuit 3. Power Window Limit Switch Circuit 4. Driver Door ECU (Power Window Master Switch)	BE–69 DI–1803 DI–1800 –
"Window lock function" does not operate.	Driver Door ECU (Power Window Master Switch)	BE–69
Only the rear LH window does not operate.	1. Power Window Motor 2. Power Window Switch 3. Body ECU	BE–69 BE–69 –
Only the rear RH window does not operate.	1. Power Window Motor 2. Power Window Switch 3. Body ECU	BE–69 BE–69 –
Only the front passenger's window does not operate.	1. Power Window Motor 2. Power Window Pulse Sensor Circuit 3. Power Window Limit Switch Circuit 4. Passenger Door ECU	BE–69 DI–1841 DI–1838 –
The Key related power window operations do not operate with driver side door key cylinder. (Master switch operation is normal.)	1. Door Key Lock and Unlock Switch Circuit 2. Driver Door ECU (Power Window Master Switch)	DI–1791 –
" Auto up " or " Auto down " does not operate. *1	1. Power Window Pulse Sensor Circuit 2. Power Window Limit Switch Circuit 3. Driver Door ECU (Power Window Master Switch)	DI–1803 DI–1800 –

*1: " Auto up " or " Auto down " may not function when the manual switch is pressed and held for 2 sec. or more with the window glass fully open or closed. In this case, by performing a sequence of the window glass operations (full open, fully close and then half open), the function can be restored. If not, replace the driver door ECU or passenger door ECU.

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POWER DOOR LOCK CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the doors cannot be locked or unlocked. (Power window control system is normal.)	1. Door Unlock Detection Switch 2. Door Key Lock and Unlock Switch 3. Driver Door ECU	BE–79 BE–79 –
Only one back lock control does not operate.	1. Back Door Lock Motor 2. Back Door Unlock Detection Switch 3. Back Door Key Lock and Unlock Switch 4. Back Door ECU	BE–79 BE–79 BE–79 –
Driver door key related function does not operate.	1. Door Key Lock and Unlock Switch 2. Driver Door ECU	BE–79 –
Front passenger door key related function does not operate.	1. Door Key Lock and Unlock Switch 2. Passenger Door ECU	BE–79 –
Back door key related function does not operate.	1. Door Key Lock and Unlock Switch 2. Back Door ECU	BE–79 –

THEFT DETERRENT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
The theft deterrent system cannot be set.	1. Key Unlock Warning Switch Circuit 2. Door Unlock Detection Switch Circuit (Driver Door ECU) Door Unlock Detection Switch Circuit (Passenger Door ECU) Door Unlock Detection Switch Circuit (Back Door ECU) Door Unlock Detection Switch Circuit (Body ECU) 3. Engine Hood Courtesy Switch Circuit 4. Back Door Courtesy Light Switch 5. Courtesy Light Switch Circuit 6. Glass Breakage Sensor Circuit (*1) 7. Body ECU	DI–1715 DI–1791 DI–1829 DI–1869 DI–1723 DI–1725 DI–1864 DI–1728 DI–1774 –
The system cannot be canceled when the ignition switch is turned ON with a key.	1. AM1 Fuse 2. AM2 Fuse 3. Key Unlock Warning Switch Circuit 4. Ignition Switch 5. Body ECU	BE–14 BE–14 DI–1715 BE–24 –
The system cannot be canceled when the back door is unlocked with a key.	1. Back Door Unlock Detection Switch Circuit 2. Back Door Key Lock and Unlock Switch Circuit 3. Back door ECU 4. Body ECU	DI–1869 DI–1882 – –
The system does not operate when the engine hood is opened.	1. Engine Hood Courtesy Switch Circuit 2. Body ECU	DI–1725 –
Some of the system does not operate. (Headlight does not come on.)	1. Bulb 2. HEAD Relay 3. DIMMER Relay 4. DRL No. 4 Relay 5. Headlight Dimmer Switch 6. Light Control Switch 7. Wire Harness 8. Body ECU	– BE–27 BE–27 BE–27 BE–27 BE–27 – –

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Some of the system does not operate. (Taillight does not come on.)	1. TAIL Fuse 2. TAILLIGHT Relay 3. Light Control Switch 4. Wire Harness 5. Body ECU	BE–14 BE–27 BE–27 – –
Some of the system do not operate. (Theft deterrent horn or vehicle horn does not sound.)	1. HORN Fuse 2. SECURITY HORN Fuse 3. HORN Relay Circuit 4. Theft Deterrent Horn Circuit 5. Horn 6. Body ECU	BE–14 BE–14 BE–145 BE–92 BE–145 –
While the warning is given, the system cannot be canceled by unlocking the door with a key or transmitter.	1. Door Key Lock and Unlock Switch Circuit (Driver Door ECU) Door Key Lock and Unlock Switch Circuit (Passenger Door ECU) Door Key Lock and Unlock Switch Circuit (Back Door ECU) 2. Body ECU	DI–1794 DI–1832 DI–1882 –

*1: w/ Glass breakage sensor

WIRELESS DOOR LOCK CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

HINT:

- ◀ Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system operates normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system operates normally.
- ◀ If the trouble still reappears even though there are no abnormalities in any of the other circuits, check and replace the Wireless Door Lock Control Receiver as the last step.

Symptom	Suspect Area	See page
All functions of wireless door lock control system do not operate.	1. Transmitter 2. Wireless Door Lock Control Receiver Circuit 3. Body ECU	BE–98 DI–1737 –
Wireless door lock operates, but the buzzer does not sound. (The buzzer does not sound when the customize function prohibits.)	1. Wireless Door Lock Buzzer Circuit 2. Body ECU	DI–1741 –

POWER SEAT CONTROL SYSTEM (w/o Driving Position Memory)

Symptom	Suspect Area	See page
Both Driver and Passenger Power seats do not operate.	1. PWR SEAT Fuse 2. Wire Harness	BE–14 –
Driver's seat does not operate.	1. Power Seat Switch (D) 2. Wire Harness	BE–109 –
Passenger's seat does not operate.	1. Power Seat Switch (P) 2. Wire Harness	BE–109 –
"Slide operation" does not operate.	1. Power Seat Switch (D, P) 2. Slide Motor (D, P) 3. Wire Harness	BE–109 BE–109 –
"Front Vertical Operation" does not operate.	1. Power Seat Switch (D) 2. Front Vertical Motor (D) 3. Wire Harness	BE–109 BE–109 –
"Lifter Operation" does not operate.	1. Power Seat Switch (D) 2. Lifter Motor (D) 3. Wire Harness	BE–109 BE–109 –

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”Reclining Operation” does not operate.	1. Power Seat Switch (D, P) 2. Reclining Motor (D, P) 3. Wire Harness	BE–109 BE–109 –
”Lumbar Support Operation” does not operate.	1. Power Seat Switch (D) 2. Lumbar Support Motor (D) 3. Wire Harness	BE–109 BE–109 –

(D): Driver’s Seat

(P): Passenger’s Seat

POWER SEAT CONTROL SYSTEM (w/ Driving Position Memory)

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspected Area	See Page
Power seat control system abnormal operation.	See DIAGNOSIS SYSTEM	DI–1505

POWER MIRROR CONTROL SYSTEM (w/o Driving Position Memory)

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Mirror does not operate.	1. Mirror Switch 2. Wire Harness	BE–115 –
Mirror operates abnormally.	1. Mirror Switch 2. Mirror Motor 3. Wire Harness	BE–115 BE–115 –

POWER MIRROR CONTROL SYSTEM (w/ Driving Position Memory)

Symptom	Suspect Area	See page
Remote control mirror LH only does not operate. (w/ Driving position memory)	1. Remote control mirror motor LH circuit 2. Remote control mirror position sensor LH circuit 3. Driver door ECU	DI–1808 DI–1810 –
Remote control mirror RH only does not operate. (w/ Driving position memory)	1. Remote control mirror motor RH circuit 2. Remote control mirror position sensor RH circuit 3. Passenger door ECU	DI–1845 DI–1847 –

ELECTRO CHROMIC MIRROR SYSTEM

Symptom	Suspect Area	See page
Electro Chromic Inner Mirror does not operate.	1. ECU–IG Fuse 2. Electro Chromic Inner Mirror 3. Wire Harness	BE–14 BE–122 –

SEAT HEATER SYSTEM

Symptom	Suspect Area	See page
Seat heaters do not operate. (Driver’s and Passenger’s)	1. SEAT HTR Fuse 2. Seat Heater Switch (D, P) 3. Seat Heater 4. Wire Harness	BE–14 BE–124 BE–124 –
Driver’s seat heater does not operate.	1. Seat Heater Switch (D, P) 2. Wire Harness	BE–124 –
Passenger’s seat heater does not operate.	1. Seat Heater Switch (D, P) 2. Wire Harness	BE–124 –
Seat heater temperature is too hot.	Seat Heater	BE–124

AUDIO SYSTEM

Symptom	Suspect Area	See page
Audio system abnormal operation.	See DIAGNOSIS SYSTEM	DI–1962

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NAVIGATION SYSTEM

Symptom	Suspect Area	See page
Navigation system abnormal operation.	See DIAGNOSIS SYSTEM	DI–2172

REAR SEAT ENTERTAINMENT SYSTEM

Symptom	Suspect Area	See page
Rear seat entertainment system abnormal operation.	See DIAGNOSIS SYSTEM	DI–2083

REAR SEAT AUDIO SYSTEM

Symptom	Suspect Area	See page
Rear seat audio system abnormal operation.	See DIAGNOSIS SYSTEM	DI–2048

CLOCK SYSTEM

Symptom	Suspect Area	See page
Clock does not operate.	TROUBLESHOOTING NO.1	BE–127
Clock loses or gains time.	TROUBLESHOOTING NO.2	BE–127

GARAGE DOOR OPENER SYSTEM

Symptom	Suspect Area	See page
The equipment of which code has been registered does not operate.	1. Garage Door Opener Switch 2. Wire Harness 3. *	BE–134 – –
LED does not come on. (Even though either switch is pressed.)	1. Garage Door Opener Switch 2. Wire Harness	BE–134 –
LED does not come on. (Only one switch is pressed.)	Garage Door Opener Switch	BE–134

* As the GARAGE DOOR OPENER on the vehicle side seems to be normal, check the OPENER on the equipment side, of which code has been registered.

ENGINE IMMOBILISER SYSTEM

Symptom	Suspect Area	See page
Engine immobilizer system does not operate.	See DIAGNOSIS SYSTEM	BE–143

HORN SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Horn system does not operate.	1. HORN Fuse 2. HORN Relay Circuit 3. Horn Switch Circuit 4. Horn 5. Body ECU	BE–14 BE–145 BE–145 BE–145 –
Horn blow all the time.	1. HORN Relay Circuit 2. Horn Switch Circuit 3. Body ECU	BE–145 BE–145 –
One horn operates but the other horn does not operate.	1. Horn 2. Wire Harness	BE–145 –

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BACK DOOR POWER WINDOW CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Back door power window does not operate.	1. Back Door Power Window Motor Circuit	IN–35
	2. Window Pulse Sensor Circuit	DI–1877
	3. Rear Wiper Motor Circuit	DI–1880
	4. Back Door Control Light Switch Circuit	DI–1864
	5. Back Door ECU	–
	6. Body ECU	–

TRAILER TOWING

Symptom	Suspect Area	See page
Trailer towing does not operate.	1. TOWING Fuse	BE–14
	2. TOWING TAIL Fuse	BE–14
	3. TOWING BRK Fuse	BE–14
	4. TOWING TAIL Relay	BE–148
	5. BATT CHARGE Relay	BE–148
	6. Towing Converter Relay	BE–148
	7. Brake Controller	BE–148
	8. Wire Harness	–

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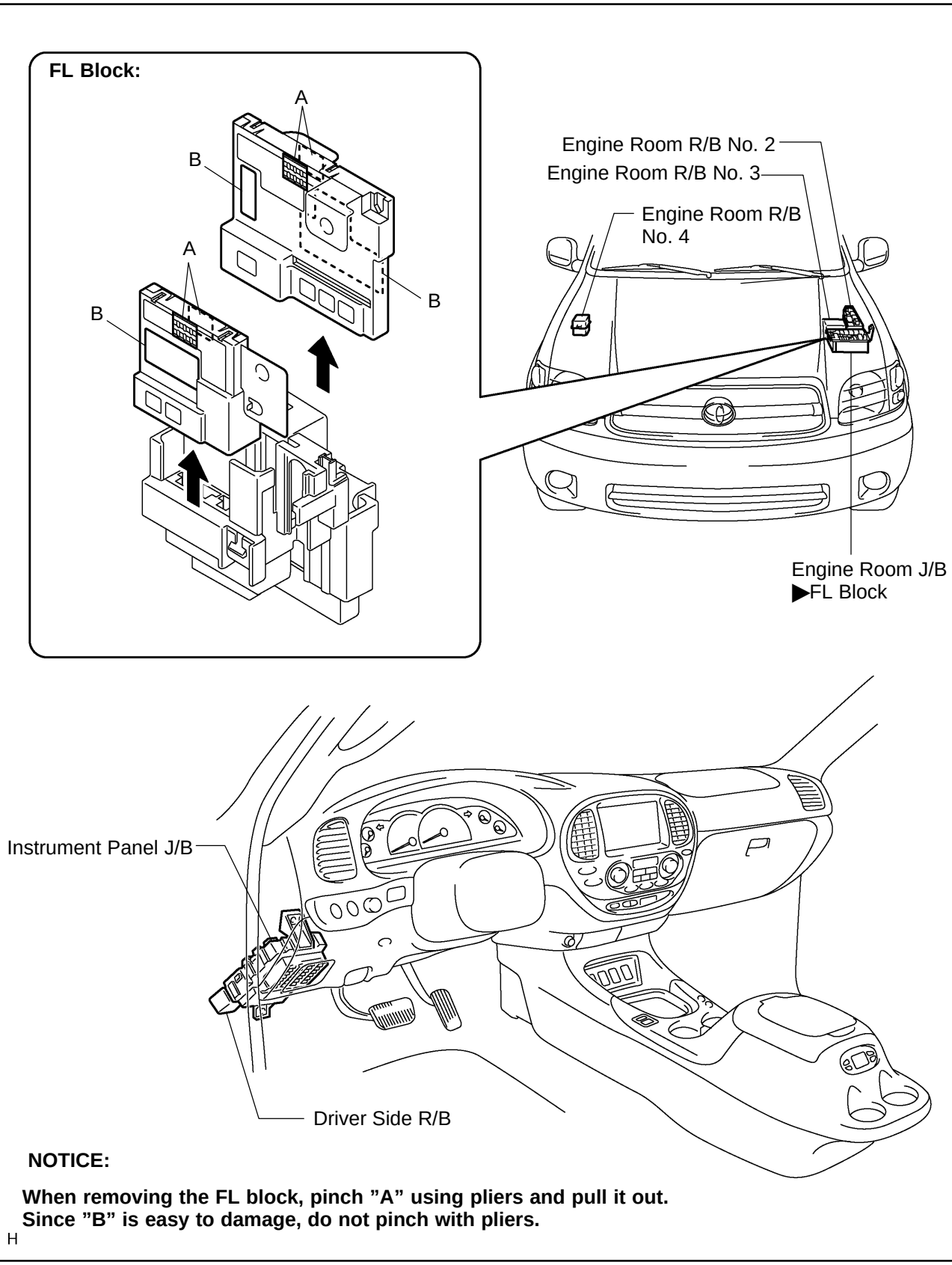
POWER SOURCE

LOCATION

BE2DG–03



NOTICE:

When removing the FL block, pinch "A" using pliers and pull it out.
Since "B" is easy to damage, do not pinch with pliers.

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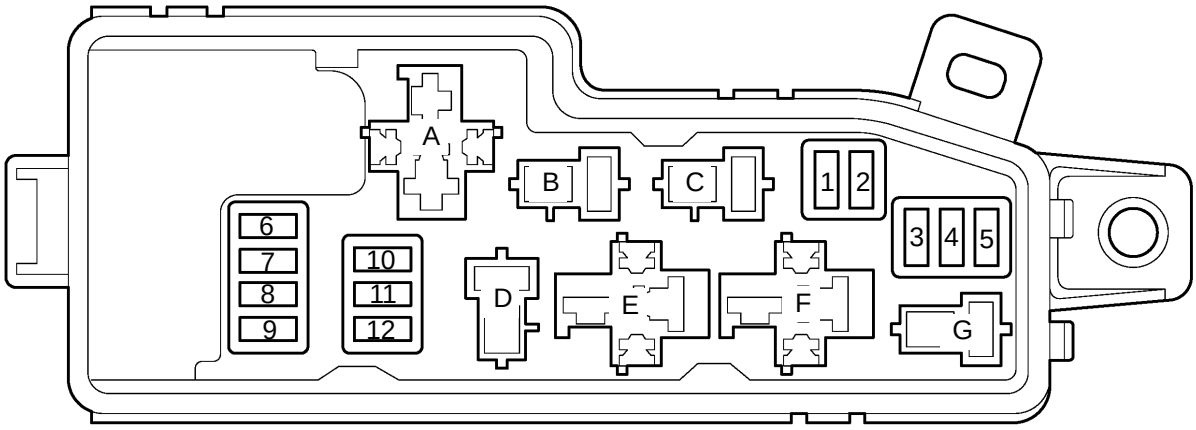
Engine Room R/B No. 2



Fuses:

1. *1 H–LP LL	10 A
2. *1 H–LP RL	10 A
3. STA	7.5 A
4. *1 H–LP LH	10 A
5. *1 H–LP RH	10 A
6. AIR SUS No. 2	10 A
7. RSE	7.5 A
8. A/F	20 A
9. SECURITY	15 A
10. DEF I/UP	7.5 A
11. –	
12. –	

Relays:

A. AIR SUS Relay
B. CDS FAN Relay
C. MG CLT Relay
D. A/F Relay
E. *1 DRL No. 4 Relay
F. DIMMER Relay
G. ST Relay

*1 w/ Daytime Running Light

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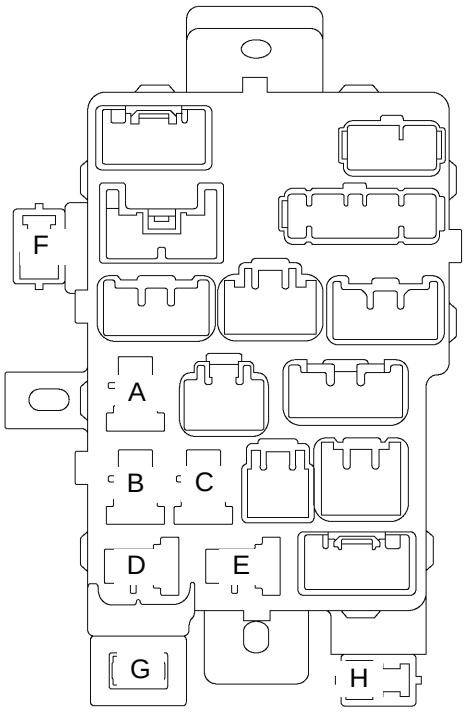
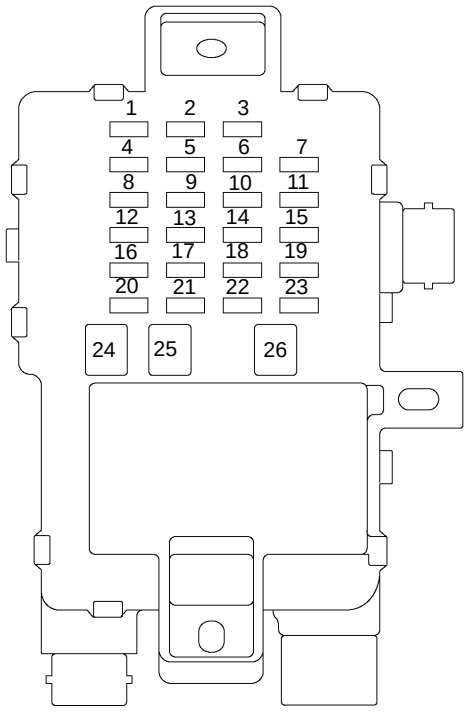
Instrument Panel J/B:



Relays:

A. Taillight Relay
B. Back–Up Light Relay
C. ACC Relay
D. Power Main Relay
E. Fog Light Relay
F. MIRROR HEATER Relay
G. FLASHER Relay
H. SEAT HEATER Relay



Fuses:

1. TAIL Fuse	15 A	14. IGN1 Fuse	10 A
2. PWR No. 4 Fuse	20 A	15. GAUGE Fuse	15 A
3. PANEL Fuse	7.5 A	16. IGN 2 Fuse	20 A
4. ECU–IG Fuse	10 A	17. STOP Fuse	15 A
5. CIG Fuse	15 A	18. SUN ROOF Fuse	25 A
6. PWR No. 1 Fuse	25 A	19. PWR OUTLET Fuse	15 A
7. HTR Fuse	10 A	20. PWR No. 3 Fuse	20 A
8. WSH Fuse	25 A	21. OBD Fuse	7.5 A
9. RAD No. 2 Fuse	7.5 A	22. PWR No. 2 Fuse	25 A
10. WIP Fuse	25 A	23. SEAT HTR Fuse	15 A
11. FOG Fuse	15 A	24. PWR SEAT Fuse	30 A
12. AC INV Fuse	15 A	25. AM1 Fuse	40 A
13. 4WD Fuse	20 A	26. PWR No. 5 Fuse	30 A

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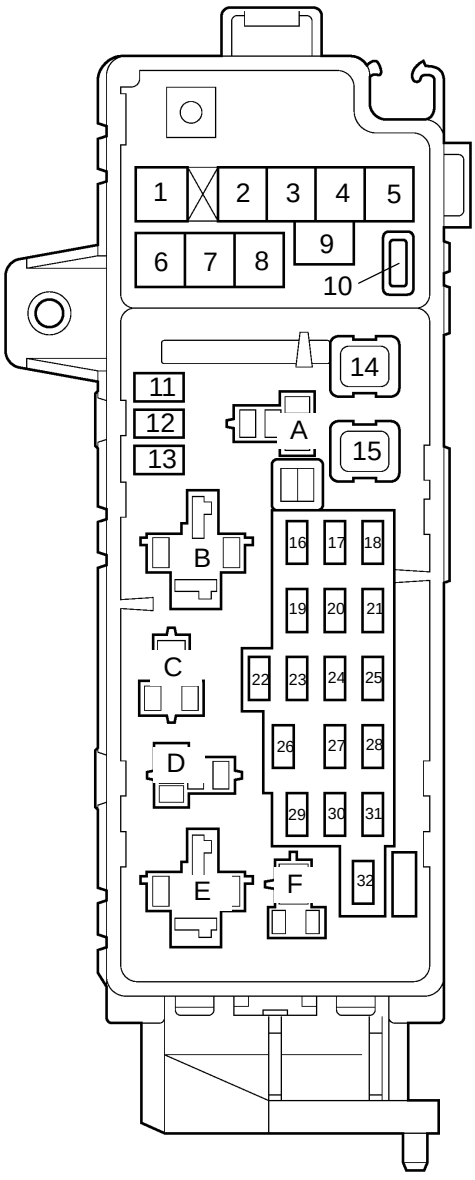
Fusible Link Block:



Engine Room J/B

Fuses:

1. TOWING R/B Fuse 50 A
2. AIR SUS Fuse 50 A
3. HEATER Fuse 50 A
4. DEFOG Fuse 40 A
5. RR HEATER Fuse 30 A
6. R/B Fuse 30 A
7. A/PUMP Fuse 50 A
8. ABS Fuse 60 A
9. ALT Fuse 140 A
10. CDS FAN Fuse 25 A
11. Spare Fuse 15 A
12. Spare Fuse 20 A
13. Spare Fuse 30 A
14. Main Fuse 40 A
15. DOOR No. 2 Fuse 30 A
16. *2 H–LP RH Fuse 15 A
17. EFI No. 1 Fuse 20 A
18. ETCS Fuse 10 A
19. *1.DRL Fuse 15 A
    *2.H–LP LH Fuse 15 A
20. ALT–S Fuse 7.5 A
21. TOWING Fuse 30 A
22. ST Fuse 30 A
23. RAD No. 3 Fuse 30 A
24. TURN–HAZ Fuse 20 A
25. AM2 Fuse 25 A
26. EFI No. 2 Fuse 10 A
27. SHORT–PIN
28. HORN Fuse 10 A
29. MIR HTR Fuse 15 A
30. ECU–B Fuse 7.5 A
31. DOME Fuse 10 A
32. RAD No. 1 Fuse 20 A

Relays:

A. C/OPN Relay
B. HEAD Relay
C. EFI Relay
D. FUEL PUMP Relay
E. DEFOG Relay
F. HORN Relay

*1 w/ Daytime Running Light
*2 w/o Daytime Running Light

N

I28399

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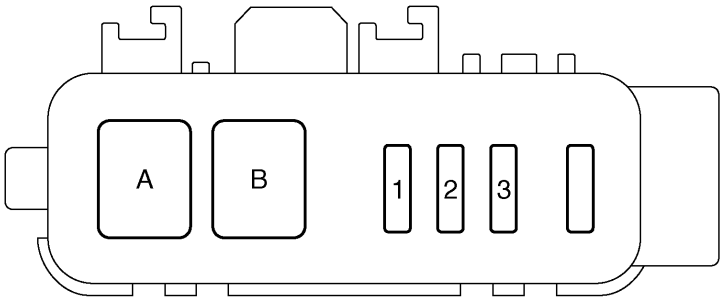
Engine Room R/B No. 3:



Fuses:

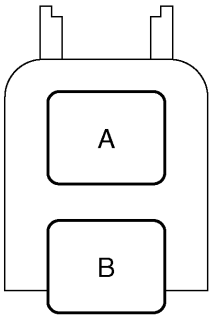
1. TOWING BRK Fuse 30 A
2. BATT CHARGE Fuse 30 A
3. TOWING TAIL Fuse 30 A

Relays:

A. BATT CHARGE Relay

B. TOWING TAIL Relay

Driver Side R/B:

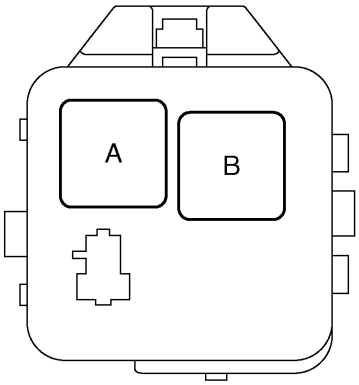


Relays:

A. INVERTER Relay

B. SEAT HEATER Relay

Engine Room R/B No. 4:



Relays:

A. RR HEATER Relay

B. HEATER Relay

N

I28550

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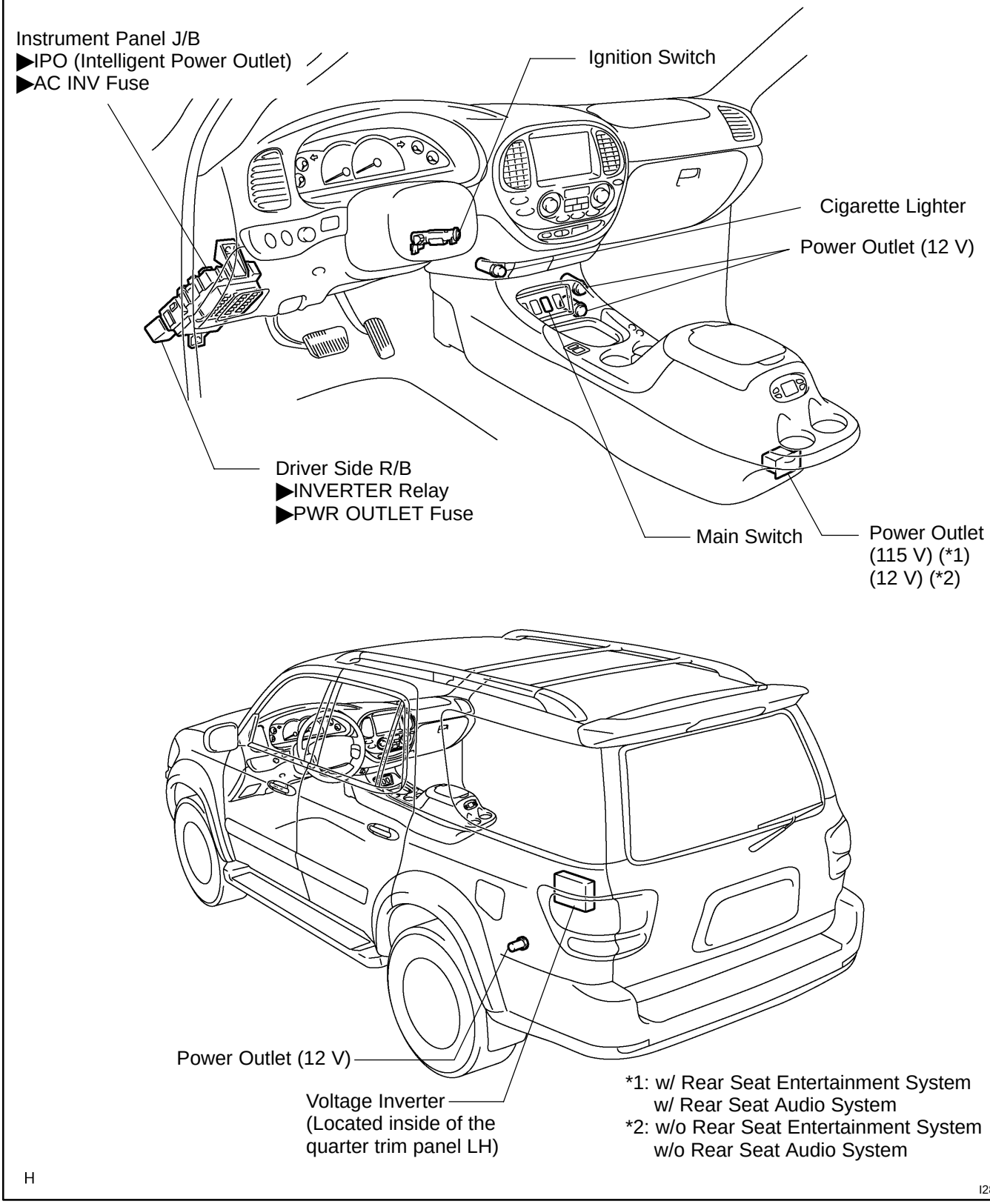
POWER OUTLET

LOCATION

BE2DE–03



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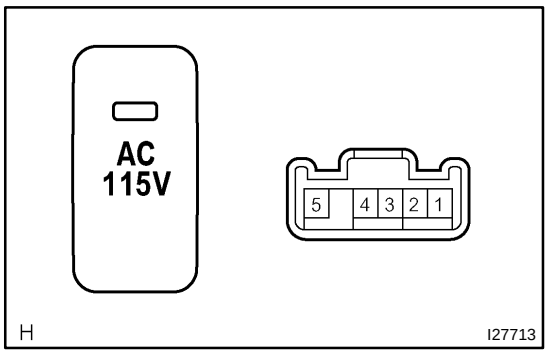
BE2MU–01

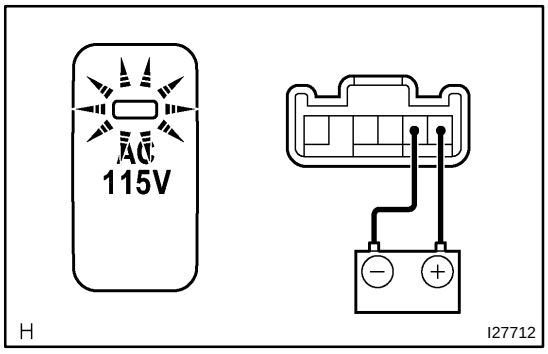
INSPECTION



1. INSPECT MAIN SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
ON	3 – 5	Continuity
OFF	3 – 5	No continuity
Constant	4 – 5	Continuity
Illumination circuit	1 – 2	Continuity

If continuity is not as specified, replace the switch.

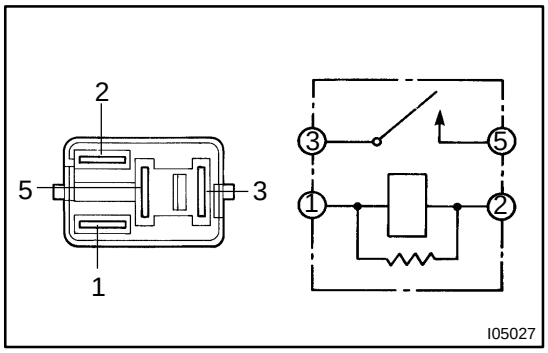


2. INSPECT MAIN INDICATOR LIGHT OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2.

(b) Push the main switch and check that the indicator light comes on.

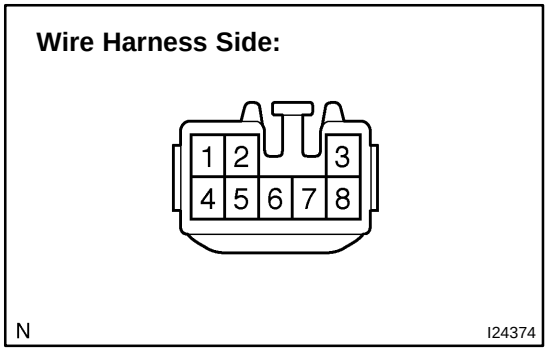
If operation is not as specified, replace the switch.



3. INSPECT INVERTER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Constant	3 – 5	No continuity
Apply B+ between terminals 1 and 2	3 – 5	Continuity

If continuity is not as specified, replace the relay.



4. INSPECT VOLTAGE INVERTER CIRCUIT

Disconnect the connector from the voltage inverter and inspect the connector on the wire harness side as shown in the table below.

Switch position	Tester connection	Specified condition
ON	1 – 4	Battery positive voltage
OFF	1 – 4	No voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

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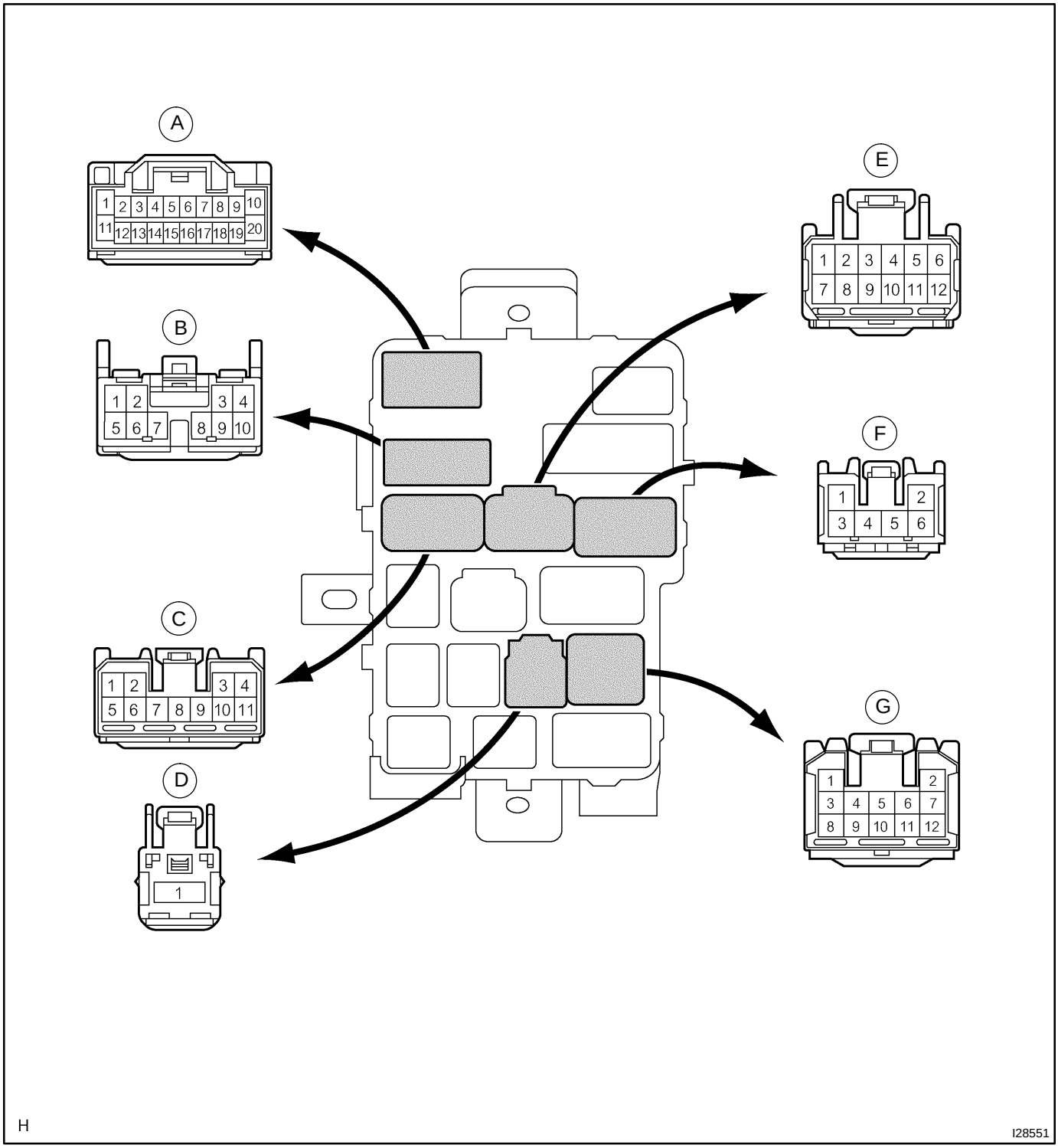
5. INSPECT INSTRUMENT PANEL J/B (IPO) CIRCUIT

Disconnect the connector from the instrument panel J/B and inspect the connector on the wire harness side as shown in the table below.



Tester connection	Condition	Specified condition
A–10 – Body ground C–3 – Body ground C–4 – Body ground	Always	10 to 14 V

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A–10 – Body ground C–3 – Body ground C–4 – Body ground	Ignition switch OFF for 2 hours → ON, or ignition switch ON after disconnection and reconnection of battery terminal cable.	10 to 14 V
B–6 – Body ground	Always	Below 1 V
D–1 – Body ground	Always	10 to 14 V
F–1 – Body ground	Ignition switch OFF → ON or ACC	Below 1 V → 10 to 14 V
F–4 – Body ground	Ignition switch OFF → ON	Below 1 V → 10 to 14 V
G–12 – Body ground	Always	Below 1 V

If the circuit is not as specified, inspect the circuit connected to other parts.

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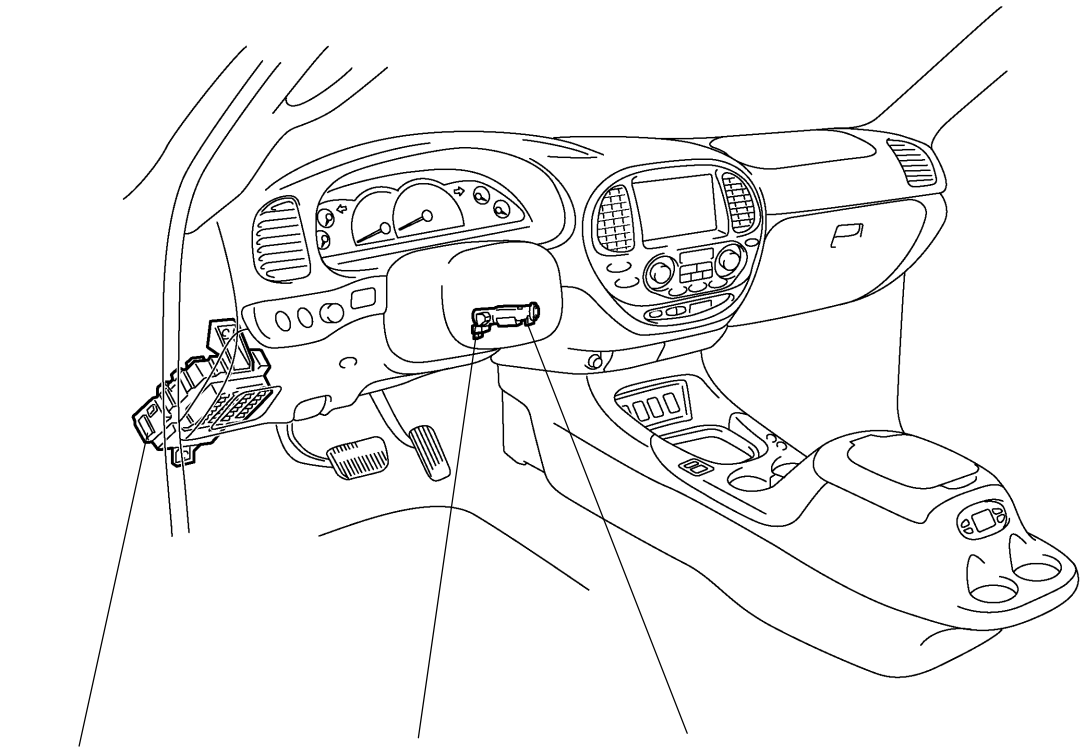
IGNITION SWITCH AND KEY UNLOCK WARNING SWITCH

BE0OP–20

LOCATION



Instrument Panel J/B
▶IG2 Fuse

Ignition Switch

Key Unlock Warning Switch

H

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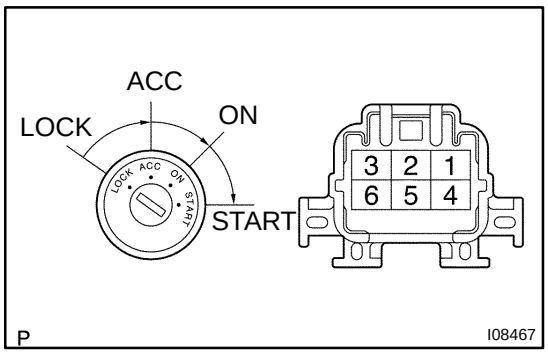
BE25S–04

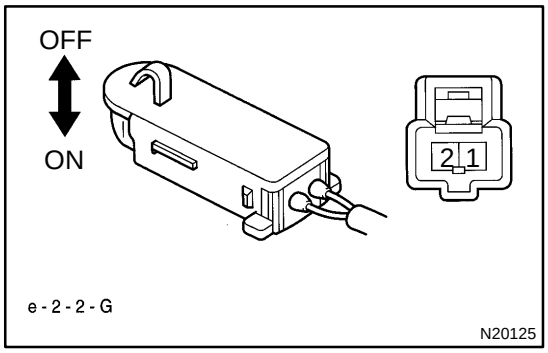


INSPECTION

1. INSPECT IGNITION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	–	No continuity
ACC	1 – 3	Continuity
ON	1 – 2 – 3 5 – 6	Continuity
START	1 – 2 4 – 5 – 6	Continuity

If continuity is not as specified, replace the switch.



2. INSPECT KEY UNLOCK WARNING SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Key removed)	–	No continuity
ON (Key set)	1 – 2	Continuity

If continuity is not as specified, replace the switch.

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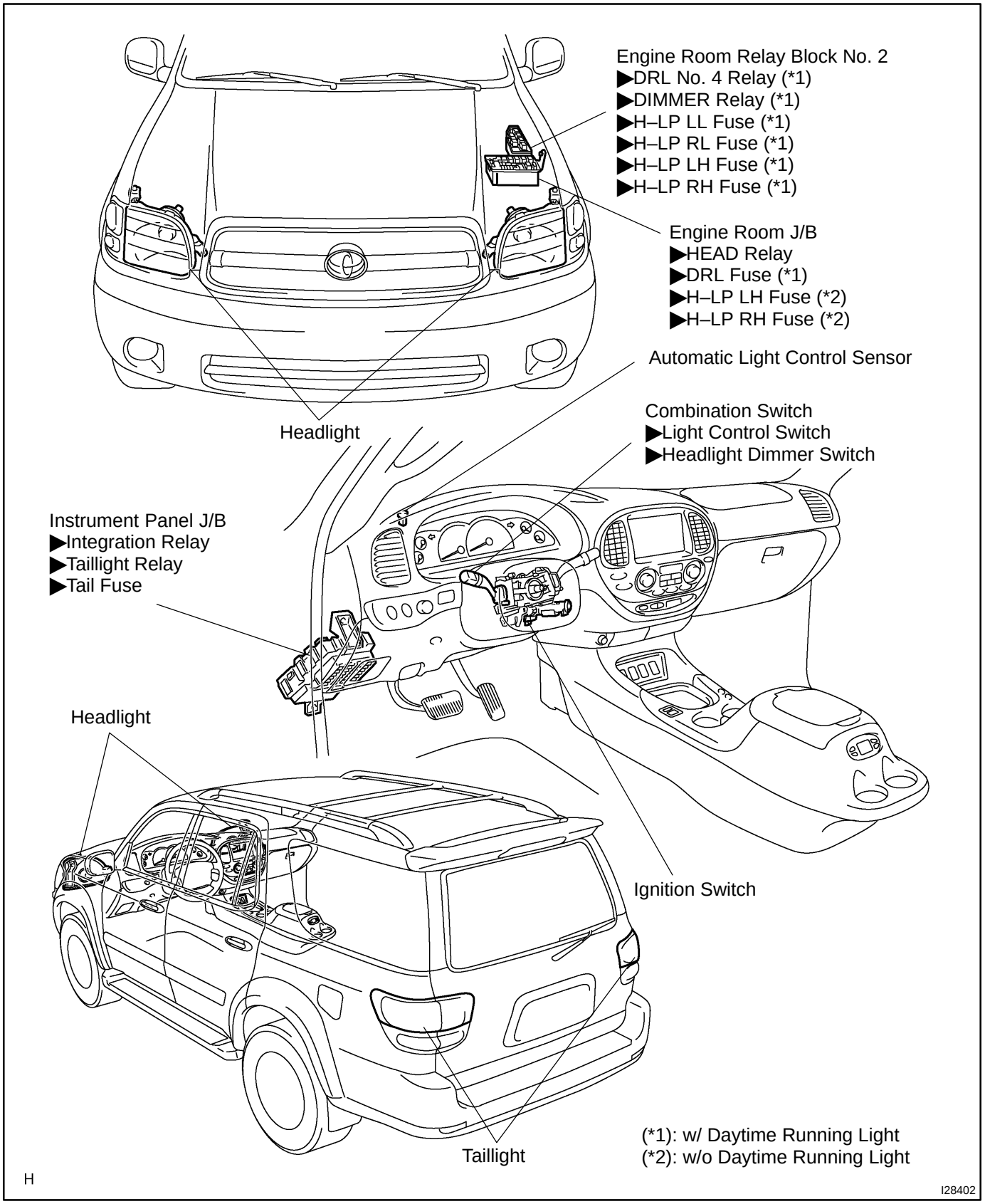
HEADLIGHT AND TAILLIGHT SYSTEM

BE0HV–12

LOCATION



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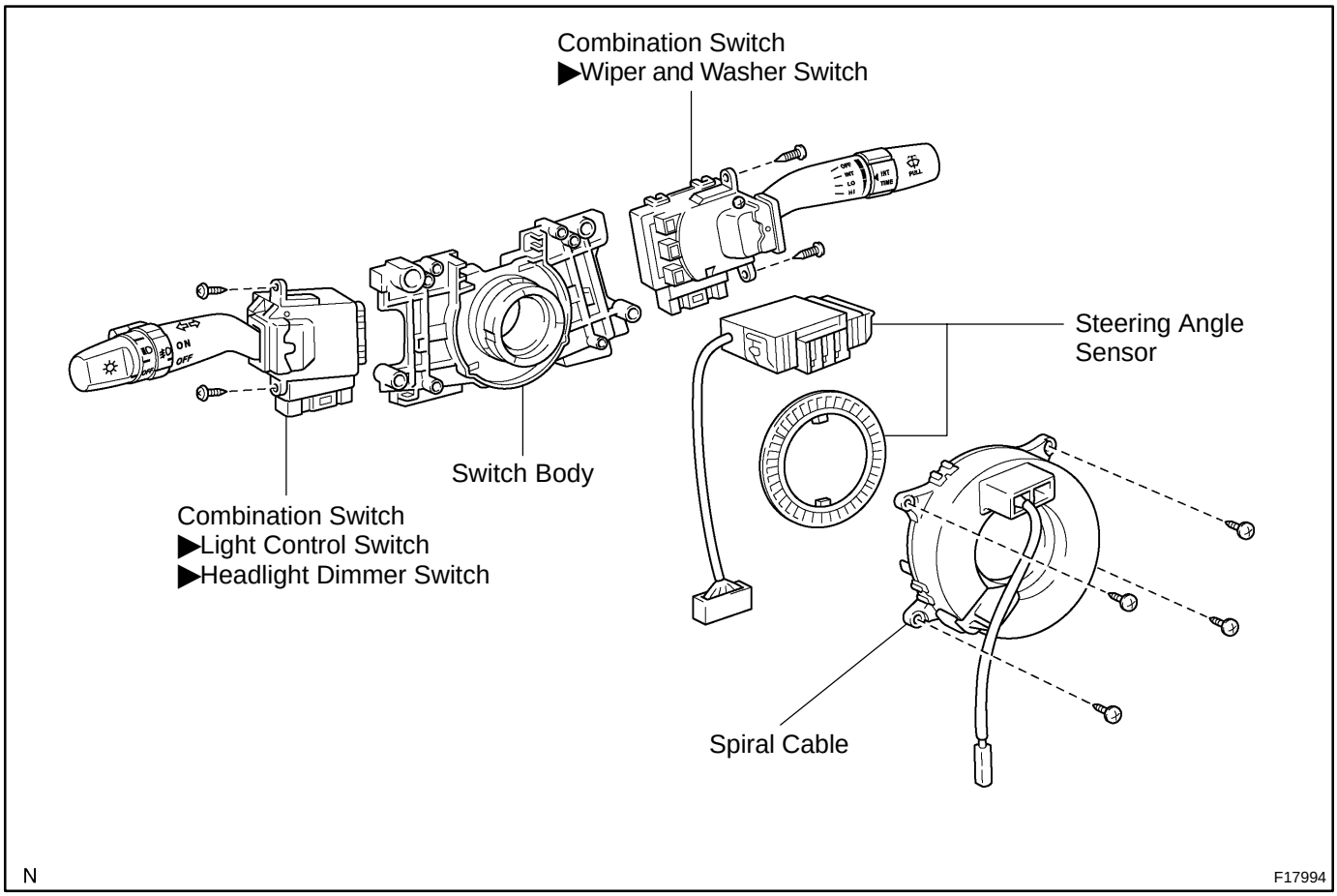
BE0HW–09

COMPONENTS



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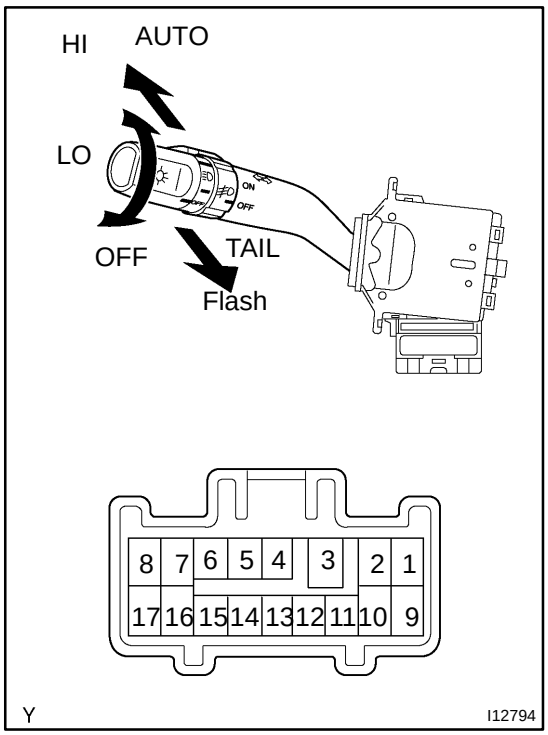
BE2MT–01

INSPECTION



1. INSPECT LIGHT CONTROL SWITCH CONTINUITY

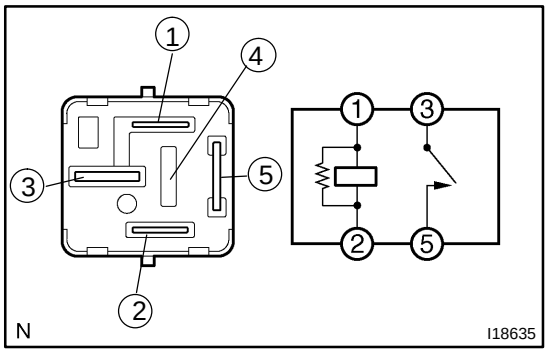
Switch position	Tester connection	Specified condition
OFF	–	No continuity
TAIL	14 – 16	Continuity
HEAD	13 – 14 – 16	Continuity
AUTO	12 – 16	Continuity

If continuity is not as specified, replace the switch.

2. INSPECT HEADLIGHT DIMMER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Flash	7 – 8 – 16	Continuity
Low beam	16 – 17	Continuity
High beam	7 – 16	Continuity

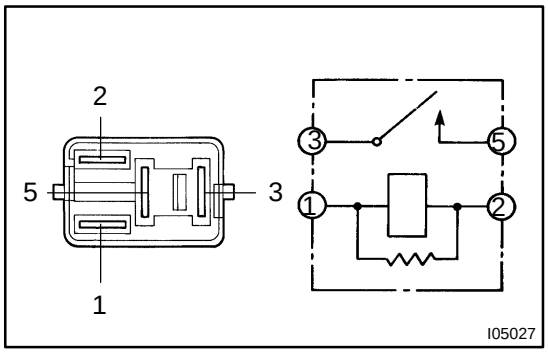
If continuity is not as specified, replace the switch.



3. INSPECT HEAD RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Constant	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

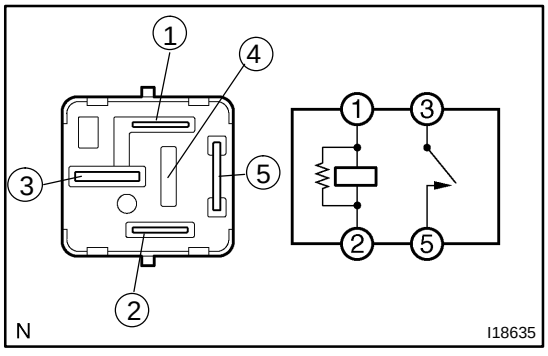
If continuity is not as specified, replace the relay.



4. INSPECT TAILLIGHT RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Constant	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.



5. INSPECT DRL NO. 4 RELAY CONTINUITY (w/ Daytime Running Light)

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Constant	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.

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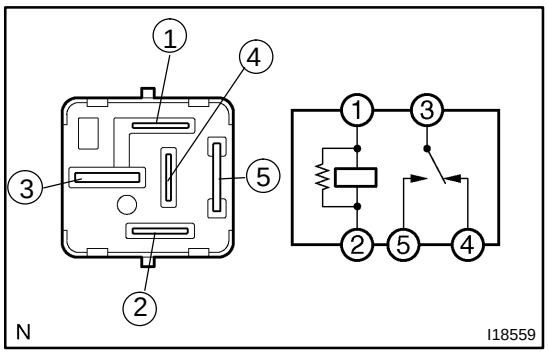
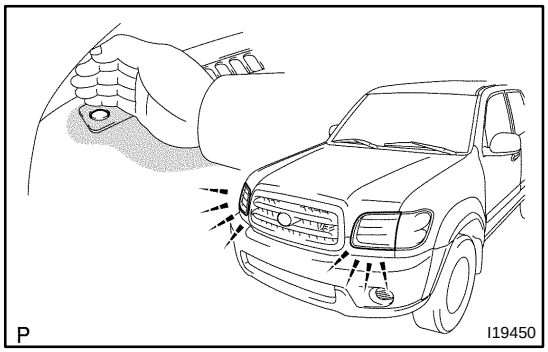


6. INSPECT DIMMER RELAY CONTINUITY (w/ Daytime Running Light)

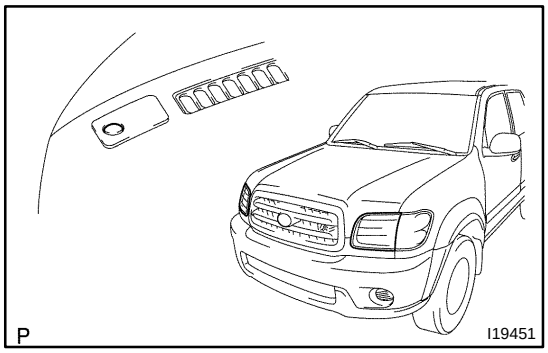
Condition	Tester connection	Specified condition
Constant	1 – 2, 3 – 4	Continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.



7. AUTO ON:
INSPECT AUTOMATIC LIGHT CONTROL

(a) Turn the ignition switch ON.
(b) Turn the light control switch to AUTO.
(c) Gradually cover the top of the sensor.
(d) Check that the accessory lights and the headlights should turn ON.



8. AUTO OFF:
INSPECT AUTOMATIC LIGHT CONTROL

(a) Gradually expose the sensor.
(b) Check that the headlights and the accessory lights should turn OFF.

9. INSPECT LIGHTS–OFF CONDITION

(a) Turn the ignition switch ON.
(b) Lights auto ON:
Gradually cover the top of the sensor.
(c) Check that the lights go off under the following conditions.
(1) Light control switch is OFF.
(2) The area surrounding the sensor gets bright.
(3) After the ignition switch is turned OFF and after 30 sec. from when open doors are all closed.

10. INSPECT LIGHTS–ON CONDITION

(a) Open the driver's door while the ignition switch is OFF.
(b) Turn the light control switch to AUTO leaving the door open and cover the top of the sensor. Make sure that the lights go on when the ignition switch is turned ON.

11. ADJUST AUTOMATIC LIGHT CONTROL SENSOR
(See page DI–1684)

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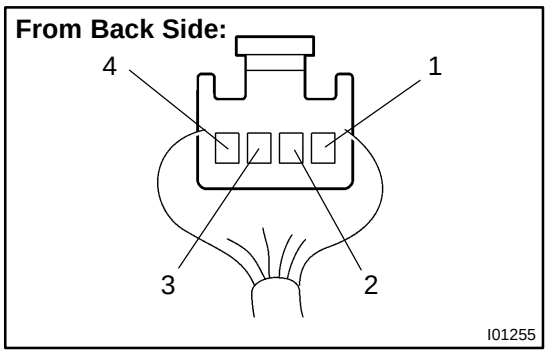


12. Connector connected:
INSPECT AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

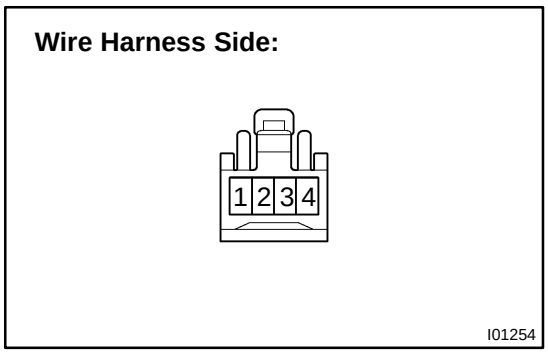
Connect the wire harness side connector to the sensor and inspect wire harness side connector from the back side, as shown in the table.

HINT:

- ▶ Ignition switch ON.
- ▶ Light control switch AUTO.
- ▶ Vehicle's surroundings are bright.

Tester connection	Condition	Specified condition
3 – Ground	Constant	Continuity
1 – Ground	Ignition switch LOCK or ACC	No voltage
1 – Ground	Ignition switch ON	9.5 V or more
3 – 4	Vehicle is under the direct sun light. (Sensor is not covered)	5.2 – 9.0 V
3 – 4	Sensor is covered	Below 0.8 V

If circuit is as specified, try replacing the sensor with a new one.
If the circuit is not as specified, inspect the circuit connected to other parts.



13. Connector disconnected:
INSPECT AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

Disconnect the connector from the sensor and inspect the connector on the wire harness side, as shown in the table.

Tester connection	Condition	Specified condition
3 – Ground	Constant	Continuity
1 – Ground	Ignition switch OFF	No voltage
1 – Ground	Ignition switch ON	Battery positive voltage
4 – Ground	Ignition switch LOCK or ACC	No voltage
4 – Ground	Ignition switch ON	5.2 – 9.0 V

If the circuit is not as specified, inspect the circuit connected to other parts.

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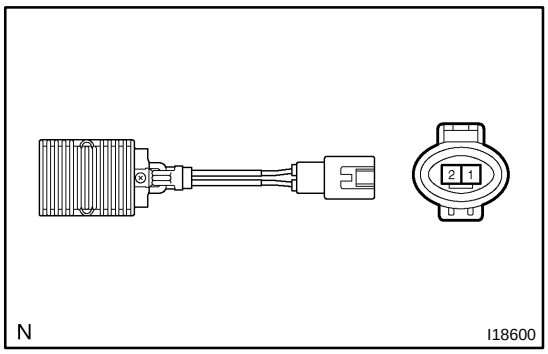

14. INSPECT DAYTIME RESISTOR CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 – 2	Approx. 33.7 mΩ at 20°C

If continuity is not as specified, replace the resistor.

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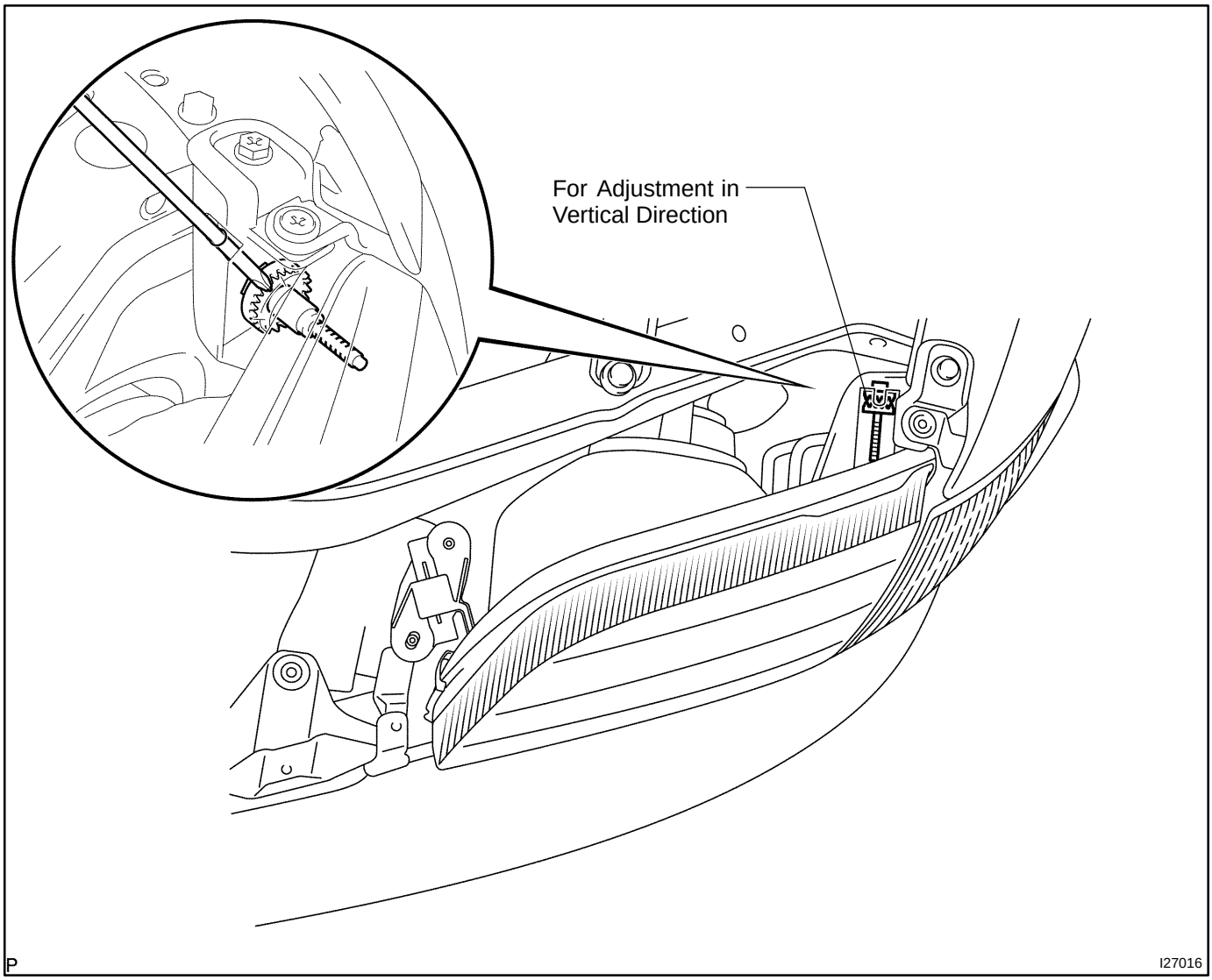
BE1DK–09

ADJUSTMENT

1. ADJUST HEADLIGHT AIMING



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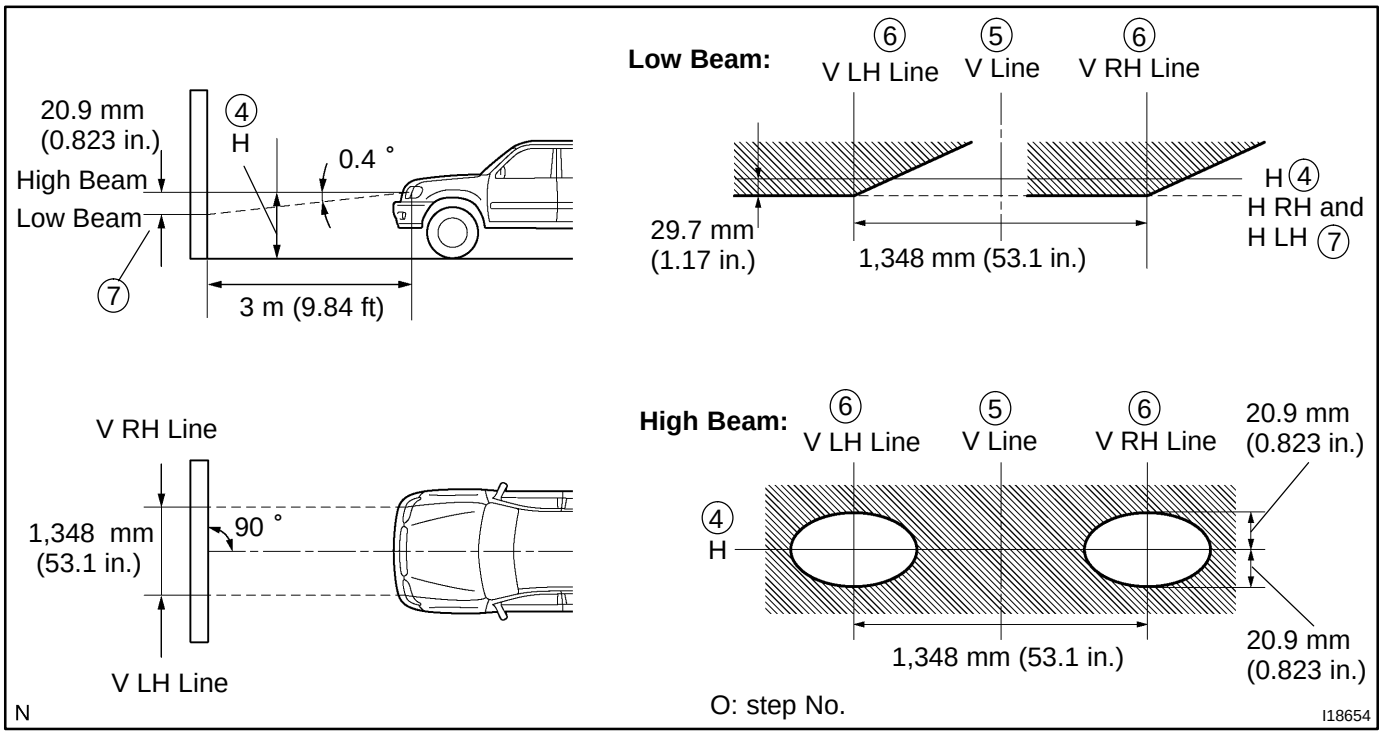
2. ADJUST HEADLIGHT AIM ONLY

(a) Place the vehicle in the following conditions.
- ▶ The area around the headlight is not deformed.
- ▶ The vehicle is parked on a level surface.
- ▶ Tire inflation pressure is the specified value.
- ▶ A driver is in the driver's seat and the vehicle is in a state ready for driving (with a tank full).
- ▶ The vehicle has been bounced several times.

(b) Check the headlight aiming.
- (1) Prepare a thick white paper.
- (2) Stand the paper perpendicular to the ground at the position 3 m (9.84 ft) away from the headlights bulb center.
- (3) Ensure that the center line of the vehicle and the paper face forms a 90–degree angle as shown in the illustration.
- (4) Draw a horizontal line (H line) on the paper, showing where the headlights should strike.
- (5) Draw a vertical line (V line) at the position where the extended center line of the vehicle strikes.
- (6) Draw 2 vertical lines (by connecting the low and high beam center marks) to where the both headlights should strike (V RH and V LH lines).
- (7) Draw a horizontal line (by connecting the both low beam center marks) at the position where the headlights should strike (H RH and H LH lines).

HINT:

The H RH and H LH line is 0.4° below the horizontal line (H line) of the light axis.
- (8) Start the engine.
- (9) Turn the headlights ON.
- (10) Check that the headlights properly strike the position shown in the illustration.
- (11) If not, adjust the lights in the vertical or horizontal direction.



HINT:

As shown in the illustration, adjust each aim of the RH and LH lights.

(c) When adjusting it in the vertical direction:

Using adjusting bolt, adjust the headlight aim to within the specified range.

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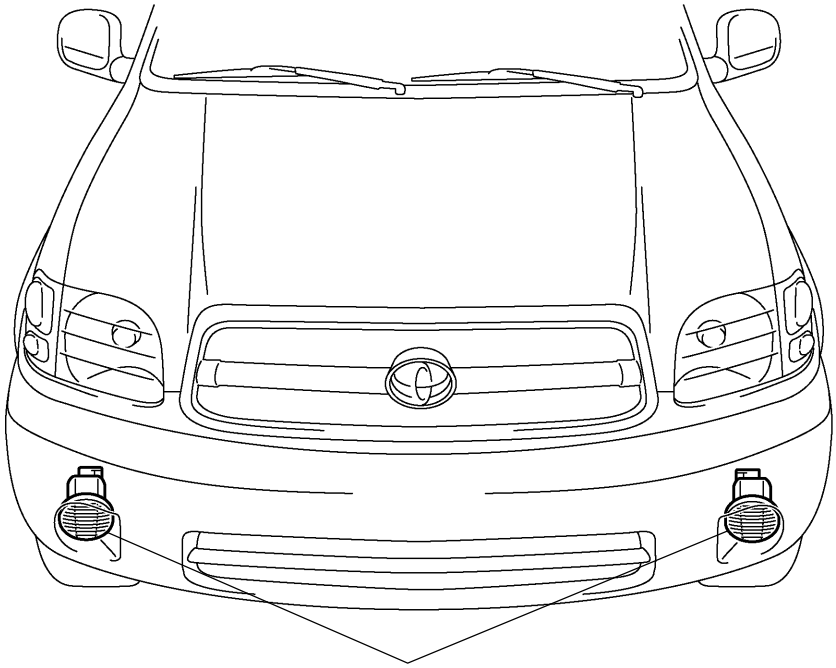
FOG LIGHT SYSTEM

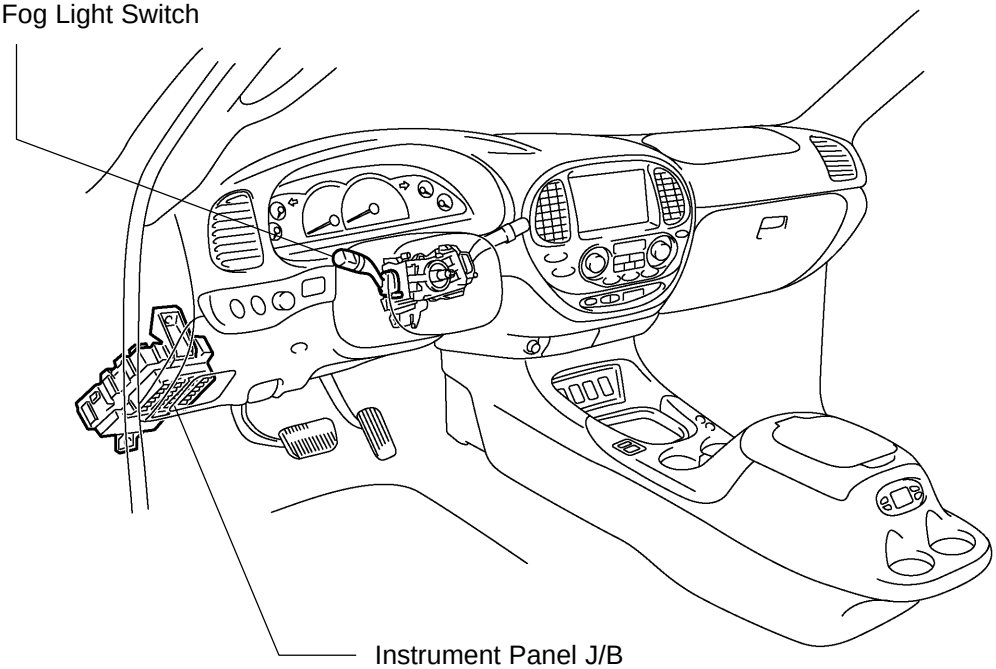
LOCATION

BE050–15



Front Fog Light

Combination Switch
▶Front Fog Light Switch



Instrument Panel J/B
▶Fog Light Relay
▶Fog Fuse

H

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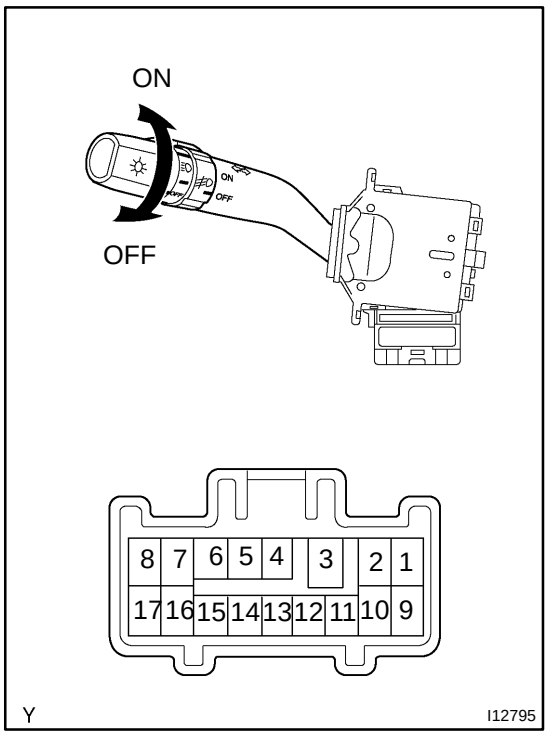
BE0HZ–08

INSPECTION

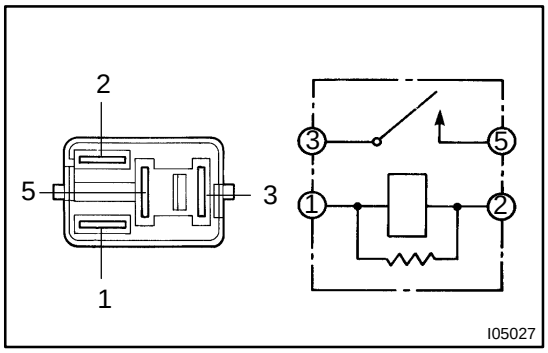
1. INSPECT FOG LIGHT SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
OFF	–	No continuity
ON	10 – 11	Continuity

If continuity is not as specified, replace the switch.

2. INSPECT FOG LIGHT RELAY CONTINUITY



Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Constant	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.

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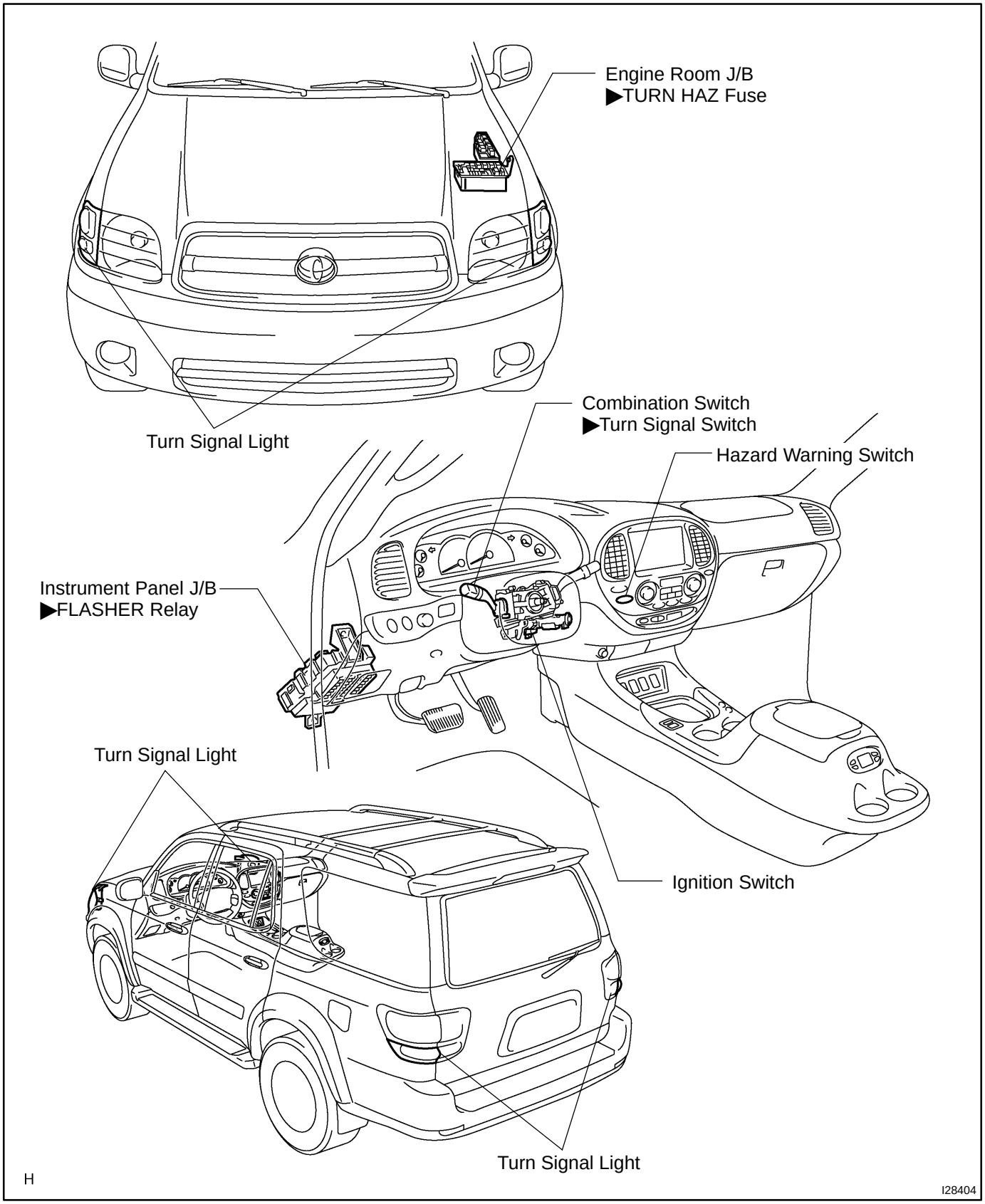
TURN SIGNAL AND HAZARD WARNING SYSTEM

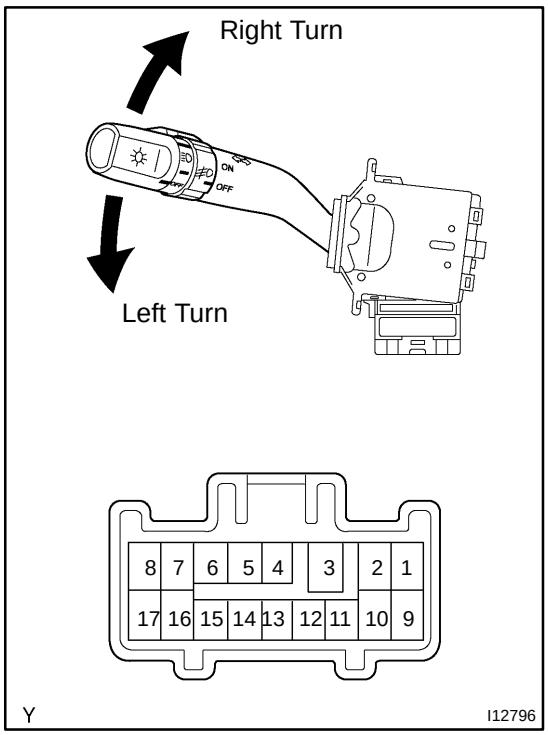
LOCATION

BE033–09



Dardoor.com

BE2DD–03

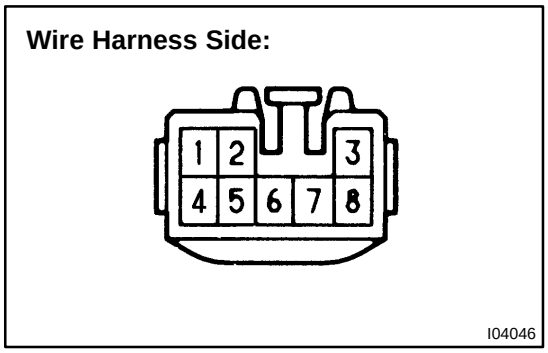


INSPECTION

1. INSPECT TURN SIGNAL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Left turn	1 – 2	Continuity
Neutral	–	No continuity
Right turn	2 – 3	Continuity

If continuity is not as specified, replace the switch.



2. Connector disconnected: INSPECT TURN SIGNAL FLASHER CIRCUIT

Disconnect the connector from the turn signal flasher and inspect the connector on the wire harness side as shown in the table below.

Tester connection	Condition	Specified condition
1 – Ground	Ignition switch LOCK or ACC	No voltage
1 – Ground	Ignition switch ON	Battery positive voltage
2 – Ground	Always	Continuity
3 – Ground	Always	Continuity
4 – Ground	Always	Battery positive voltage
5 – Ground	Turn signal switch RIGHT or OFF	No Continuity
5 – Ground	Turn signal switch LEFT	Continuity
6 – Ground	Turn signal switch LEFT or OFF	No Continuity
6 – Ground	Turn signal switch RIGHT	Continuity
7 – Ground	Always	Continuity
8 – Ground	Hazard warning switch OFF	No Continuity
8 – Ground	Hazard warning switch ON	Continuity

If the circuit is as specified, perform the inspection on the next step.

If the circuit is not as specified, inspect the circuit connected to other parts.

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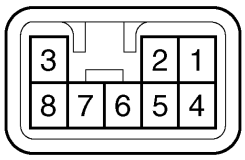
Turn Signal Flasher Relay Connector Front View:



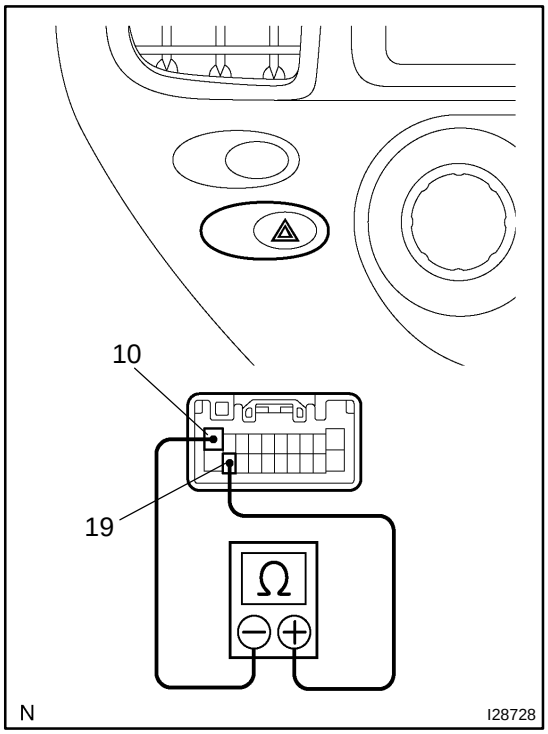
N I24334

3. Connector connected:
INSPECT TURN SIGNAL FLASHER RELAY OPERATION

Connect the wire harness side connector to the turn signal flasher and inspect the connector from the back side, as shown.

Tester connection	Condition	Specified condition
2 – Ground	Turn signal switch RIGHT	Battery positive voltage ↔ 0 V
3 – Ground	Turn signal switch LEFT	Battery positive voltage ↔ 0 V

If operation is not as specified, replace the relay.



N I28728

4. INSPECT HAZARD WARNING SWITCH CONTINUITY

(a) Remove the center cluster finish panel.
(b) Disconnect the connector from the integrated center cluster.
(c) Check that continuity exists between terminals 19 and 10 with the switch ON.
(d) Check that no continuity exists between terminals 19 and 10 with the switch OFF.

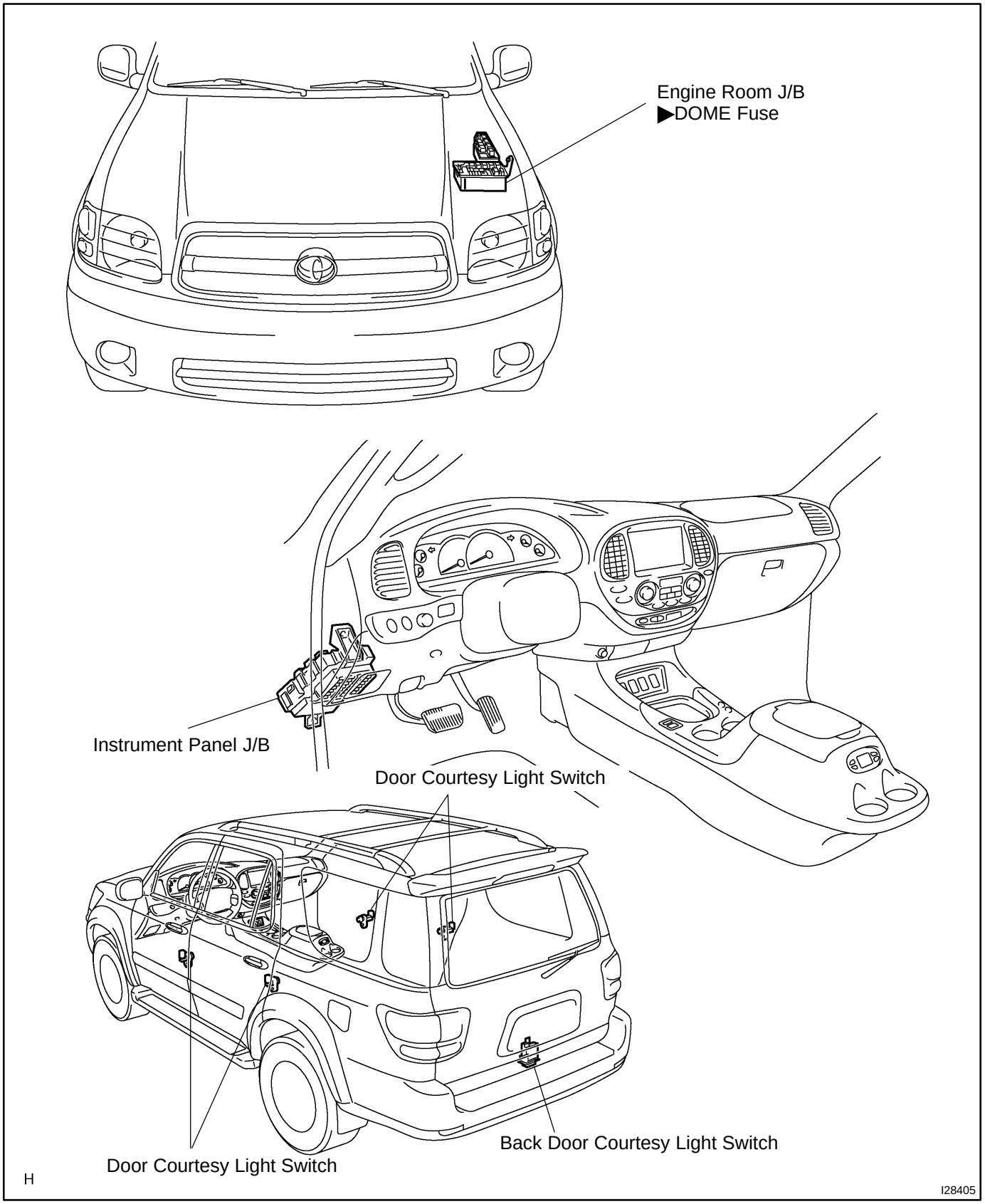
If continuity is not as specified, replace the switch.

Dardoor.com

INTERIOR LIGHT SYSTEM

LOCATION

BE175–06



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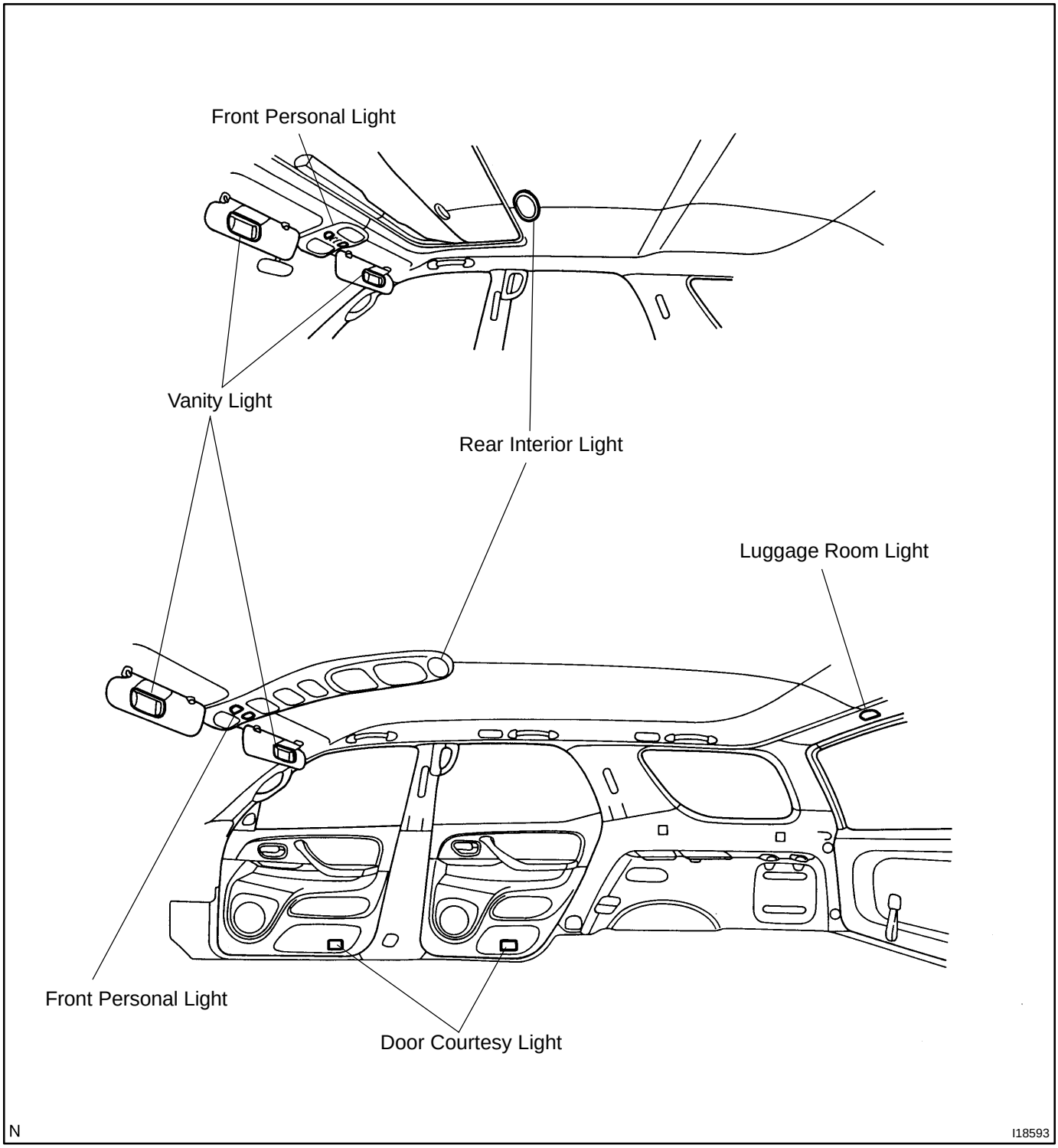
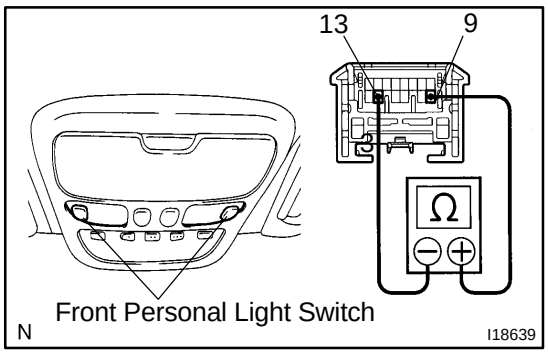

Front Personal Light
Vanity Light
Rear Interior Light
Luggage Room Light
Front Personal Light
Door Courtesy Light
N
I18593

Dardoor.com

BE2MS–01

INSPECTION



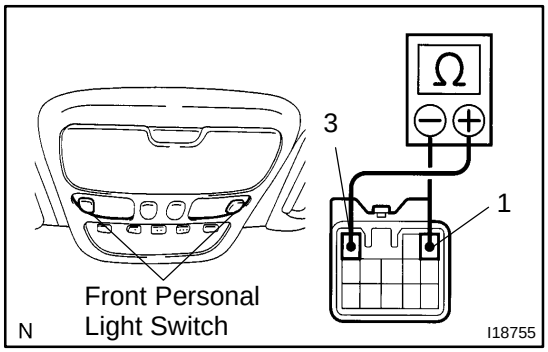
1. w/o Sliding Roof:

INSPECT FRONT PERSONAL LIGHT SWITCH CONTINUITY

(a) Disconnect the connector from the personal light.

(b) Push the personal light switch ON, check that continuity exists between terminal 9 and terminal 13.

If continuity is not as specified, replace the light assembly or bulb.



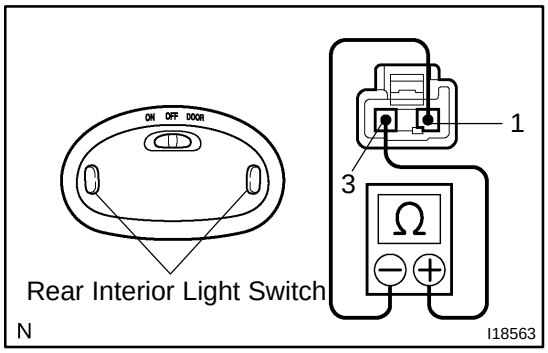
2. w/ Sliding Roof:

INSPECT FRONT PERSONAL LIGHT SWITCH CONTINUITY

(a) Disconnect the connector from the personal light.

(b) Push the personal light switch ON, check that continuity exists between terminal 1 and terminal 3.

If continuity is not as specified, replace the light assembly or bulb.



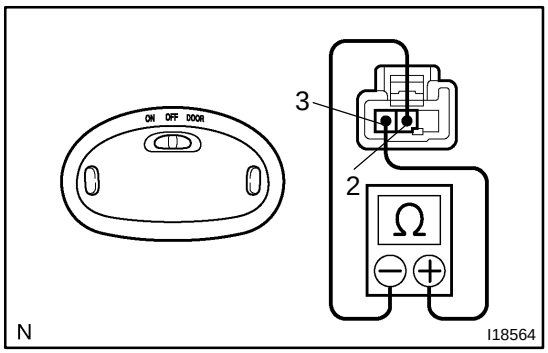
3. w/o RSE or RSA:

INSPECT REAR INTERIOR LIGHT SWITCH CONTINUITY

(a) Disconnect the connector from the doom light.

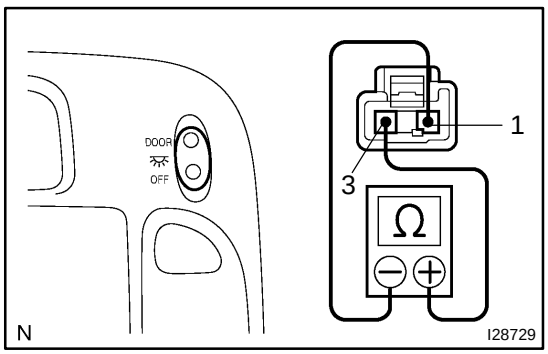
(b) Push the rear interior light switch ON, check that continuity exists between terminal 1 and terminal 3.

If continuity is not as specified, replace the light assembly or bulb.



(c) Turn the light switch to DOOR, check that continuity exists between terminals 2 and 3.

If continuity is not as specified, replace the light assembly or bulb.



4. w/ RSE or RSA:

INSPECT REAR INTERIOR LIGHT SWITCH CONTINUITY

(a) Disconnect the connector from the rear interior light.

(b) Push the rear interior light switch ON, check that continuity exists between terminal 1 and terminal 3.

If continuity is not as specified, replace the light assembly or bulb.

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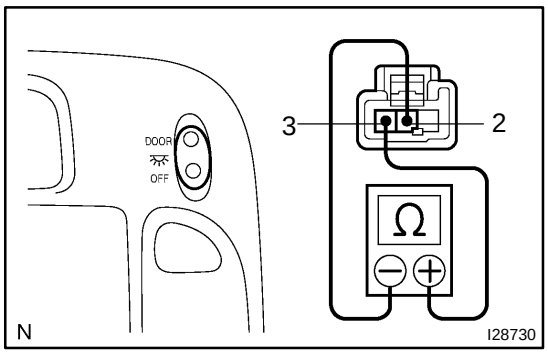
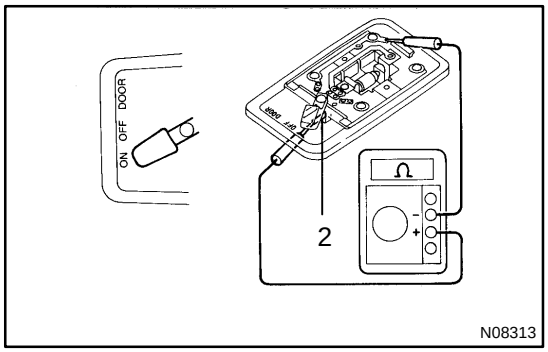


(c) Turn the light switch to DOOR, check that continuity exists between terminals 2 and 3.

If continuity is not as specified, replace the light assembly or bulb.

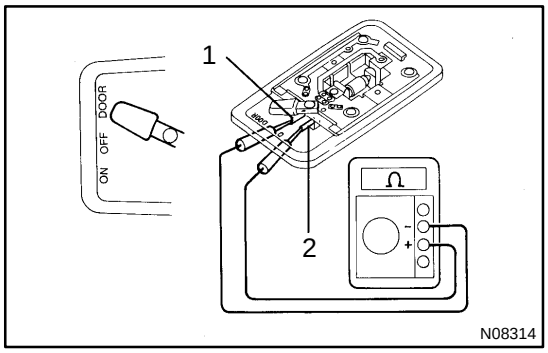


5. INSPECT LUGGAGE ROOM LIGHT SWITCH CONTINUITY

(a) Disconnect the connector from the interior light assembly.

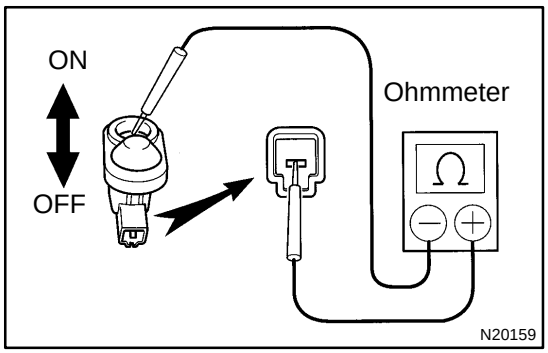
(b) Turn the interior light switch ON, check that continuity exists between terminal 2 and body ground.

If continuity is not as specified, replace the light assembly or bulb.



(c) Turn the interior light switch to DOOR, check that continuity exists between terminals 1 and 2.

If continuity is not as specified, replace the light assembly or bulb.

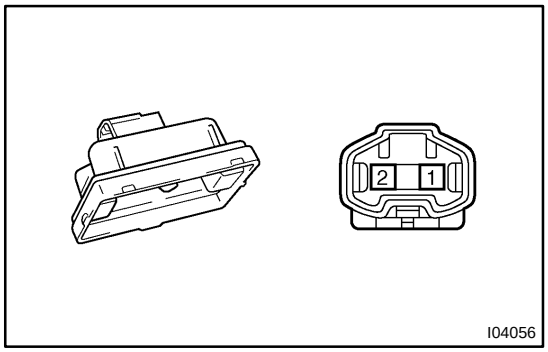


6. INSPECT DOOR COURTESY LIGHT SWITCH CONTINUITY

(a) Check that continuity exists between terminals and the switch body with the switch ON (switch pin released: opened door).

(b) Check that no continuity exists between terminals and the switch body with the switch OFF (switch pin pushed in: closed door).

If continuity is not as specified, replace the switch.



7. INSPECT DOOR COURTESY LIGHT CONTINUITY

Check that continuity exists between terminals.

If continuity is not as specified, replace the light assembly or bulb.

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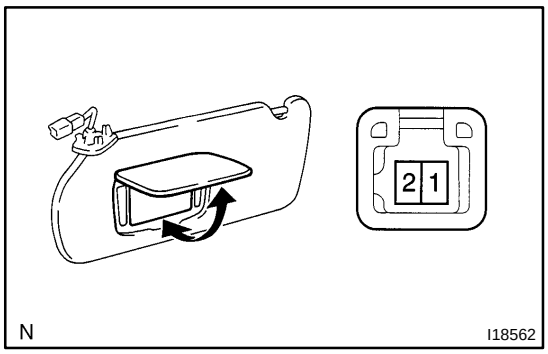
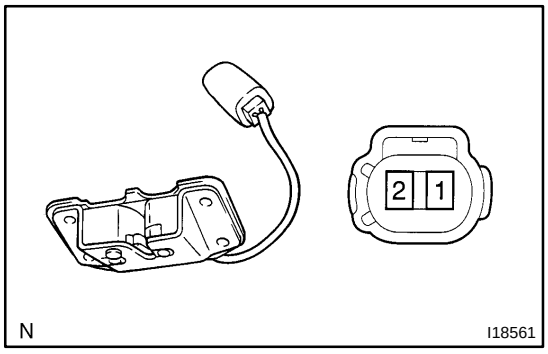


8. INSPECT VANITY LIGHT CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Closed)	1 – 2	No continuity
ON (Opened)	1 – 2	Continuity

If continuity is not as specified, replace the bulb or vanity light.



9. INSPECT BACK DOOR COURTESY LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Closed)	1 – 2	No continuity
ON (Opened)	1 – 2	Continuity

If continuity is not as specified, replace the switch.

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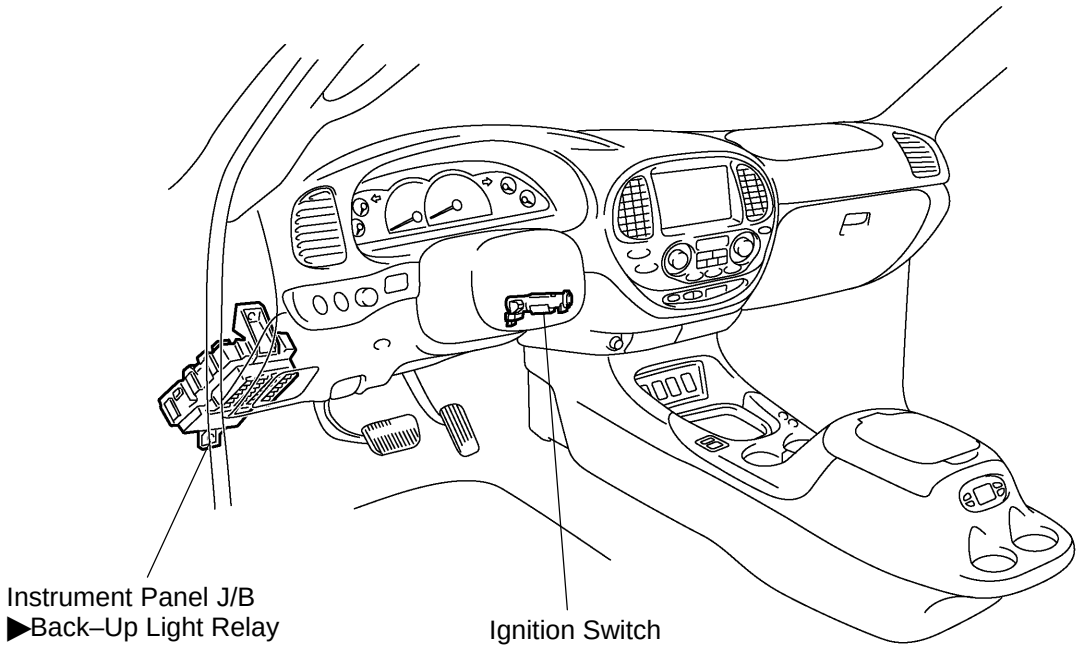
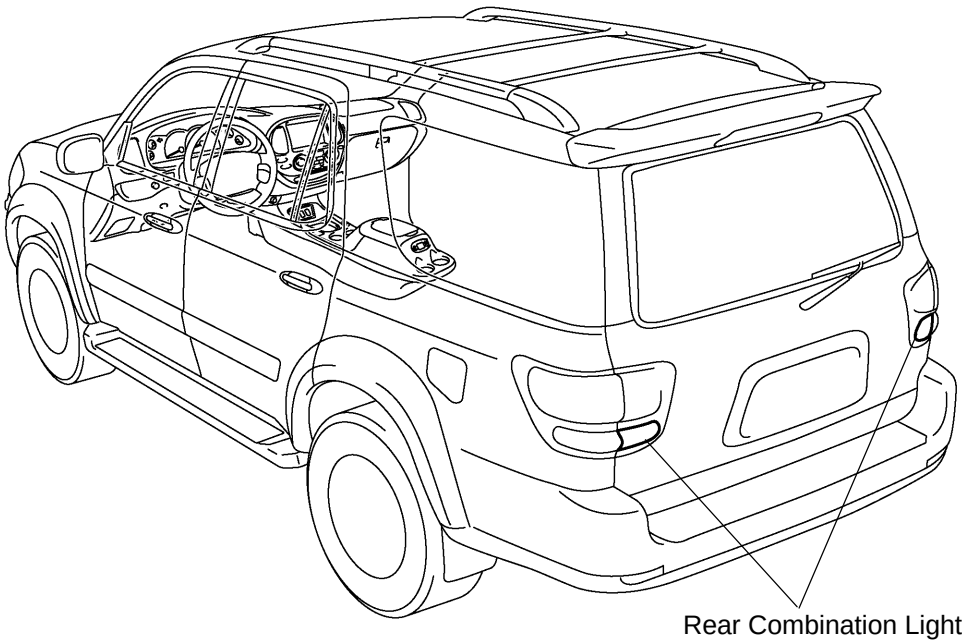
BACK–UP LIGHT SYSTEM

LOCATION

BE037–08





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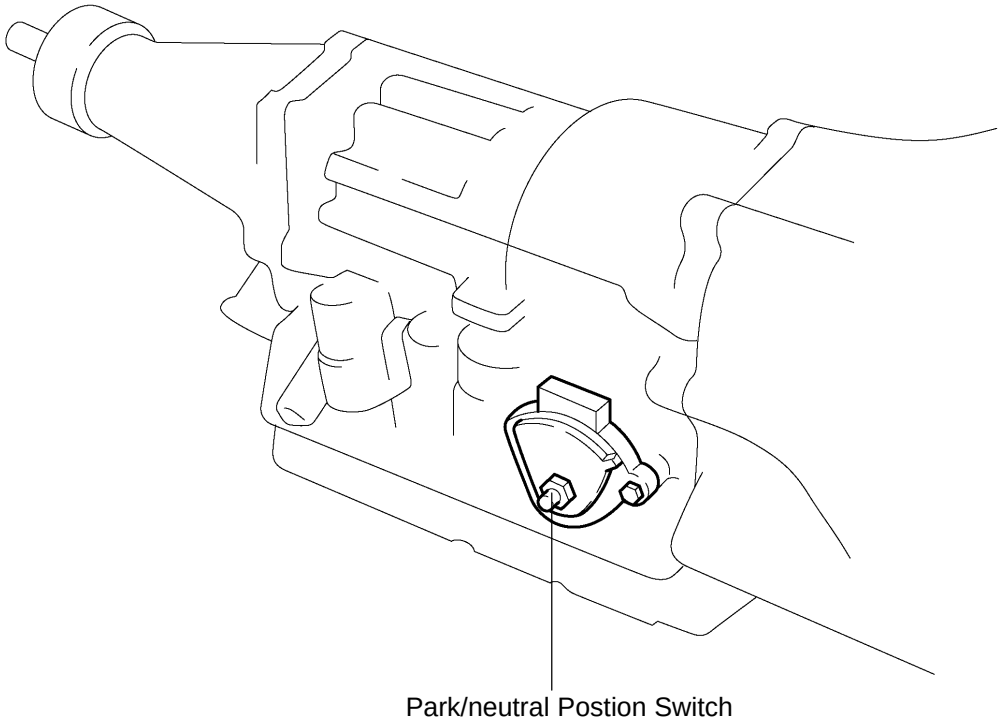
I28407

Dardoor.com



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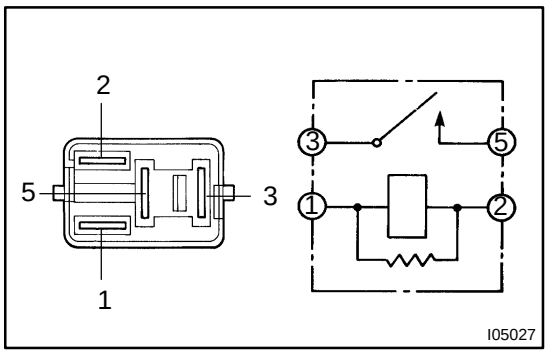
Dardoor.com

BE25V–04



INSPECTION

1. INSPECT BACK–UP LIGHT RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Constant	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.

2. INSPECT PARK/NEUTRAL POSITION SWITCH (See page DI–576)

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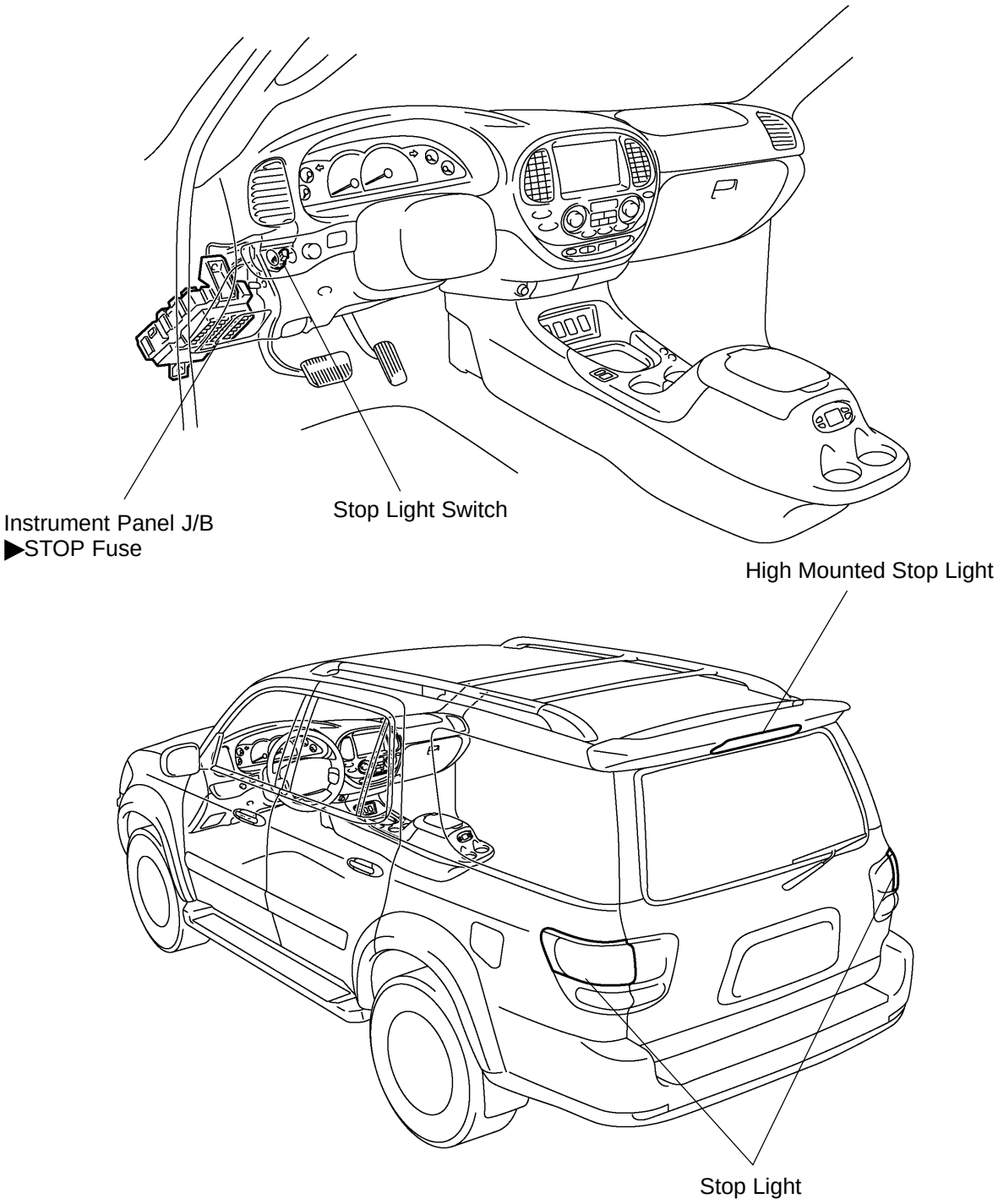
STOP LIGHT SYSTEM

LOCATION

BE039–08



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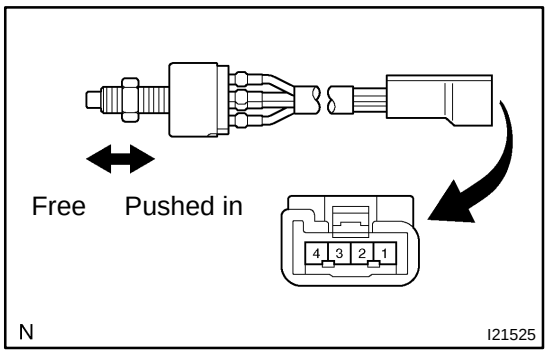
BE25W–04

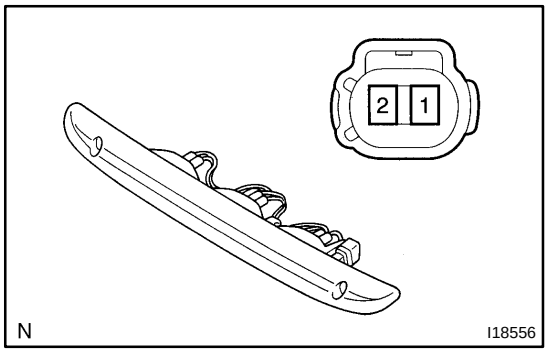
INSPECTION

1. INSPECT STOP LIGHT SWITCH CONTINUITY



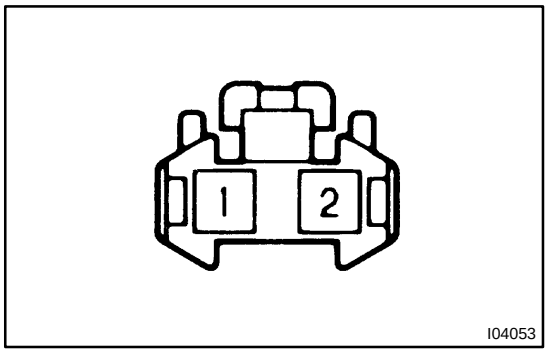
Switch position	Tester connection	Specified condition
Switch pin free	1 – 4	Continuity
Switch pin pushed in	1 – 4	No continuity
Switch pin free	2 – 3	No continuity
Switch pin pushed in	2 – 3	Continuity

If continuity is not as specified, replace the switch.



2. w/ Rear Spoiler: INSPECT HI–MOUNTED STOP LIGHT ASSEMBLY CONTINUITY

Using the ohmmeter, check that continuity exists between terminal 1 and terminal 2.
If continuity is not as specified, replace the light assembly.



3. w/o Rear Spoiler: INSPECT HI–MOUNTED STOP LIGHT ASSEMBLY CONTINUITY

Using the ohmmeter, check that continuity exists between terminal 1 and terminal 2.
If continuity is not as specified, replace the light assembly.

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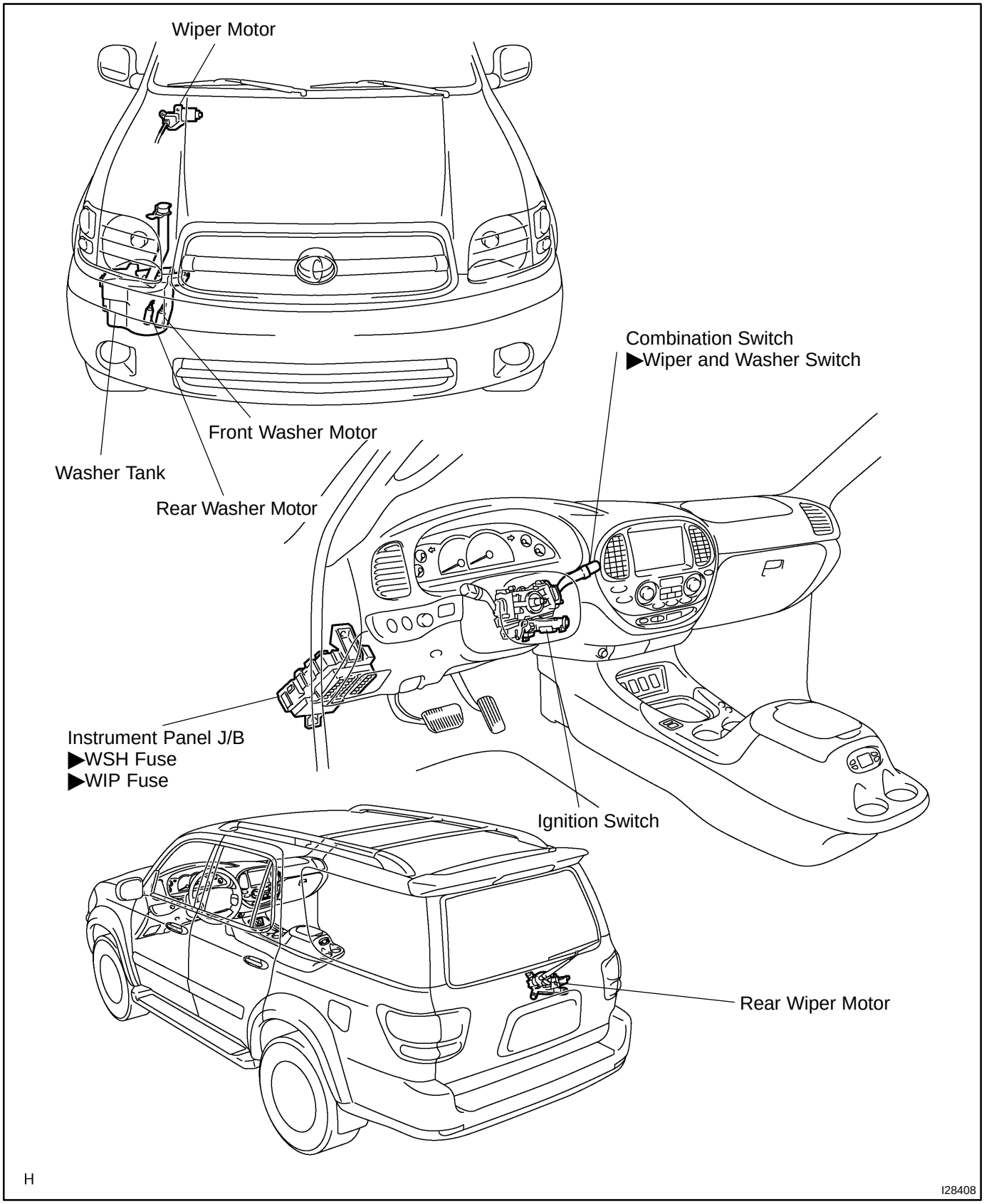
WIPER AND WASHER SYSTEM

BE03B–10

LOCATION



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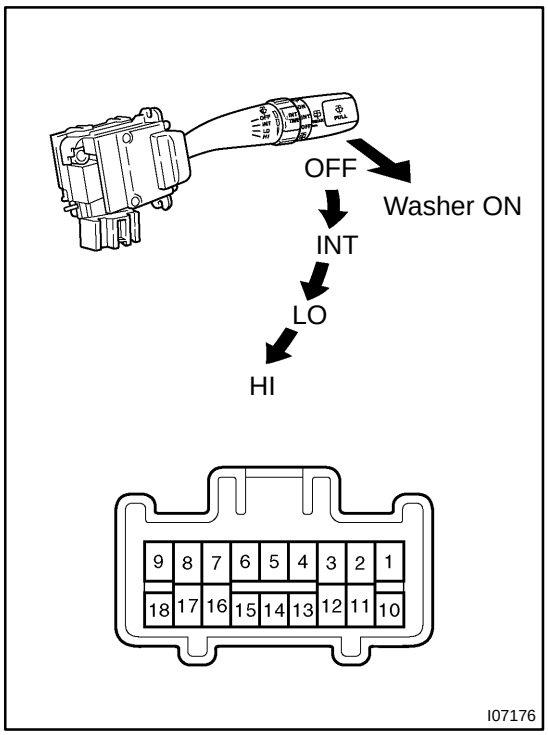
BE2AV–04

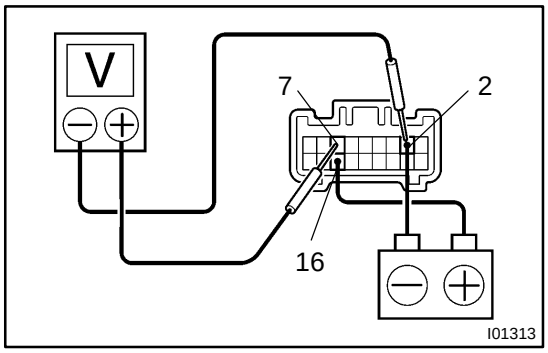
INSPECTION

1. INSPECT FRONT WIPER AND WASHER SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
OFF	7 – 16	Continuity
INT	7 – 16	Continuity
LO	7 – 17	Continuity
HI	8 – 17	Continuity
Washer ON	2 – 11	Continuity

If continuity is not as specified, replace the switch.



2. INSPECT FRONT WIPER INTERMITTENT OPERATION

(a) Turn the wiper switch to the INT position.
(b) Turn the intermittent time control switch to the FAST position.
(c) Connect the positive (+) lead from the battery to terminal 16 and the negative (–) lead to terminal 2.
(d) Connect the positive (+) lead from the voltmeter to terminal 7 and the negative (–) lead to terminal 2, and check that the meter needle indicates battery positive voltage.

INT time control switch position	Voltage
FAST	Approx. 1–3 sec. Battery positive voltage 0 volt
SLOW	Approx. 10–15 sec. Battery positive voltage 0 volt

V03883

If operation is not as specified, replace the wiper and washer switch.

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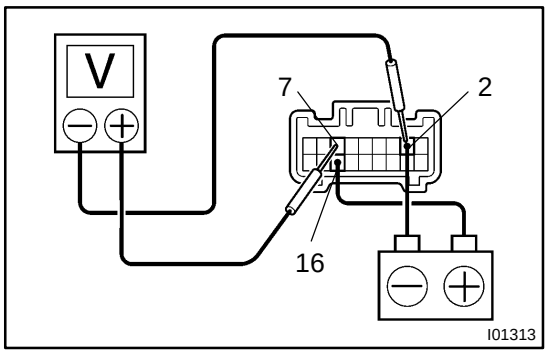
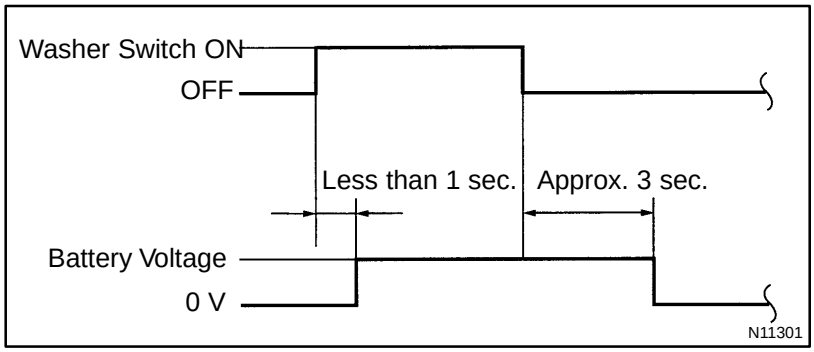


3. INSPECT FRONT WASHER LINKED OPERATION

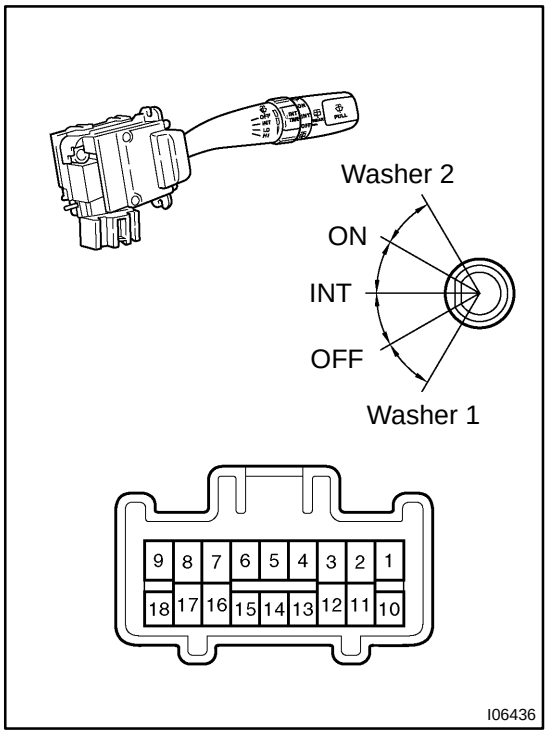
(a) Connect the positive (+) lead from the battery to terminal 16 and the negative (–) lead to terminal 2.

(b) Connect the positive (+) lead from the voltmeter to terminal 7 and the negative (–) lead to terminal 2.

(c) Push in the washer switch, and check that the voltage changes as shown in the following illustration.



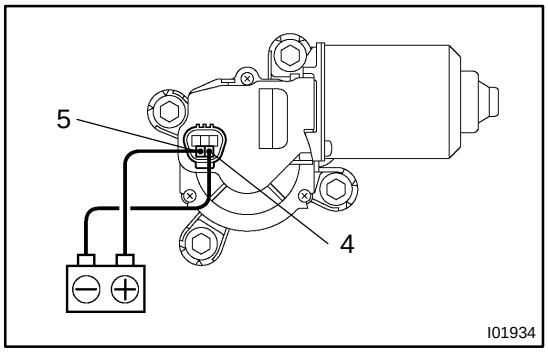
If operation is not as specified, replace the wiper and washer switch.



4. INSPECT REAR WIPER AND WASHER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Washer 1	2 – 12	Continuity
OFF	–	–
INT	2 – 13	Continuity
ON	2 – 10	Continuity
Washer 2	2 – 10 – 12	Continuity

If continuity is not as specified, replace the wiper and washer switch.



5. Low Speed: INSPECT WIPER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 5 and the negative (–) lead from the battery to the motor body or terminal 4, and check that the motor operates at low speed.

If operation is not as specified, replace the motor.

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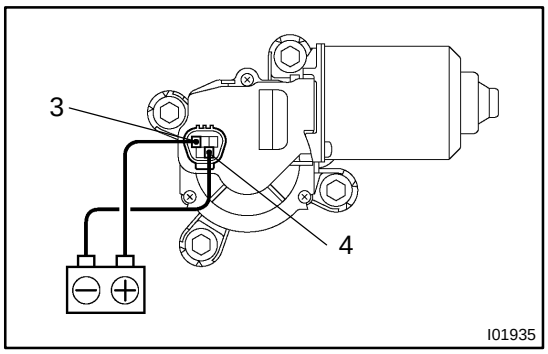
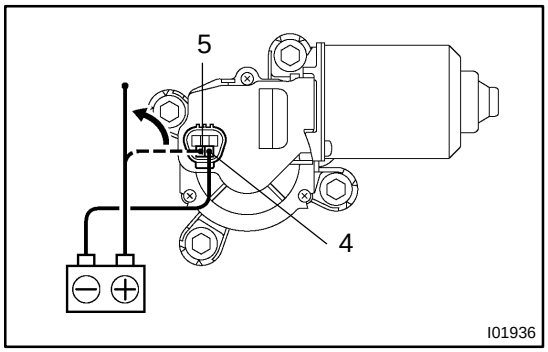


6. High Speed:
INSPECT WIPER MOTOR OPERATION

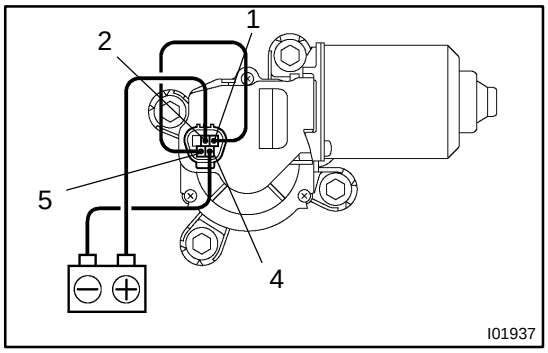
Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead from the battery to the motor body or terminal 4, and check that the motor operates at high speed.

If operation is not as specified, replace the motor.



7. Stopping at Stop Position:
INSPECT WIPER MOTOR OPERATION

(a) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 5.

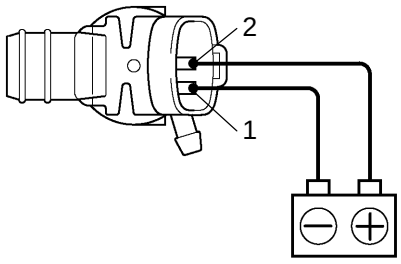


(b) Connect terminals 1 and 5.

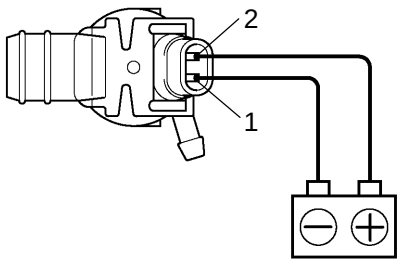
(c) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead from the battery to the motor body or terminal 4, and check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.

Front Washer Motor:



Rear Washer Motor:



8. INSPECT WASHER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, and check that the motor operates.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.

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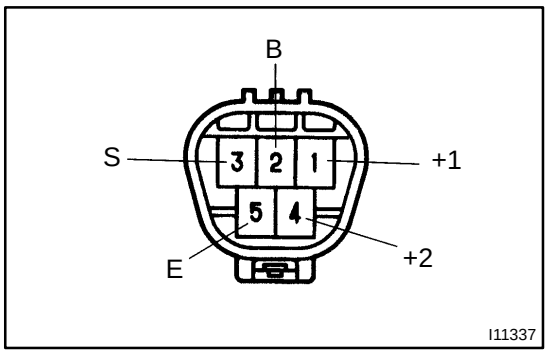
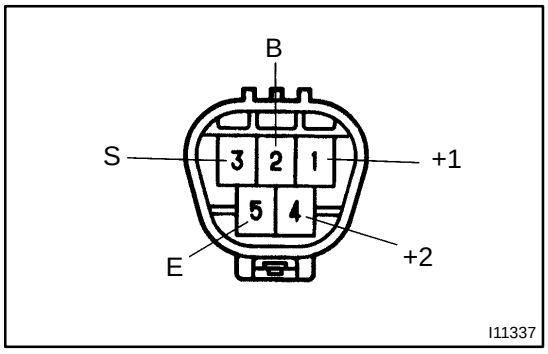


9. INSPECT REAR WIPER MOTOR OPERATION

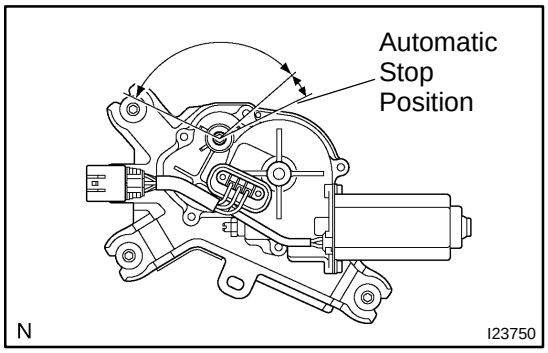
Connect the positive (+) lead from the battery to terminal 5 and the negative (–) lead from the battery to the motor body or terminal 4, and check that the motor operates.

If operation is not as specified, replace the motor.



10. Stopping at Stop Position:
INSPECT REAR WIPER MOTOR OPERATION

(a) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 3.



(b) Connect terminals 2 and 5.

(c) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead from the battery to the motor body or terminal 4, and check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.

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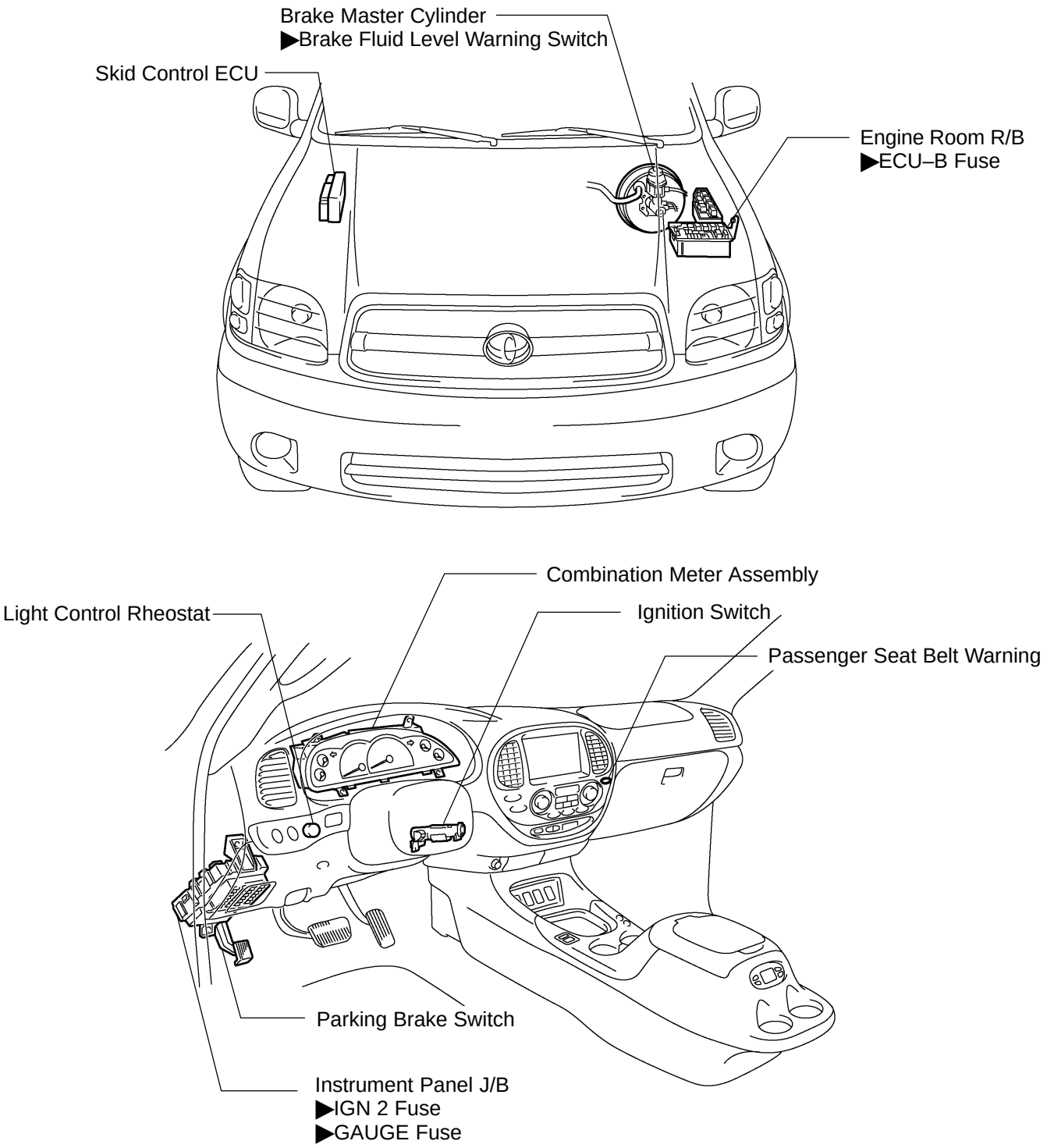
COMBINATION METER

LOCATION

BE17A–06



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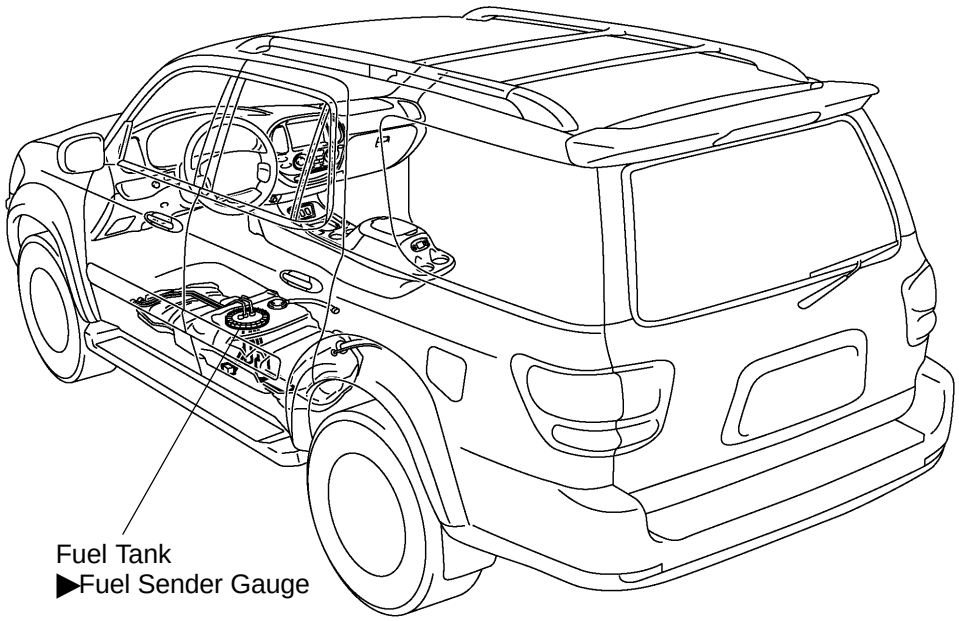

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BE2MR–01

INSPECTION

1. INSPECT SPEEDOMETER ON–VEHICLE

Using a speedometer tester, inspect the speedometer for allowable indication error and check odometer operation.

HINT:

Tire wear and tire over or under inflation will increase the indication error.

USA (mph)		CANADA (km/h)	
Standard indication	Allowable range	Standard indication	Allowable range
20	19 – 22	20	17.5 – 21.5
40	39 – 42.5	40	38 – 42
60	59.5 – 63.5	60	58 – 63
80	79.5 – 84	80	78 – 84
100	100 – 105	100	98.5 – 104.5
–		120	119 – 125
–		140	139 – 145
–		160	159 – 167

If error is excessive, replace the speedometer.

2. INSPECT TACHOMETER

(a) Connect a tune–up test tachometer, and start the engine.

NOTICE:

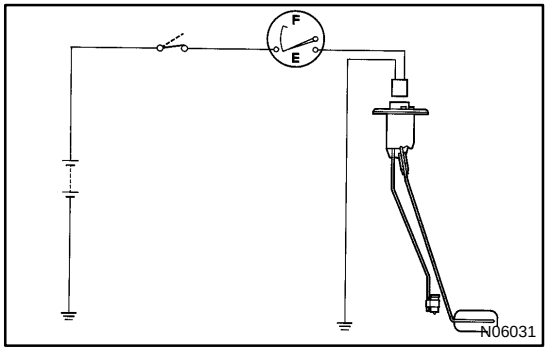
- **Reversing the connection of the tachometer will damage the transistors and diodes inside.**
- **When removing or installing the tachometer, be careful not to drop or subject it to heavy shocks.**

(b) Compare the tester and tachometer indications.

DC 13.5 V 20˚C at (68˚F)

Standard indication	Allowable range
700	630 – 770
1,000	900 – 1,100
2,000	1,850 – 2,150
3,000	2,800 – 3,200
4,000	3,800 – 4,200
5,000	4,800 – 5,200
6,000	5,750 – 6,250

If error is excessive, replace the tachometer.



3. INSPECT FUEL RECEIVER GAUGE OPERATION

(a) Disconnect the connector from the sender gauge.

(b) Turn the ignition switch ON and check that the receiver gauge needle indicates EMPTY.

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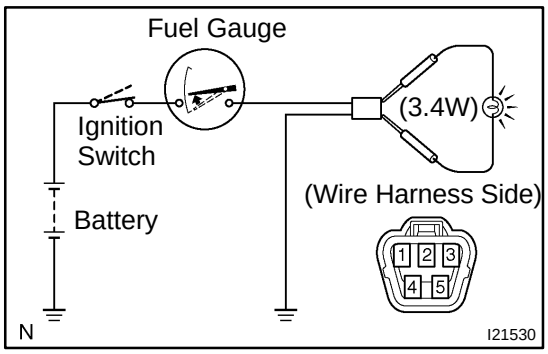
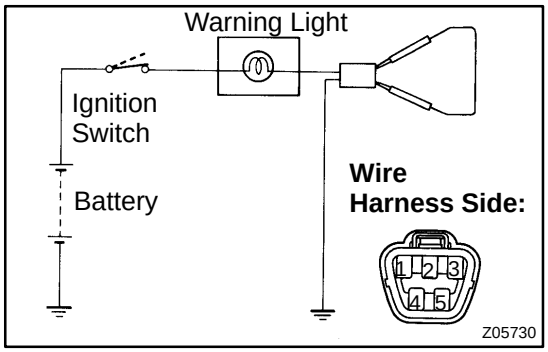


(c) Connect terminals 2 and 3 on the wire harness side connector through a 3.4 watts test bulb.
(d) Turn the ignition switch ON, check that the bulb comes on and the receiver gauge needle moves towards the full side.

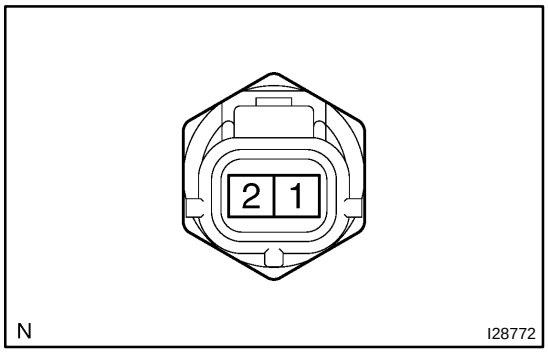
HINT:
Because of silicon oil in the gauge, it will take a short time for the needle to stabilize.
If operation is not as specified, inspect the receiver gauge resistance.



4. INSPECT FUEL LEVEL WARNING LIGHT OPERATION

(a) Disconnect the connector from the sender gauge.
(b) Connect terminals 2 and 3 on the wire harness side connector.
(c) Turn the ignition switch ON and check that the warning light comes on.

If the warning light does not come on, test the bulb or inspect the wire harness.

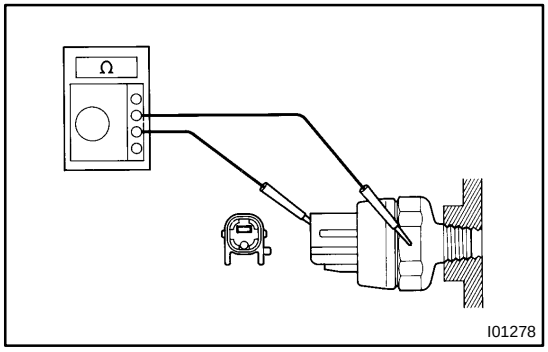


5. INSPECT ENGINE COOLANT TEMPERATURE SENDER GAUGE RESISTANCE

(a) Disconnect the engine coolant temperature sender gauge.
(b) Measure the resistance between terminals 1 and 2 of the connector according to the value(s) in the table below.

Temperature ˚C (˚F)	Resistance (Ω)
–20 (–4)	13,840 to 16,330
20 (68)	2,320 to 2,590
80 (176)	310 to 326
110 (230)	139.9 to 143.5

If resistance value is not as specified, replace the engine coolant sender gauge.



6. INSPECT OIL PRESSURE SENDER OPERATION

(a) Disconnect the connector from the oil pressure sender.
(b) Check that no continuity exists between terminal and ground with the engine stopped.
(c) Check that continuity exists between terminal and ground with the engine running.

HINT:
Oil pressure should be over 24.5 kPa (0.25 kgf/cm^2, 3.55 psi).
If operation is not as specified, replace the oil pressure sender.

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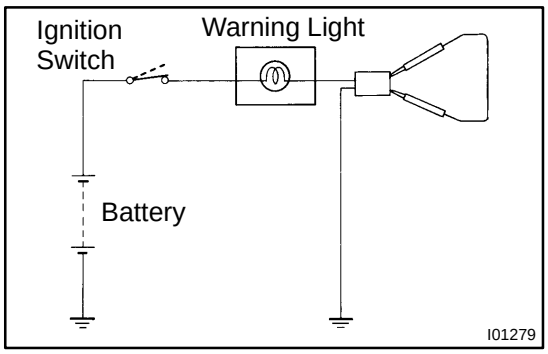
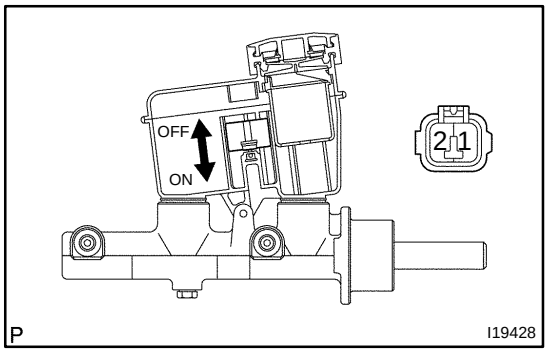


7. INSPECT BRAKE WARNING LIGHT OPERATION

(a) Disconnect the connector from the brake fluid warning switch.
(b) Release the parking brake pedal.
(c) Connect the terminals on the harness side of the level warning switch connector.
(d) Start the engine and check that the warning light comes on.

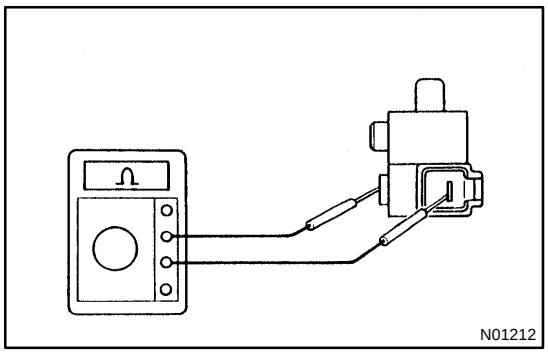
If the warning light does not come on, test the bulb or wire harness.



8. INSPECT BRAKE FLUID LEVEL WARNING SWITCH CONTINUITY

(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the connector.
(c) Check that no continuity exists between the terminals with the switch OFF (float up).
(d) Use siphon, etc. to drain fluid out of the reservoir tank.
(e) Check that continuity exists between the terminals with the switch ON (float down).
(f) Pour the fluid back in the reservoir tank.

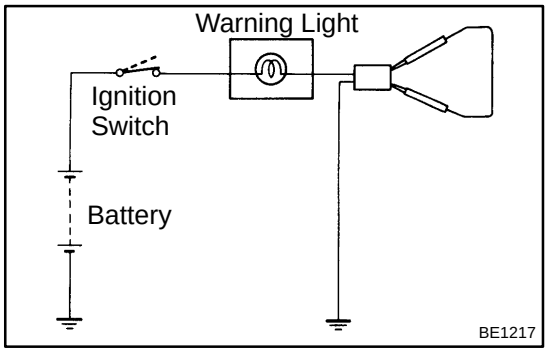
If continuity is not as specified, replace the switch.



9. INSPECT PARKING BRAKE SWITCH CONTINUITY

(a) Check that continuity exists between the terminal and switch body with the switch ON (switch pin released).
(b) Check that no continuity exists between the terminal and switch body with the switch OFF (switch pin pushed in).

If operation is not as specified, replace the switch or inspect ground point.



10. INSPECT WASHER LEVEL WARNING LIGHT OPERATION

(a) Disconnect the connectors from the combination meter.
(b) Connect the negative (–) lead from the battery to terminal 16.
(c) Turn the ignition switch ON and check that the warning light comes on.

If the warning light does not come on, test the bulb.

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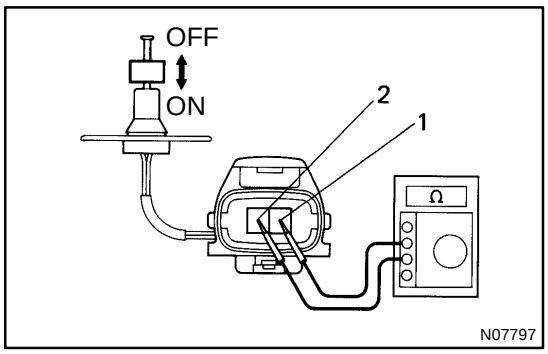


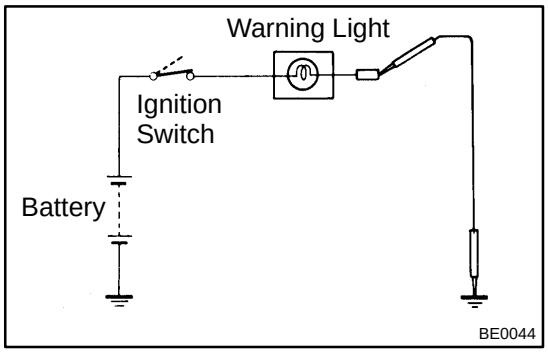
11. INSPECT WASHER LEVEL SWITCH CONTINUITY

(a) Check that there is no continuity between terminals with the switch OFF (float up).

(b) Check that there is continuity between terminals with the switch ON (float down).

If operation is not as specified, replace the jar & pump assembly.

12. INSPECT BUCKLE SWITCH CONTINUITY
(See page DI–1126)

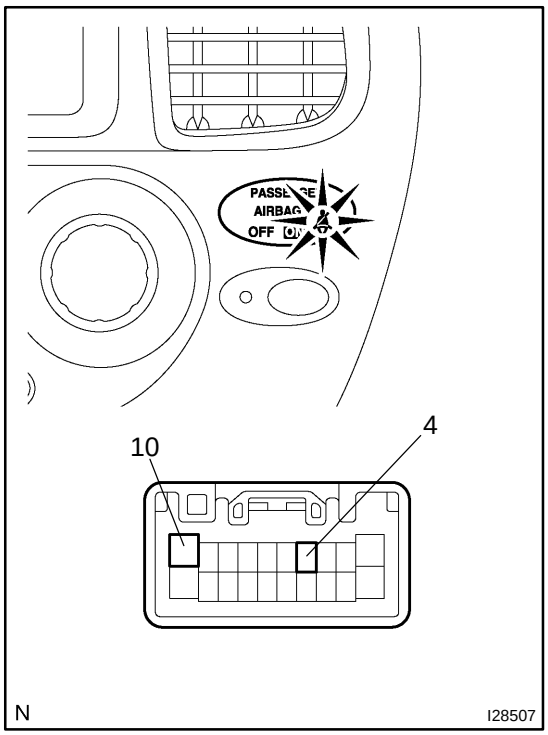


13. INSPECT OPEN DOOR WARNING LIGHT OPERATION

(a) Disconnect the connector from the door courtesy switch and ground terminal on the wire harness side connector.

(b) Check that the warning light comes on.

If the warning light does not come on, test the bulb.



14. INSPECT PASSENGER SEAT BELT WARNING LIGHT

(a) Remove the center cluster finish panel.

(b) Disconnect the connectors from the center cluster integration.

(c) Connect the positive (+) lead from the battery to terminal 4 and the negative (–) lead to terminal 10, and check that the warning light comes on.

If the warning light does not come on, inspect the bulb or wire harness (See page DI–1126).

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15. INSPECT DRIVER'S SEAT BELT WARNING BUZZER

(a) Check warning buzzer function.
   (1) Turn the ignition switch ON and check that the driver's seat belt warning buzzer sounds if the driver's seat belt is not fastened.
   (2) Check that the buzzer stops after about 6 seconds.

16. INSPECT KEY REMINDER WARNING BUZZER

(a) Check warning buzzer function.
   (1) Turn the ignition switch OFF and check that the key reminder warning buzzer sounds if the ignition key is inserted into the key cylinder and the front driver side door is opened.

17. MAINTENANCE LIQUID RESETTING PROCEDURE

Indicator Condition:

State	Condition	Specified State
Blinking	The vehicle has traveled 4,500 miles after the previous setting	The indicator blinks for 12 seconds after the ignition switch is turned on (including 3 seconds for a valve check).
Continuously Illuminated	The vehicle has traveled 5,000 miles after the previous setting	The indicator is continuously illuminated after the ignition switch is turned on.

(a) Set the display window to ODO.
(b) Turn the ignition switch off.
(c) Pressing the reset switch, turn the ignition switch to the ON position (keep pressing for at least 5 seconds).
(d) Reset procedure is completed.

HINT:

- If the ignition switch is turned off during the reset procedure, reset mode is canceled.
- If the reset switch is turned off during the reset procedure, reset mode is canceled and the display shows the condition prior to the reset procedure.

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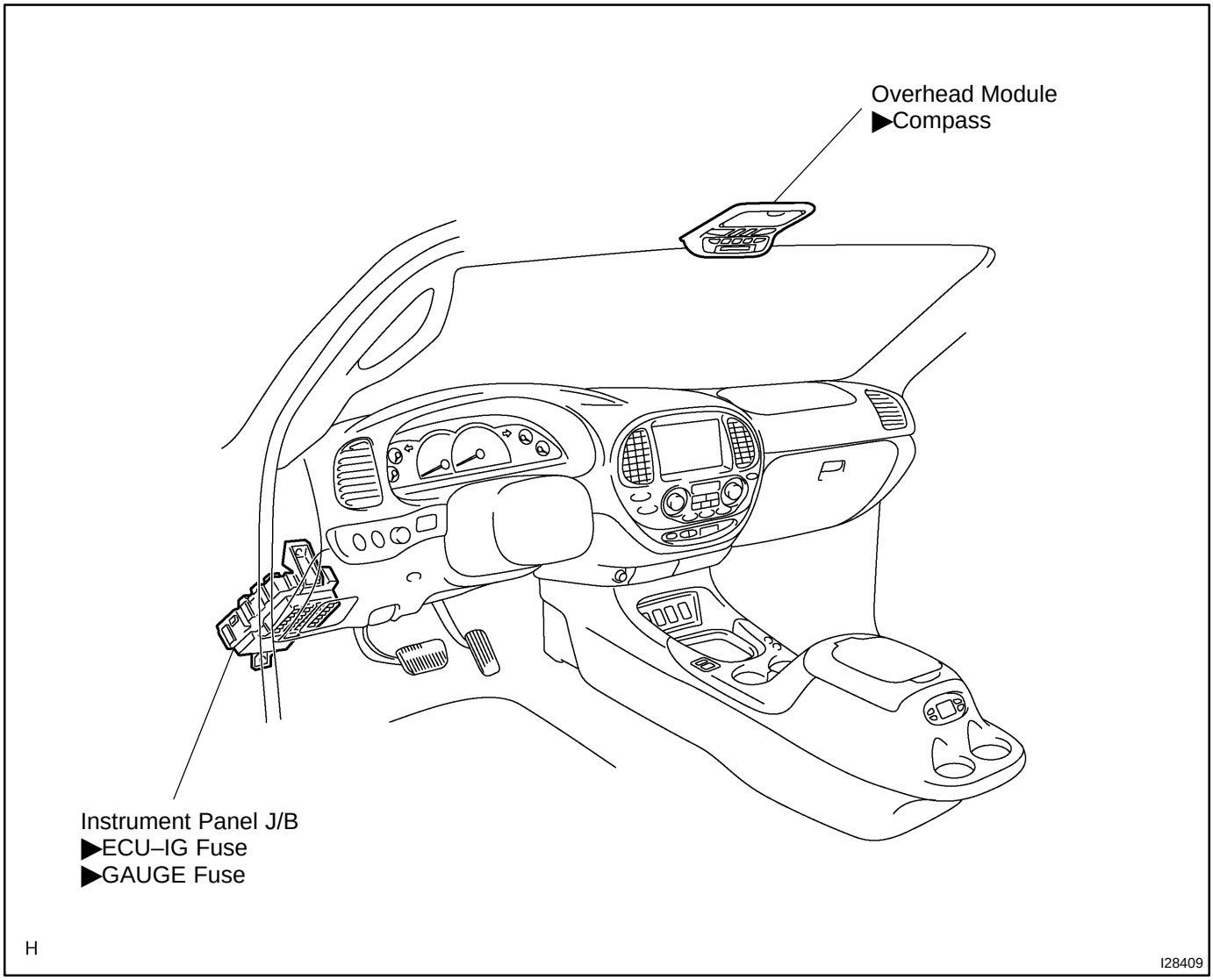
COMPASS

LOCATION

BE260–05



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BE2MQ–01

CALIBRATION

1. SELECTING COMPASS DISPLAY MODE

The mode select switch allows you to select a Display or Non–display mode of the compass.

2. SETTING ZONE

Deviation between the magnetic north and ”actual north” differs depending on the terrestrial location, therefore, an adjustment in magnetism is required. Since the magnetic condition differs according to the area where the vehicle will be used, it is necessary for each user to set the zone. (Refer to ”Compass Zone Map”). The zone setting can be changed using the E/M switch of the display.

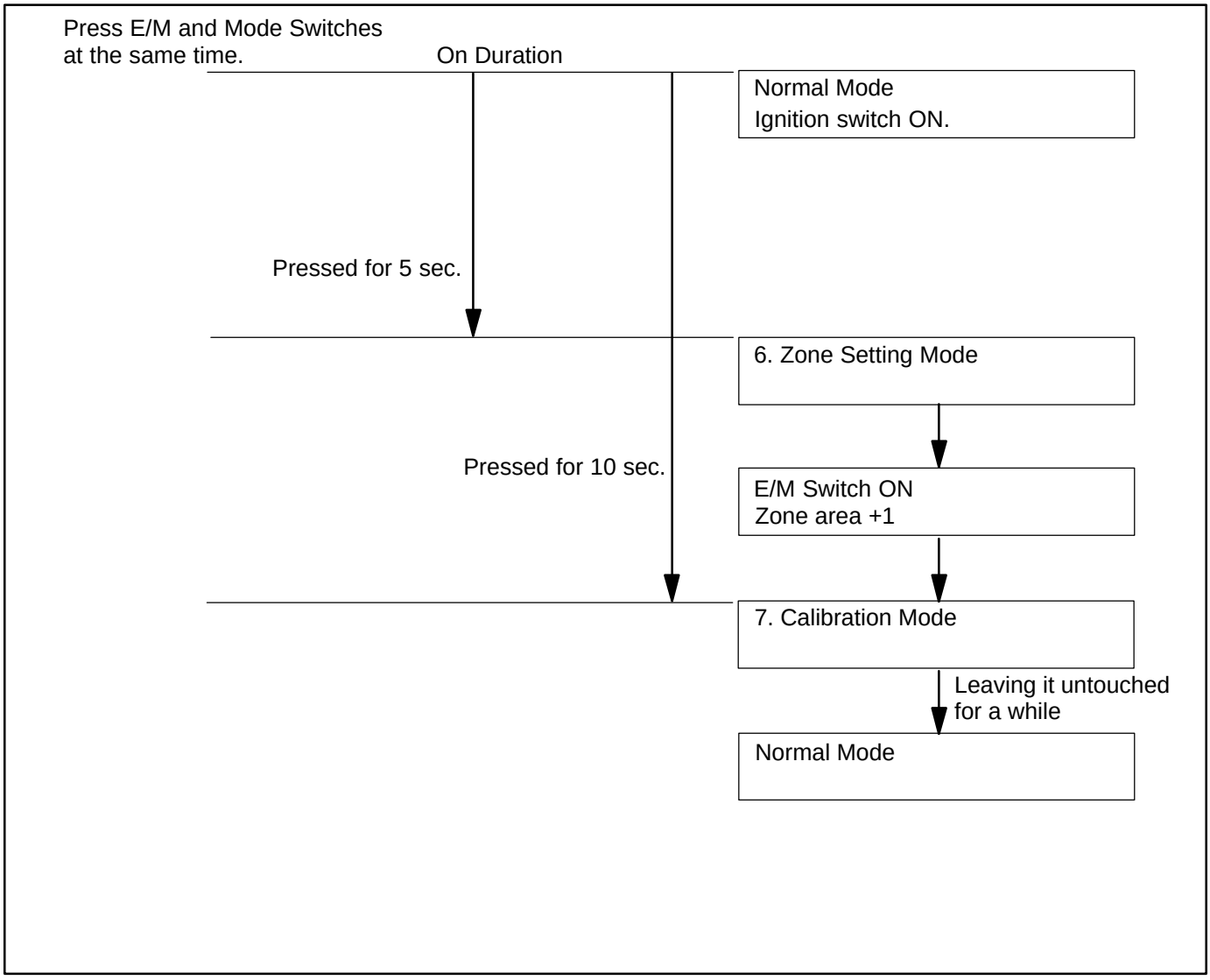
3. PERFORMING CALIBRATION

Because each vehicle has its own magnetic field, calibration should be performed for each vehicle. This compass function is used when storing the record of the vehicle’s magnetic field.

4. WHEN COMPASS MAGNETIZED:

A compass could be magnetized during shipping by vessels or freight cars. Before delivery, therefore, make sure to perform calibration and ensure that calibration can be done. If it cannot be done (cannot complete in spite of driving round several times), it may be caused by magnetization. Demagnetize the vehicle using a demagnetizer and perform calibration again.

5. SETTING COMPASS



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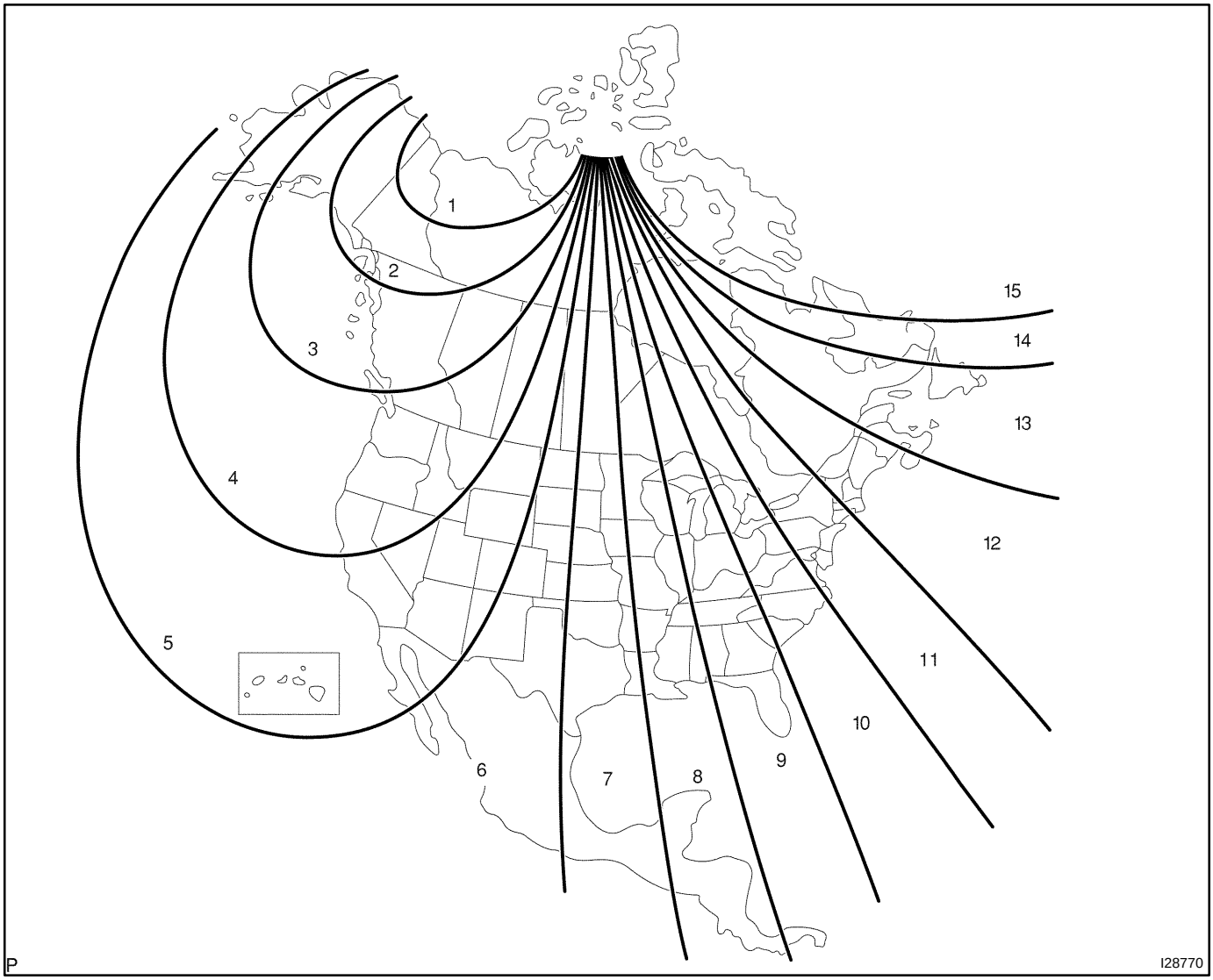
6. ZONE SETTING MODE

(a) Turn the ignition switch ON.

(b) Keep pressing the E/M switch and MODE switch for 5 sec. when outer temperature is displayed, will activate zone setting mode, showing a number (1–15) on the compass display.



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HINT:
In the initial status, ”8” is displayed.

(c) The displayed number increases +1 every time the E/M switch is pressed. Referring to the map, check the number for the area where the vehicle will be used and set the zone number.

(d) Leave it untouched for several seconds after setting and check that the compass display shows an azimuthal direction (N, NE, E, SE, S, SW, W, or NW) or ”VAR”.

7. CALIBRATION SETTING MODE

(a) After the set zone is displayed, if the E/M switch and MODE switch remains pressed for another 5 seconds, calibration setting mode will be activated.

(b) Keep pressing the E/M switch and MODE switch for 10 sec. when outer temperature is displayed will also activate this mode.

(c) Drive the vehicle at a speed of 5 MPH (8 km/h) or less in a circle.

(d) Driving in a circle 1 to 3 times will display the azimuthal direction on the display, completing the calibration.

HINT:
Once calibration is completed, it is not necessary to perform the above procedures unless the magnetic field strength is drastically changed. If this happens, the azimuthal display will be changed to ”CAL”.

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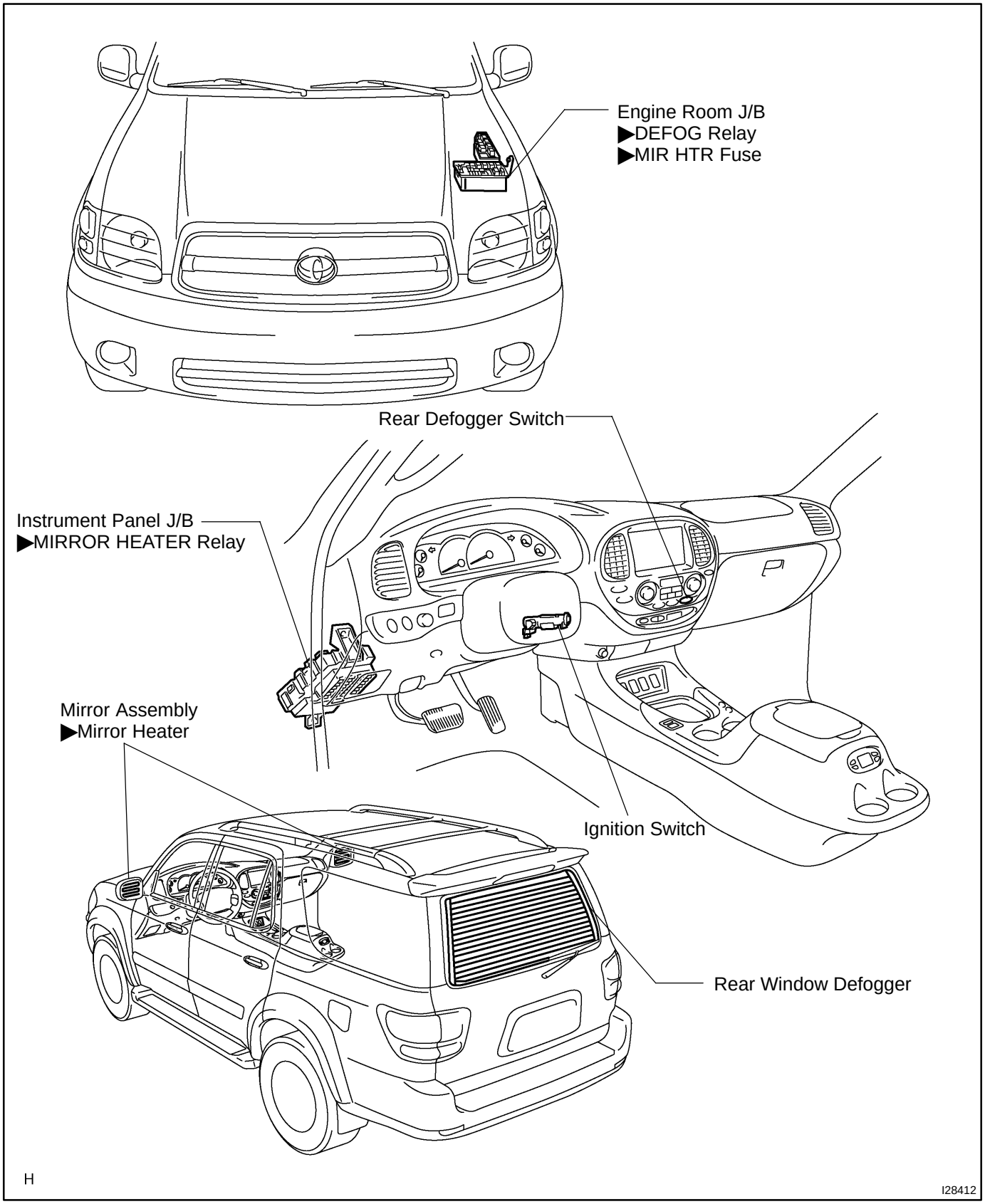
DEFOGGER SYSTEM

LOCATION

BE0TC–09



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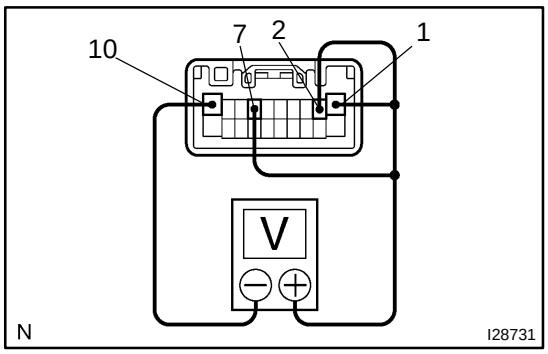
BE2MP–01

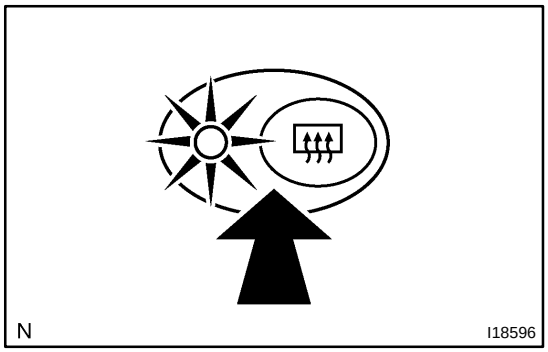
INSPECTION



1. Connecter connected:
INSPECT DEFOGGER TIMER OPERATION

(a) Connect the positive (+) lead from the voltmeter to terminals 1, 2 and 7 of the panel switch connector and the negative (–) lead to terminal 10.

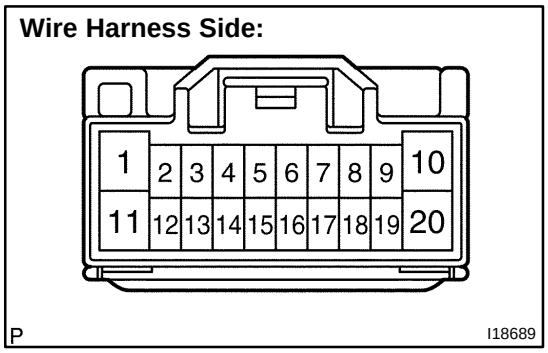
(b) When the switch is OFF, the voltage should be approx. 12 V.



(c) Turn the defogger switch ON and check that the indicator comes on and that the voltage is less than 1 V.

(d) After 15 minutes, check that the switch is OFF and the voltage is approx. 12 V.

If operation is not as specified, replace the switch.

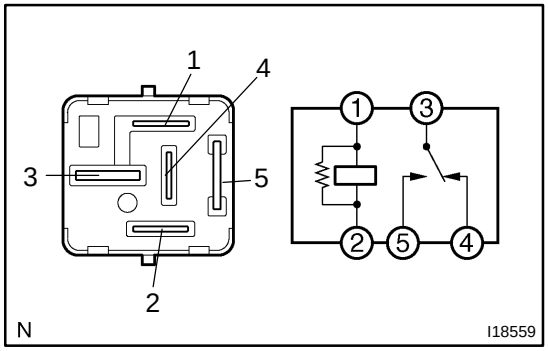


2. Connector disconnected:
INSPECT DEFOGGER SWITCH (in INTEGRATION CONTROL PANEL SWITCH) CIRCUIT

Disconnect the connector from the panel switch and inspect the connector on the wire harness side, as shown in the chart below.

Tester connection	Condition	Specified condition
10 – Ground	Always	Continuity
1 – Ground	Always	Battery voltage
2 – Ground	Ignition switch OFF or ACC	No voltage
2 – Ground	Ignition switch ON	Battery voltage
7 – Ground	Ignition switch OFF	No voltage
7 – Ground	Ignition switch ACC or ON	Battery voltage

If the circuit is not as specified, inspect the circuit connected to other parts.



3. INSPECT DEFOGGER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 – 2, 3 – 4	Continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.

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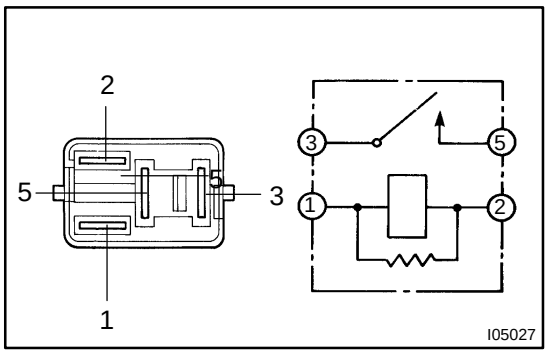
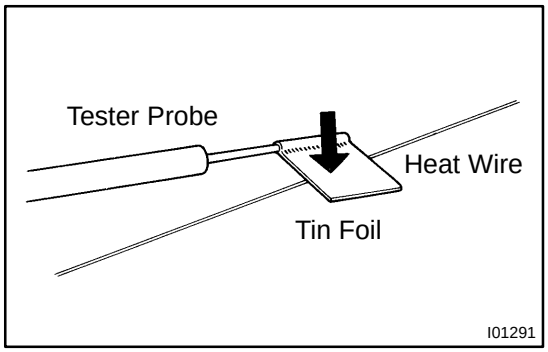


4. INSPECT MIRROR HEATER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 – 2	Continuity
Always	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.



5. INSPECT DEFOGGER WIRE

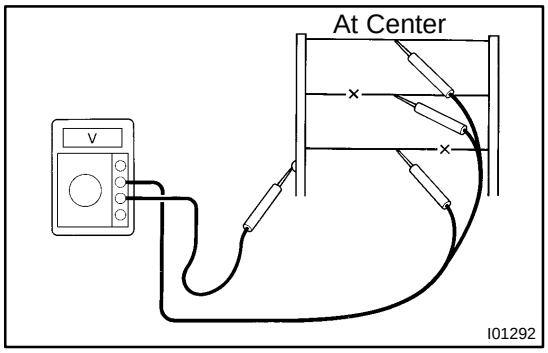
NOTICE:

- **When cleaning the glass, use a soft, dry cloth, and wipe the glass in the direction of the wire. Take care not to damage the wires.**
- **Do not use detergents or glass cleaners with abrasive ingredients.**
- **When measuring voltage, wrap a piece of tin foil around the tip of the negative probe and press the foil against the wire with your finger, as shown in the illustration.**

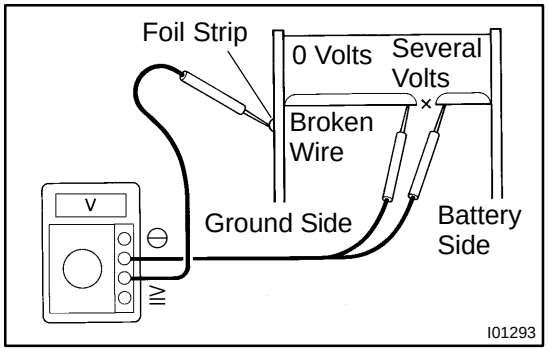
(a) Turn the ignition switch ON.

(b) Turn the defogger switch ON.

(c) Inspect the voltage at the center of each heat wire, as shown.



Voltage	Criteria
Approx. 5 V	Okay (No break in wire)
Approx. 10 V or 0 V	Broken wire



HINT:

If there is approximately 10 V, the wire is broken between the center of the wire and the positive (+) end. If there is no voltage, the wire is broken between the center of the wire and ground.

(d) Place the voltmeter positive (+) lead against the defogger wire on the battery side.

(e) Place the voltmeter negative (–) lead with the foil strip against the wire on the ground side.

(f) Slide the positive (+) lead from the battery to the ground side.

(g) The point where the voltmeter deflects from several V to zero V is the place where the defogger wire is broken.

HINT:

If the heat wire is not broken, the voltmeter indicates 0 V at the positive (+) end of the heat wire but gradually increases to about 12 V as the meter probe moves to the other end.

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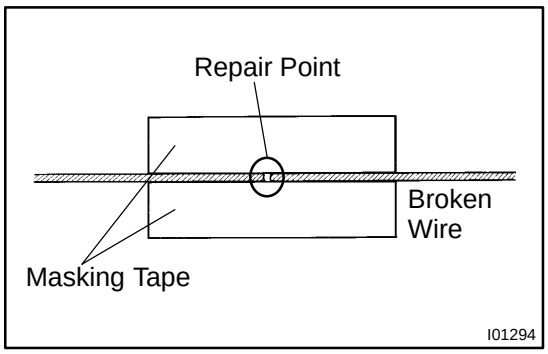
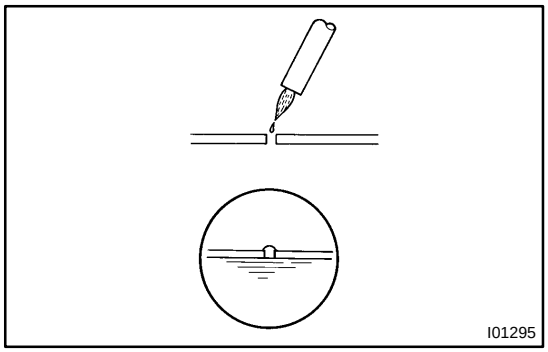


6. IF NECESSARY, REPAIR DEFOGGER WIRE

(a) Clean the broken wire tips with grease, wax and silicon remover.

(b) Place the masking tape along both sides of the wire for repair.

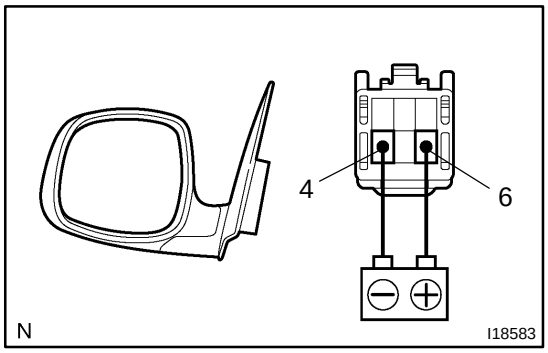
(c) Thoroughly mix the repair agent (Dupont paste No. 4817).



(d) Using a fine tip brush, apply a small amount of the agent to the wire.

(e) After a few minutes, remove the masking tape.

(f) Do not repair the defogger wire for at least 24 hours.



7. w/o Retract Mirror and Driving Position Memory: INSPECT MIRROR HEATER OPERATION

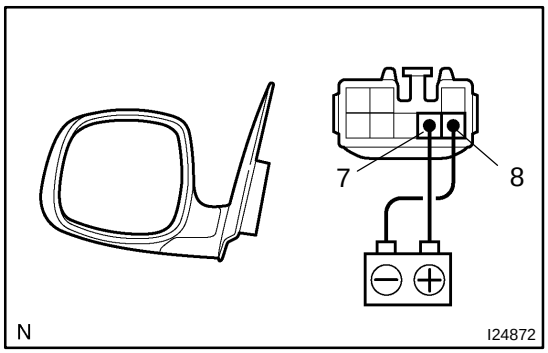
(a) Connect the positive (+) lead from the battery to terminal 6 and the negative (–) lead to terminal 4.

(b) Check that the mirror becomes warm.

HINT:

It will take a short time for the mirror to become warm.

If operation is not as specified, replace the mirror.



8. w/ Retract Mirror only: INSPECT MIRROR HEATER OPERATION

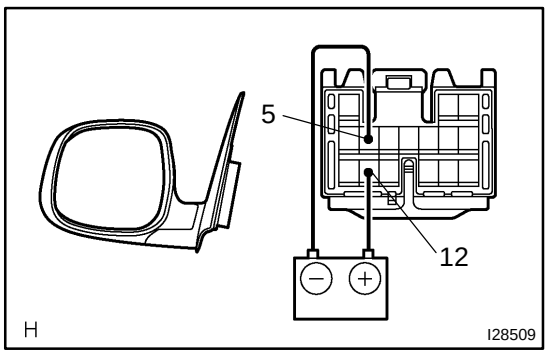
(a) Connect the positive (+) lead from the battery to terminal 7 and the negative (–) lead to terminal 8.

(b) Check that the mirror becomes warm.

HINT:

It will take a short time for the mirror to become warm.

If operation is not as specified, replace the mirror.



9. w/ Retract Mirror and Driving Position Memory: INSPECT MIRROR HEATER OPERATION

(a) Connect the positive (+) lead from the battery to terminal 5 and the negative (–) lead to terminal 12.

(b) Check that the mirror becomes warm.

HINT:

It will take a short time for the mirror to become warm.

If operation is not as specified, replace the mirror.

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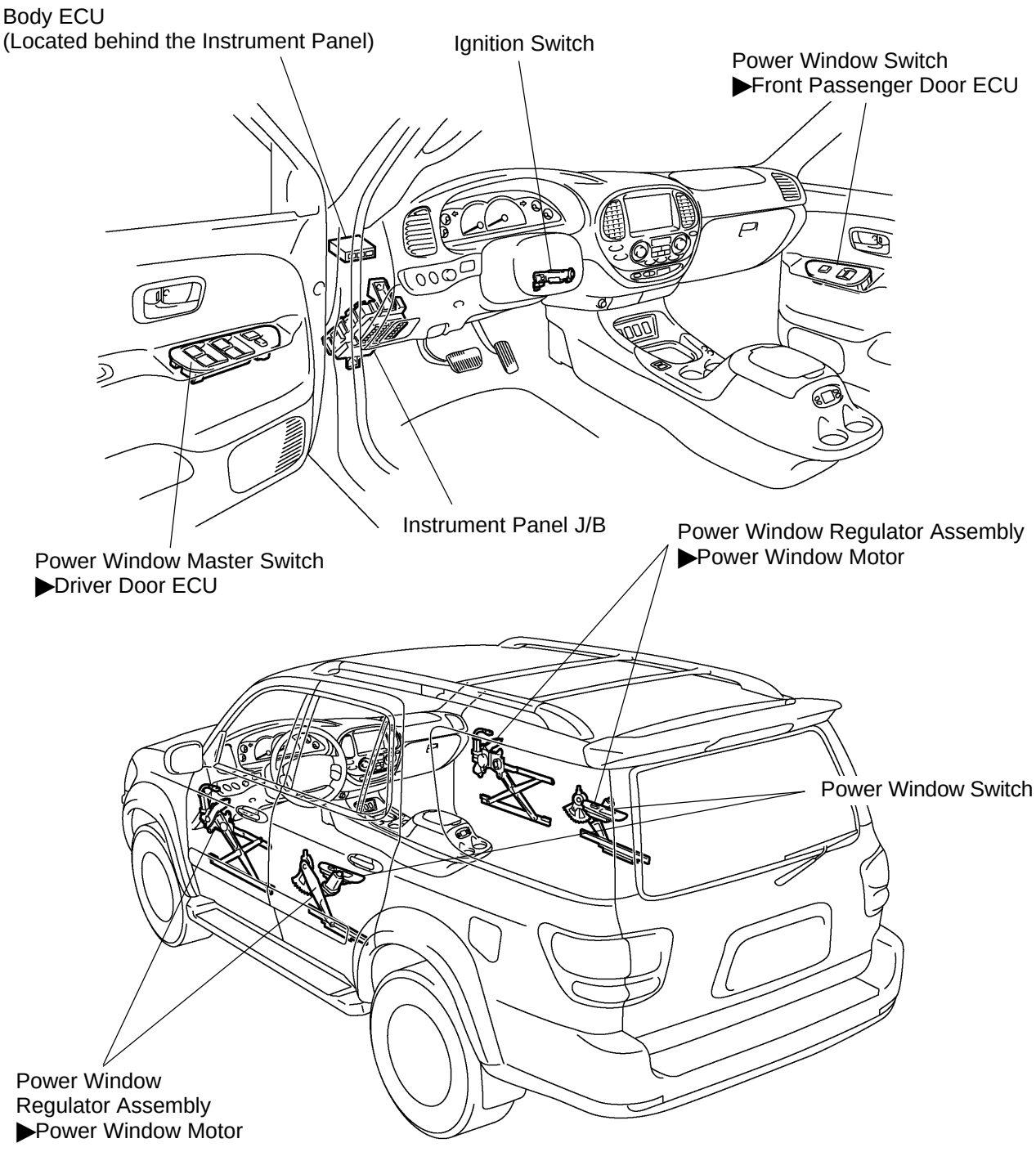
POWER WINDOW CONTROL SYSTEM

BE03O–08

LOCATION



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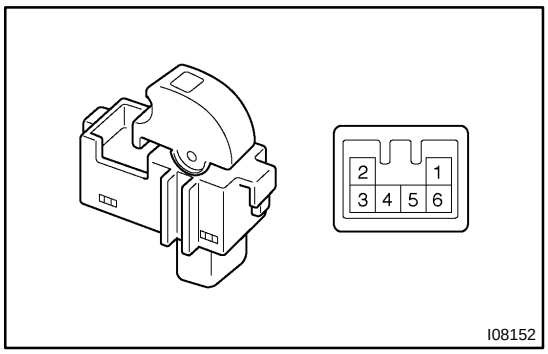
BE2MO–01

INSPECTION

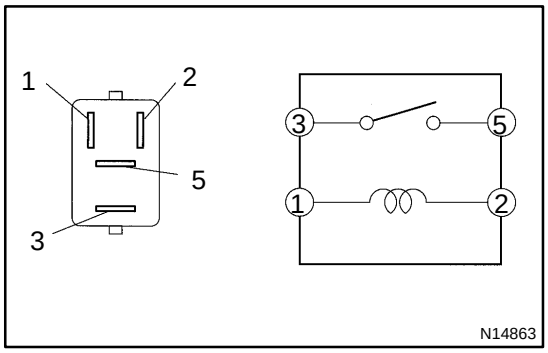


1. INSPECT REAR DOOR POWER WINDOW SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
UP	2 – 3, 4 – 5	Continuity
OFF	2 – 3 – 5	Continuity
DOWN	2 – 4, 3 – 5	Continuity

If continuity is not as specified, replace the switch.

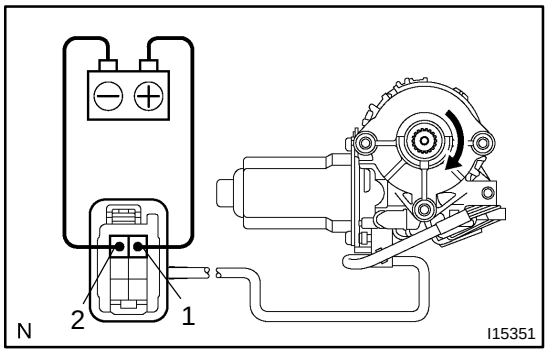
2. INSPECT POWER WINDOW SWITCH CIRCUIT
(Driver's Door: See page DI–1788)
(Passenger's Door: See page DI–1826)
(Rear Door: See page DI–1747)
(Back Door: See page DI–1747)



3. INSPECT POWER MAIN RELAY CONTINUITY

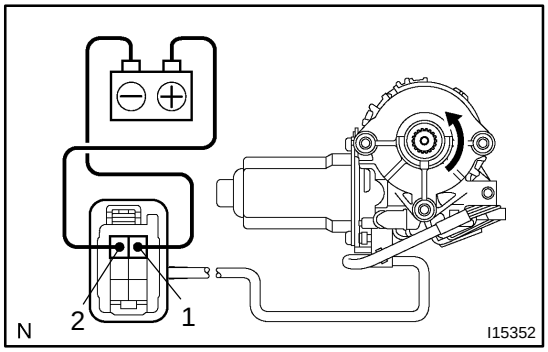
Condition	Tester connection	Specified condition
Always	1 – 2	Continuity
Always	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.



4. Driver's Door:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the motor turns clockwise.



(b) Reverse the polarity and check that the motor turns counterclockwise.

If operation is not as specified, replace the power window motor.

NOTICE:

Since the jam protection may not work properly, be sure to conduct procedures described in "HOW TO RESET POWER MOTOR (RESET AND PULSE SWITCH)" after this inspection.

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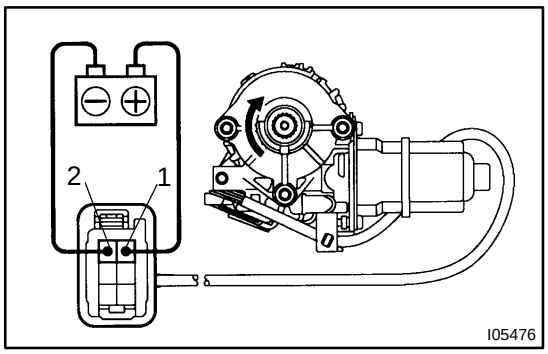
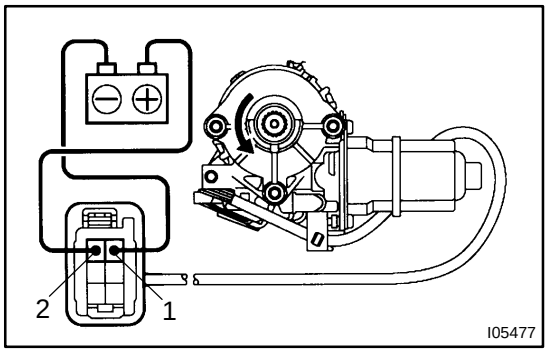


5. Passenger's Door:
INSPECT POWER WINDOW MOTOR OPERATION

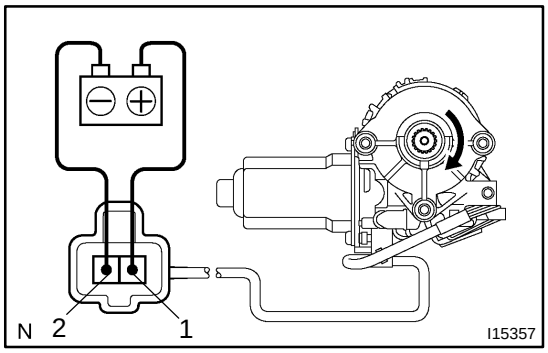
(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the motor turns clockwise.



(b) Reverse the polarity and check that the motor turns counterclockwise.

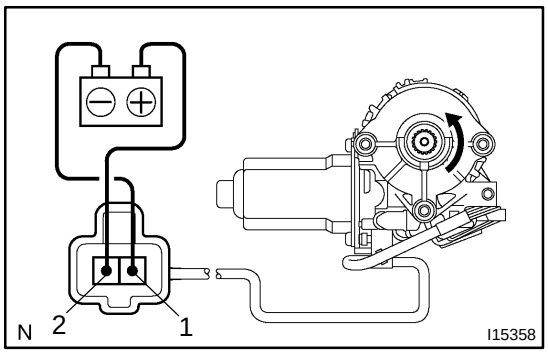
If operation is not as specified, replace the power window motor.

NOTICE:
Since the jam protection may not work properly, be sure to conduct procedures described in "HOW TO RESET POWER MOTOR (RESET AND PULSE SWITCH)" after this inspection.



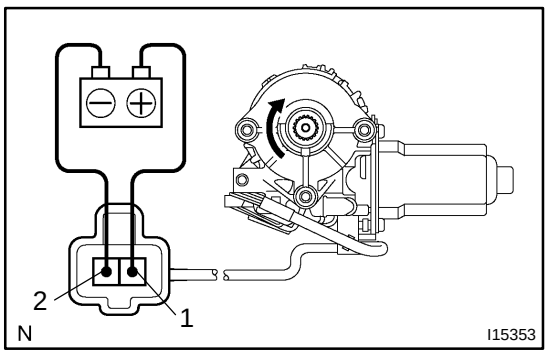
6. Rear Right Door:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminals 2, and check that the motor turns clockwise.



(b) Reverse the polarity and check that the motor turns counterclockwise.

If operation is not as specified, replace the power window motor.



7. Rear Left Door:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the motor turns clockwise.

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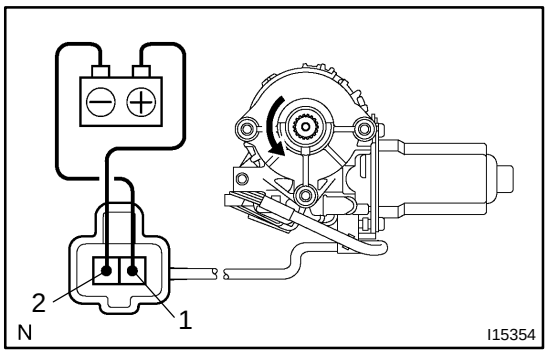
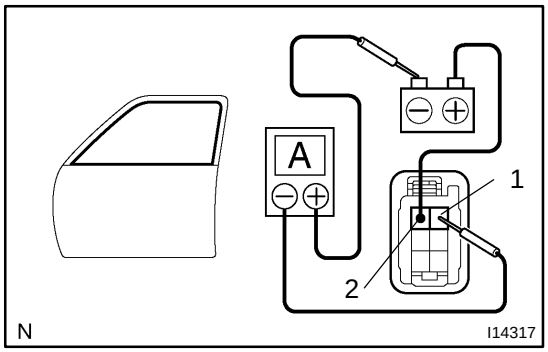


(b) Reverse the polarity and check that the motor turns counterclockwise.

If operation is not as specified, replace the power window motor.

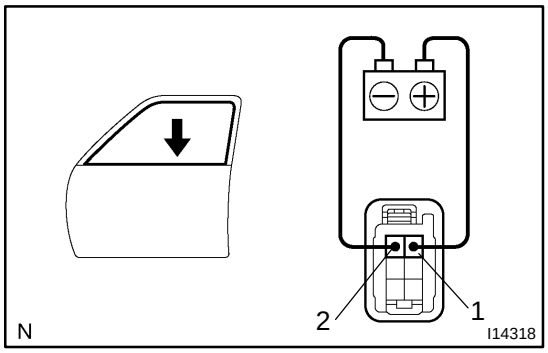


8. Front Door:
INSPECT PTC OPERATION

(a) Disconnect the connector from the wire harness side connector.

(b) Connect the negative (–) lead from the ammeter to terminal 1 of the motor side connector and the positive (+) lead to negative terminal of the battery.

(c) Connect the positive (+) lead from the battery to terminal 2 of the motor side connector, and raise the window to the fully closed position.

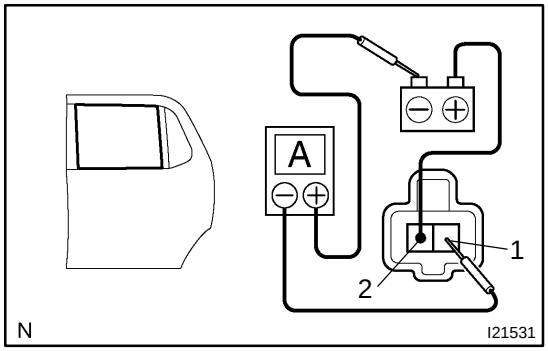


(d) Continue to apply voltage and check that the current changes from approximately 14 A to less than 1 A within 4 to 90 seconds.

(e) Disconnect the leads from the terminals.

(f) Approximately 90 seconds later, connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the window begins to goes down.

If operation is not as specified, replace the power window motor.

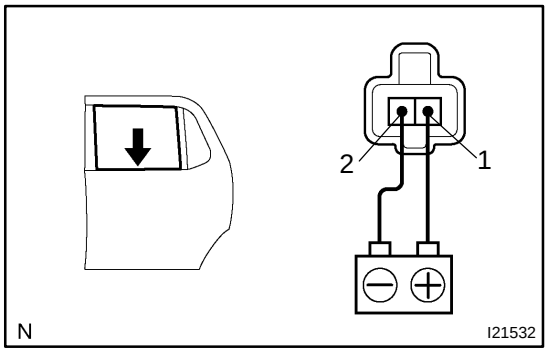


9. Rear Door:
INSPECT PTC OPERATION

(a) Disconnect the connector from the wire harness side connector.

(b) Connect the negative (–) lead from the ammeter to terminal 1 of the motor side connector and the positive (+) lead to negative terminal of the battery.

(c) Connect the positive (+) lead from the battery to terminal 2 of the motor side connector, and raise the window to the fully closed position.



(d) Continue to apply voltage and check that the current changes from approximately 14 A to less than 1 A within 4 to 90 seconds.

(e) Disconnect the leads from the terminals.

(f) Approximately 90 seconds later, connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the window begins to goes down.

If operation is not as specified, replace the power window motor.

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10. INSPECT JAM PROTECTION FUNCTION

NOTICE:

Be careful not to be caught any part of your body when checking.

HINT:

When performing resetting of the limit switch, do checking after repeating up and down of the glass with automatic operation.

(a) Confirmation of AUTO up operation:
Confirm that the window will be fully closed with AUTO up operation.

(b) Checking operation of the jam protection function:
(1) Move up the window with AUTO up operation and check that the window will go down when it touches the inserted handle of the hammer.
(2) Confirm that the window will then stop going down about 200 mm (7.87 in.).

HINT:

When removing the glass, glass guide, regulator, etc. be sure to perform checking of the jam protection function.

If the jam protection is not functioning properly, adjust the power window motor limit switch and pulse switch.

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BE264–03

ADJUSTMENT

HOW TO RESET POWER WINDOW MOTOR (LIMIT SWITCH)

NOTICE:

If the jam protection function is not functioning properly, perform the following procedures.

HINT:

It is necessary to reset the power window motor (in initial position for the limit switch) when separating the window regulator from the power window motor or operating the window regulator with the door glass not installed.

(a) Remove the power window motor.

HINT:

Place matchmarks on the power window motor and window regulator gear.

(b) Connect the power window motor and power window switch to the wire harness of the vehicle.

(c) Turn the ignition switch ON.

(d) Press the power window UP switch until the motor completes 6 to 10 rotations (4 seconds of rotation or more).

(e) Assemble the power window motor and regulator.

HINT:

- Install the motor when the regulator arm is below the middle point.
- Align the matchmarks on the power window motor and window regulator gear when installing the power window motor.

(f) Assemble the power window regulator and door glass.

HINT:

Never rotate the motor downward until the completion of the window glass installation.

(g) Connect the power window switch to the wire harness and turn the ignition switch ON.

(h) Repeat UP and DOWN operation several times manually.

(i) Check that AUTO UP → AUTO DOWN automatic operation is normal.

NOTICE:

- **The jam protection function does not operate immediately after performing reset.**
- **If the jam protection function is triggered and the window lowers after the window has been fully closed by AUTO UP operation (step i), reset the power window motor again.**

(j) Check the power window function.

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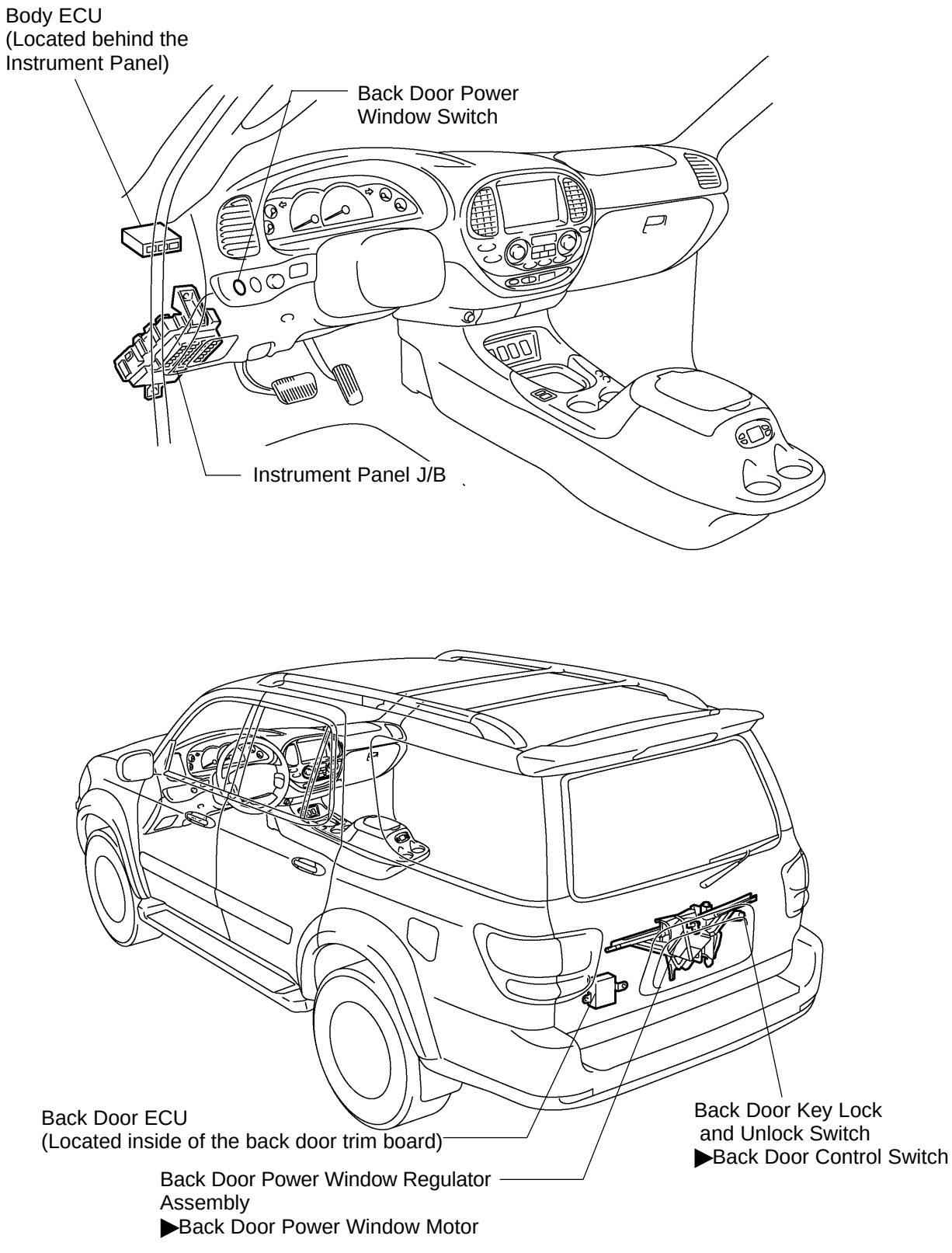
BACK DOOR POWER WINDOW CONTROL SYSTEM

BE073–07

LOCATION



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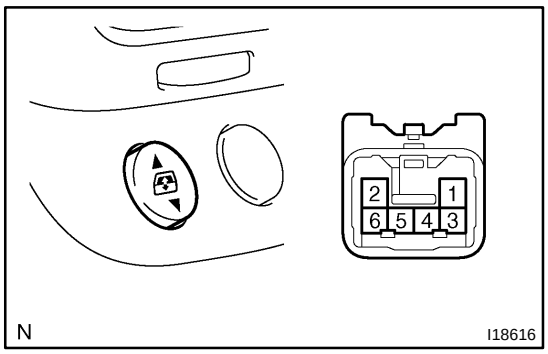
BE2MM–01

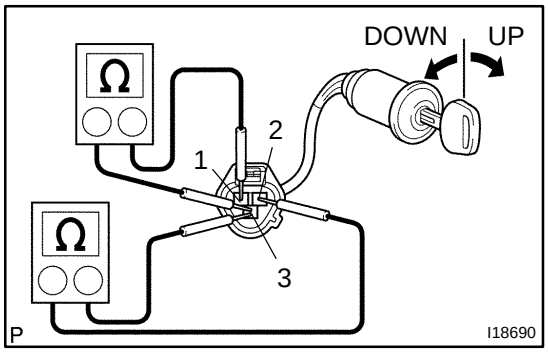
INSPECTION



1. INSPECT BACK DOOR POWER WINDOW SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
UP	3 – 6	Continuity
OFF	–	No continuity
DOWN	3 – 5	Continuity

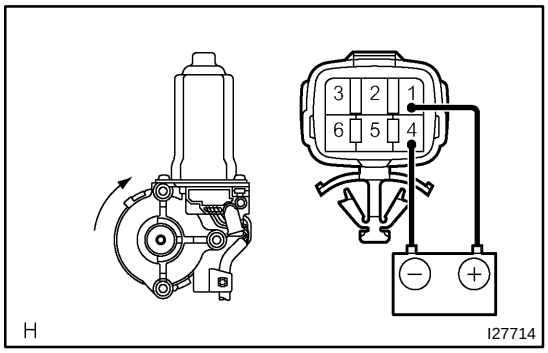
If continuity is not as specified, replace the switch.



2. INSPECT BACK DOOR KEY LOCK AND UNLOCK SWITCH CONTINUITY (Back Door Control Switch)

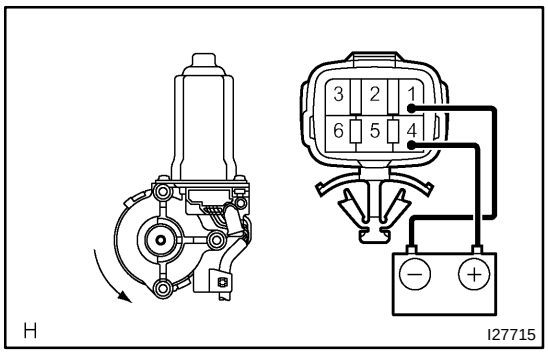
Switch position	Tester connection	Specified condition
UP	1 – 3	Continuity
OFF	–	No continuity
DOWN	2 – 3	Continuity

If continuity is not as specified, replace the switch.



3. INSPECT BACK DOOR POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 4 and check that the motor turns clockwise.



(b) Connect the positive (+) lead from the battery to terminal 4 and the negative (–) lead to terminal 1 and check that the motor turns counterclockwise.

If operation is not as specified, replace the back door power window motor.

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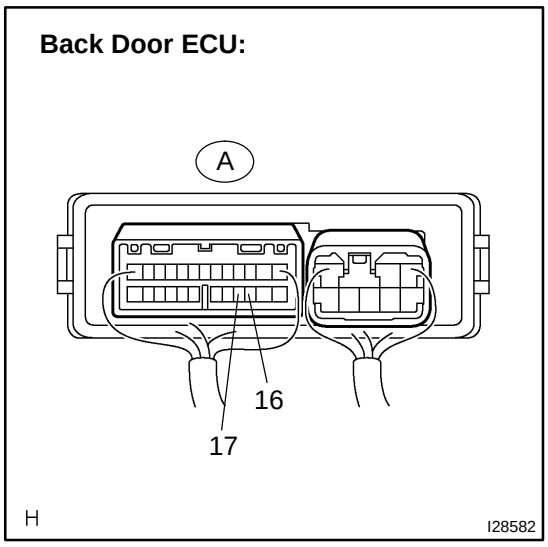

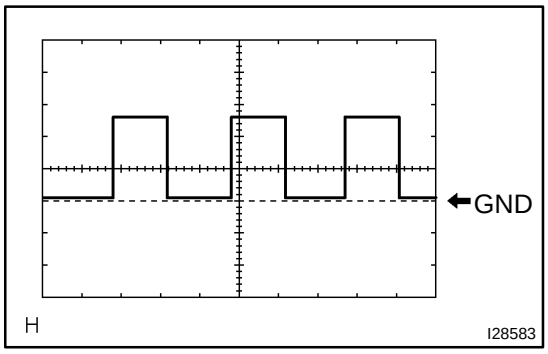

4. INSPECT BACK DOOR POWER WINDOW PULSE SENSOR (Using oscilloscope)

(a) Remove the back door ECU with the connectors still connected.

(b) Connect the oscilloscope to terminals A–16 and A–17 and body ground.

(c) Operate the back door power window switch.

(d) Check the signal waveform according to the condition (s) in the table below.

Item	Condition
Tool setting	5V/DIV, 10 ms/DIV
Vehicle condition	Ignition switch ON

OK:

As shown in the illustration

5. INSPECT JAM PROTECTION FUNCTION

NOTICE:

Be careful not to get any part of your body caught when checking.

HINT:

When performing resetting of the limit switch, do checking after repeating up and down of the glass with automatic operation.

(a) Confirmation of AUTO up operation:
Confirm that the window will close fully with AUTO up operation.

(b) Checking operation of the jam protection function:
(1) Raise the window with AUTO up operation and check that the window goes down when it touches the inserted handle of the hammer.
(2) Confirm that the window will then stop going down after about 200 mm (7.87 in).

HINT:

When removing the glass, glass guide, regulator, etc. be sure to perform a check of the jam protection function.

If the jam protection is not functioning properly, adjust the power window motor switch and pulse switch.

Dardoor.com

BE2MN–01

ADJUSTMENT

1. RESET (INITIALIZE) POWER WINDOW REGULATOR MOTOR

NOTICE:

Resetting the power window regulator motor (initializing the pulse sensor) is necessary if: 1) the battery terminal cable is disconnected; 2) the back door ECU, wire harness, power window regulator switch, power window regulator assembly and power window regulator motor are replaced or removed/installed; or 3) the P/W fuse is replaced or removed. If resetting is not performed, the master switch assembly will not be able to operate the AUTO operation function, jam protection function and remote operation function.

(a) Turn the ignition switch ON.
(b) Open the power window halfway by pressing the power window switch.
(c) Fully pull up on the switch until the power window is fully closed and continue to hold the switch for at least 1 second.
(d) Check that the AUTO UP/DOWN function operates normally.

If the AUTO UP/DOWN function operates normally, reset operations are complete. If abnormal, follow the steps (e) to (g) below.

(e) Disconnect the negative battery terminal cable for 10 seconds.
(f) Connect the battery terminal cable.
(g) Perform the steps (a) to (d) again.

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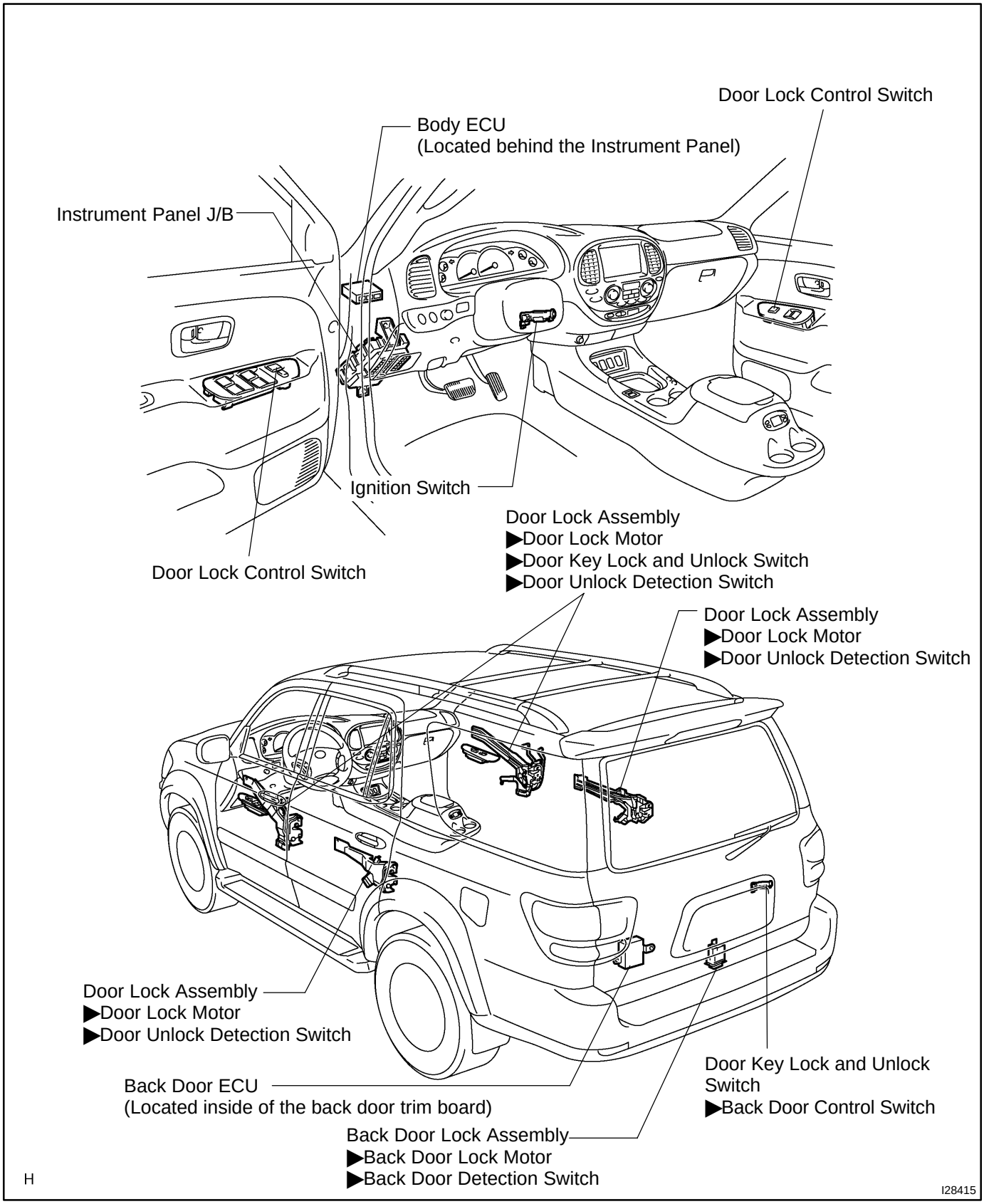
POWER DOOR LOCK CONTROL SYSTEM

LOCATION

BE075–07



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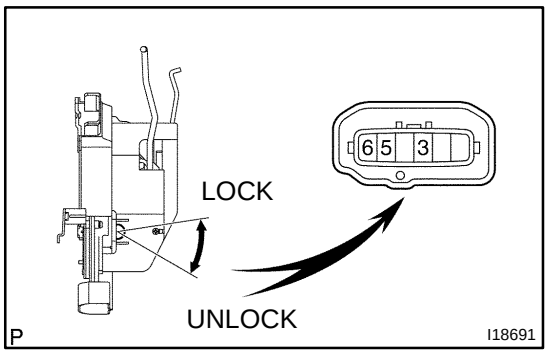
BE266–05

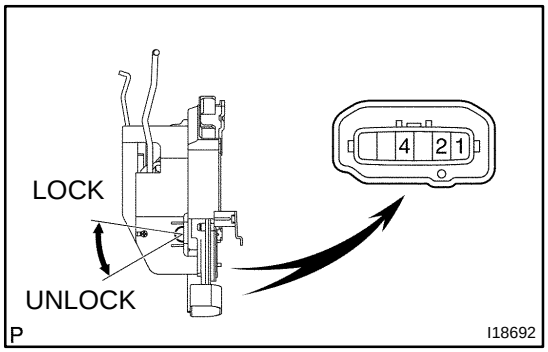
INSPECTION



1. INSPECT DRIVER DOOR KEY LOCK AND UNLOCK SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	3 – 5	Continuity
OFF	–	No continuity
UNLOCK	3 – 6	Continuity

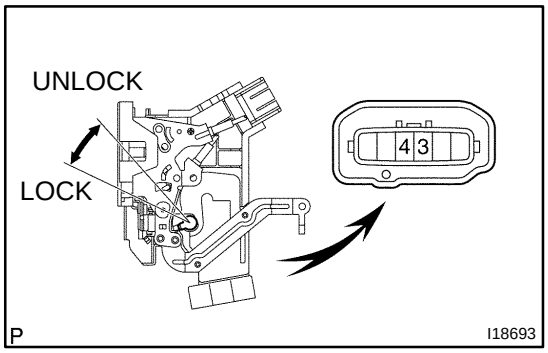
If continuity is not as specified, replace the door lock motor.



2. INSPECT PASSENGER'S DOOR KEY LOCK AND UNLOCK SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	2 – 4	Continuity
OFF	–	No continuity
UNLOCK	1 – 4	Continuity

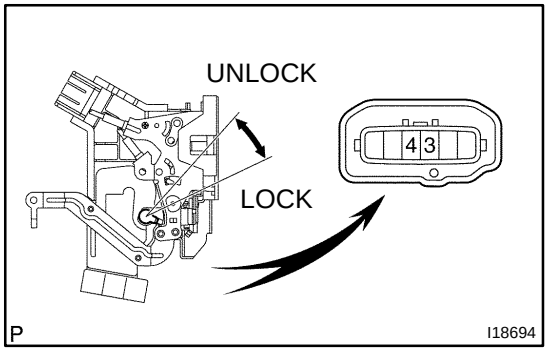
If continuity is not as specified, replace the door lock motor.



3. INSPECT DRIVER'S DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	–	No continuity
ON (Door Lock set to UNLOCK)	3 – 4	Continuity

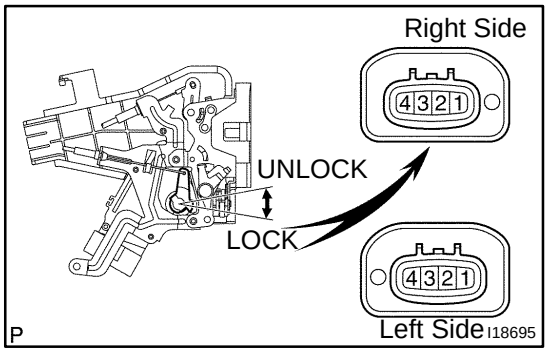
If continuity is not as specified, replace the door lock motor.



4. INSPECT PASSENGER'S DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	–	No continuity
ON (Door Lock set to UNLOCK)	3 – 4	Continuity

If continuity is not as specified, replace the door lock motor.



5. INSPECT REAR DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	–	No continuity
ON (Door Lock set to UNLOCK)	3 – 4 (Left side) 1 – 2 (Right side)	Continuity

If continuity is not as specified, replace the door lock motor.

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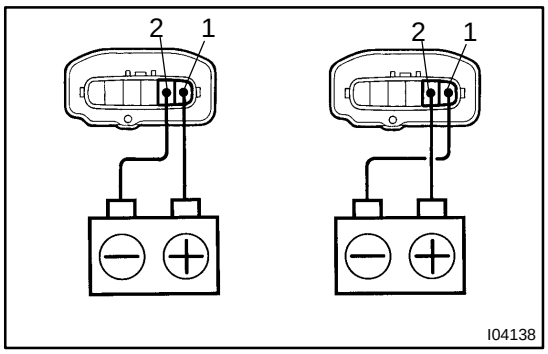
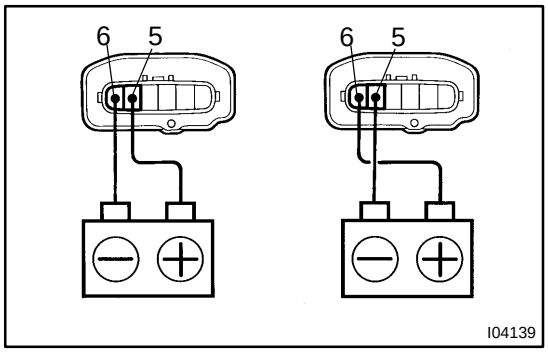


6. INSPECT DRIVER'S DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the door lock cable moves to the UNLOCK position.

(b) Reverse the polarity and check that the door lock cable moves to the LOCK position.

If operation is not as specified, replace the door lock motor.

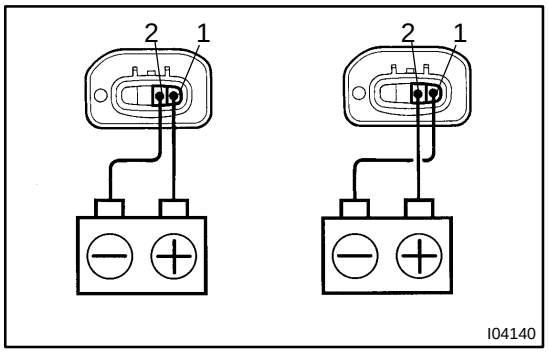


7. INSPECT PASSENGER'S DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 5 and the negative (–) lead to terminal 6, and check that the door lock cable moves to the UNLOCK position.

(b) Reverse the polarity and check that the door lock cable moves to the LOCK position.

If operation is not as specified, replace the door lock motor.

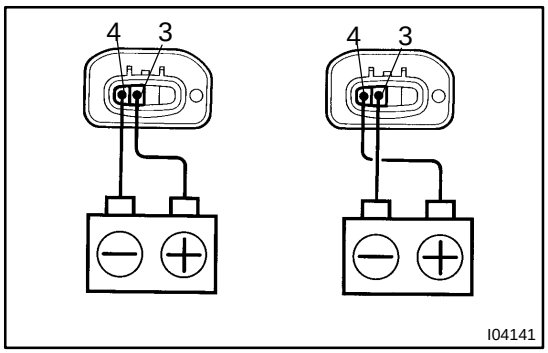


8. INSPECT REAR LEFT SIDE DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the door lock cable moves to the UNLOCK position.

(b) Reverse the polarity and check that the door lock cable moves to the LOCK position.

If operation is not as specified, replace the door lock motor.

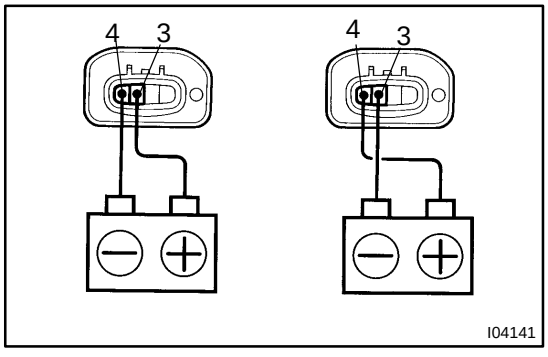


9. INSPECT REAR RIGHT SIDE DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 4, and check that the door lock cable moves to the UNLOCK position.

(b) Reverse the polarity and check that the door lock cable moves to the LOCK position.

If operation is not as specified, replace the door lock motor.



10. INSPECT BACK DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 4, and check that the door lock cable moves to the UNLOCK position.

(b) Reverse the polarity and check that the door lock cable moves to the LOCK position.

If operation is not as specified, replace the door lock motor.

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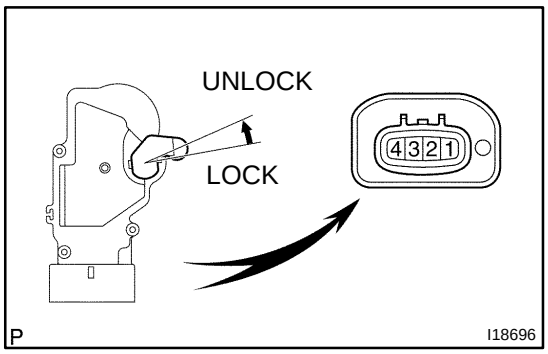
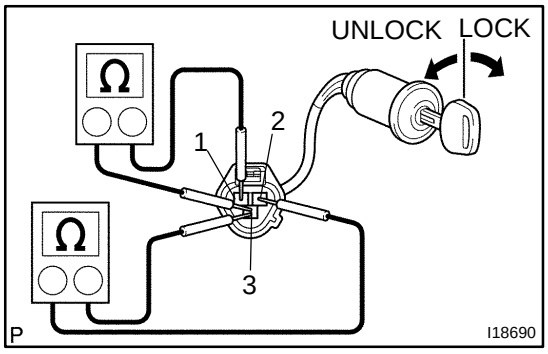


11. INSPECT BACK DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	–	No continuity
ON (Door Lock set to UNLOCK)	1 – 2	Continuity

If continuity is not as specified, replace the back door lock motor.



12. INSPECT BACK DOOR KEY LOCK AND UNLOCK SWITCH CONTINUITY (Back Door Control switch)

Switch position	Tester connection	Specified condition
LOCK	1 – 3	Continuity
OFF	–	No continuity
UNLOCK	2 – 3	Continuity

If continuity is not as specified, replace the switch.

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THEFT DETERRENT SYSTEM

BE2ML–01

ON–VEHICLE INSPECTION

1. OUTLINE OF THEFT DETERRENT SYSTEM

When the theft deterrent system detects any theft, it informs people around by flashing lights and sound.

All initial settings are performed in active mode. It can be switched to passive mode by using the hand–held tester. (See step 3. CHANGING METHOD OF PASSIVE MODE.)

HINT:

There are 4 conditions in this system: disarmed state, arming preparation, armed state and alarm sounding.

(1) Disarmed state
- ◀ Alarm function does not operate.
- ◀ Theft deterrent function is not performed.

(2) Arming preparation
- ◀ Time until transferring to armed state.
- ◀ Theft deterrent function is not performed.

(3) Armed state

Theft deterrent function is ready.

(4) Alarm sounding:

When the system detects a theft, it informs people around the vehicle using light and sound.

Refer to the table below for alarming method or time.

Alarm method	Horn
	Security horn
	Headlight
	Taillight
	Interior light
Alarm time	60 seconds
Alarm output	Continuous 0.4 secs. (ON) 0.4 secs. (OFF)

HINT:

Alarm output for the hazard is the same as the one for the hazard on the vehicle.

If any of the doors is unlocked not by the key or wireless remote control in the armed state, a force lock signal will be output.

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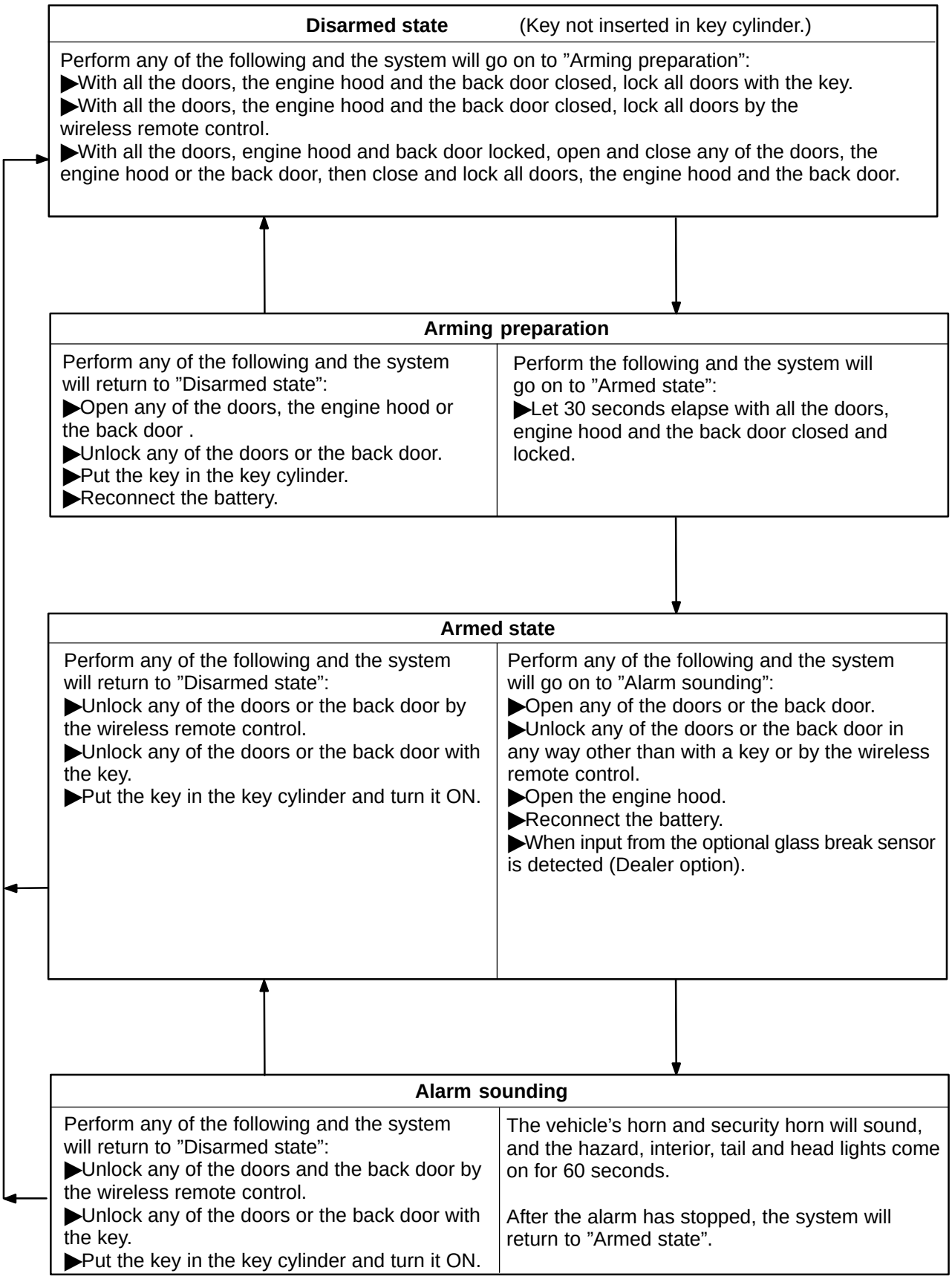
2. ACTIVE ARMING MODE



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Indicator light output:

Condition	Indicator light
Disarmed state	OFF
Arming preparation	ON
Armed state	OFF
Alarm sounding	ON

HINT:
Even in the disarmed state, the indicator light blinks. (Due to the signal output from the immobilizer system.) The indicator always blinks receiving the signal from the immobilizer system any time in the armed state.

Blinking frequency:
0.2 seconds (ON)
1.8 seconds (OFF)

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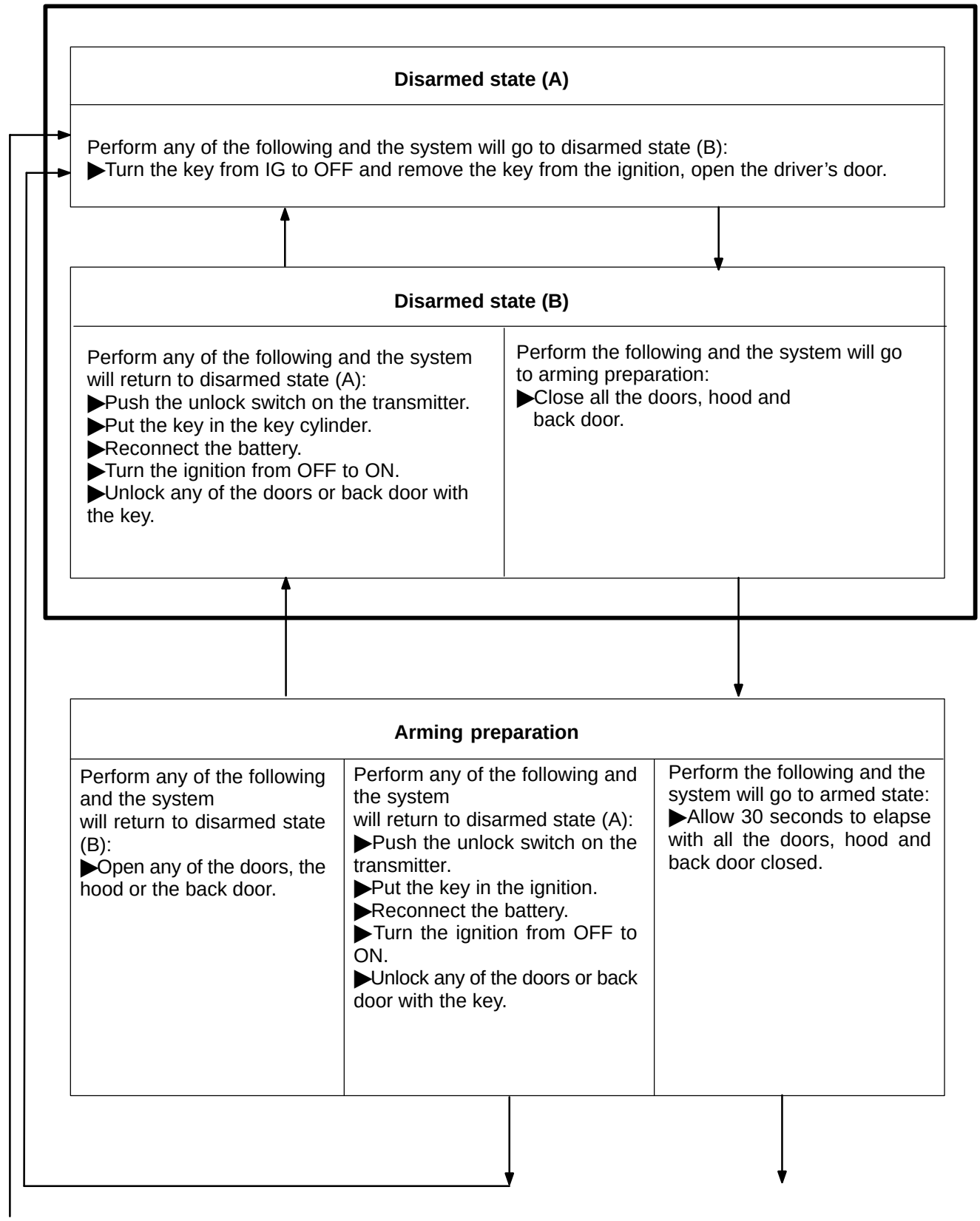
3. PASSIVE ARMING MODE

◀ This mode can be switched by the C–BEST customizing function (See page DI–1684).

◀ All modes are initially set to active when shipped from factory (no passive mode).



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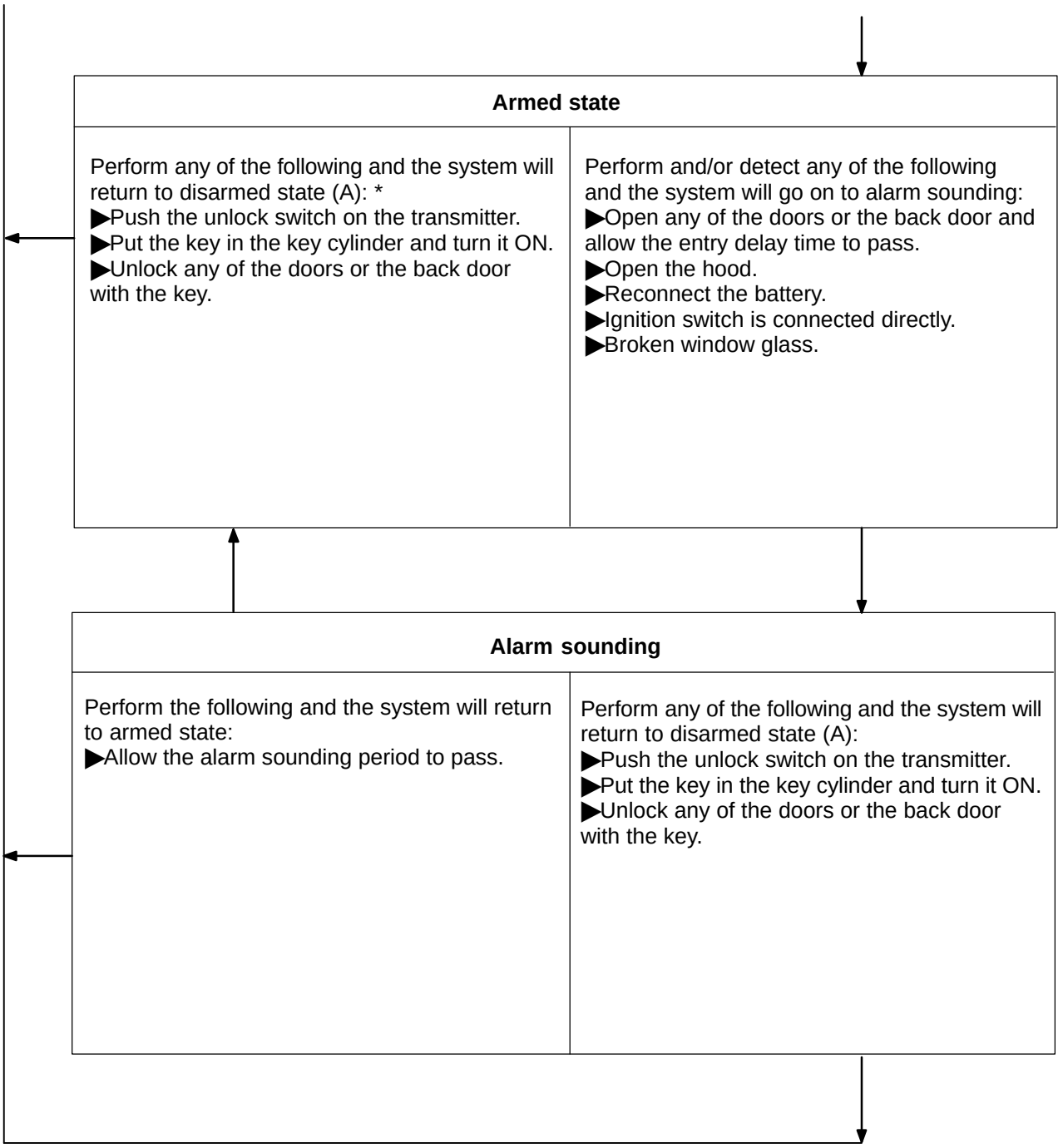
Armed state
Perform any of the following and the system will return to disarmed state (A): *
▶Push the unlock switch on the transmitter.
▶Put the key in the key cylinder and turn it ON.
▶Unlock any of the doors or the back door with the key.
Perform and/or detect any of the following and the system will go on to alarm sounding:
▶Open any of the doors or the back door and allow the entry delay time to pass.
▶Open the hood.
▶Reconnect the battery.
▶Ignition switch is connected directly.
▶Broken window glass.
Alarm sounding
Perform the following and the system will return to armed state:
▶Allow the alarm sounding period to pass.
Perform any of the following and the system will return to disarmed state (A):
▶Push the unlock switch on the transmitter.
▶Put the key in the key cylinder and turn it ON.
▶Unlock any of the doors or the back door with the key.

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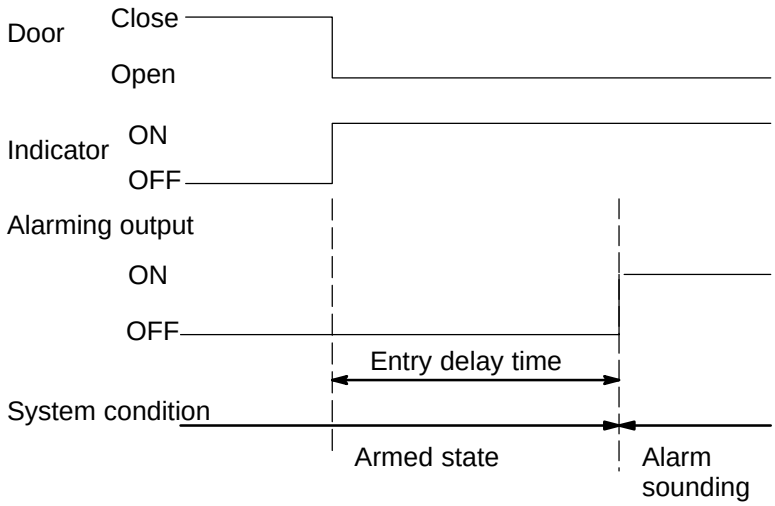
HINT:
If any door is opened in the armed state, entry delay will occur for 14 seconds.
During this time, the mode transfers to disarmed state if the condition * is met.
When the condition is not met, the system judges that theft occurs and transfers to the alarm sounding state.



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Indicator light output:

Condition	Indicator light
Disarmed state	OFF
Arming preparation	ON
Armed state (Entry delay time)	OFF (ON)
Alarm sounding	ON

HINT:
Even in the disarmed state, the indicator light blinks. (Due to the signal output from the immobilizer system). The indicator always blinks receiving the signal from the immobilizer system any time in the arming condition.

Blinking frequency:
0.2 seconds (ON)
1.8 seconds (OFF)

(a) Transfer to active mode:
In each passive mode, when "disarmed state of active mode → arming preparation transfer condition" is met, the active mode transfers to each condition. In this case, active mode continues till it becomes disarmed state.

Passive mode when transfer condition is met.	Active mode transfer condition
Disarmed state	Arming preparation condition
Arming preparation condition	Arming preparation condition
Armed state (During entry delay time)	Arming condition (After alarming time has elapsed, arming condition)
Alarm sounding	After alarming time has elapsed, arming condition

(b) Answer back:
The buzzer and taillights respond as answer back under the following conditions.
(1) When the system is set:
Arming preparation is set from disarmed state using the wireless door lock, the buzzer and taillights.
(2) When the system is released:
Disarmed state is set from either arming preparation, armed state or alarm sounding using the wireless door lock, the buzzer and taillights.

4. PANIC ALARM CONTROL

(a) The panic alarm control makes it possible for you to voluntarily set off the panic alarm by pressing the PANIC switch on the wireless transmitter. However, this control operates independently from the alarm control by the theft deterrent system (switched to the alarm sounding state from the armed state).

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(1) Conditions that cause the panic alarm control to set off the panic alarm:
The panic alarm control sets off the panic alarm by pressing the PANIC switch on the wireless transmitter under the following conditions.
- The ignition switch is OFF.
- The theft deterrent system is not in the alarm sounding state (common to active arming mode and passive arming mode).
- The panic alarm control is not operating (the alarm is not set off).

(2) Conditions that cause the panic alarm control to shut off the alarm:
The panic alarm control shuts off the panic alarm when any of the following conditions is met during panic alarm operation.
- The ignition switch is turned ON.
- Any of the switches on the wireless transmitter (PANIC/LOCK/UNLOCK) is pressed.
- The panic alarm ends (60 seconds have passed).
- The theft deterrent system switches to the alarm sounding state (common to active arming mode and passive arming mode). Conditions for canceling the panic alarm are the same as for the alarm control.

HINT:
Active arming mode: See step 2
Passive arming mode: See step 3

5. Using hand–held tester:
CHANGING METHOD OF PASSIVE MODE (ON or OFF)
(See page DI–1684)

6. SWITCH TO THE ACTIVE ARMING MODE

HINT:
In each state of the passive arming mode, when the switch condition transferring to active arming mode (disarmed state of active arming mode → arming preparation state of active arming mode) is satisfied, the system will switch to each state of the active arming mode. In this case, the active arming mode will continue until the system switches to the disarmed state.

State of Passive Arming Mode Before Switching	State of Active Arming Mode After Switching
Disarmed state	Arming preparation state
Arming preparation state	Arming preparation state (continues for 30 seconds)
Armed state (except during entry delay time)	Armed state

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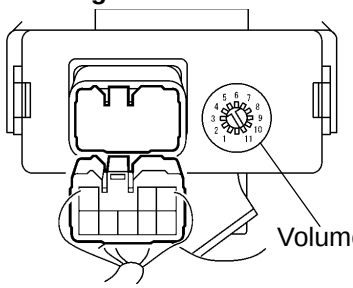
Armed state (during entry delay time)	After alarming time has elapsed, the system will switch to the armed state
Alarm sounding state	After alarming time has elapsed, the system will switch to the armed state

Glass Breakage Sensor:



7. OPERATE GLASS BREAKAGE SENSOR

HINT:

The glass breakage sensor functions only during the active arming mode.

(a) If the glass breakage sensor detects that the glass is broken (1st time), the sensor will set off an alarm for 20 seconds (pre–alarm). If the glass breakage sensor detects that the glass is broken furthermore (at 2nd time), the sensor will set off an alarm for 60 seconds.

HINT:

If the 2nd detection is performed during the pre–alarming time (20 seconds), the sensor will continuously set off the 2nd alarm. At this time, the total alarming time of the 1st alarm (pre–alarm) and 2nd alarm is 60 seconds.

(b) The sensitivity of the glass breakage sensor can be adjusted by the volume switch in the glass breakage sensor.

HINT:

Because the glass breakage sensor has a high sensitivity, it might set off a wrong alarm if the volume switch is adjusted too high.

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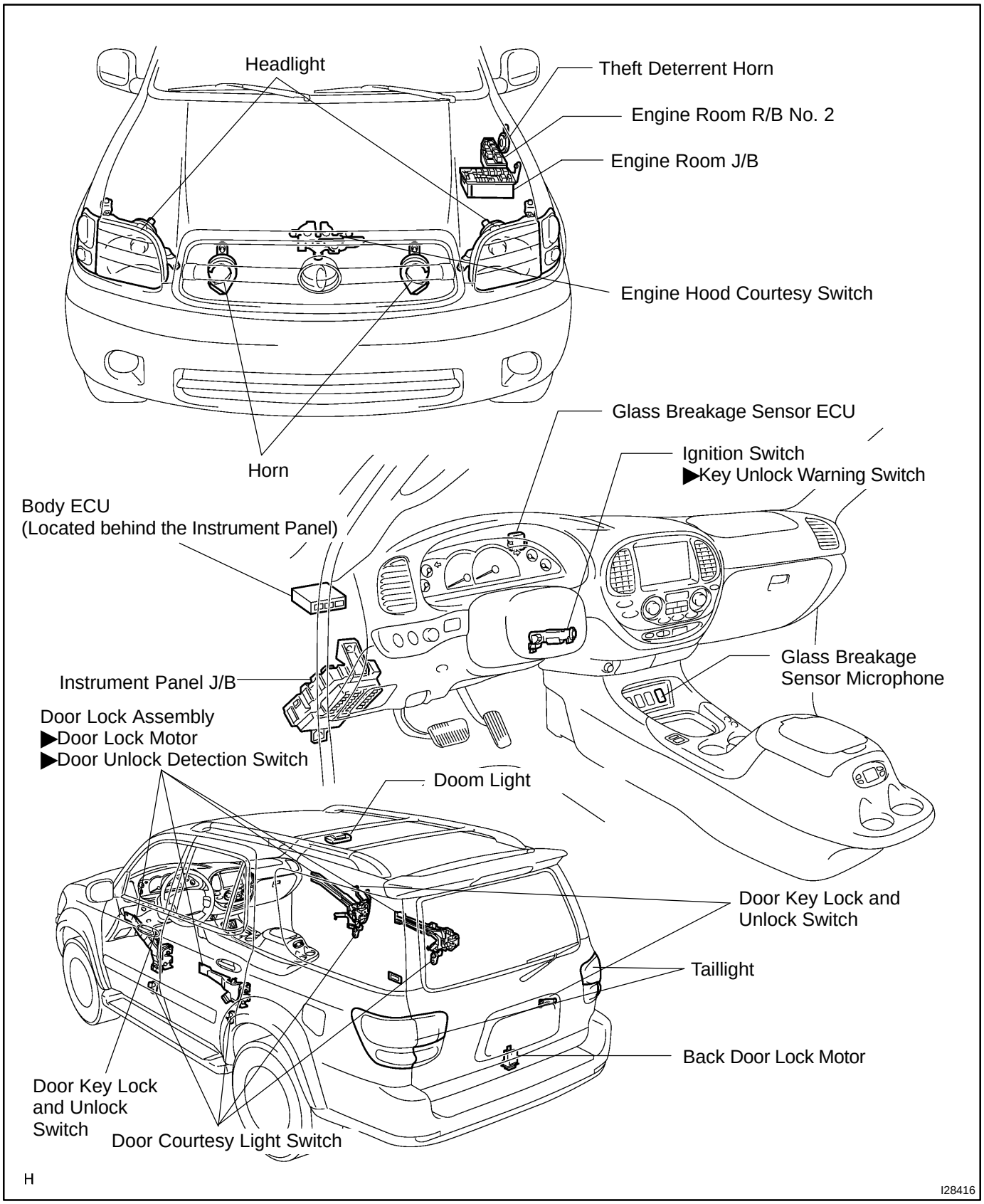
BE0CE–10

LOCATION



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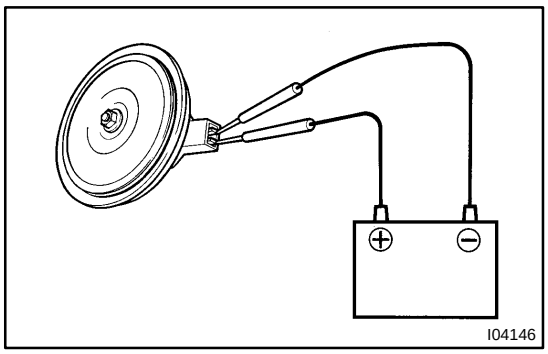
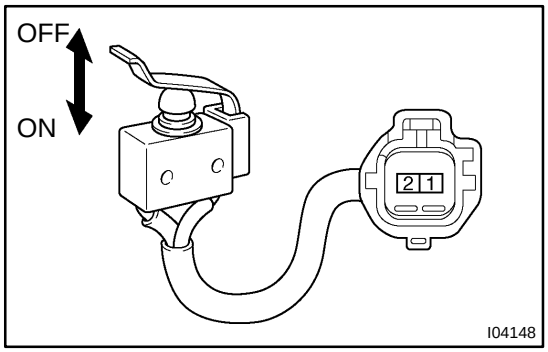
INSPECTION



1. INSPECT THEFT DETERRENT HORN OPERATION

Connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to the theft deterrent horn body, and check that the theft deterrent horn blows.

If operation is not as specified, replace the horn.



2. INSPECT ENGINE HOOD COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
CLOSE (OFF)	–	No continuity
OPEN (ON)	1 – 2	Continuity

If continuity is not as specified, replace the switch.

3. INSPECT ENGINE HOOD COURTESY SWITCH CIRCUIT (See page DI–1725)

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WIRELESS DOOR LOCK CONTROL SYSTEM

ON–VEHICLE INSPECTION

BE2MK–01

Only wireless function (Remote control) will not operate.
(If a new transmitter or a transmitter of the same type that works properly with the vehicle is not available.)

Make the vehicle in the initialized condition:
The initialized condition is the condition when the following conditions are satisfied.
(1) Key plate has not been inserted in the ignition key cylinder.
(2) All the doors are closed. (Door warning light is OFF.)
(3) All the doors are locked.

Basic function check:

Under the standard operation, when repeating UNLOCK and LOCK switch 3 times or more alternately, check the UNLOCK–LOCK operation from 3rd time onward.
▶Following procedures are standard operation.
(1) Keep about 1 M away to the right direction from the outside handle of a driver's seat.
(2) Face the transmitter toward the vehicle and press one of transmitter switches for about 1 sec.
<Reference>
▶As of the security function, even the wireless function is normal, there may be the case that only UNLOCK operation will not work.
▶As of the body customize function, if "operation twice" has been set using hand–held tester, only driver's seat is unlocked by unlock operation performed once.

No

Yes

Normal
<Reference>
▶Operative distance may differ according to an operator, the way of holding the transmitter or position.
▶Because weak electric wave is used, when there is strong wave or noise in the used frequency, operation distance might be shortened.

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Transmitter battery check:

Replace the transmitter battery with a new or normal one and check UNLOCK–LOCK function works under the standard operation.
<Reference>
▶The battery should be replaced by only the shops with sufficient skill as new or normal battery is necessary.
▶Battery quality can be judged by checking the remnant volume of the battery.

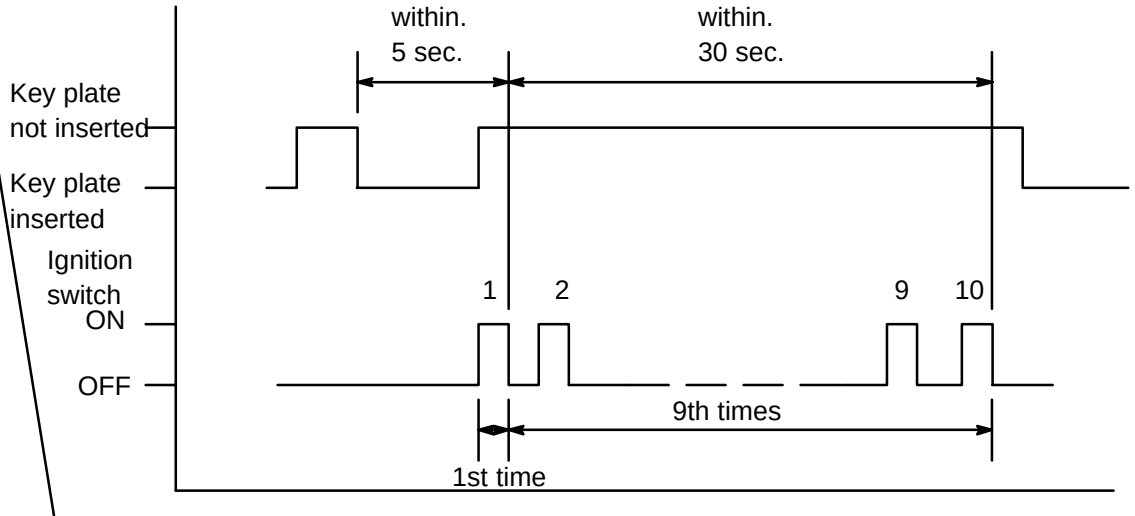
Yes → Battery faulty.

No

Make the vehicle be in the initialized condition.

Inspection start by using self diagnostic mode:

Enter into the self diagnostic mode.
If operating door control receiver in the order of 1 through 2, the mode turns to diagnostic mode.
(1) Insert the key plate in the ignition key cylinder and pull out, then insert it again and turn ignition switch OFF → ON → OFF once within 5 seconds after pulling out.
(2) After completing the procedure within 30 seconds, turn the ignition switch OFF → ON → OFF 9 times.
HINT:
In the case that either (1) or (2) condition is not satisfied, transfer to normal mode.
<Reference>
When completing self–diagnostic mode, turn the ignition switch ON.
LOCK and UNLOCK operation and output of luggage door opener signal are not performed under the self diagnostic mode.



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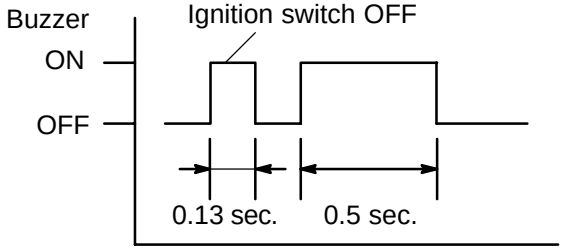
Self diagnostic mode operation check:

After the self–diagnostic mode input operation has been performed, check that the buzzer chirps.



No
(Not entered in self diagnostic mode)

Is the method to enter into the diagnostic mode correct?

No

Yes

Is the chirping function of operation confirmation buzzer normal?

No

Check door control buzzer.

Yes

Yes
(Entered in self diagnostic mode)

Key unlock warning switch inspection:

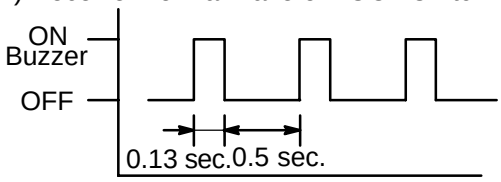
Check that continuity exists between connector terminal A3 of MPX body ECU on the vehicle side and ground by inserting the key plate into the ignition key cylinder.

Check key unlock warning switch.

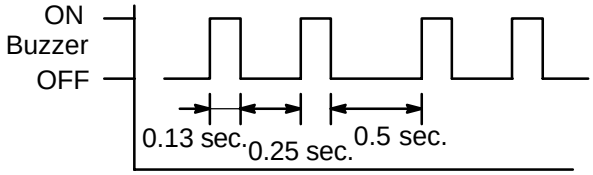
Self diagnostic mode check:

Check that how the buzzer chirps when pressing each transmitter switch.

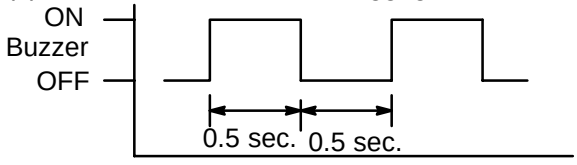
(1) Receiver normal wave of LOCK switch.



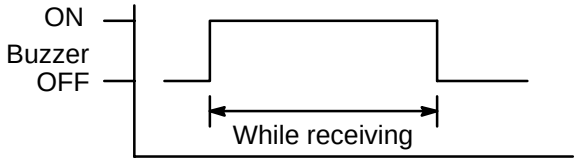
(2) Receiver normal wave of UNLOCK switch.



(3) Receiver normal wave of luggage door switch.



(4) Incompatibility of the recognition code or out from synchronization of rolling code.



<Reference>:
While turning the ignition switch ON in the self–diagnostic mode, the mode returns to normal mode.

(1), (2) or (3) are output.

(4) is output.
(All buzzer's response is same.)

Recognition code registration function check:

Check that it is possible to enter into rewrite mode or add mode.
(Refer to "Wireless door lock receiver and transmitter" – "Recognition code registration".)

Wireless door lock operates normally when recognition code is registered.

No response from buzzer

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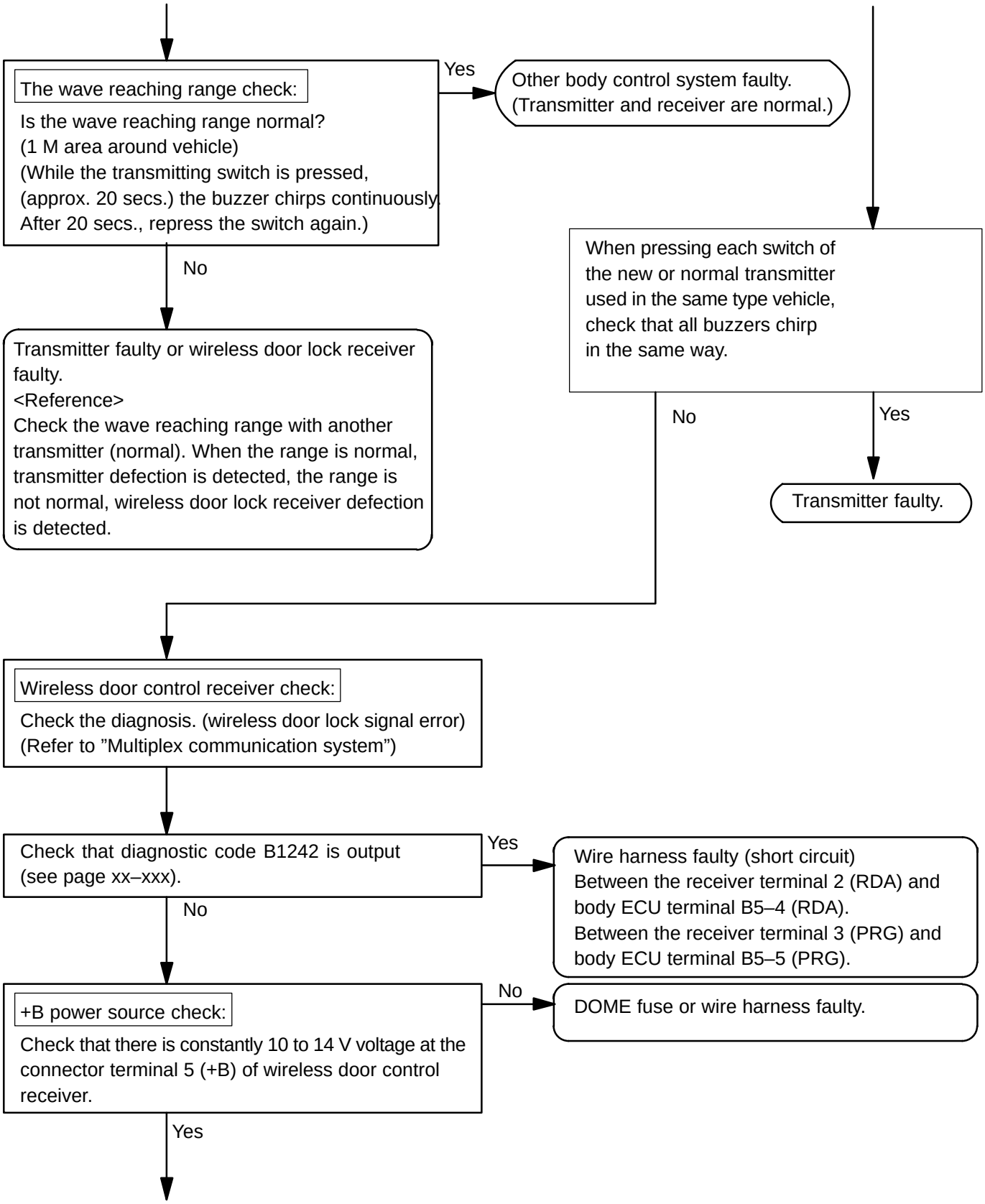
The wave reaching range check:
Is the wave reaching range normal?
(1 M area around vehicle)
(While the transmitting switch is pressed, (approx. 20 secs.) the buzzer chirps continuously. After 20 secs., repress the switch again.)
Yes
Other body control system faulty.
(Transmitter and receiver are normal.)
No
Transmitter faulty or wireless door lock receiver faulty.
<Reference>
Check the wave reaching range with another transmitter (normal). When the range is normal, transmitter defection is detected, the range is not normal, wireless door lock receiver defection is detected.
When pressing each switch of the new or normal transmitter used in the same type vehicle, check that all buzzers chirp in the same way.
No
Yes
Transmitter faulty.
Wireless door control receiver check:
Check the diagnosis. (wireless door lock signal error)
(Refer to ”Multiplex communication system”)
Check that diagnostic code B1242 is output
(see page xx–xxx).
Yes
Wire harness faulty (short circuit)
Between the receiver terminal 2 (RDA) and body ECU terminal B5–4 (RDA).
Between the receiver terminal 3 (PRG) and body ECU terminal B5–5 (PRG).
No
+B power source check:
Check that there is constantly 10 to 14 V voltage at the connector terminal 5 (+B) of wireless door control receiver.
No
DOME fuse or wire harness faulty.
Yes

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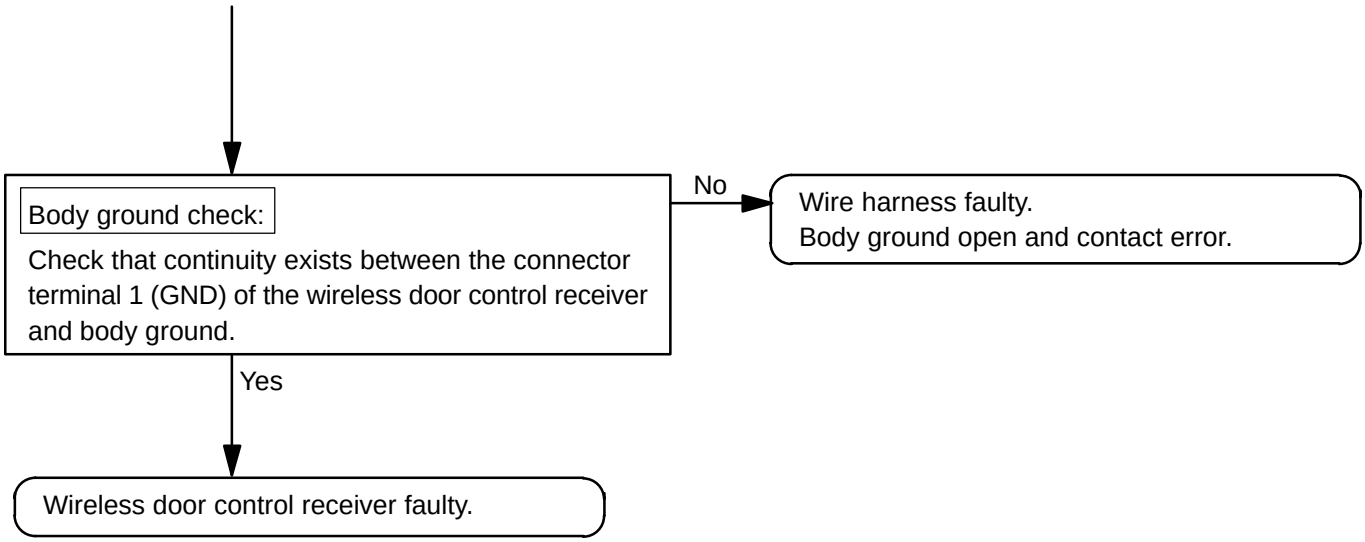
Body ground check:
Check that continuity exists between the connector terminal 1 (GND) of the wireless door control receiver and body ground.
No
Wire harness faulty.
Body ground open and contact error.
Yes
Wireless door control receiver faulty.

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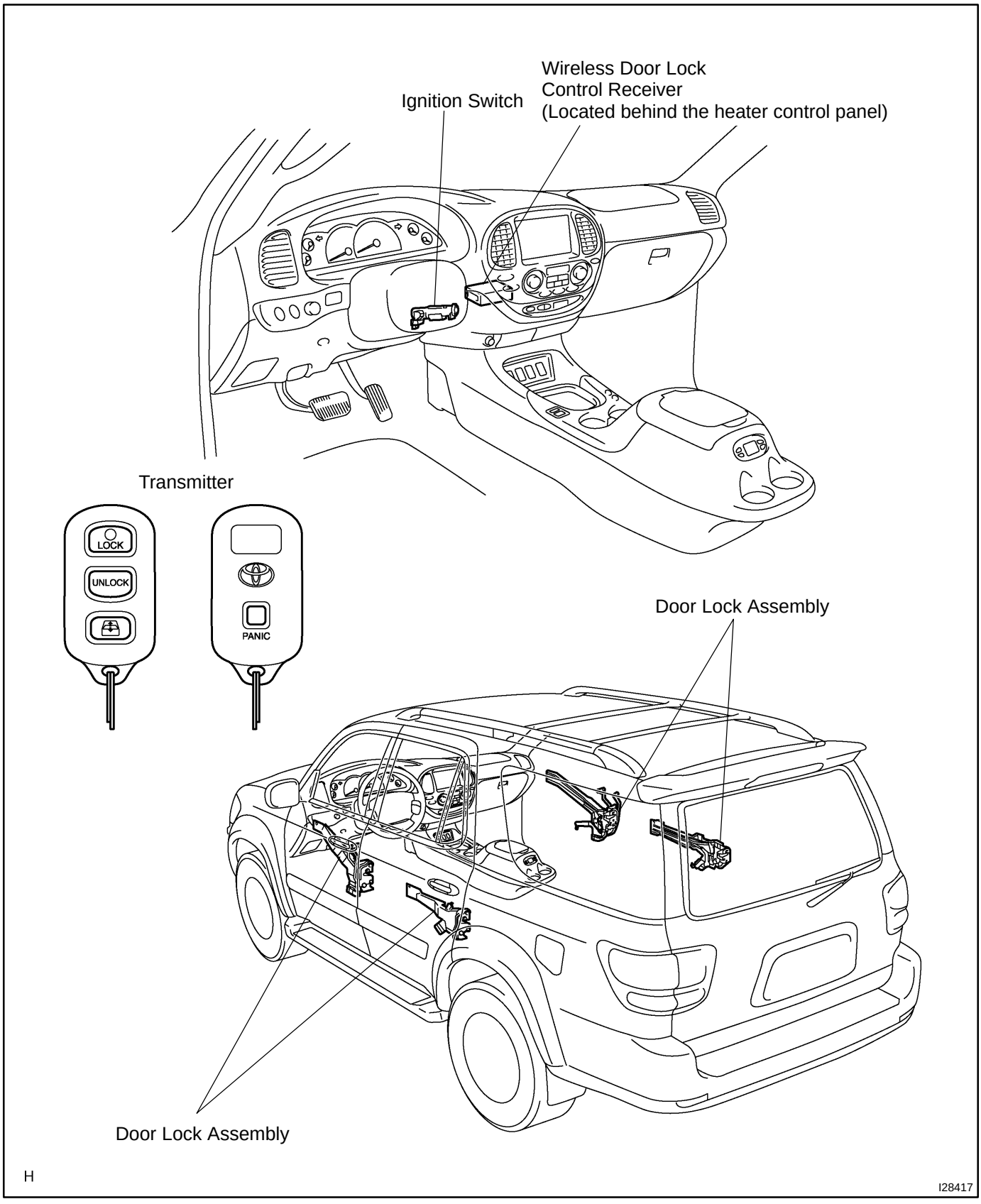
BE0GM–16

LOCATION



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BE0GO–11

INSPECTION

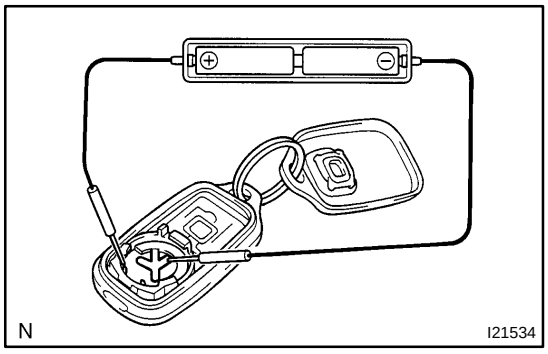
1. INSPECT WIRELESS DOOR LOCK TRANSMITTER OPERATION

HINT:

Refer to ”Wireless door lock control transmitter battery replacement” on page BE–103.

(a) Using a screwdriver, remove the cover.

(b) Remove the battery (lithium battery).



(c) Install a new or normal battery (lithium battery).

HINT:

When a new or normal battery can not be obtained, connect 2 new 1.5 V batteries in series, connect the battery (+) to the battery receptacle side terminal and the battery (–) to the bottom terminal, then apply 3 V voltage to the transmitter.

(d) In the location where transmitter is approx. 1 M away from the driver’s outside handle in the right direction, check transmitter operation while pressing transmission switch on the side of the transmitter body.

Standard:

Remote control of the vehicle door lock can be operated.

HINT:

- The minimum operation distance differs according to operator, the way of holding the transmitter, and location.
- As a weak wave is used, operating distance might be shortened when noise is detected in a strong wave or a used frequency.

(e) Install the battery (lithium battery).

(f) Install the cover so that a rubber cover is not distorted or slipped off.

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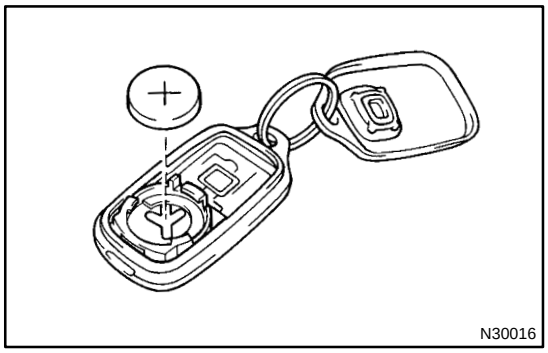
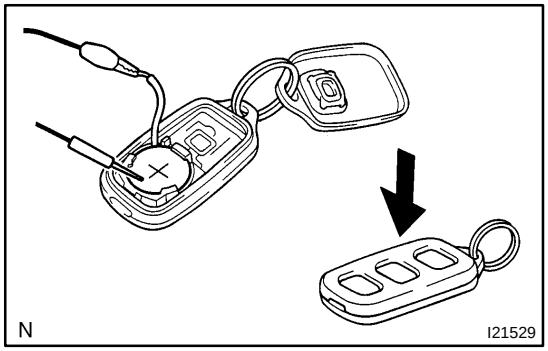
2. CHECK BATTERY CAPACITY

HINT:

- ▶ Make sure to use the TOYOTA electrical tester.
- ▶ With the battery unloaded, judge can not be made whether the battery is available or not on the test.
- ▶ When the transmitter is faulty, the energy amount left in the battery might not be checked correctly.
- ▶ On the lithium battery used for the transmitter, the voltage more than 2.5 V with the battery unloaded is shown on the tester until the energy is completely consumed.
  Accordingly when inspecting the energy amount left in the battery, it is necessary to measure the voltage when the battery is loaded (1.2 kΩ).



(a) Remove the cover using a (–) driver.
(b) Remove the battery (lithium battery) from the transmitter.
(c) Connect the lead to the (–) terminal of the transmitter and install the battery.



(d) Connect the (+) tester to the (+) battery (lithium battery), and (–) tester to the lead respectively.
(e) Press one of the transmitting switches on the transmitter for approx. 1 second.
(f) Press the transmitting switch on the transmitter again to check the voltage.
Standard: 2.1 V or more

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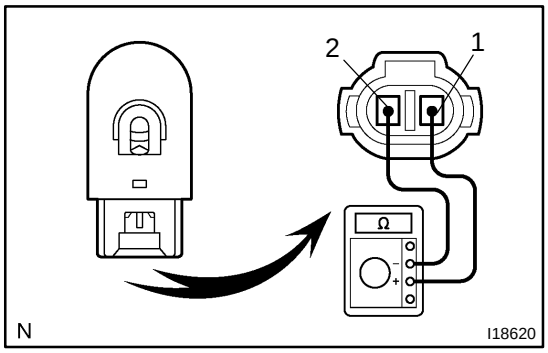
HINT:

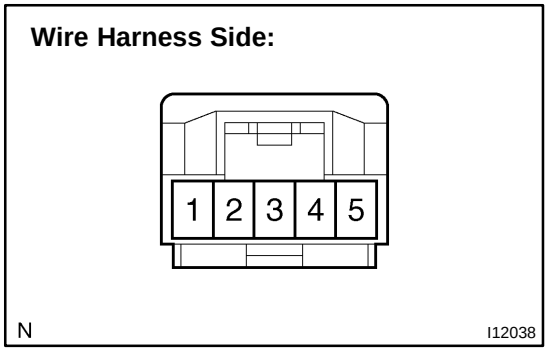
- When the temperature of the battery is low, the judge can not be made correctly.
  When the outcome of the test is less than 2.1 V, conduct the test again after leaving the battery in the place at 18 °C for more than 30 minutes.
- By auto power off function, the voltage becomes no load voltage (more than 2.5 V) condition after 20 seconds from the switch was pressed.
  Make sure to read the voltage before of it.
- High voltage might be shown once or twice after leaving the battery, judge should be made with the voltage shown at the 3rd time or later.

(g) Disconnect the lead.
(h) Set the battery (lithium battery) in the transmitter.
(i) Install the cover, so that the rubber cover is not distorted or slipped off.



3. INSPECT WIRELESS DOOR LOCK BUZZER RESISTANCE

Connect the positive (+) lead from the ohmmeter to terminal 1 and the negative (–) lead to terminal 2, and measure resistance of approx. 1 kΩ.
If resistance is not as specified, replace the buzzer.



4. Connector disconnected:
INSPECT WIRELESS DOOR LOCK CONTROL RECEIVER CIRCUIT

Disconnect the connector from the receiver and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
1 – Ground	Always	Continuity
5 – Ground	Always	Battery positive voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

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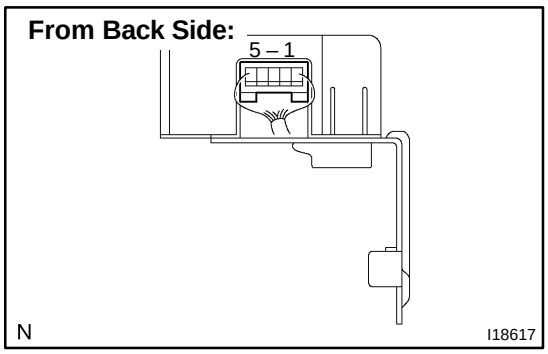

5. Connector connected:
INSPECT WIRELESS DOOR LOCK CONTROL RECEIVER CIRCUIT

Connect the wire harness side connector to the receiver and inspect the wire harness side connector from the back side, as shown.

Tester connection	Condition	Specified condition
3 – Ground	Normal mode	Approx. 10 – 14 V
2 – Ground	Ignition switch position OFF, Key removed, Transmitter ON	Approx. 6 – 7 V

If circuit is as specified, replace the receiver.
If the circuit is not as specified, inspect the circuits connected to other parts.

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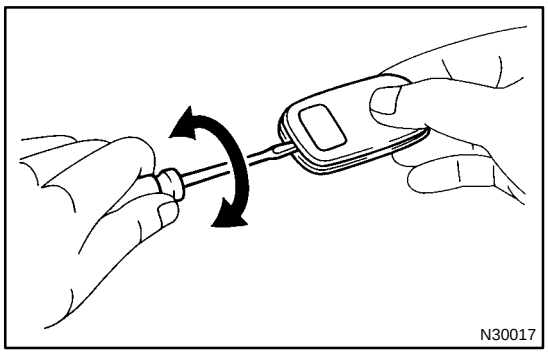
BE267–05



REPLACEMENT

1. REPLACE TRANSMITTER (LITHIUM) BATTERY

NOTICE:

Great caution should be taken for handling each component as they are precision electronic components.

(a) Using a screwdriver, remove the cover.

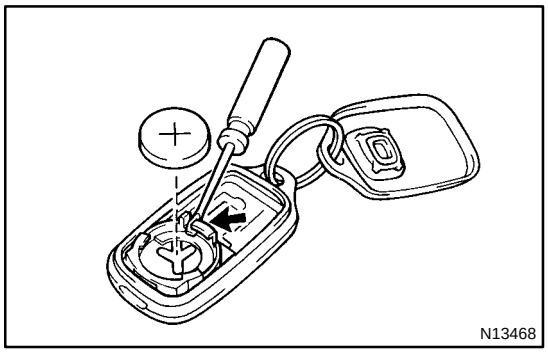
NOTICE:

Do not pry out the cover forcibly.

HINT:

Push the cover with a finger as shown in the illustration, so that there becomes clearance, then pry out the cover from that clearance.

(b) Remove the transmitter.



(c) Remove the battery (lithium battery).

NOTICE:

- **Do not push the terminals with a finger.**
- **If prying up the battery (lithium battery) forcibly to remove, the terminals are deformed.**

(d) Install a battery (lithium battery) as shown in the illustration.

NOTICE:

Face the battery upward. Take care not to deform the terminals.

(e) Check that the rubber cover is not distorted or slipped off, and install the cover.

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2. REPLACE DOOR CONTROL RECEIVER AND TRANSMITTER

NOTICE:

When replacing the door control receiver and transmitter, registration of recognition code is necessary because they are provided as single components.

(a) Select one of the operations mode should be performed from the following modes.

- Add mode
- Rewrite mode
- Prohibition mode
- Confirmation mode

HINT:

- The add mode is used to retain codes already registered while you register new recognition codes. This mode is used when adding a transmitter. However, if the number of registered codes exceeds 4 codes, previously registered codes are correspondingly erased in order, starting from the first registered code.
- The rewrite mode is used to erase all previously registered codes and register only new recognition codes.
- The prohibition mode is used to erase all registered codes and cancels the wireless door lock function. Use this mode when the transmitter is lost.
- The confirmation mode is for confirming how many recognition codes are already registered before you register additional recognition codes.

(b) Follow the chart on the following pages to register the transmitter recognition code at the wireless door lock control receiver.

HINT:

- When procedure is out of the specified, the operation returns to normal operation.
- Maximum 4 recognition codes can be registered.

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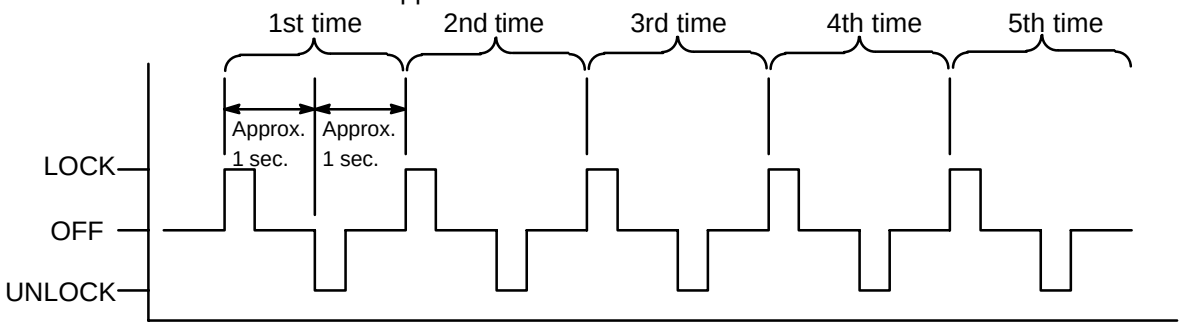
Start registration of recognition code

The vehicle should be in the following conditions.
▶Any door is OPEN. (Other doors are CLOSED)
▶Insert the key into the ignition key cylinder, then pull it out.

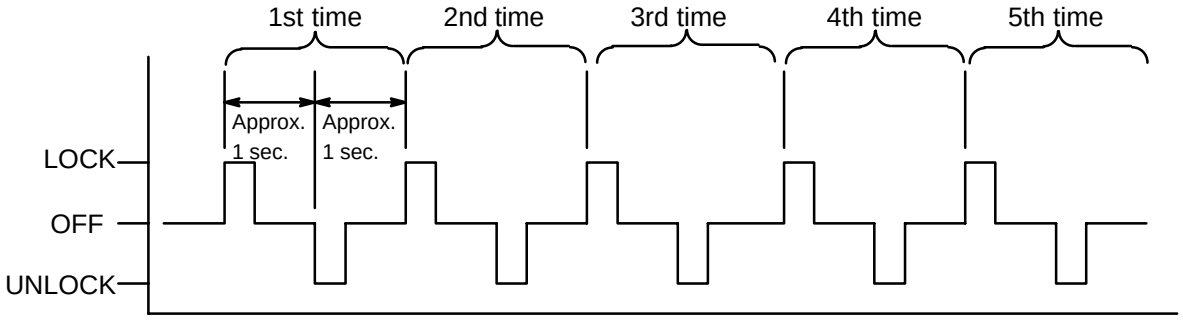
Within 40 secs.

Press the door lock control switch (for manual operation) 5 times to LOCK/UNLOCK at approx. 1 sec. interval.



Close the DRIVER'S door, then open the DRIVER'S door.

Press the door lock control switch again (for manual operation) 5 times to LOCK/UNLOCK at approx. 1 sec. interval.



Insert the key into the ignition key cylinder.

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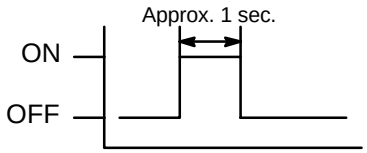
Turn the ignition switch from ON to LOCK at approx. 1 sec. interval 1 to 5 times to select the mode.

Within 40secs.

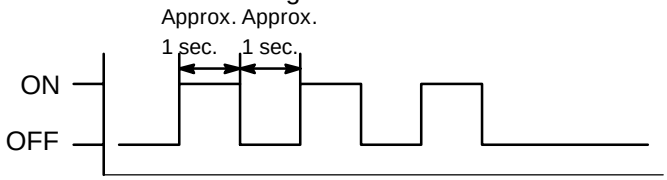
Add mode

ON – OFF change occurs 1 time



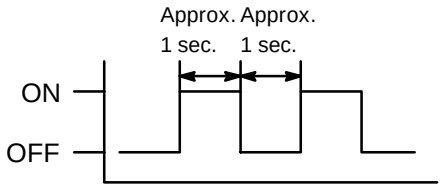
Confirmation mode

ON – OFF change occurs 3 times



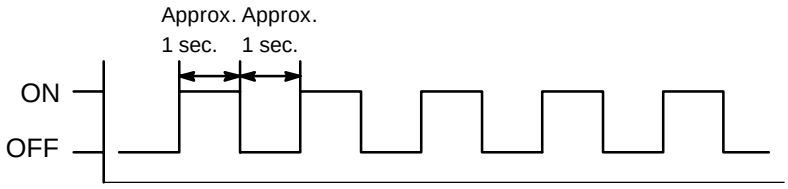
Rewrite mode

ON – OFF change occurs 2 times



Prohibition mode

ON – OFF change occurs 5 times



Pull out the key plate from the ignition key cylinder.

When add mode or rewrite mode is selected.

When prohibition mode is selected.

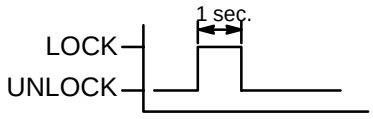
When confirmation mode is selected.

Within 3 secs.

MPX body ECU automatically performs the LOCK–UNLOCK operation once or twice at 1 sec. interval to inform the operator that either the add mode or rewrite mode has been selected.

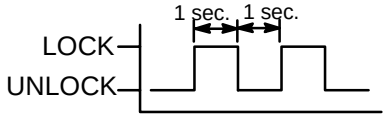
LOCK–UNLOCK occurs once

Indicates that add mode has been selected.



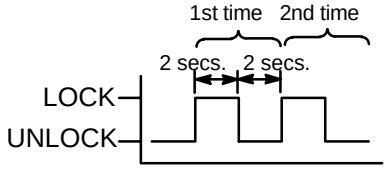
LOCK–UNLOCK occurs twice

Indicates that rewrite mode has been selected.



MPX body ECU automatically performs the LOCK–UNLOCK operation 1 to 4 times at 2 sec. interval to inform the operator of the number of the registered codes.
HINT:
When the number of the registered code is 0, the operation is automatically performed 5 times.

Example:
When the operation is performed twice, it directs that 2 types of recognition code have been registered.



Registration of recognition code (Confirmation mode and prohibition mode) is completed.

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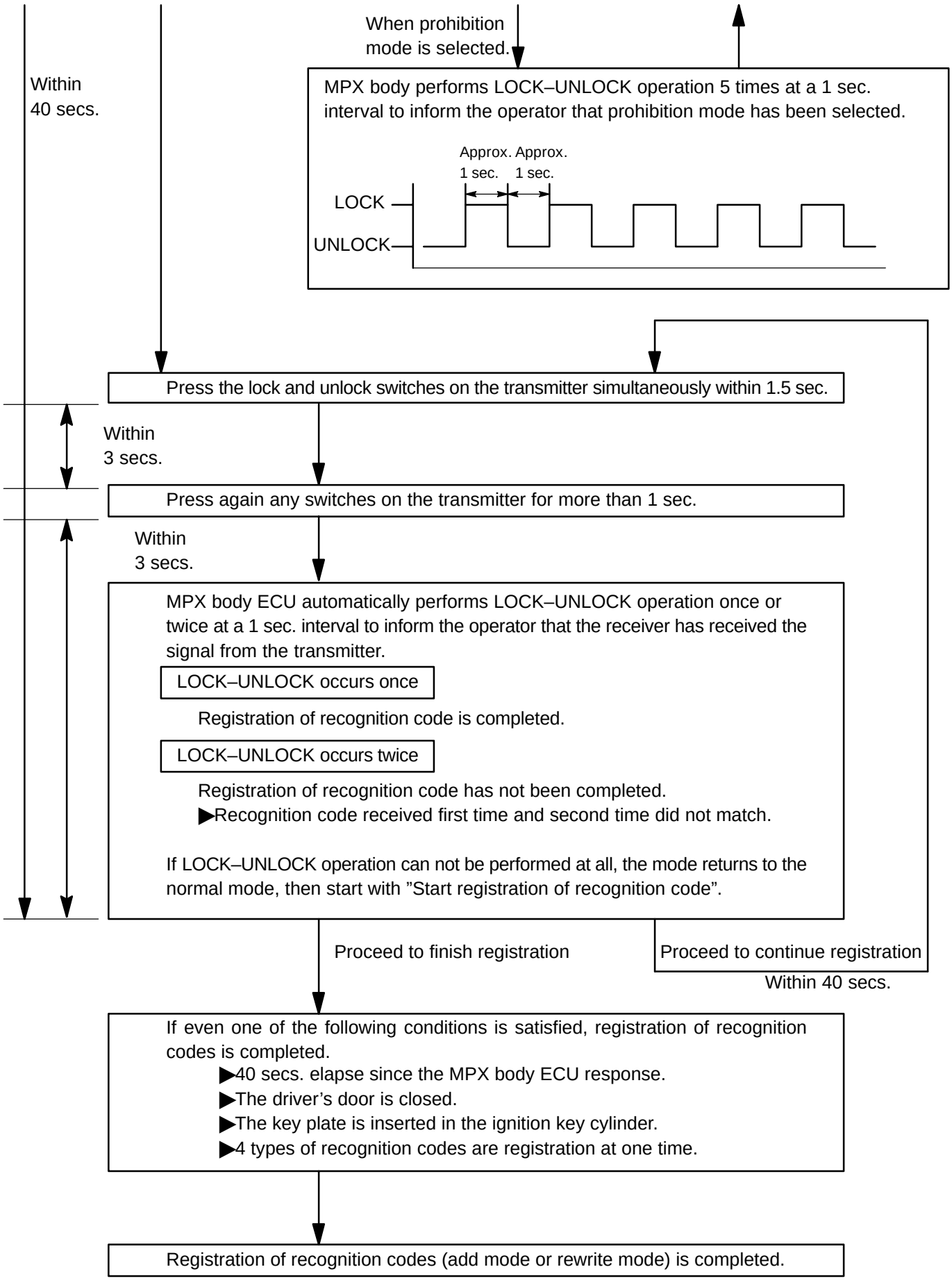
When prohibition mode is selected.
Within 40 secs.
MPX body performs LOCK–UNLOCK operation 5 times at a 1 sec. interval to inform the operator that prohibition mode has been selected.
Approx. 1 sec.
Approx. 1 sec.
LOCK
UNLOCK
Press the lock and unlock switches on the transmitter simultaneously within 1.5 sec.
Within 3 secs.
Press again any switches on the transmitter for more than 1 sec.
Within 3 secs.
MPX body ECU automatically performs LOCK–UNLOCK operation once or twice at a 1 sec. interval to inform the operator that the receiver has received the signal from the transmitter.
LOCK–UNLOCK occurs once
Registration of recognition code is completed.
LOCK–UNLOCK occurs twice
Registration of recognition code has not been completed.
▶Recognition code received first time and second time did not match.
If LOCK–UNLOCK operation can not be performed at all, the mode returns to the normal mode, then start with ”Start registration of recognition code”.
Proceed to finish registration
Proceed to continue registration
Within 40 secs.
If even one of the following conditions is satisfied, registration of recognition codes is completed.
▶40 secs. elapse since the MPX body ECU response.
▶The driver’s door is closed.
▶The key plate is inserted in the ignition key cylinder.
▶4 types of recognition codes are registration at one time.
Registration of recognition codes (add mode or rewrite mode) is completed.

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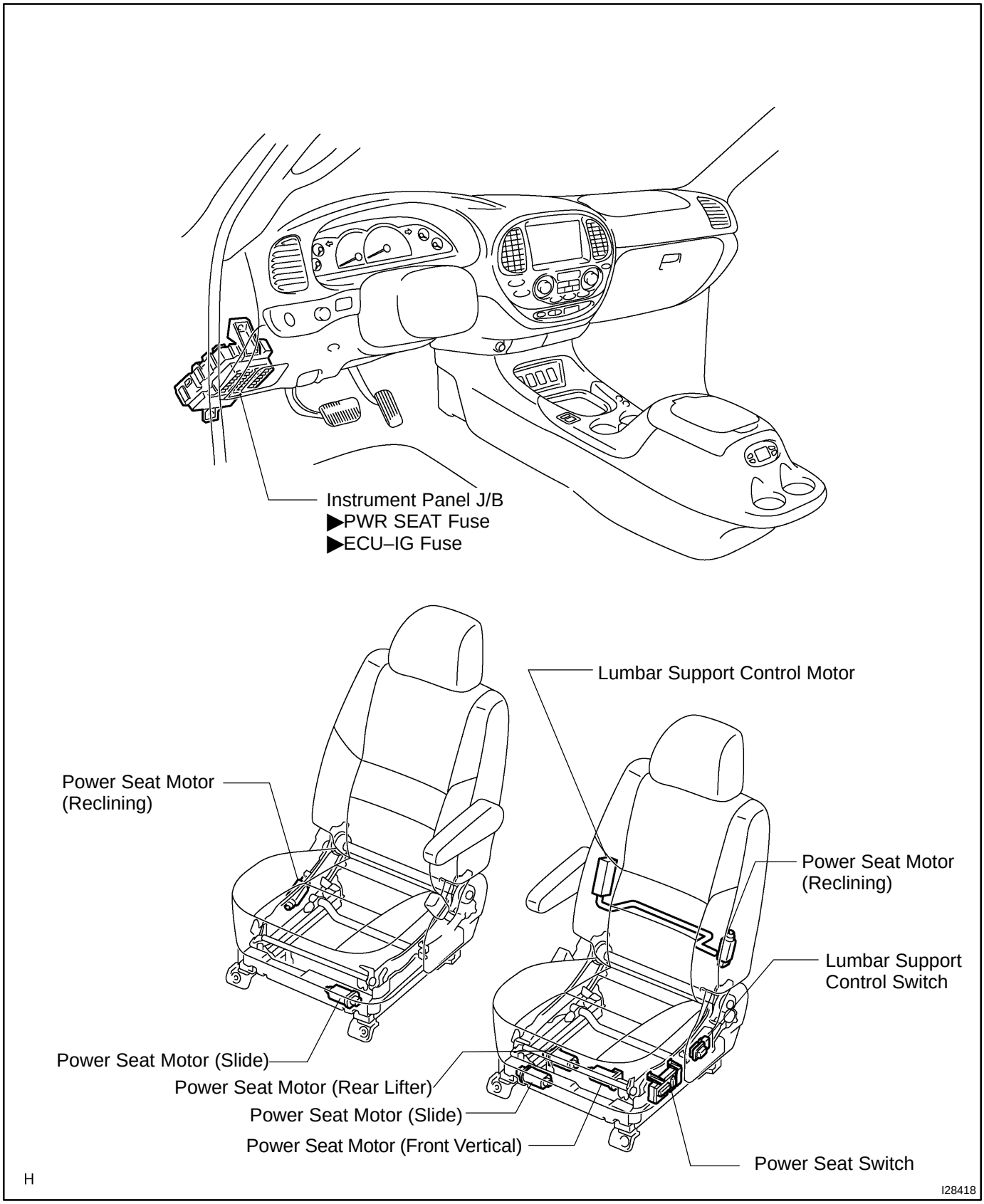
POWER SEAT CONTROL SYSTEM

BE17F–08

LOCATION



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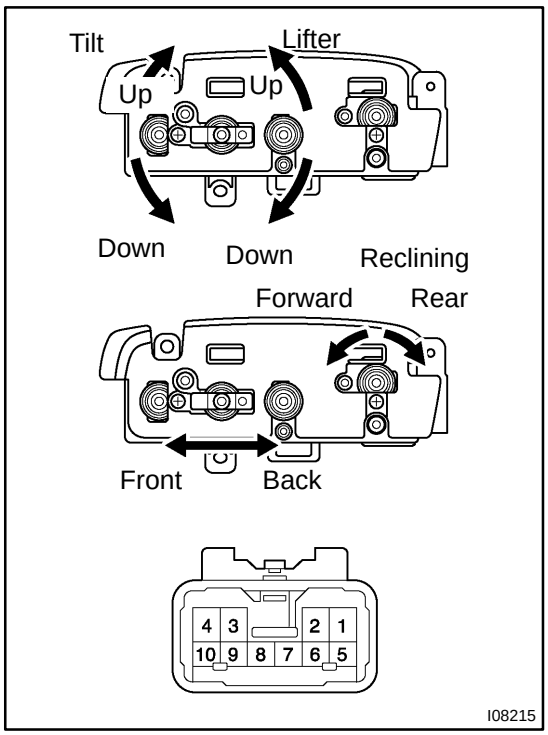
BE268–04



INSPECTION

1. INSPECT DRIVER'S POWER SEAT SWITCH CONTINUITY (w/o Driving Position Memory)

Slide Switch:

Switch position	Tester connection	Specified condition
FRONT	1 – 9, 4 – 6	Continuity
OFF	4 – 6 – 9	Continuity
BACK	1 – 6, 4 – 9	Continuity

Front Tilt Switch:

Switch position	Tester connection	Specified condition
UP	1 – 10, 4 – 5	Continuity
OFF	4 – 5 – 10	Continuity
DOWN	1 – 5, 4 – 10	Continuity

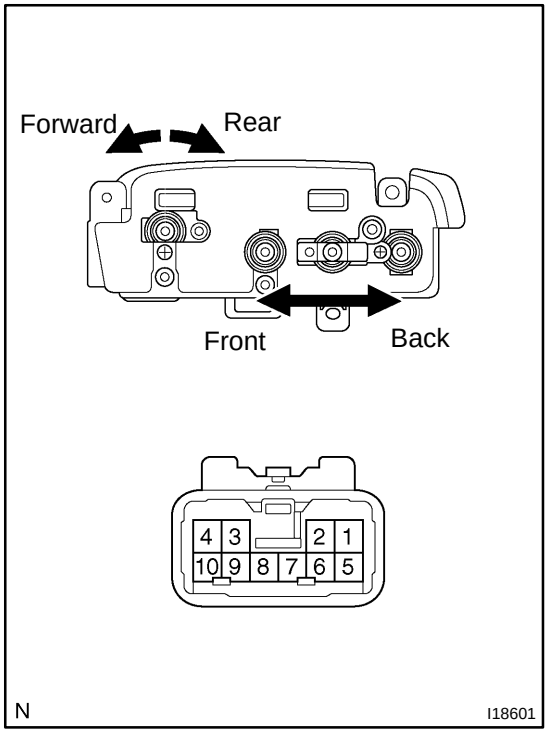
Rear Lifter Switch:

Switch position	Tester connection	Specified condition
UP	1 – 7, 4 – 8	Continuity
OFF	4 – 7 – 8	Continuity
DOWN	1 – 8, 4 – 7	Continuity

Reclining Switch:

Switch position	Tester connection	Specified condition
FORWARD	1 – 3, 2 – 4	Continuity
OFF	2 – 3 – 4	Continuity
REAR	1 – 2, 3 – 4	Continuity

If continuity is not as specified, replace the switch.



2. INSPECT PASSENGER'S POWER SEAT SWITCH CONTINUITY

Slide Switch:

Switch position	Tester connection	Specified condition
FRONT	1 – 9, 4 – 6	Continuity
OFF	4 – 6 – 9	Continuity
BACK	1 – 6, 4 – 9	Continuity

Reclining Switch:

Switch position	Tester connection	Specified condition
FORWARD	1 – 3, 2 – 4	Continuity
OFF	2 – 3 – 4	Continuity
REAR	1 – 2, 3 – 4	Continuity

If continuity is not as specified, replace the switch.

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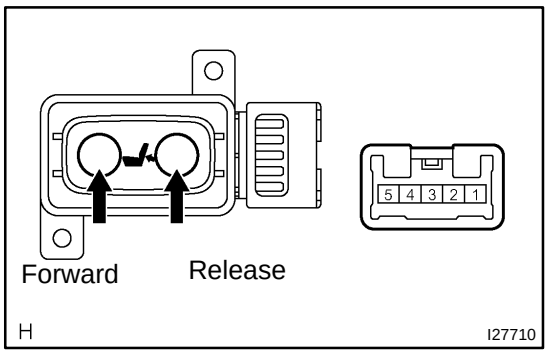
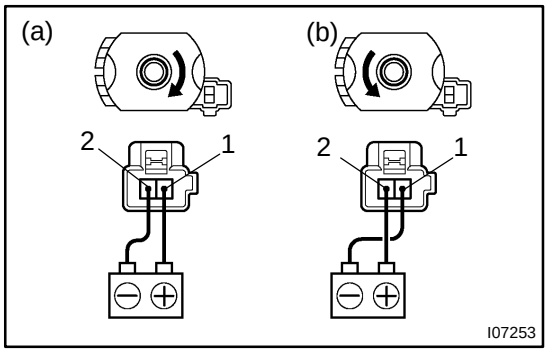


3. INSPECT DRIVER'S LUMBAR SUPPORT CONTROL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Forward	1 – 2, 3 – 4	Continuity
OFF	1 – 2, 4 – 5	Continuity
Release	1 – 3, 4 – 5	Continuity

If continuity is not as specified, replace the switch.

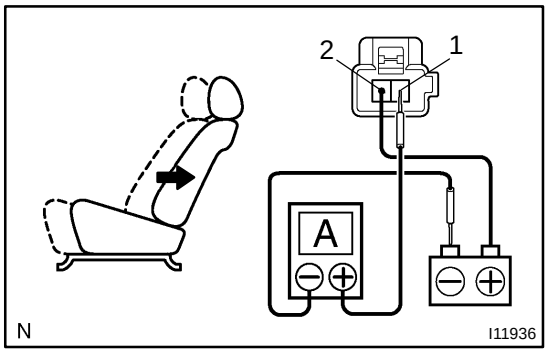


4. INSPECT SLIDE MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counter-clockwise.

If operation is not as specified, replace the seat adjuster.

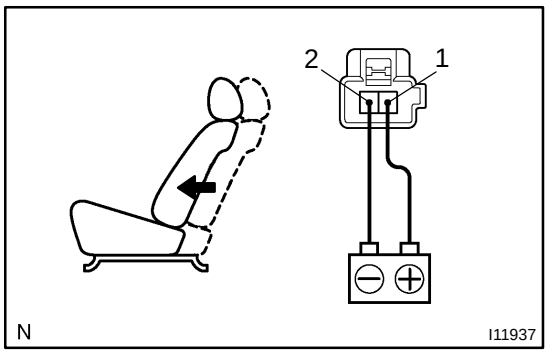


5. INSPECT SLIDE MOTOR PTC THERMISTOR OPERATION

( ): Passenger Side

(a) Connect the positive (+) lead from the battery to terminal 2 (1), the positive (+) lead from the ammeter to terminal 1 (2) and the negative (–) lead to the battery negative (–) terminal, then move the seat cushion to the rear position.

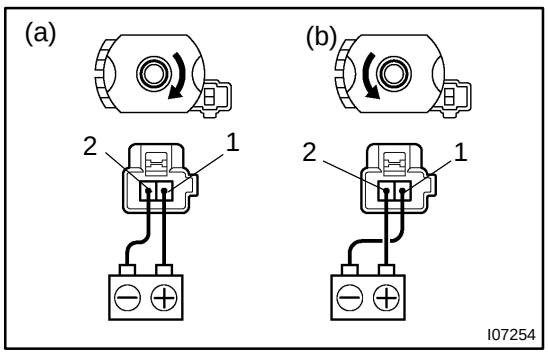
(b) Continue to apply voltage, check that current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 (2) and the negative (–) lead to terminal 2 (1), check that the seat cushion begins to move forwards.

If operation is not as specified, replace the seat adjuster.



6. INSPECT FRONT TILT MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counter-clockwise.

If operation is not as specified, replace the seat adjuster.

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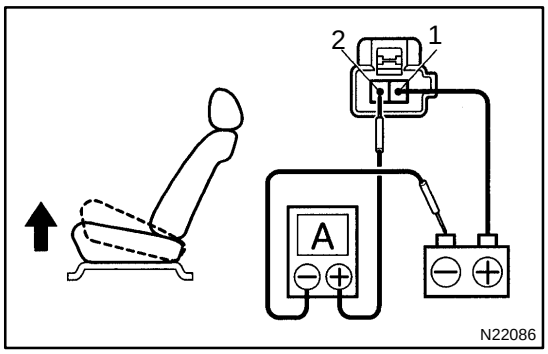
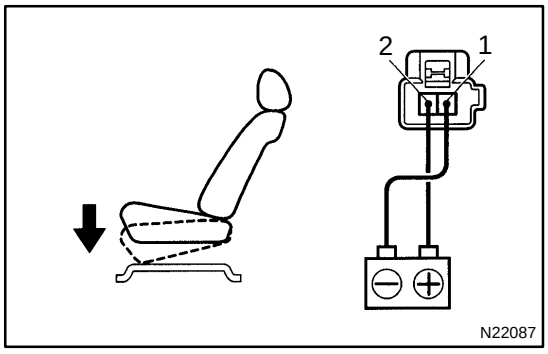


7. INSPECT FRONT TILT MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1, the positive (+) lead from the ammeter to terminal 2 and the negative (–) lead to the battery negative (–) terminal, then move the seat cushion to the highest position.

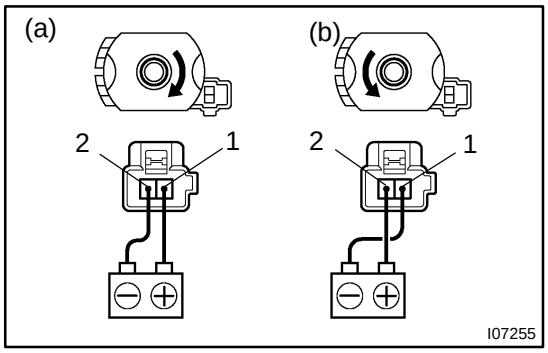
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, check that the seat cushion begins to descend.

If operation is not as specified, replace the seat adjuster.

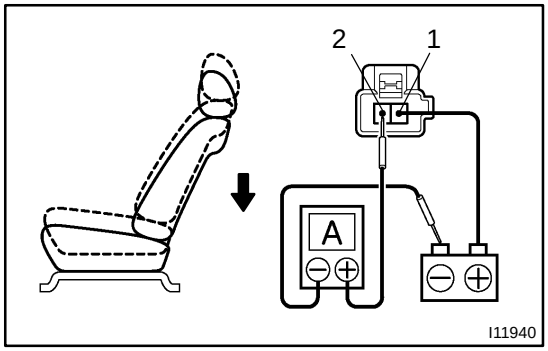


8. INSPECT LIFTER MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counterclockwise.

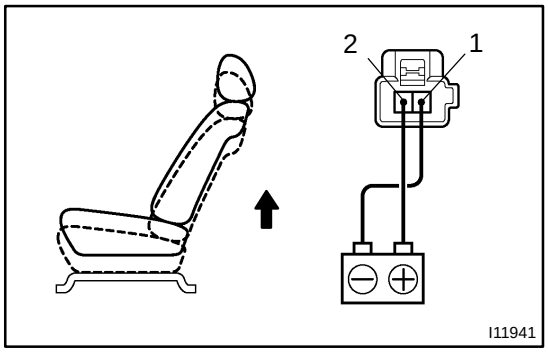
If operation is not as specified, replace the seat adjuster.



9. INSPECT LIFTER MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1, the positive (+) lead from the ammeter to terminal 2 and the negative (–) lead to the battery negative (–) terminal, then move the seat cushion to the lowest position.

(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, check that the seat cushion begins to ascend.

If operation is not as specified, replace the seat adjuster.

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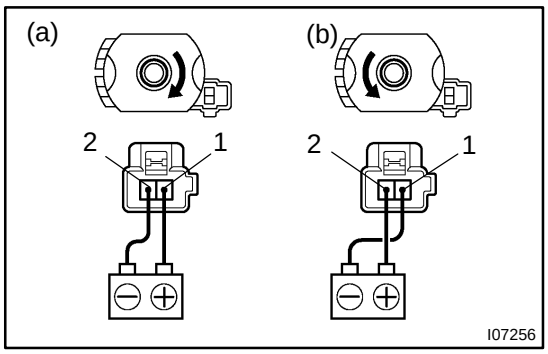
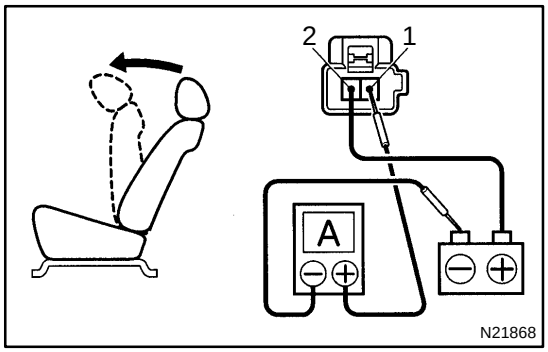


10. INSPECT RECLINING MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counter-clockwise.

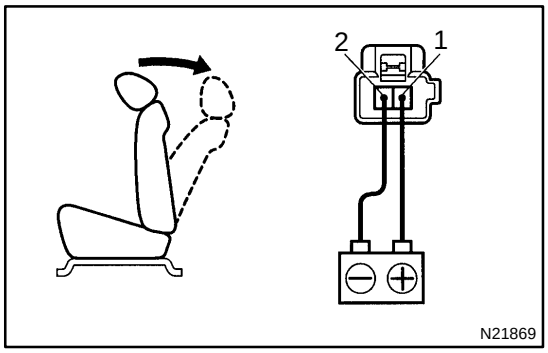
If operation is not as specified, replace the seat adjuster.



11. INSPECT RECLINING MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2, the positive (+) lead from the ammeter to terminal 1 and the negative (–) lead to the battery negative (–) terminal, then recline the seat back to the most forward position.

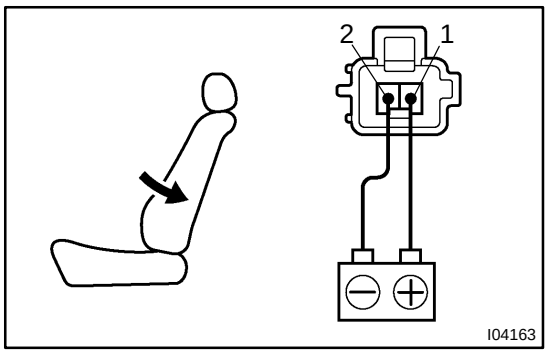
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

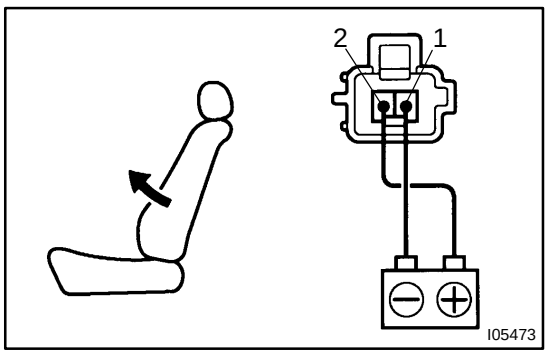
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the seat back begins to fall backward.

If operation is not as specified, replace the seat adjuster.



12. INSPECT LUMBAR SUPPORT MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the lumbar support moves to release side.



(b) Reverse the polarity, check that the lumbar support moves forward.

If operation is not as specified, replace the seat adjuster.

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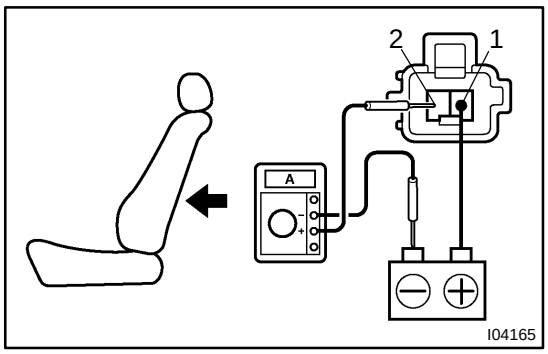
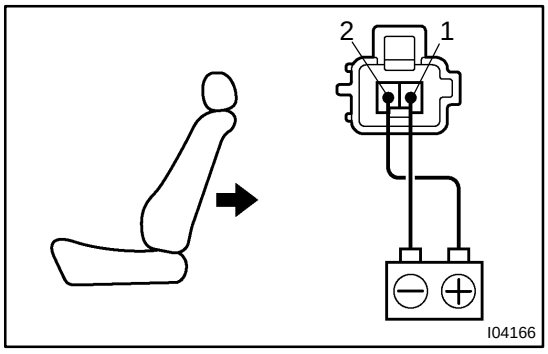


13. INSPECT LUMBAR SUPPORT MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1 on the lumbar support motor connector and move the lumbar support to front end position.



(b) Continue to apply voltage, check that a circuit breaker operation noise can be heard within 4 to 60 seconds.

(c) Reverse the polarity, check that the lumbar support begins to move to release side within approximately 60 seconds.

If operation is not as specified, replace the motor.

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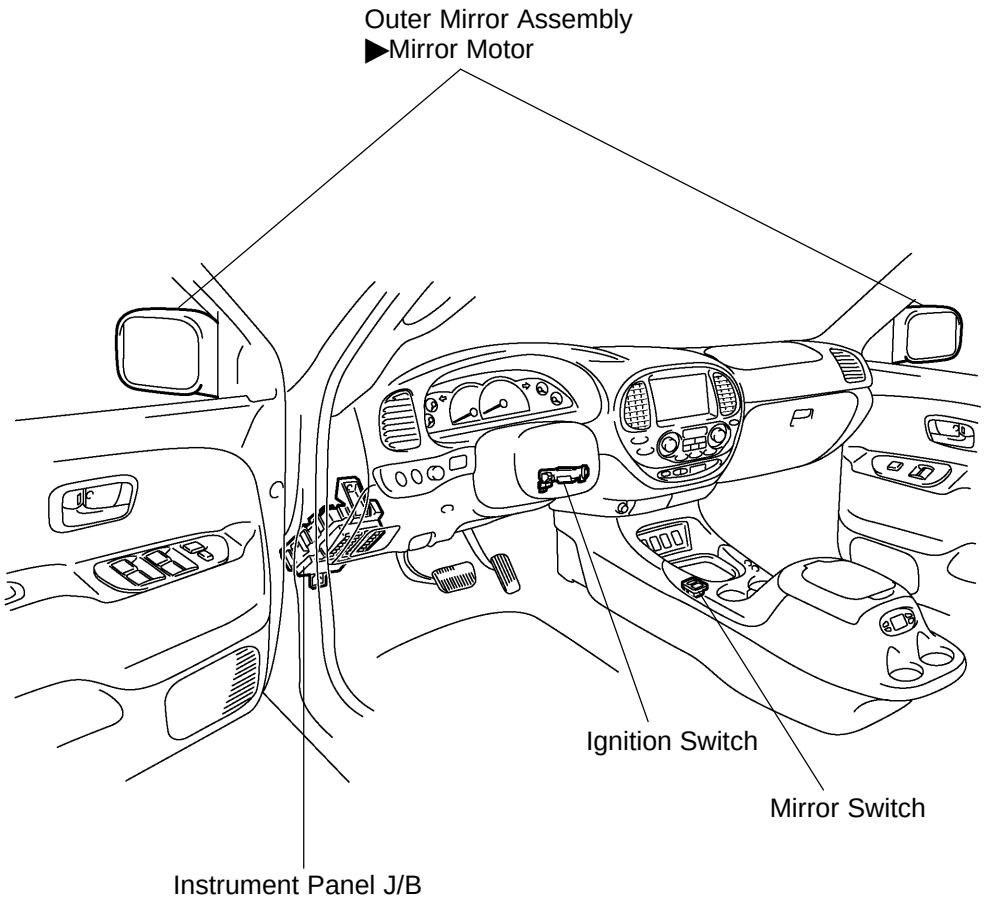
POWER MIRROR CONTROL SYSTEM

BE03G–08

LOCATION



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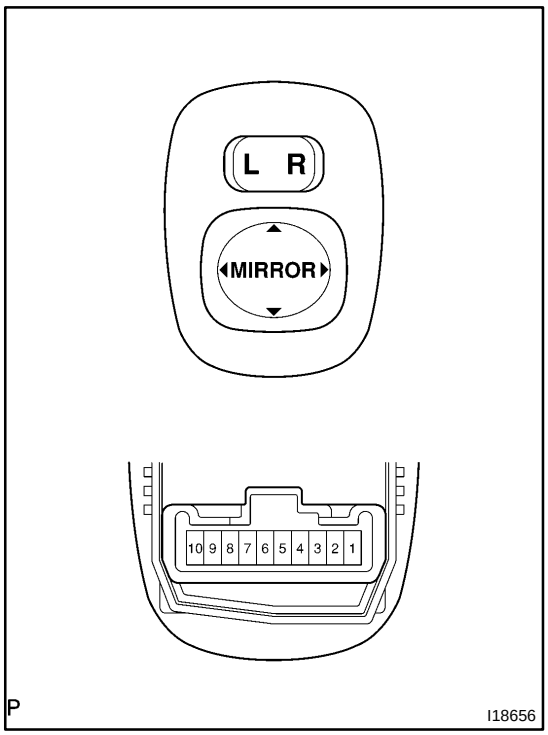


INSPECTION

1. w/o Retract Mirror and Driving Position Memory:

(a) Left Side:

INSPECT MIRROR SWITCH CONTINUITY

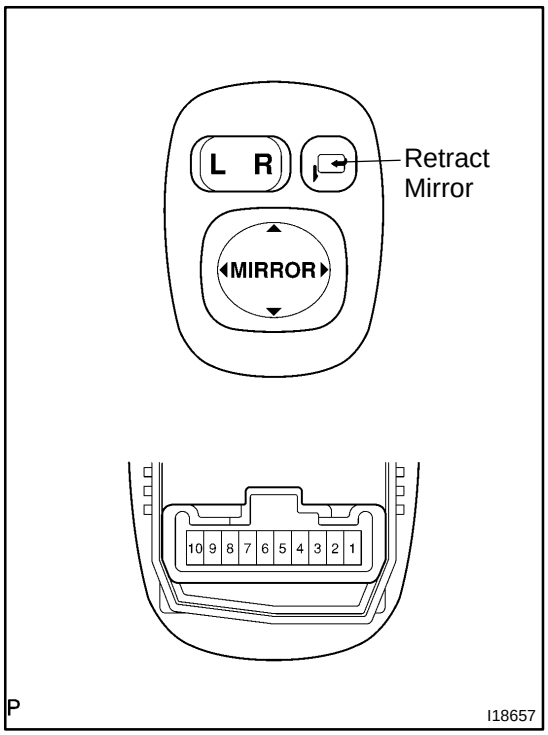
Switch position	Tester connection	Specified condition BE2MJ–01
OFF	–	No continuity
UP	4 – 8, 6 – 7	Continuity
DOWN	4 – 7, 6 – 8	Continuity
LEFT	5 – 8, 6 – 7	Continuity
RIGHT	5 – 7, 6 – 8	Continuity

(b) Right Side:

INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	–	No continuity
UP	3 – 8, 6 – 7	Continuity
DOWN	3 – 7, 6 – 8	Continuity
LEFT	2 – 8, 6 – 8	Continuity
RIGHT	2 – 7, 6 – 8	Continuity

If continuity is not as specified, replace the switch.



2. w/ Retract Mirror only:

(a) Left Side:

INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	–	No continuity
UP	4 – 8, 6 – 7	Continuity
DOWN	4 – 7, 6 – 8	Continuity
LEFT	5 – 8, 6 – 7	Continuity
RIGHT	5 – 7, 6 – 8	Continuity

(b) Right side:

INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	–	No continuity
UP	3 – 8, 6 – 7	Continuity
DOWN	3 – 7, 6 – 8	Continuity
LEFT	5 – 8, 6 – 7	Continuity
RIGHT	5 – 7, 6 – 8	Continuity

If continuity is not as specified, replace the switch.

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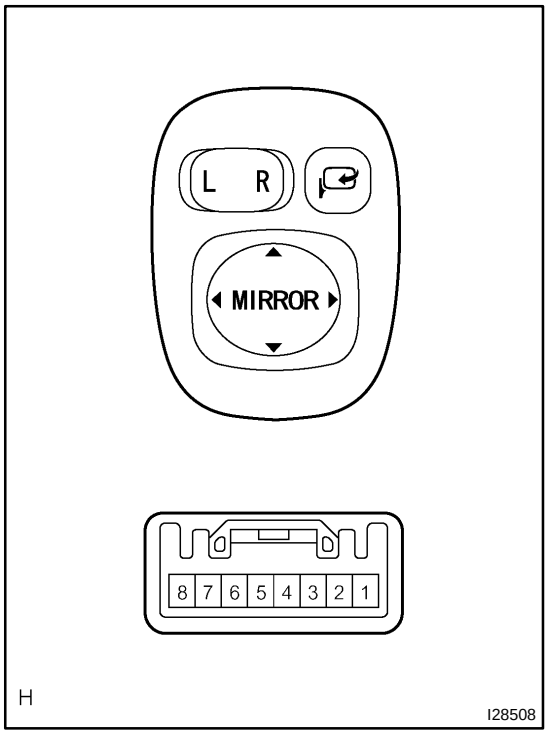
(c) INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
DRIVE	7 – 9, 8 – 10	Continuity
RETRACT	7 – 10, 8 – 9	Continuity

If continuity is not as specified, replace the switch.



3. w/o Retract Mirror and Driving Position Memory:

(a) Left Side:
INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	1 – 2	10 kΩ or higher
UP	2 – 3	100 Ω
DOWN	2 – 3	470 Ω
LEFT	2 – 3	800 Ω
RIGHT	2 – 3	250 Ω

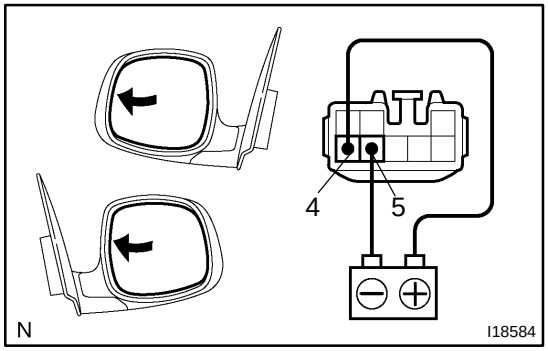
(b) Right Side:
INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	1 – 2	10 kΩ or higher
UP	2 – 3	100 Ω
DOWN	2 – 3	470 Ω
LEFT	2 – 3	800 Ω
RIGHT	2 – 3	250 Ω

If continuity is not as specified, replace the switch.

(c) INSPECT MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
DRIVE	4 – 7, 6 – 8	Continuity
RETRACT	4 – 8, 6 – 7	Continuity



4. w/ Retract Mirror only:
INSPECT MIRROR MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 4 and the negative (–) lead to terminal 5. Check that the mirror turns leftward.

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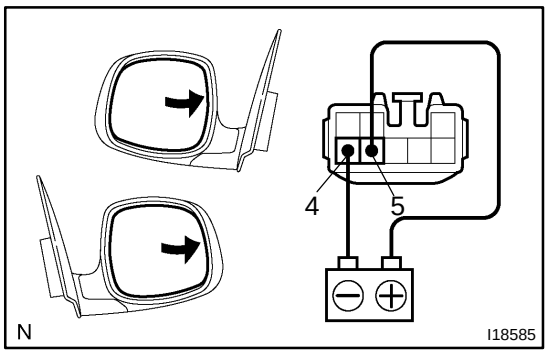
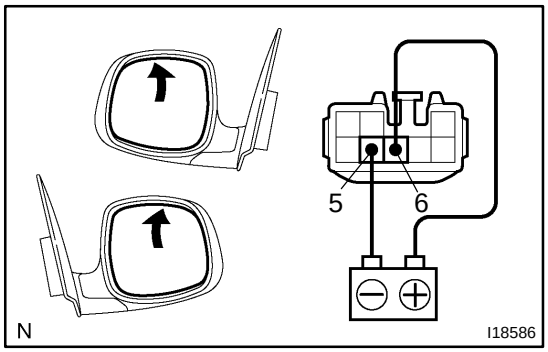
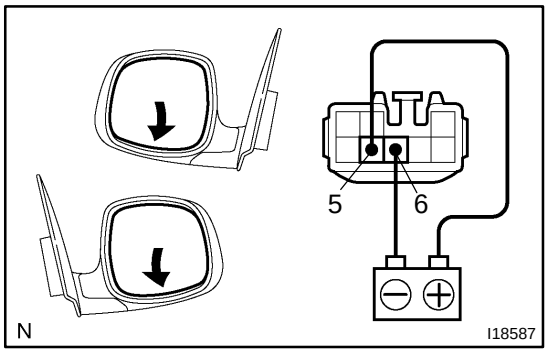


(b) Reverse the polarity and check that the mirror turns rightward.

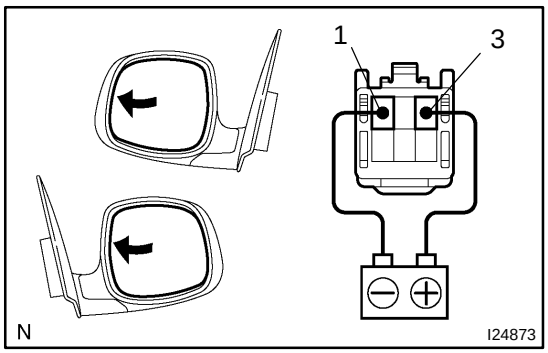


(c) Connect the positive (+) lead from the battery to terminal 6 and the negative (–) lead to terminal 5. Check that the mirror turns upward.



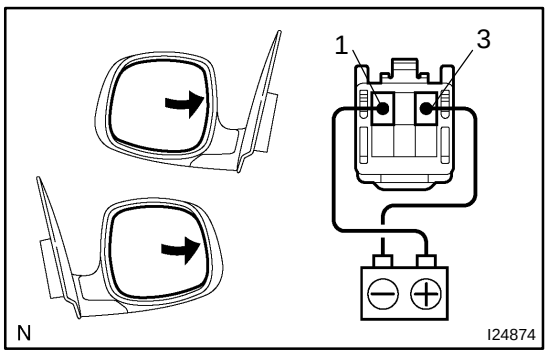
(d) Reverse the polarity and check that the mirror turns downward.

If operation is not as specified, replace the mirror assembly.



5. w/o Retract Mirror and Driving Position Memory: INSPECT MIRROR MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 1. Check that the mirror turns leftward.



(b) Reverse the polarity and check that the mirror turns rightward.

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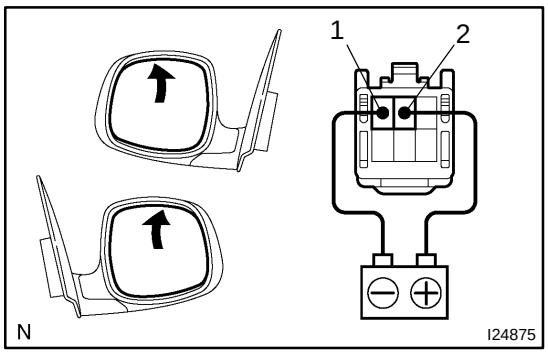
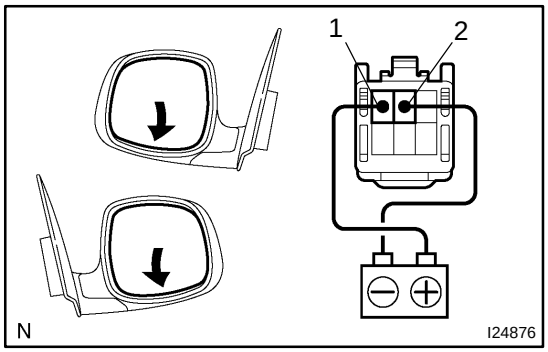
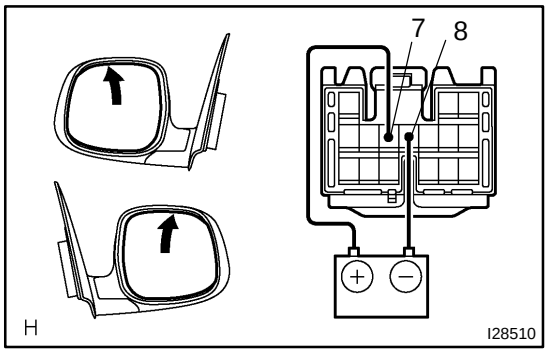


(c) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1. Check that the mirror turns upward.



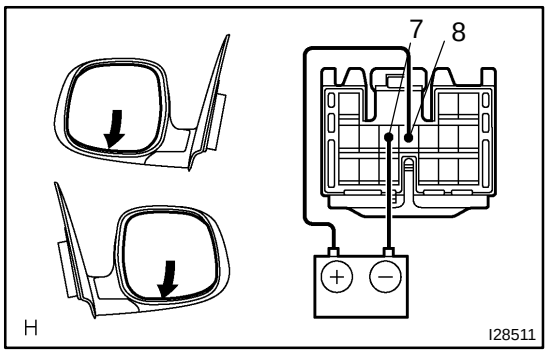
(d) Reverse the polarity and check that the mirror turns downward.

If operation is not as specified, replace the mirror assembly.

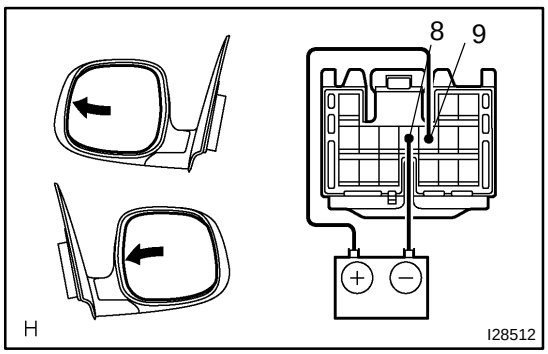


6. w/ Retract Mirror and Driving Position Memory: INSPECT MIRROR MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 7 and the negative (–) lead to terminal 8. Check that the mirror turns upward.



(b) Reverse the polarity and check that the mirror turns downward.



(c) Connect the positive (+) lead from the battery to terminal 8 and the negative (–) lead to terminal 9. Check that the mirror turns leftward.

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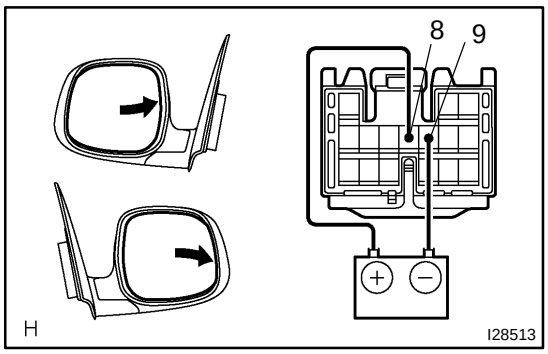
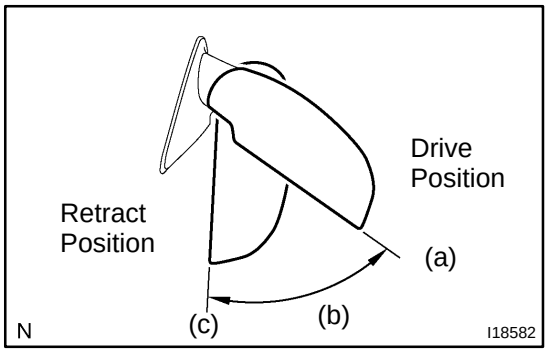


(d) Reverse the polarity and check that the mirror turns rightward.



7. w/o Driving Position Memory:
INSPECT ELECTRICAL RETRACT MOTOR OPERATION

(a) Driving position:
(1) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2. Check that the mirror moves to the retract position.
(2) Reverse the polarity and check that the mirror does not operate.

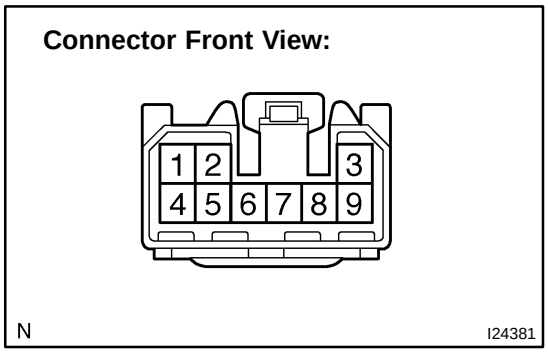
If operation is not as specified, replace the mirror assembly.

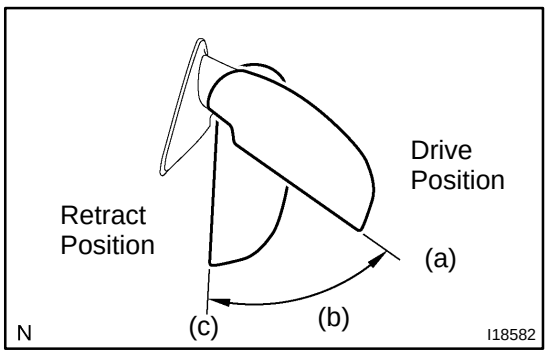
(b) Between driving position and retract position:
(1) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2. Check that the mirror moves to the retract position.
(2) Reverse the polarity and check that the mirror moves to the return position (Stops at the driving position).

If operation is not as specified, replace the mirror assembly.

(c) Retract position:
(1) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2. Check that the mirror does not operate.
(2) Reverse the polarity and check that the mirror moves to the return position (Stops at the driving position).

If operation is not as specified, replace the mirror assembly.





8. w/ Driving Position Memory:
INSPECT ELECTRICAL RETRACT MOTOR OPERATION

(a) Driving position:
(1) Connect the positive (+) lead from the battery to terminal 13 and the negative (–) lead to terminal 14. Check that the mirror moves to the retract position.
(2) Reverse the polarity and check that the mirror does not operate.

If operation is not as specified, replace the mirror assembly.

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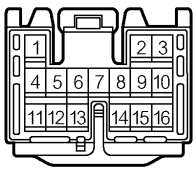
Connector Front View:



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(b) Between driving position and retract position:
  (1) Connect the positive (+) lead from the battery to terminal 13 and the negative (–) lead to terminal 14. Check that the mirror moves to the retract position.
  (2) Reverse the polarity and check that the mirror moves to the return position (Stops at the driving position).

If operation is not as specified, replace the mirror assembly.

(c) Retract position:
  (1) Connect the positive (+) lead from the battery to terminal 13 and the negative (–) lead to terminal 14. Check that the mirror does not operate.
  (2) Reverse the polarity and check that the mirror moves to the return position (Stops at the driving position).

If operation is not as specified, replace the mirror assembly.

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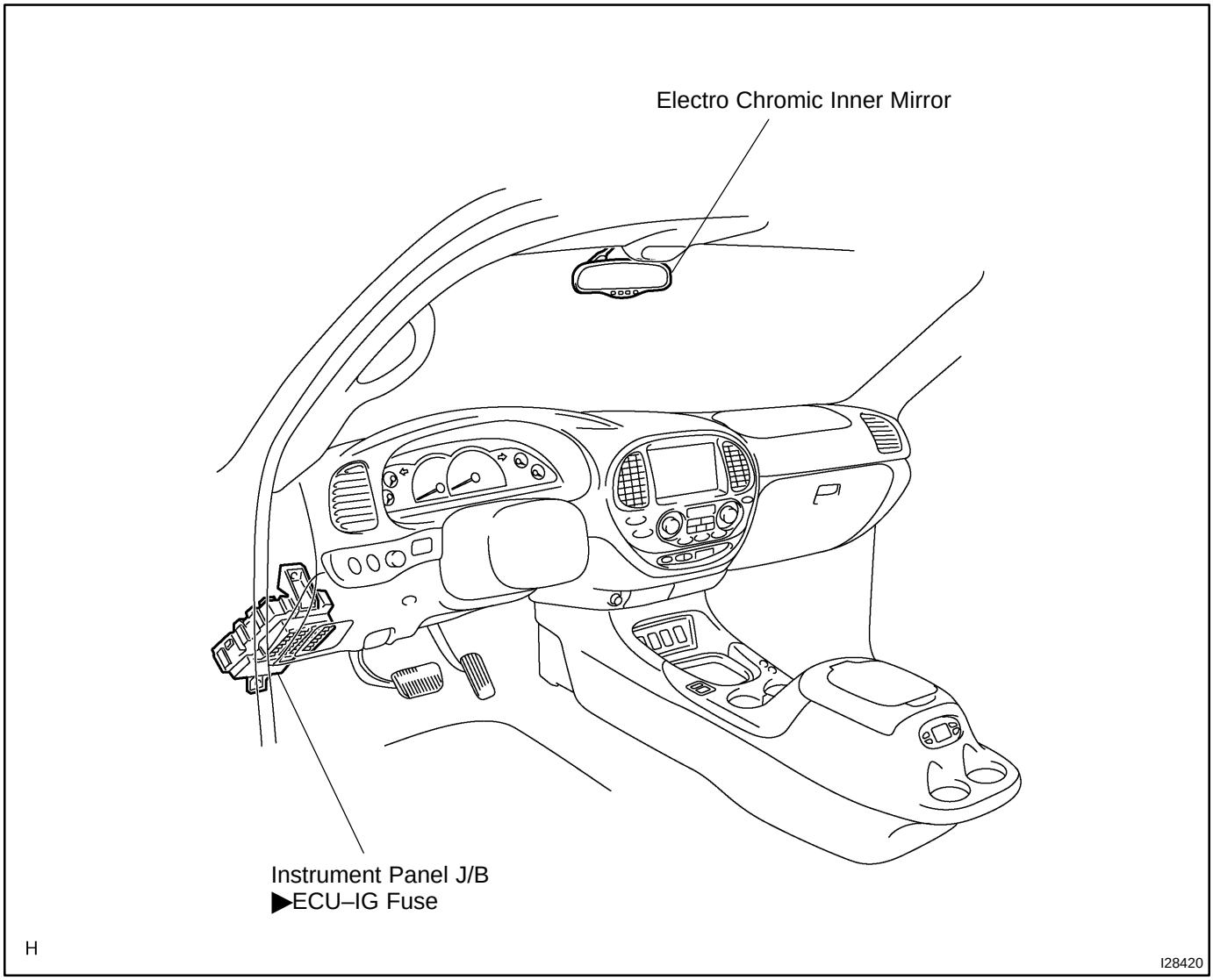
ELECTRO CHROMIC MIRROR SYSTEM

LOCATION

BE2D8–03



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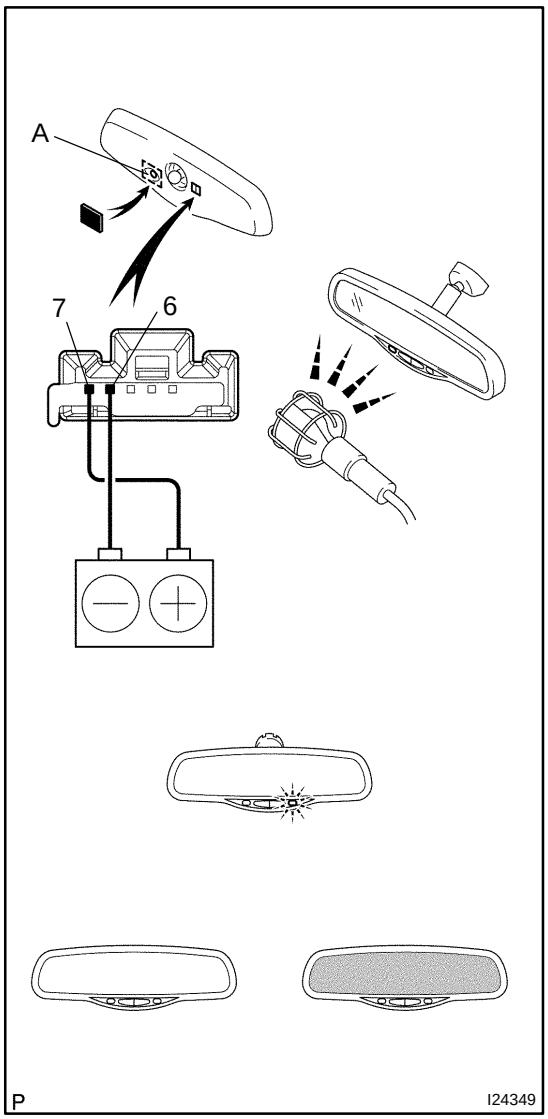
BE2D9–02



INSPECTION

INSPECT ELECTRO CHROMIC INNER MIRROR OPERATION

(a) Cover the sensor A so that the sensor does not receive any light.

(b) Connect the positive (+) lead the battery to terminal 7 and the negative (–) lead to terminal 6.

(c) Shine an electric light on the mirror, and check that there is battery positive voltage and mirror surface becomes bright to dark.

If operation is not as specified, replace the inner mirror.

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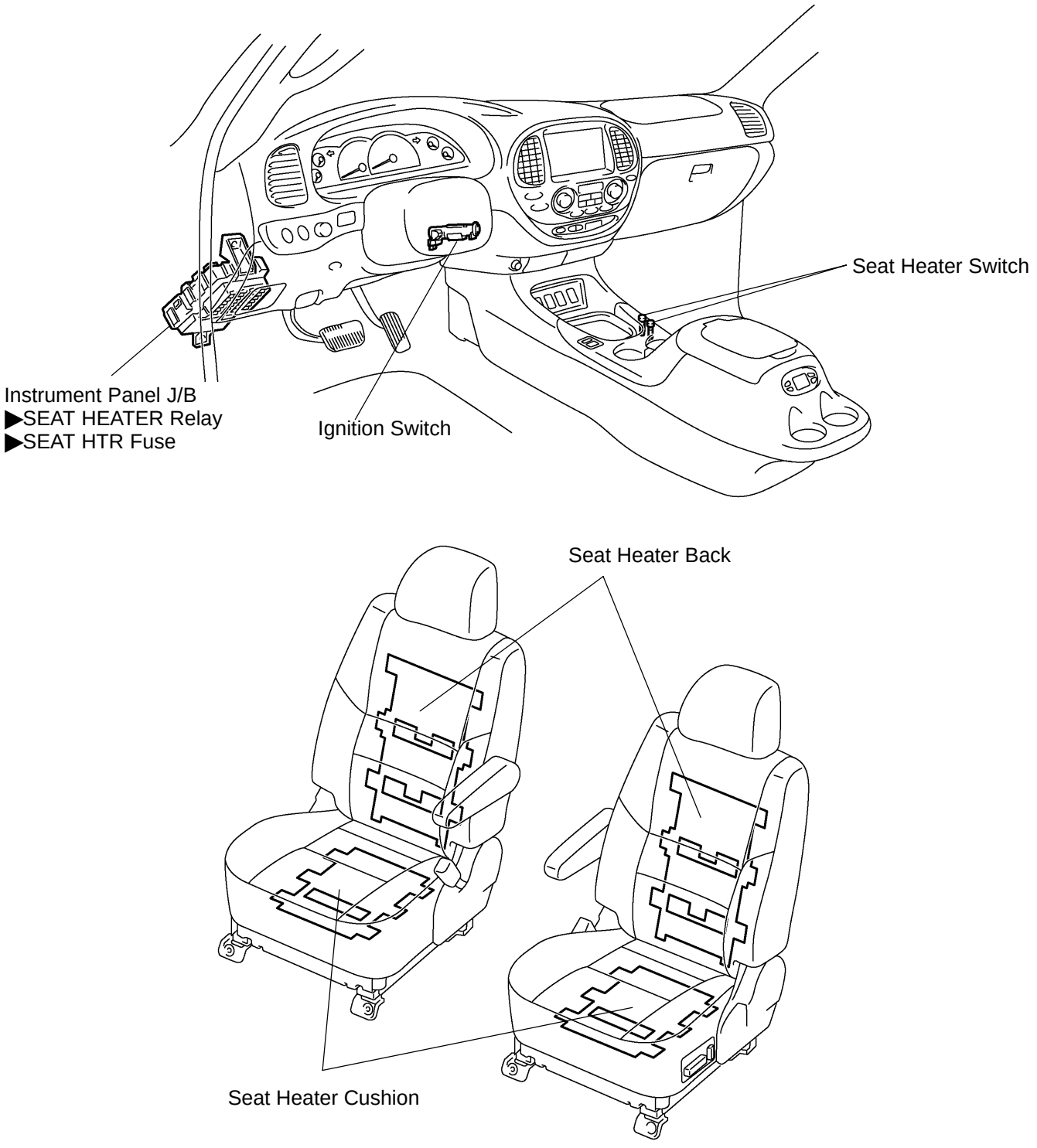
SEAT HEATER SYSTEM

LOCATION

BE0GH–22



Dardoor.com

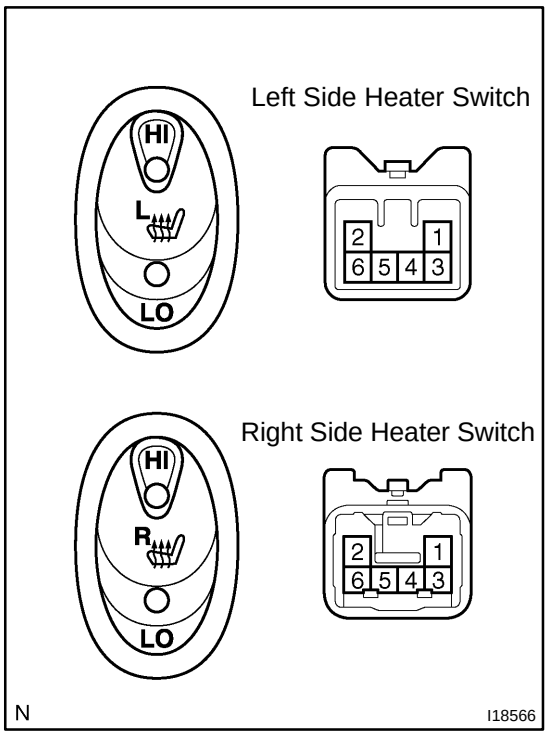
BE2D7–03

INSPECTION

1. INSPECT SEAT HEATER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Right side	3 – 4 – 6	Continuity
OFF	–	No continuity
Left side	3 – 4 – 6	Continuity
Illumination circuit	1 – 2	Continuity

If continuity is not as specified, replace the switch.

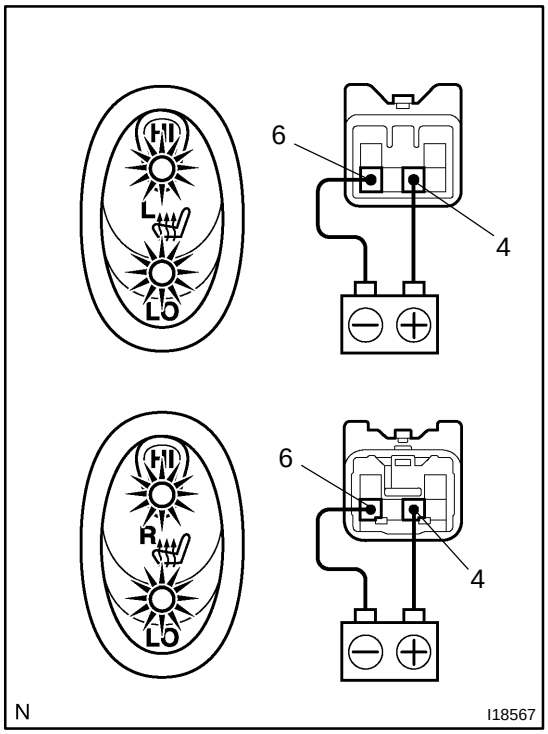


2. INSPECT SEAT HEATER INDICATOR LIGHT OPERATION

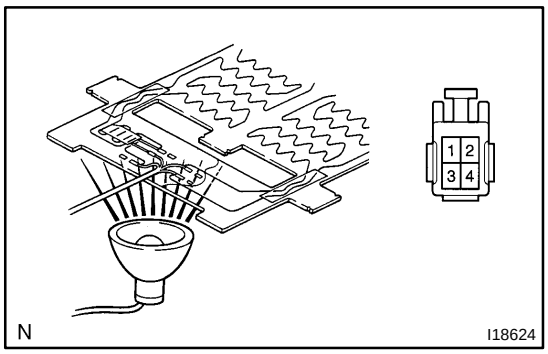
(a) Connect the positive (+) lead from the battery to terminal 4 and the negative (–) lead to terminal 6.

(b) Push the seat heater switch (right or left side) and check that the indicator light comes on.

If operation is not as specified, replace the switch.



Dardoor.com



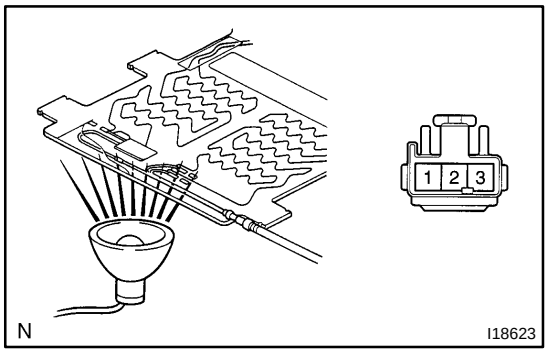
3. INSPECT SEAT HEATER CUSHION CONTINUITY

(a) Heat the thermostat with a light.

(b) Inspect the seat heater cushion continuity between terminals, as shown.

Tester connection	Condition	Specified condition
2 – 4	Always	Continuity
1 – 3	Seat heater temperature below 30˚C (86˚F)	Continuity
1 – 3	Seat heater temperature above 40˚C (104˚F)	No continuity

If continuity is not as specified, replace the seat cushion pad.



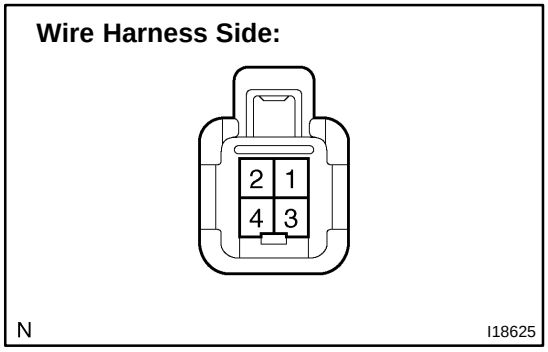
4. INSPECT SEAT BACK CONTINUITY

(a) Heat the thermostat with a light.

(b) Inspect the seat heater cushion continuity between terminals, as shown.

Tester connection	Condition	Specified condition
2 – 3	Always	Continuity
1 – 2, 1 – 3	Seat heater temperature below 30˚C (86˚F)	Continuity
1 – 2, 1 – 3	Seat heater temperature above 50˚C (122˚F)	No continuity

If continuity is not as specified, replace the seat back pad.



5. INSPECT SEAT HEATER CUSHION CIRCUIT

Inspect the seat heater inner cushion and front cushion continuity between terminals, as shown.

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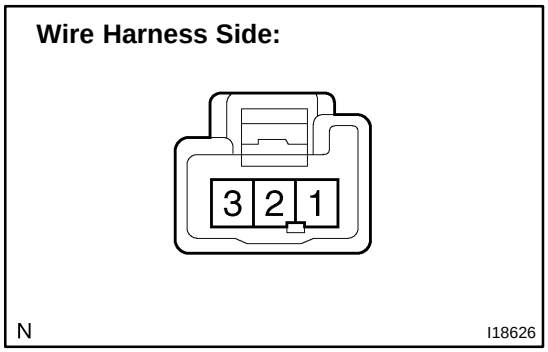
Tester connection	Condition	Specified condition
1 – Body ground	Seat heater switch ON	Battery positive voltage

If continuity is not as specified, replace the seat back pad.

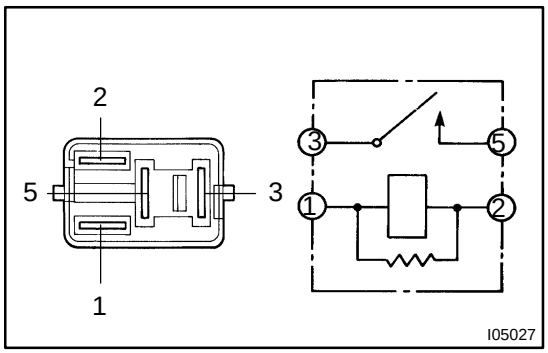


6. INSPECT SEAT BACK CONTINUITY

Inspect the seat back continuity between terminals, as shown.

Tester connection	Condition	Specified condition
1 – Body ground	Always	Continuity

If continuity is not as specified, replace the seat back pad.



7. INSPECT SEAT HEATER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 – 2	Continuity
Always	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.

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CLOCK

TROUBLESHOOTING

BE2MI–01

HINT:

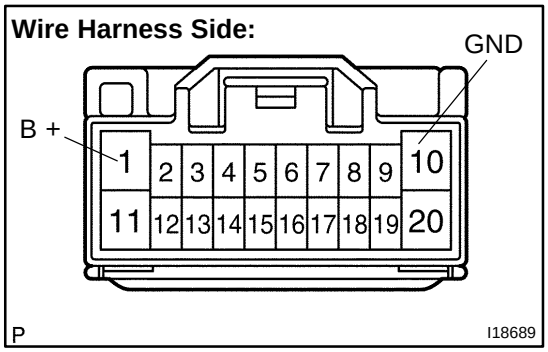
Troubleshoot the clock according to the table below.

Problem	No.
Clock will not operate	1
Clock loses or gains time	2

Allowable error (per day): ± 1.5 seconds

1. PROBLEM NO. 1

1	**CLOCK WILL NOT OPERATE**



(a) Check that the battery positive voltage is 10 to 16 V.

If voltage is not as specified, replace the battery.

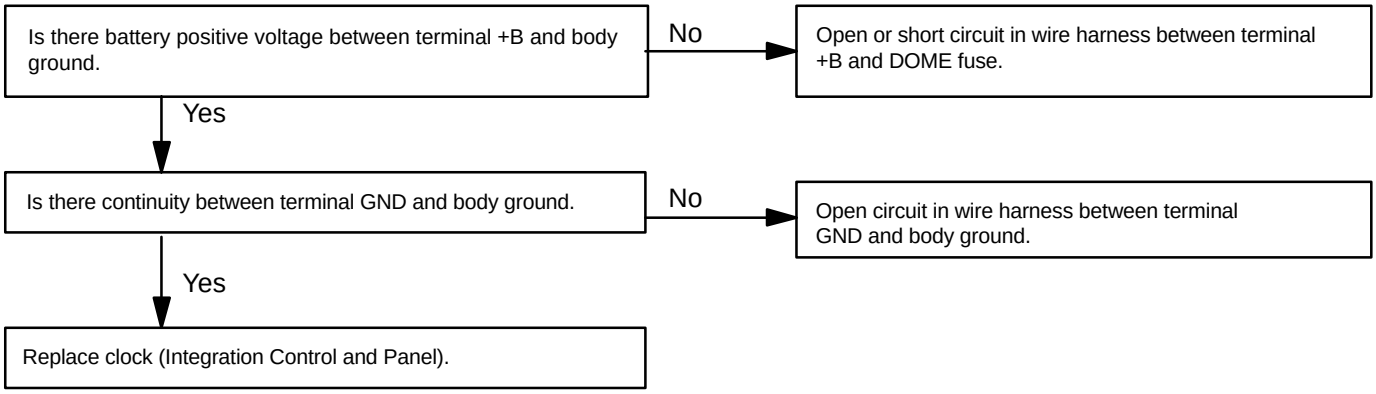
(b) Check that the DOME fuse is not blown.

If the fuse is blown, replace the fuse and check for a short.

(c) Troubleshoot the clock as follows.

HINT:

Inspect the connector on the wire harness side.



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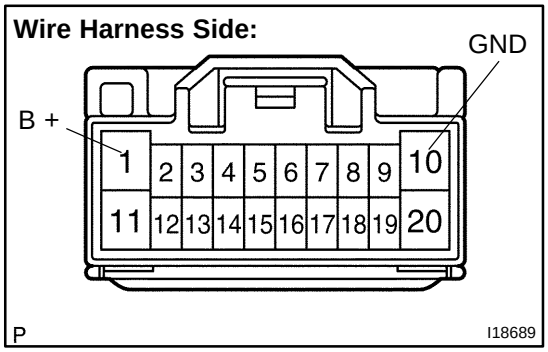
2. PROBLEM NO. 2

2	CLOCK LOSES OR GAINS TIME



(a) Check that the battery positive voltage is 10 to 16 V.

If voltage is not as specified, replace the battery.

(b) Inspect the error of the clock.

Allowable error (per day): ± 1.5 seconds

If the error exceeds the allowable value, replace the clock.

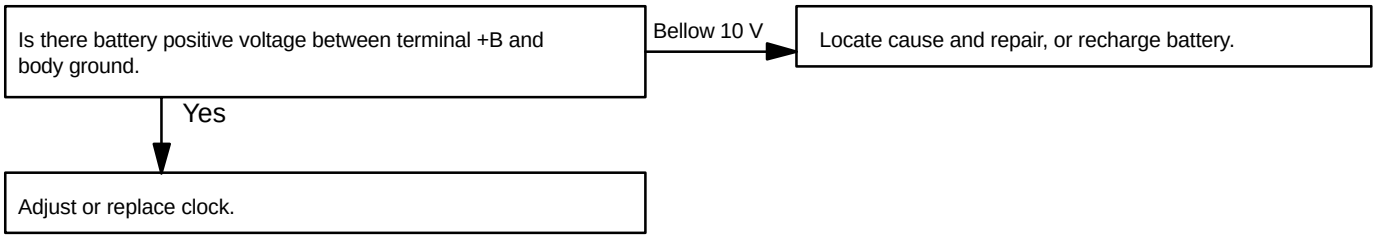
(c) Check that the clock adjusting button is struck and has failed to return.

If the error exceeds the allowable value, replace the clock.

(d) Troubleshoot the clock according to the following flow–chart.

HINT:

Inspect the connector on the wire harness side.



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GARAGE DOOR OPENER SYSTEM

BE0G2–08

REGISTRATION PROCEDURE

1. NEW CODE REGISTRATION

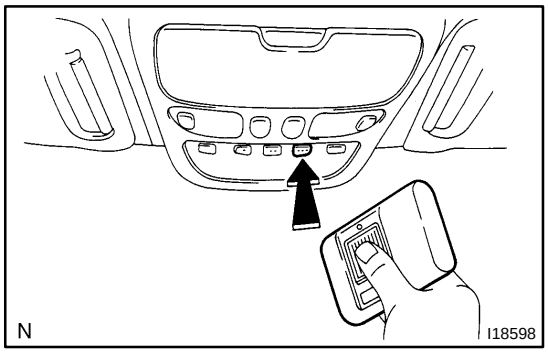
NOTICE:

- **If pressing the switch of the original transmitter to register the code, the system might operate.**
- **When registering the transmitter codes such as for garage or gate, check that there is nobody around those places.**

(a) Press the switch of the item to be registered for 20 seconds.

HINT:

When transferring to registration mode, garage door indicator (green) blinks in 1 Hz cycle.



(b) Bring the original transmitter to within 1–inch area around the garage door opener and press the switch (code transmitting).

HINT:

When code registration is complete correctly, the garage door indicator (green) blinks in 5.6 Hz cycle.

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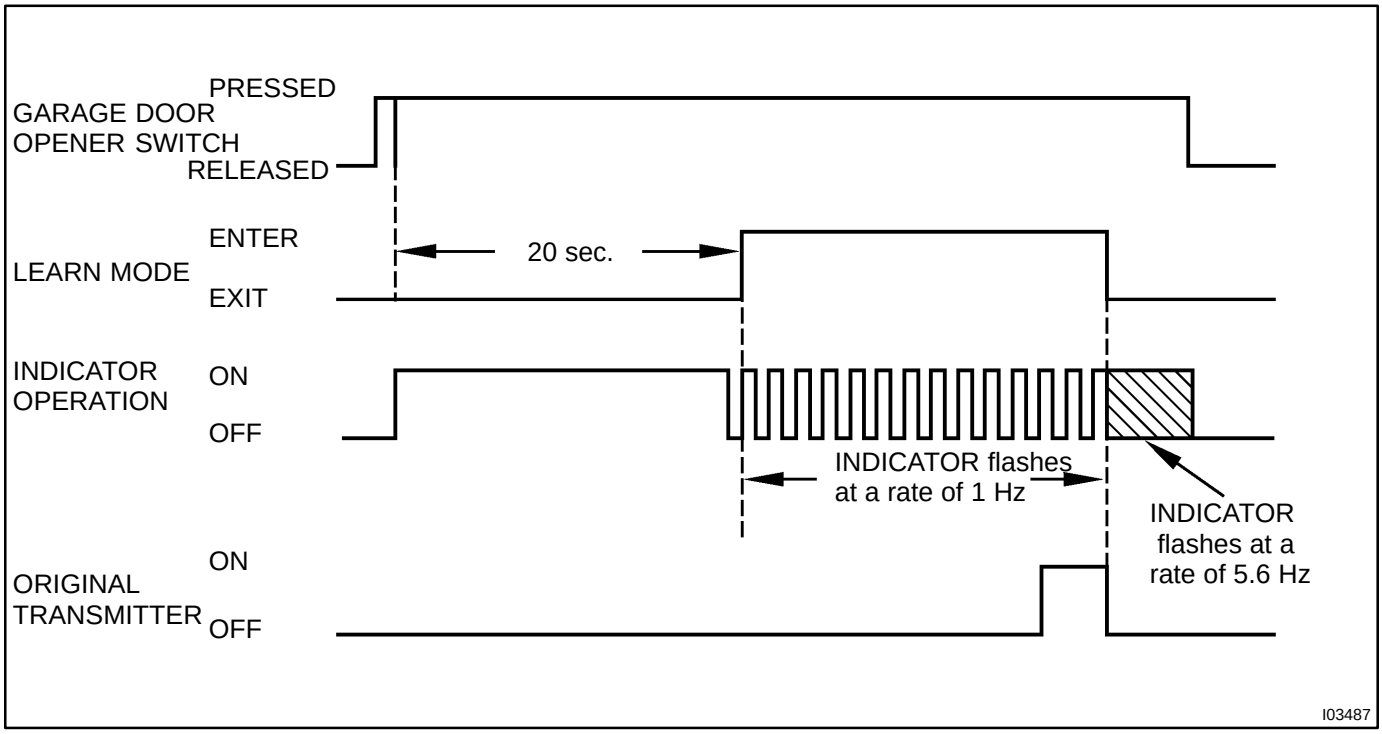
New code registration timing chart



If a code can not be registered, observe the following conditions.

HINT:

- If the battery of original transmitter is consumed.
- Press the switch of the transmitter repeatedly in registration mode, as some transmitters stop transmitting for 1 to 2 seconds.
- This system is not applicable to the garage door opener which had been made before 1982.

2. CODE DELETION

(a) Press the switches at both ends of the garage door opener simultaneously for 20 seconds.

HINT:

When transferring to deletion mode, garage door indicator (green) blinks in 6 Hz cycle.

(b) When releasing the switch within 10 seconds after transferring to deletion mode, all the registered codes will be erased.

HINT:

Press the switch until 6 Hz cycle blinking stops, so that the default code for check is set.

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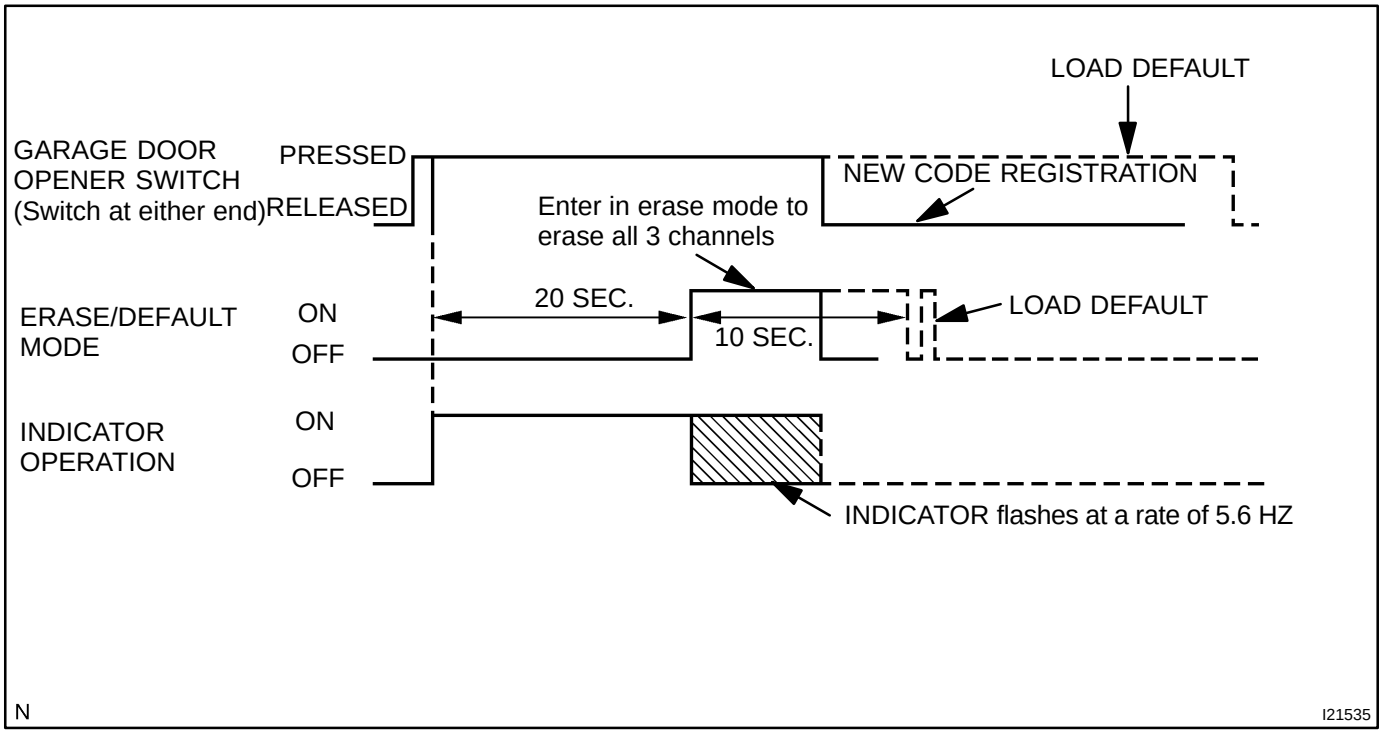
Code deletion timing chart



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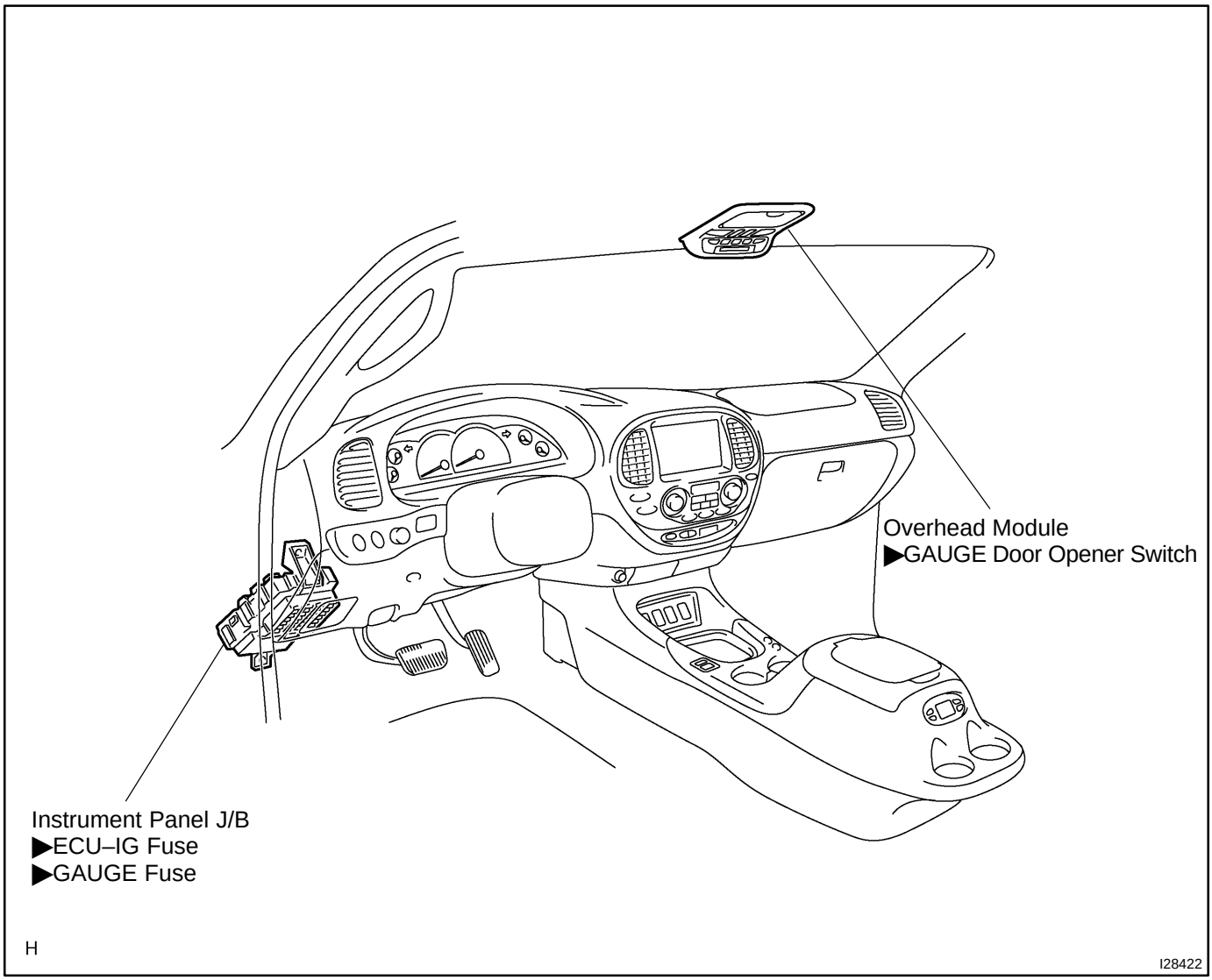
BE0G3–10

LOCATION



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BE0G4–01

REMOVAL

1. REMOVE FRONT PERSONAL LIGHT LENS

2. REMOVE FRONT PERSONAL LIGHT

(a) Remove the 3 screws.

(b) Disconnect the 2 connectors.

3. REMOVE GARAGE DOOR OPENER SWITCH

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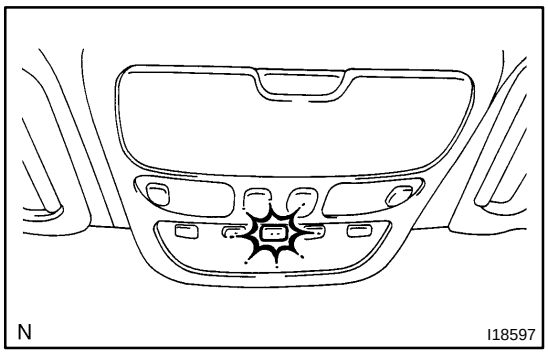
BE26F–03

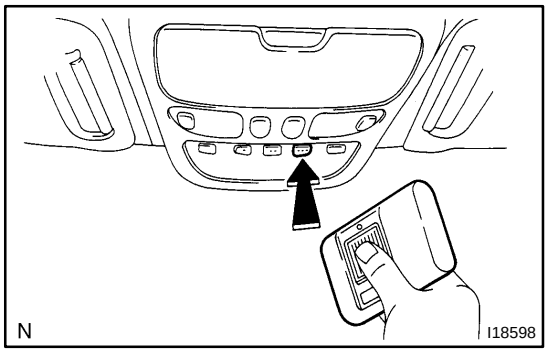
INSPECTION



1. INSPECT GARAGE DOOR OPENER SWITCH

(a) Press the switch and check that each garage door indicator (green) comes on.

(b) Even if only one switch does not come on, replace it.



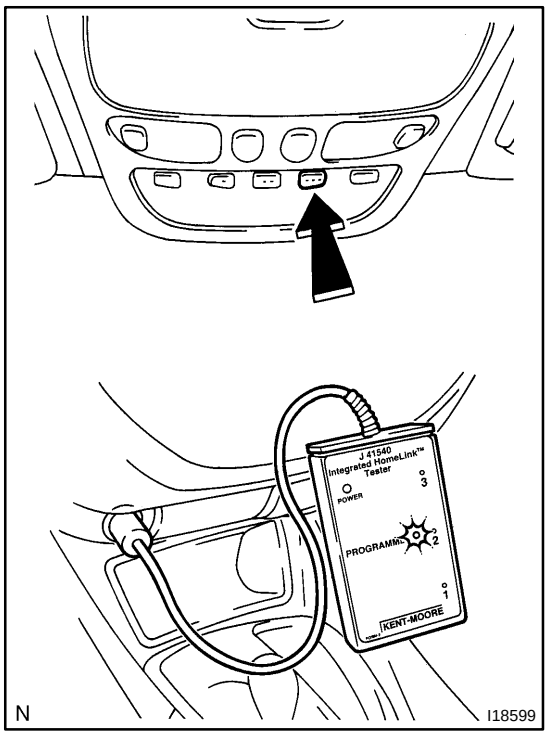
2. INSPECT GARAGE DOOR OPENER REGISTRATION AND TRANSMITTING

HINT:

Use the home link tester made by KENT MORE for this test. As it is necessary to record the code of the hand held transmitter, customer's code will be erased. When the inspection is complete, please register the customer's again.

(a) Check that the inspection code of the hand held transmitter can be recorded (See page BE–129).

If the code can not be registered, replace the garage door opener.



(b) Press the switch which an inspection code has been registered for and check that garage door indicator (green) of the home link tester comes on.

If the garage door indicator (green) does not come on, replace the garage door opener.

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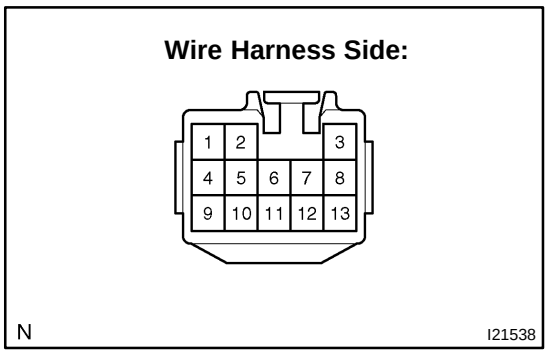


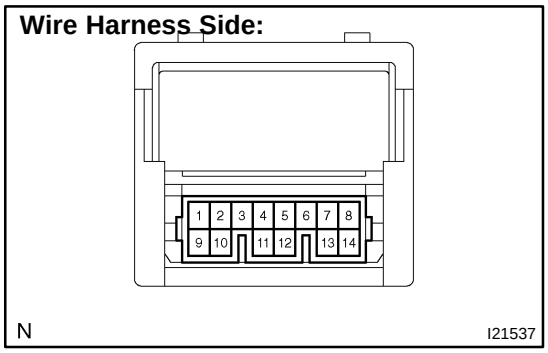
3. w/ Sliding Roof:

INSPECT GARAGE DOOR OPENER SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
1 – Ground	Always	Continuity
3 – Ground	Always	Battery positive voltage

If the circuit is not as specified, inspect the power source or wire harness.



4. w/o Sliding Roof:

INSPECT GARAGE DOOR OPENER SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
9 – Ground	Always	Battery positive voltage
13 – Ground	Always	Continuity

If the circuit is not as specified, inspect the power source or wire harness.

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BE0G6–01

INSTALLATION

1. INSTALL GARAGE DOOR OPENER

2. INSTALL FRONT PERSONAL LIGHT

(a) Connect the 2 connectors.

(b) Install the 3 screws.

3. INSTALL FRONT PERSONAL LIGHT LENS

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ENGINE IMMOBILISER SYSTEM

REGISTRATION PROCEDURE

HINT:

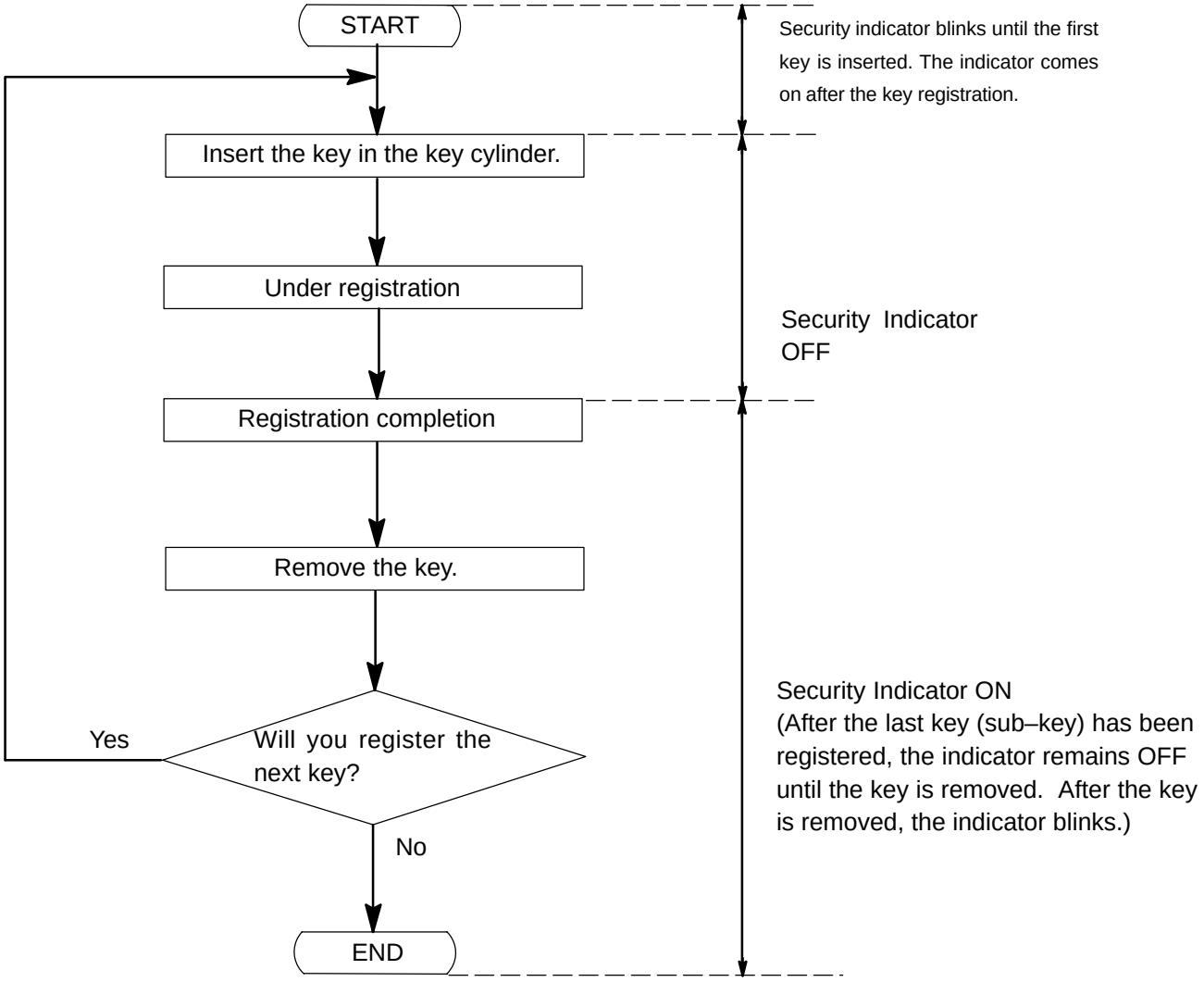
If you lose all the registered master keys, you cannot registrar or delete additionally. Change the transponder key ECU and then register the new key codes following the registration procedure of the automatic registration mode below.

1. KEY REGISTRATION IN AUTOMATIC REGISTRATION MODE

(a) Registration of a new transponder key.

HINT:

- ▶ This procedure must be done when you install a new transponder key ECU.
- ▶ The new transponder key ECU is in automatic key code registration mode. The key codes already fixed for this transponder key ECU can be registered.
  For this type of vehicle, up to 3 key codes can be registered.
- ▶ In the automatic registration mode, the last key registered becomes a sub–key.



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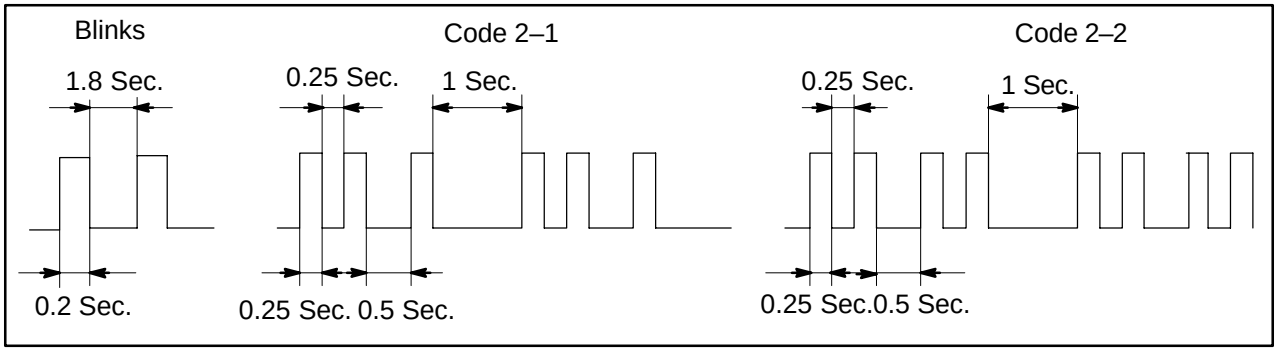
HINT:

- When a key cannot be inserted in the key cylinder in automatic registration mode, the security indicator always comes on.
- When the immobilizer system operates normally and the key is pull out, the security indicator blinks.
- When key code registration could not be performed in automatic registration mode, code 2–1 is output from the security indicator and when the registered key in inserted, code 2–2 is output.



(b) Automatic registration mode completion

If completing the mode forcibly when more than 1 key codes are registered in automatic registration mode, perform the following procedures.

After 1 more key codes are registered with the master key, turn the ignition switch LOCK → ON 5 times within 10 secs. by inserting the registered key or without pulling the key out.

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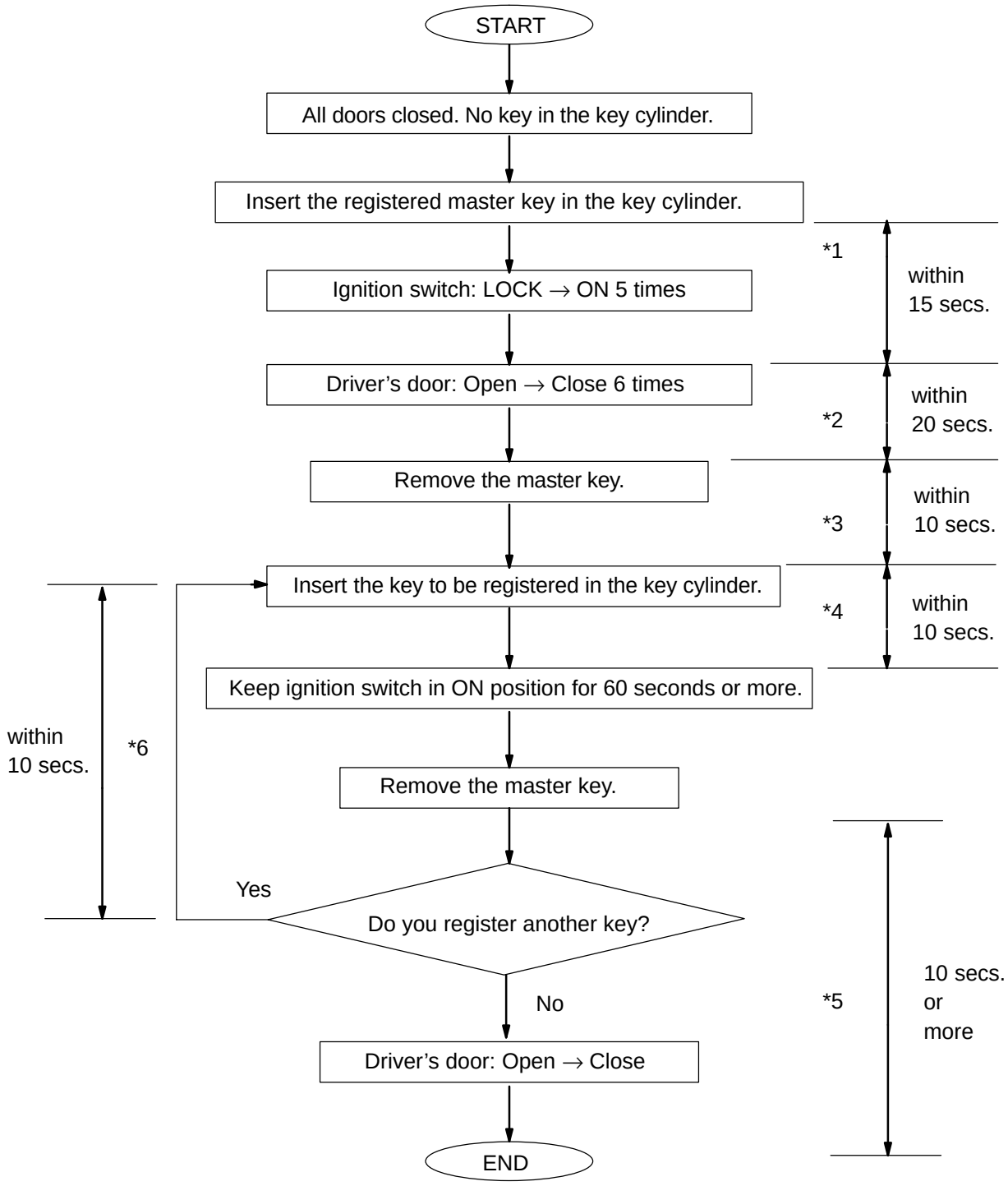
2. REGISTRATION OF ADDITIONAL MASTER KEY AND SUB KEY

Do this operation to register an additional master key and sub key.



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*1: Insert the master key into the key cylinder.
Turn the ignition switch to the LOCK → ON position 5 times within 15 seconds.
*2: Open and close the driver's door 6 times within 20 seconds after completion of the previous operation.
*3: Remove the master key from the ignition switch and insert another key to be registered in the key cylinder within 10 seconds after completion of the previous operation.
*4: Turn the ignition switch to the ON position and wait for 60 seconds or more, then key registration will be completed.
*5: 10 seconds or more elapse after removal of the key or open and close the driver's door, then key registration will be completed.
*6: When registering multiple keys, insert the key to be registered in the key cylinder.

HINT:

- It is possible to register up to 4 master key codes including the registered key code.
- It is possible to register up to 2 sub key codes including the registed key code.
- When any operation time described above is over, registration mode completes.
- When the next procedure is performed while the timer is working, the timer completes counting time, then the next timer starts.

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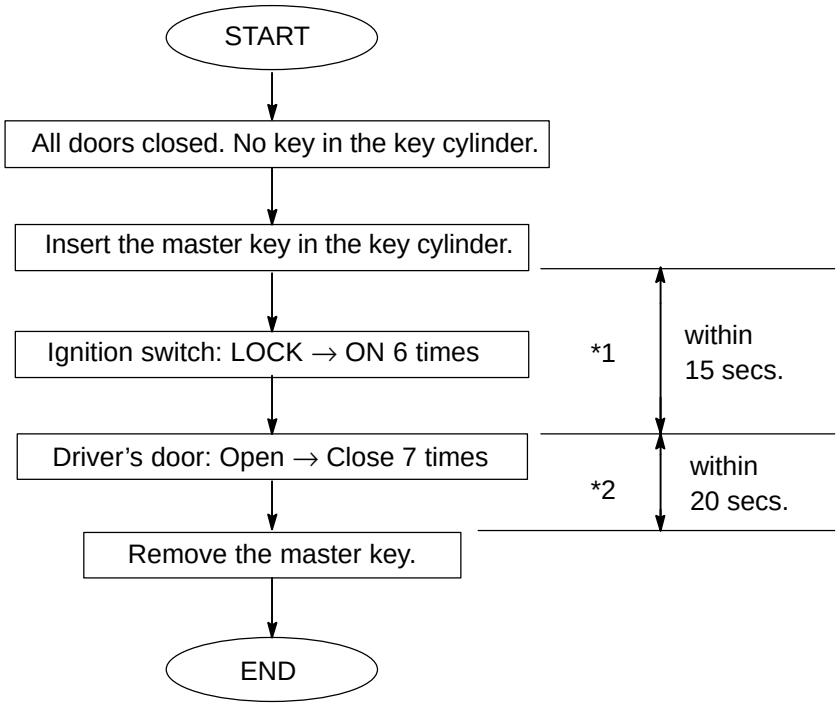
3. ERASURE OF TRANSPONDER KEY CODE

Do this operation to erase transponder key registration from the transponder key computer.
HINT:
Delete all other master and sub–key codes leaving the master key code to use the operation. When using the key which was used before deletion, it is necessary to register the code again.



*1: Insert the master cylinder into the key cylinder.
Turn the ignition switch to LOCK → ON 6 times within 15 seconds.
*2: Open and close driver's door 7 times and remove the master key within 20 seconds after completion of the previous operation.
HINT:

- When any operation time described above is over, registration mode completes.
- When the next procedure is performed while the timer is working, the timer completes counting time, then the next timer starts.

4. ECU COMMUNICATION ID REGISTRATION

NOTICE:

- **The ECU communication ID should be registered when the transponder key ECU and/or the ECM is replaced, in order to match these ECM COMMUNICATION ID.**
- **The engine cannot be started unless the ECM COMMUNICATION ID matches.**

(a) Register the ECU communication ID.
  (1) After the transponder key ECU and/or the ECM is replaced, turn the ignition switch ON (the engine is not running).
  (2) Short the Tc and CG terminals of the DLC3 and leave it as it is for 30 minutes.
  (3) Check that the engine starts.

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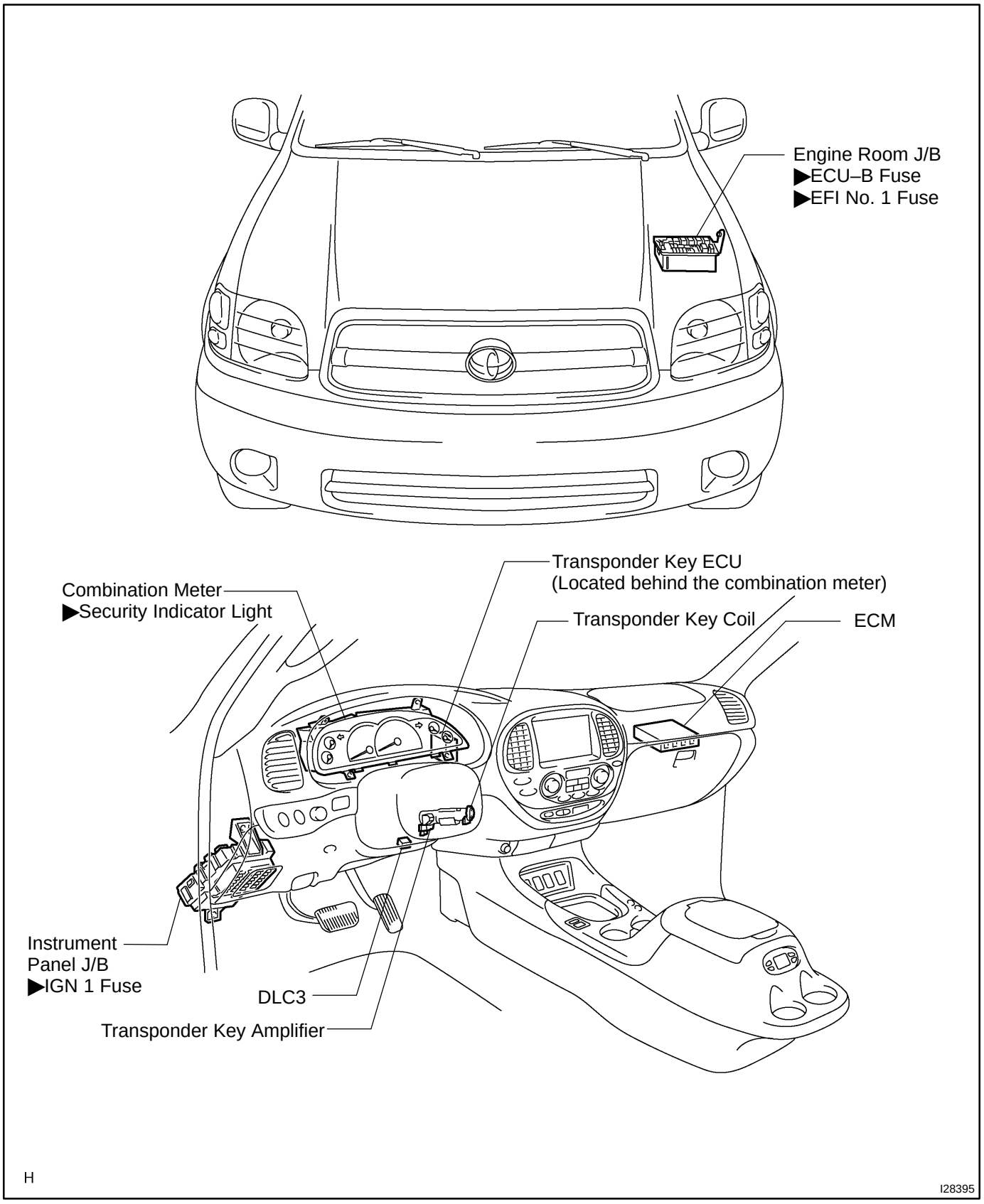
BE0D8–11

LOCATION



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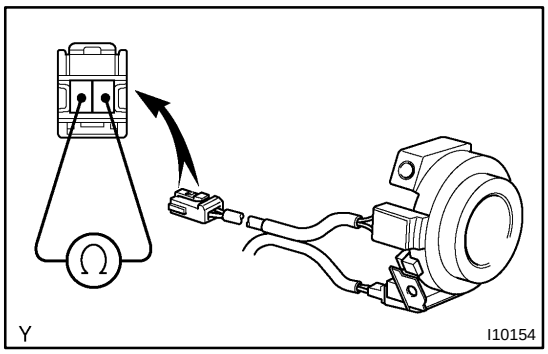
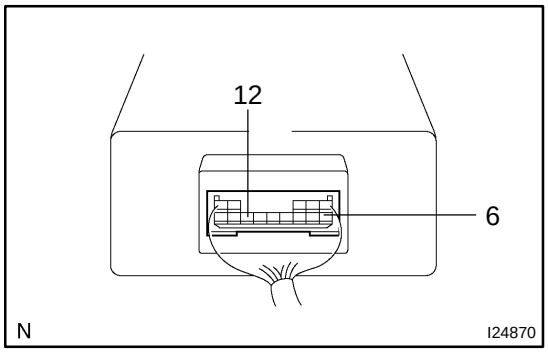
BE2D6–02

INSPECTION



1. INSPECTION TRANSPONDER KEY COIL CONTINUITY

Check that there is continuity between terminals 1 and 2.
If continuity is not as specified, replace the coil.



2. INSPECT TRANSPONDER KEY ECU CIRCUIT

Connect the wire harness side connector to the ECU and inspect the wire harness side connector from the back side, as shown in the table below.

Condition	Tester connection	Specified condition
Always	6 – 12	Battery positive voltage

If the circuit is as specified, replace the ECU with a new one.
If the circuit is not as specified, inspect the circuit connected to other parts.

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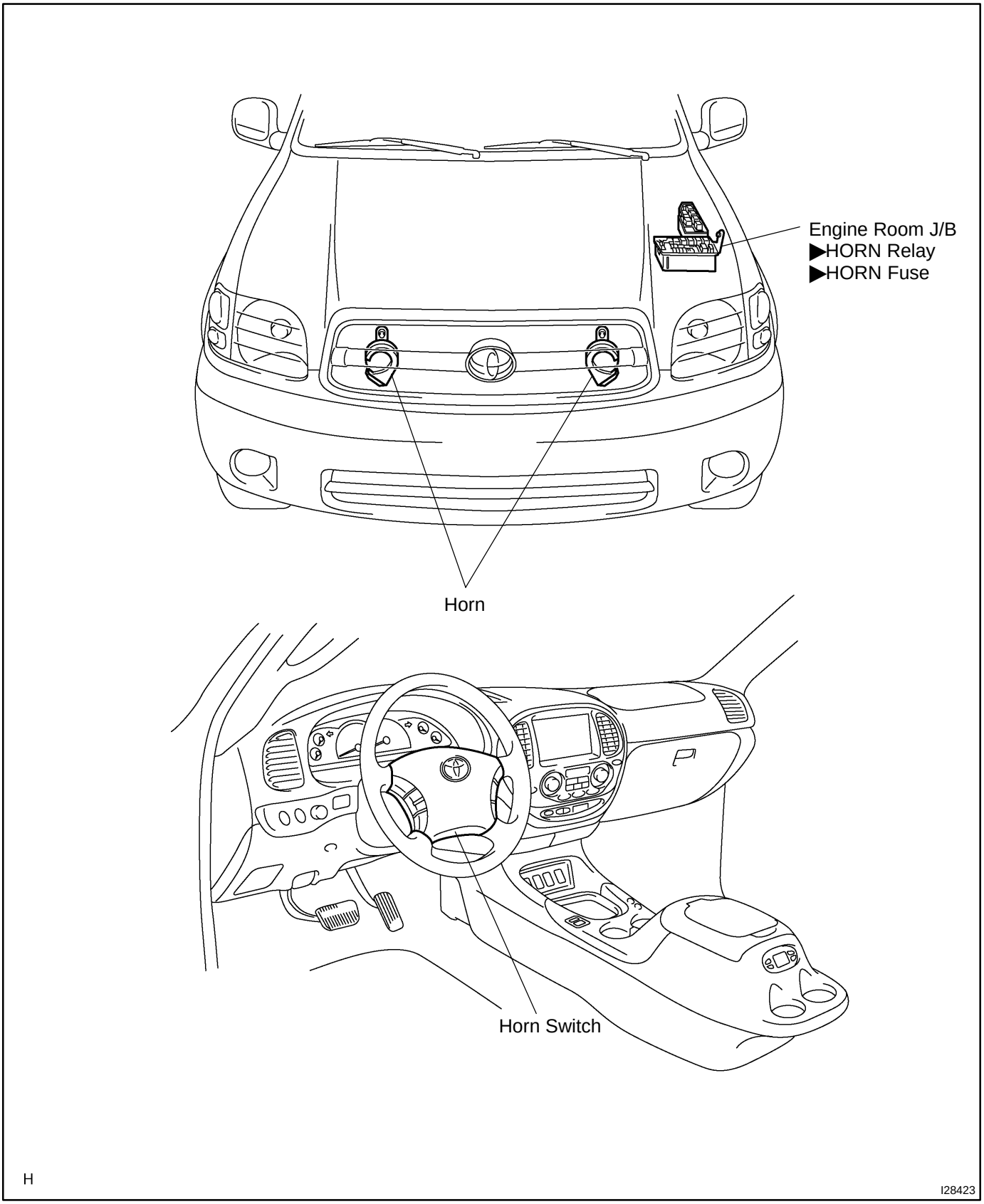
HORN SYSTEM

LOCATION

BE0FY–32



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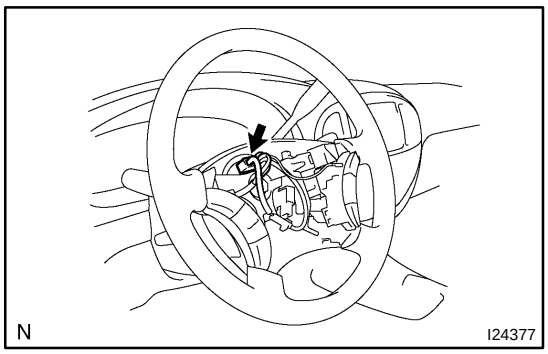
BE0FZ–25

INSPECTION

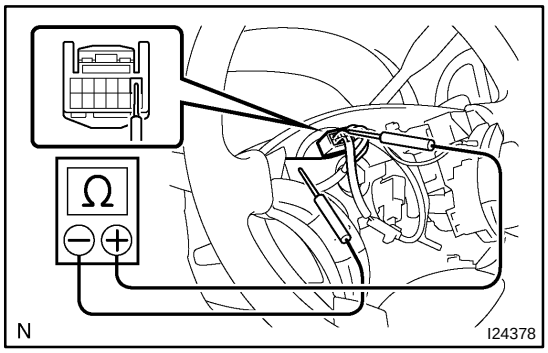


1. INSPECT HORN SWITCH

(a) Disconnect the negative (–) terminal from the battery.
(b) Remove the left and right covers from the steering wheel.
(c) Using a torx socket wrench, loosen the 2 bolts.
(d) Pull up the horn pad and place it on the steering column, as shown.

HINT:
Do not disconnect the connector from the horn pad.

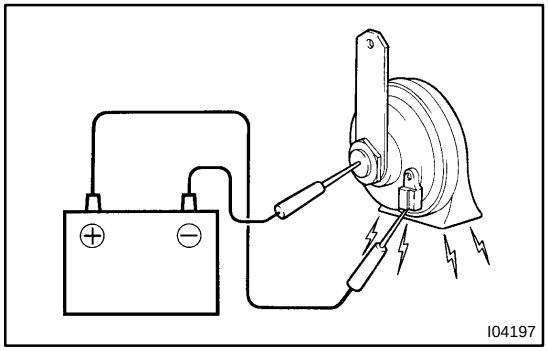
(e) Disconnect the connector from the slip ring.



(f) Check that no continuity exists between terminal 6 of the connector and body ground.
(g) Check that continuity exists between terminal 6 of the connector and body ground when the horn contact plate is pressed against the steering spoke assembly.

If continuity is not as specified, repair or replace the steering wheel or wire harness as necessary.

(h) Install the horn pad in place and using a torx socket wrench, torque the 2 bolts.
Torque: 7.1 N·m (72 kgf·cm, 62 in.·lbf)
(i) Install the left and right covers.
(j) Connect the negative (–) terminal to the battery.



2. INSPECT HORN OPERATION

Connect the positive (+) lead from the battery to the terminal and negative (–) lead to the horn body and check that the horn blows.

If operation is not as specified, replace the horn.

3. INSPECT HORN SWITCH CIRCUIT
(See page DI–1764)

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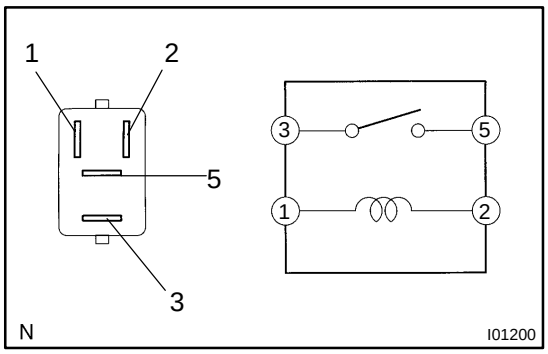

4. INSPECT HORN RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 – 2	Continuity
Always	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.

5. INSPECT HORN RELAY CIRCUIT

(See page DI–1764)

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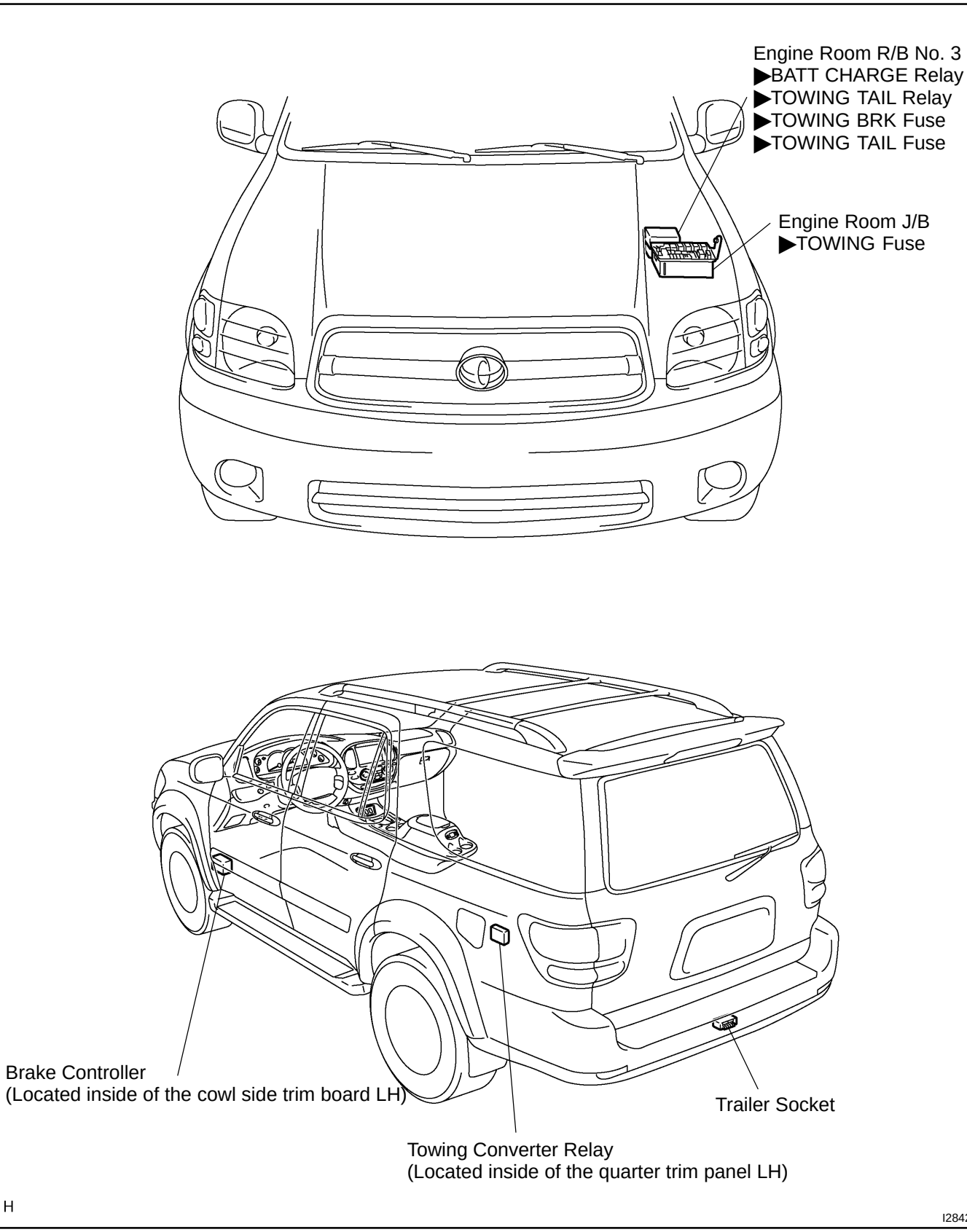
TRAILER TOWING

LOCATION

BE26G–04



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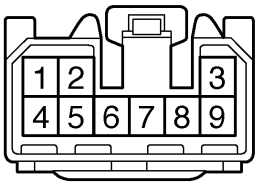
BE2D5–02

Wire Harness Side:



N I24381

INSPECTION

1. INSPECT TOWING CONVERTER CIRCUIT

Remove the towing converter with the connector still connected and inspect the wire harness side connector from the back side, as shown in the table below.

Tester connection	Condition	Specified condition
4 – 6	Turn signal switch LEFT or hazard warning switch ON	10 – 14 V ↔ 0 V
4 – 6	Turn signal switch LEFT and stop light switch ON (Brake pedal depressed)	10 – 14 V ↔ 0 V
4 – 6	Turn signal switch OFF, hazard warning switch OFF and stop light switch OFF (Brake pedal released)	0 V
4 – 6	Stop light switch ON (Brake pedal depressed)	10 – 14 V
6 – 9	Turn signal switch LEFT or hazard warning switch ON	10 – 14 V ↔ 0 V
6 – 9	Turn signal switch OFF or RIGHT and hazard warning switch OFF	0 V
6 – Body ground	Always	Continuity
2 – 6	Turn signal switch RIGHT or hazard warning switch ON	10 – 14 V ↔ 0 V
2 – 6	Turn signal switch RIGHT and stop light switch ON (Brake pedal depressed)	10 – 14 V ↔ 0 V
2 – 6	Turn signal switch OFF, and hazard warning switch OFF and stop light switch OFF (Brake pedal released)	0 V
2 – 6	Stop light switch ON (Brake pedal depressed)	10 – 14 V ↔ 0 V
1 – 6	Always	10 – 14 V
6 – 8	Stop light switch ON (Brake pedal depressed)	10 – 14 V
6 – 8	Stop light switch OFF (Brake pedal released)	0 V
3 – 6	Turn signal switch RIGHT or hazard warning switch ON	10 – 14 V ↔ 0 V
3 – 6	Turn signal switch OFF or LEFT and hazard warning switch OFF	0 V

If the circuit is not as specified, inspect the circuit connected to other parts.

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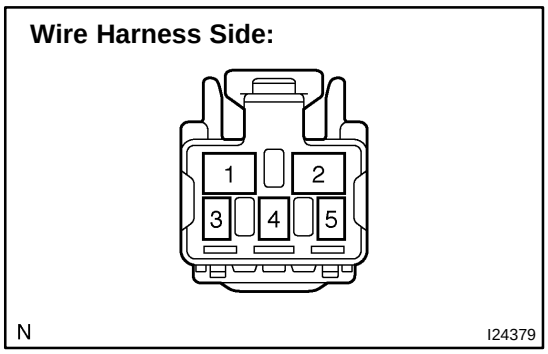
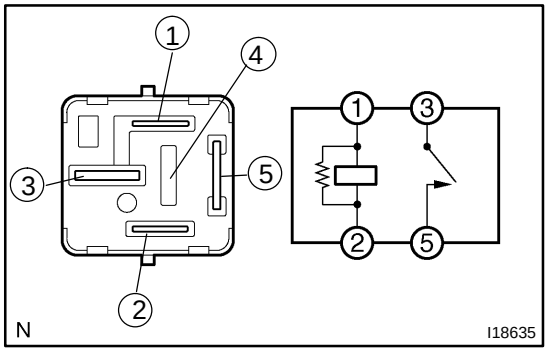


2. Trailer Socket 7 Pin Type:
INSPECT BRAKE CONTROLLER CIRCUIT

Remove the brake controller with the connector still connected and inspect the wire harness side connector from the back side, as shown in the table below.

Tester connection	Condition	Specified condition
1 – 3	Stop light switch ON (Brake pedal depressed)	10 – 14 V
1 – 3	Stop light switch OFF (Brake pedal released)	0 V
2 – 3	Always	10 – 14 V
3 – 4	Stop light switch ON (Brake pedal depressed)	10 – 14 V
3 – 4	Stop light switch OFF (Brake pedal released)	0 V
3 – 5	Light control switch TAIL or HEAD	10 – 14 V
3 – 5	Light control switch OFF	0 V

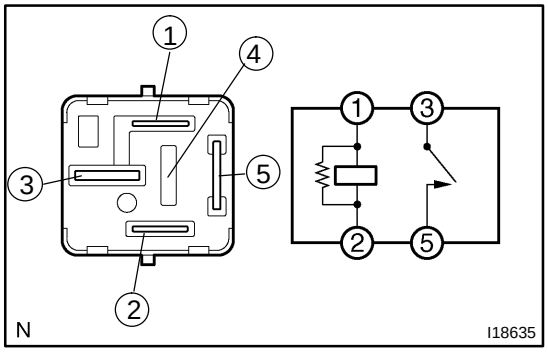
If the circuit is not as specified, inspect the circuit connected to other parts.



3. INSPECT TOWING TAIL RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 – 2	Continuity
Always	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.



4. INSPECT BATT CHARGE RELAY CIRCUIT

Condition	Tester connection	Specified condition
Always	1 – 2	Continuity
Always	3 – 5	No continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.

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BATTERY

BO4S4–01

PRECAUTION

NOTICE:

When disconnecting the battery terminal, initialize the following system after the terminal is reconnected.

System Name	See Page
Back Door Power Window Control System	BE–77

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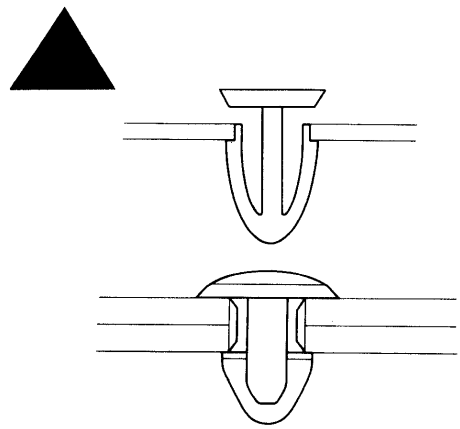
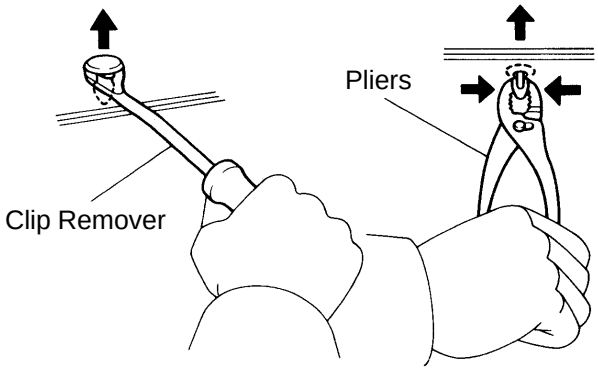
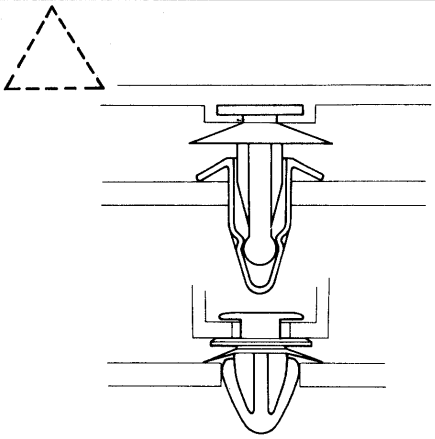
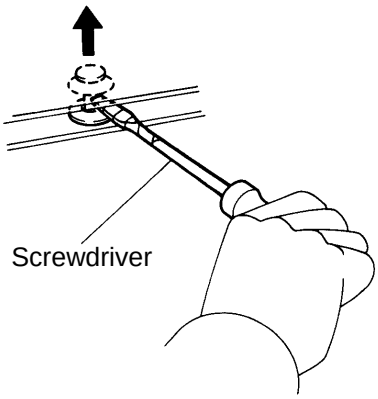
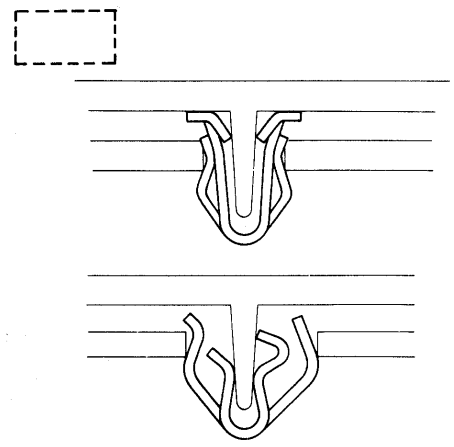
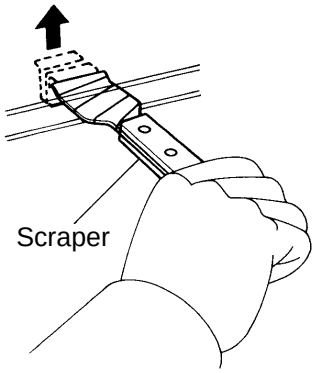
CLIP

BO0HX–01

REPLACEMENT

The removal and installation methods of typical clips used in body parts are shown in the table below.
HINT:
If the clip is damaged during the operation, always replace it with a new clip.

Shape (Example)	Removal/Installation
	
	
	

V00005

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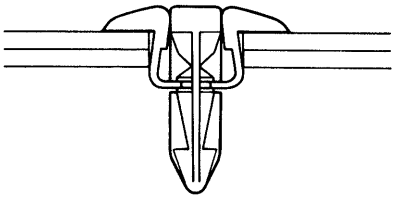
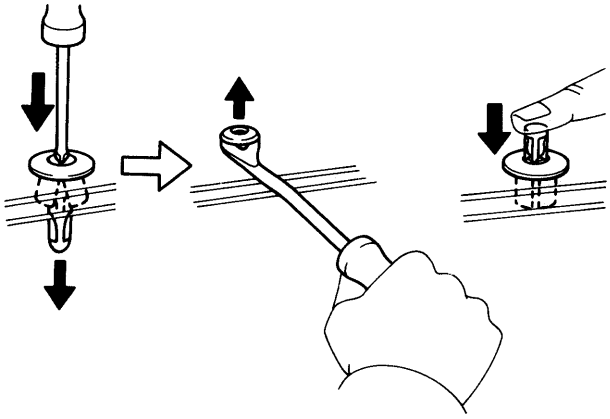
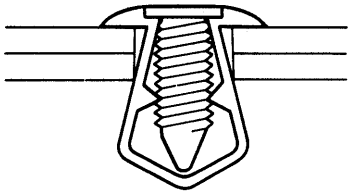
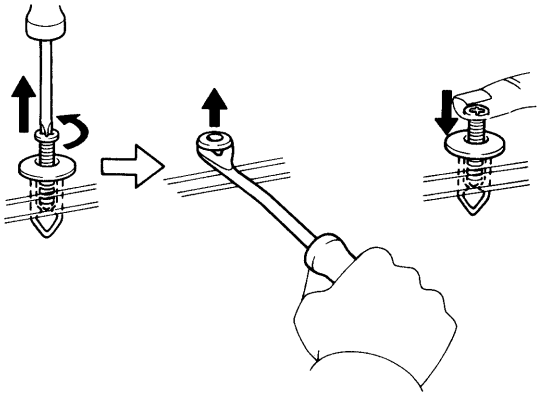
Shape (Example)	Removal/Installation
	
	

V00012

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SRS AIRBAG

BO0HY–04

PRECAUTION

The SEQUOIA is equipped with an SRS (Supplemental Restraint System) such as the driver airbag, front passenger airbag and side airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

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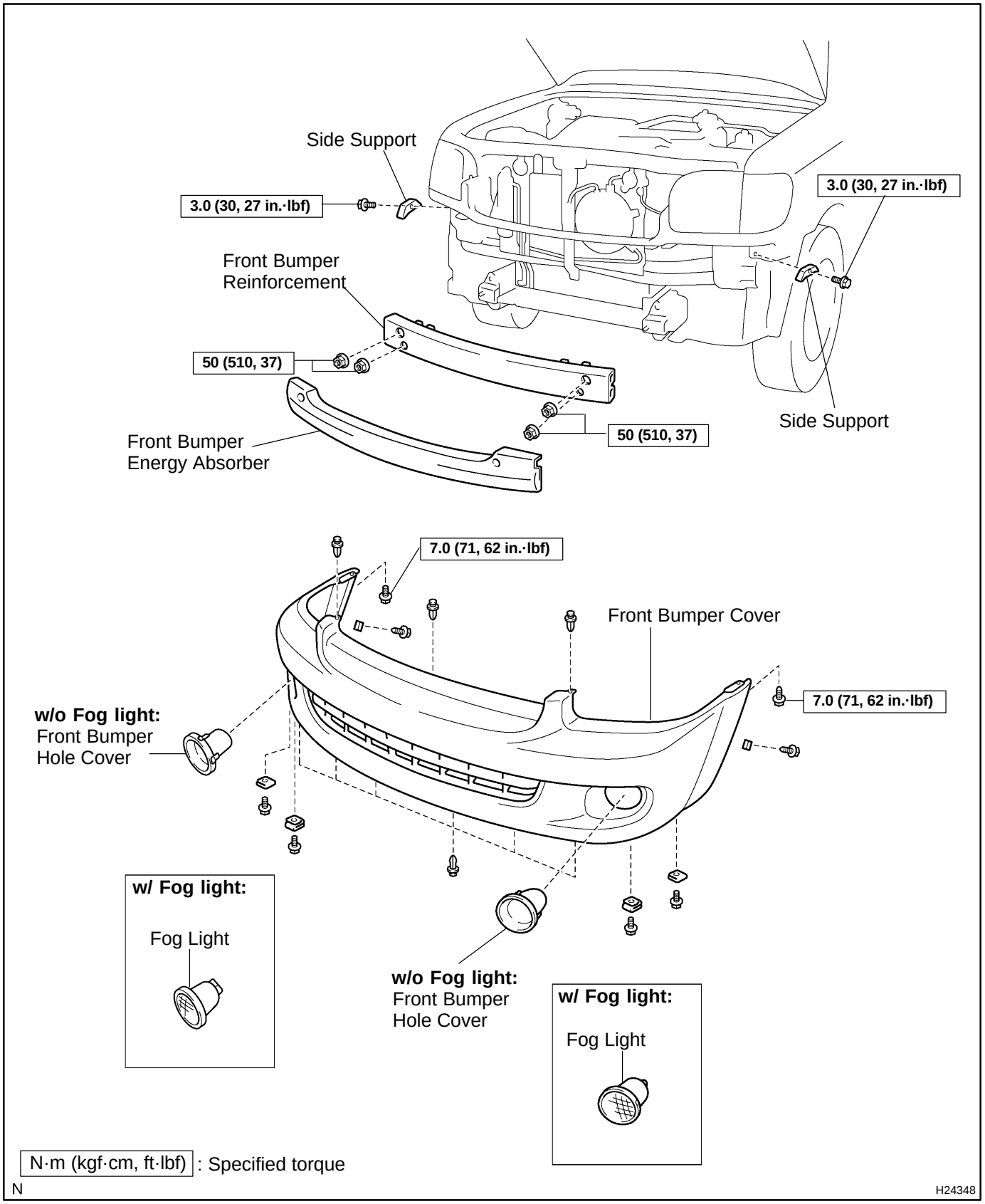
FRONT BUMPER

COMPONENTS

BO45H–02



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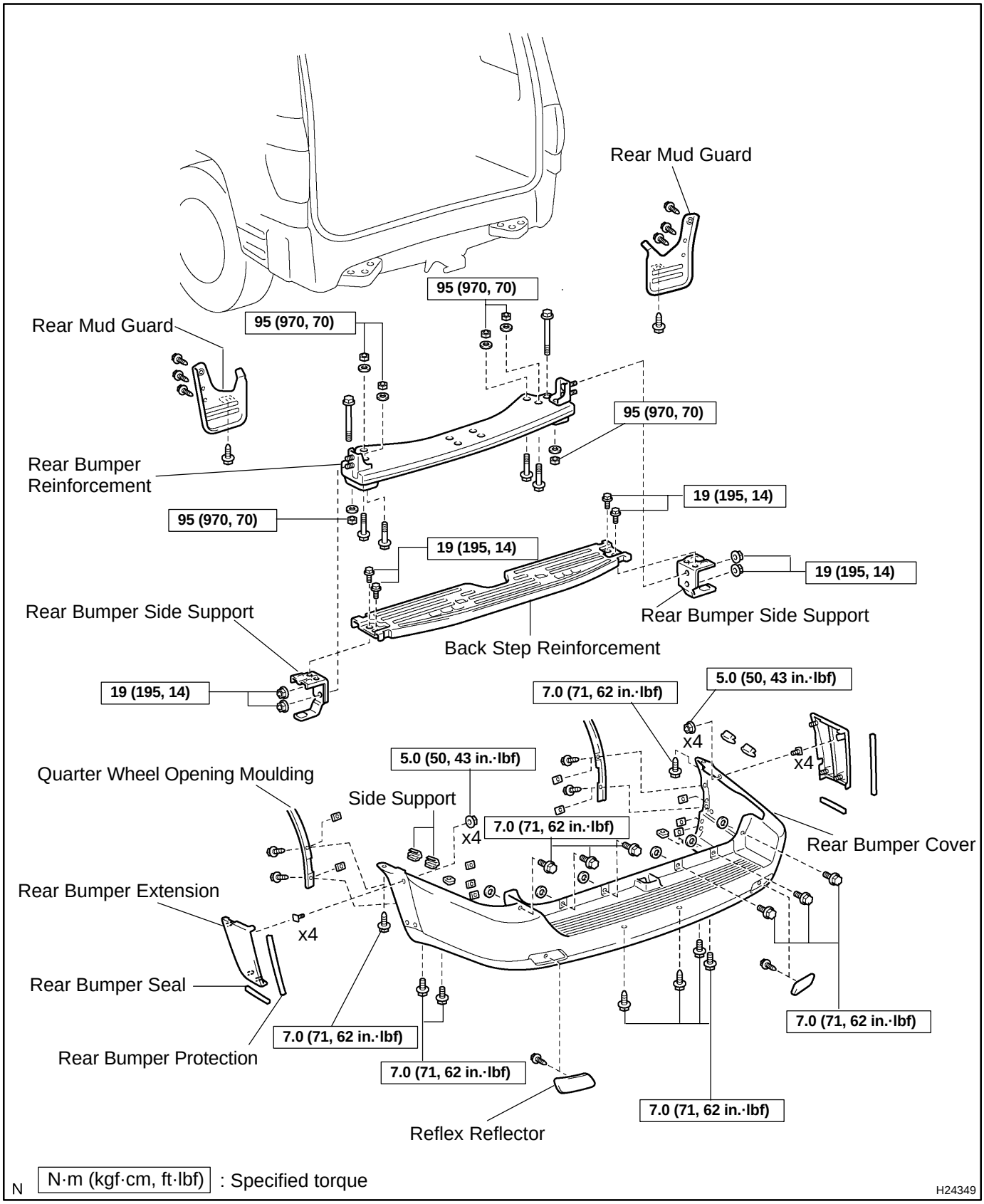
REAR BUMPER

COMPONENTS

BO45I–02



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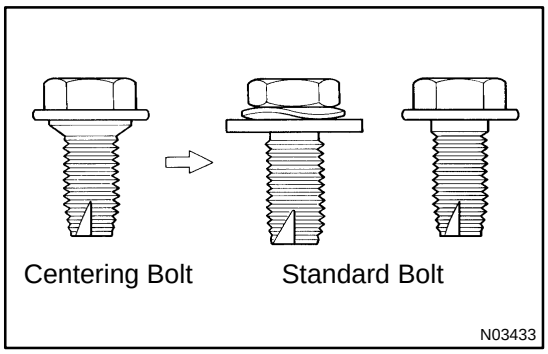


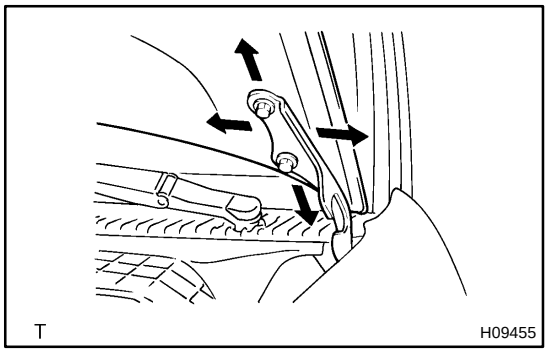
HOOD

ADJUSTMENT

BO45J–01

HINT:

Since the centering bolt is used as the hood hinge set bolt, the hood cannot be adjusted with it on. Substitute the standard bolt for the centering bolt.



1. ADJUST HOOD IN FORWARD/REARWARD

Adjust the hood by loosening the hood side hinge bolts.

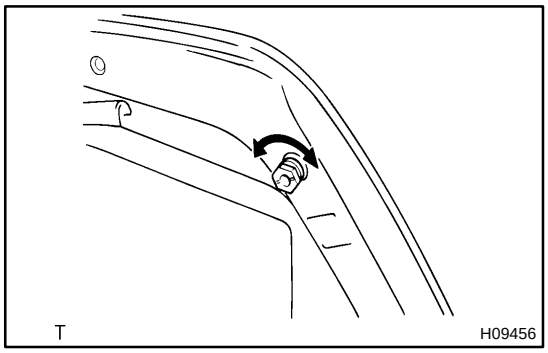
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

2. ADJUST HOOD IN VERTICAL DIRECTIONS

(a) Remove the bolts and increase or decrease the number of washers between the hinge and hood.

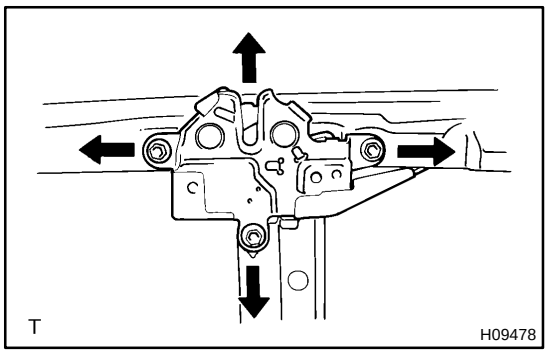
(b) Install the bolts again.

Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



3. ADJUST FRONT EDGE OF HOOD IN VERTICAL DIRECTION

Adjust the hood by turning the cushions.



4. ADJUST HOOD LOCK

Adjust the lock by loosening the bolts.

Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)

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HOOD SUPPORT

BO45K–01

REPLACEMENT

1. REMOVE HOOD SUPPORT

(a) Remove the bolt and hood support from the hood.

HINT:

While supporting the hood by hand, remove the hood support from the hood.

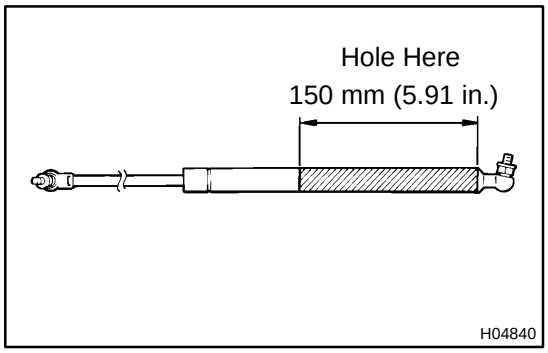
(b) Remove the bolt and hood support.

2. IF NECESSARY, REPLACE HOOD SUPPORT

NOTICE:

Handling the hood support

- **Do not disassemble the support as the cylinder is filled with pressurized gas.**



- **If the hood support is to be replaced, drill a 2.0 – 3.0 mm (0.079 – 0.118 in.) hole in the area shown in the illustration to completely release the high pressure gas before disposing of it.**
- **When drilling, chips may fly out so work carefully.**
- **The gas is colorless, odorless and non – toxic.**
- **When working, handle the hood support carefully. Never score or scratch the exposed part of the piston rod, and allow any paint or oil to get on it.**
- **Do not turn the piston rod and cylinder with the hood support fully extended.**

3. INSTALL HOOD SUPPORT

(a) Install the bolt and hood support to the body.
Torque: 22 N·m (224 kgf·cm, 16 ft·lbf)

(b) Install the bolt and hood support to the hood.
Torque: 22 N·m (224 kgf·cm, 16 ft·lbf)

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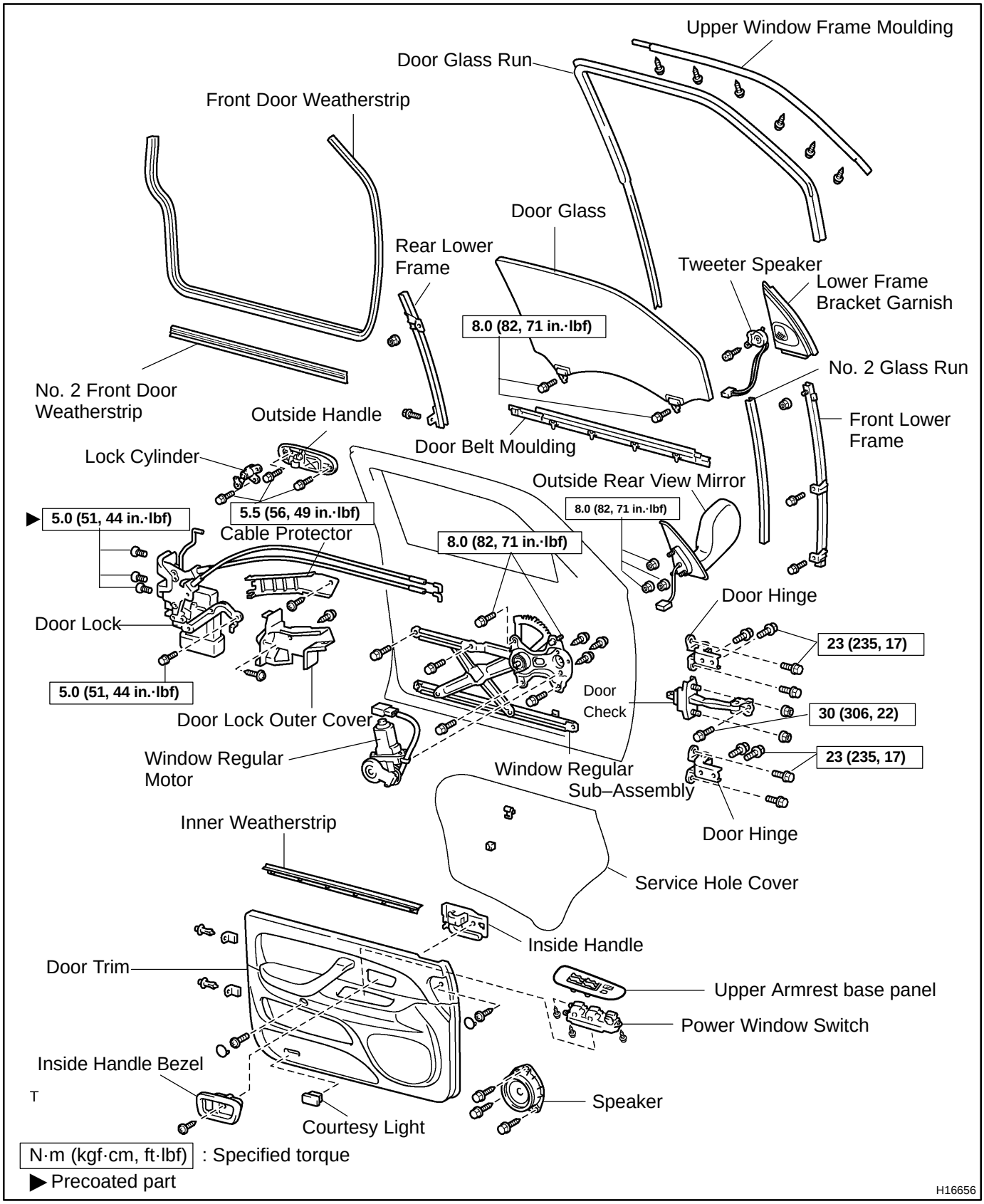
FRONT DOOR

COMPONENTS

BO45L–02



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BO45M–01

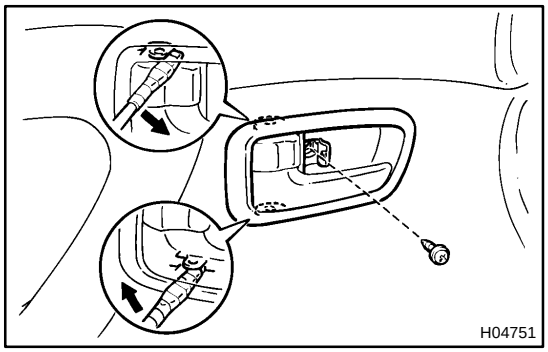
DISASSEMBLY

1. REMOVE INSIDE HANDLE BEZEL

(a) Using a screwdriver, open the cover.

HINT:

Tape the screwdriver tip before use.



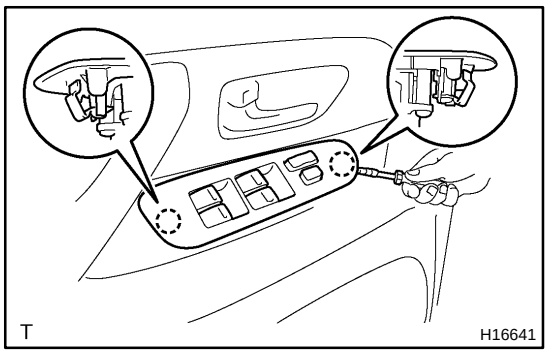
(b) Remove the screw.

(c) Using a screwdriver, remove the inside handle bezel as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

2. REMOVE COURTESY LIGHT



3. REMOVE UPPER ARMREST BASE PANEL WITH POWER WINDOW SWITCH

(a) Using a screwdriver, remove the upper armrest base panel with power window switch.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connector.

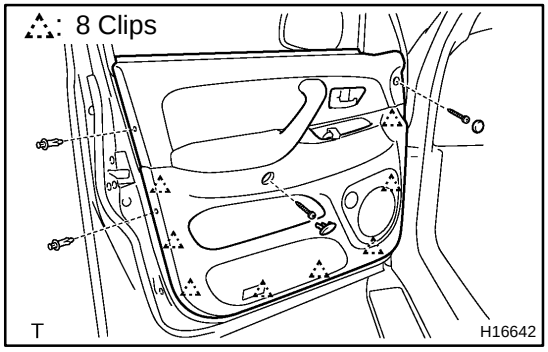
(c) Remove the 3 screws and power window switch from the upper armrest base panel.

4. REMOVE LOWER FRAME BRACKET GARNISH

Using a screwdriver, remove the lower frame bracket garnish.

HINT:

Tape the screwdriver tip before use.



5. REMOVE DOOR TRIM

(a) Using a screwdriver, remove the 2 caps.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and 2 clips.

(c) Insert a screwdriver between the door trim and door panel to pry the door trim.

HINT:

Tape the screwdriver tip before use.

(d) Pull the door trim upward to remove the door trim.

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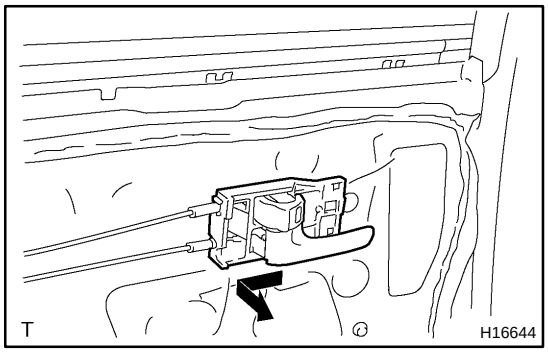
(e) Remove the inner weatherstrip from the door trim.

6. REMOVE TWEETER SPEAKER

7. REMOVE OUTSIDE REAR VIEW MIRROR

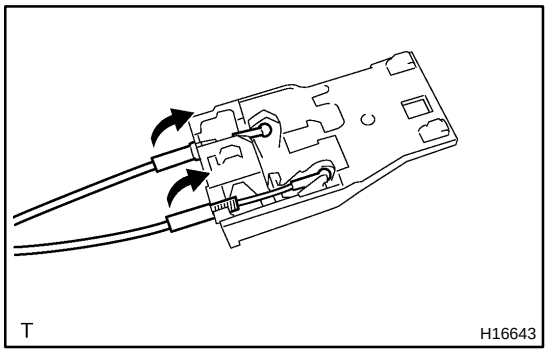
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

8. REMOVE SPEAKER



9. REMOVE INSIDE HANDLE

(a) Slide the inside handle backward to remove it.



(b) Disconnect the 2 cables from inside handle as shown in the illustration.

10. REMOVE SERVICE HOLE COVER

(a) Using a clip remover, remove the clamp and grommets.

(b) Remove the service hole cover.

NOTICE:

Do not tear the cover.

HINT:

At the time of reassembly, please refer to the following item.

Bring out the 2 control cables and wire harness through the service hole cover.

11. REMOVE DOOR GLASS

(a) Open the door glass until the bolts appear in the service hole.

(b) Remove the 2 bolts.

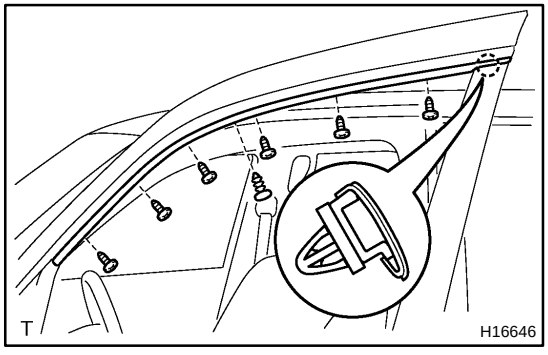
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

NOTICE:

Be careful not to drop the door glass.

(c) Pull the door glass upward to remove it.

12. REMOVE DOOR GLASS RUN



13. REMOVE UPPER WINDOW FRAME MOULDING

(a) Remove the 6 screws.

(b) Using a screwdriver or clip remover, remove the upper window frame moulding.

HINT:

Tape the screwdriver tip before use.

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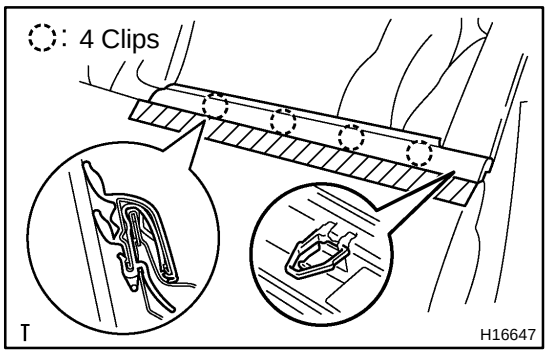
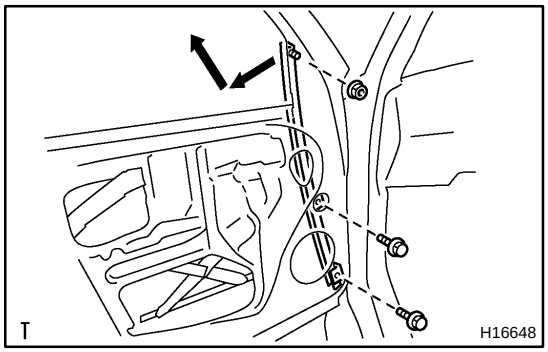


14. REMOVE DOOR BELT MOULDING

(a) Apply protective tape to the outer surface as shown in the illustration, to keep the surface from being scratched.

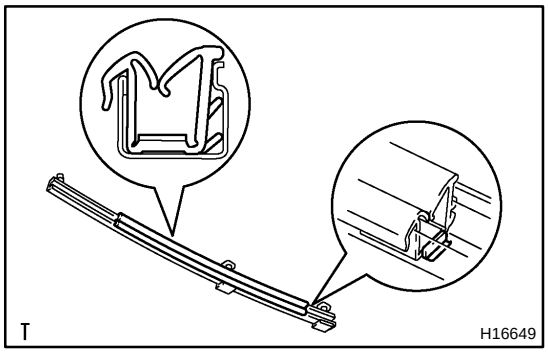
(b) Using a moulding remover, remove the door belt moulding.



15. REMOVE FRONT LOWER FRAME

(a) Remove the 2 bolts, nut and front lower frame as shown in the illustration.

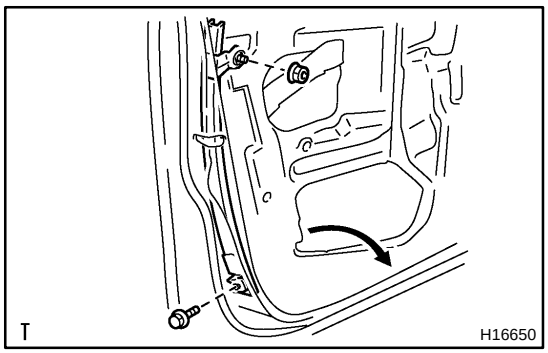
(b) Remove the No. 2 glass run from the front lower frame.



HINT:

At the time of reassembly, please refer to the following item.

Install the No. 2 glass run to the front lower frame as shown in the illustration.

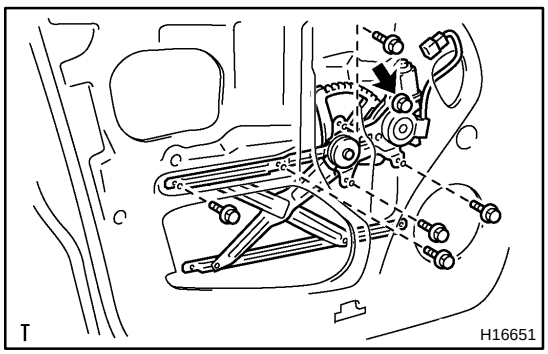


16. REMOVE REAR LOWER FRAME

Remove the bolt, nut and rear lower frame as shown in the illustration.

HINT:

Remove the rear lower frame through the service hole.



17. REMOVE WINDOW REGULATOR ASSEMBLY

(a) Disconnect the connector.

(b) Remove the 5 bolts.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(c) Loosen the bolt, then remove the window regulator assembly.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

HINT:

Remove the window regulator assembly through the service hole.

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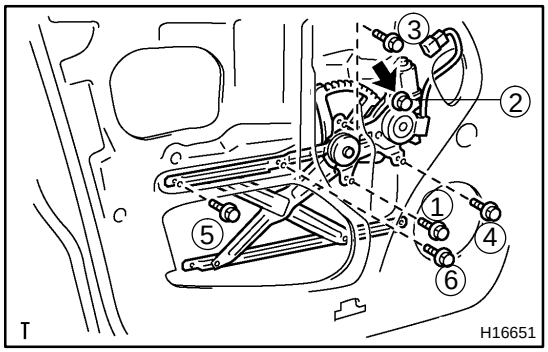
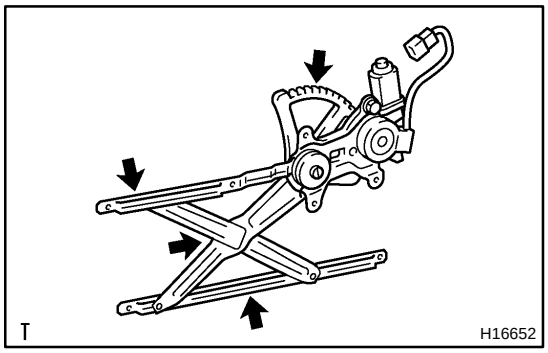
(d) Remove the 3 screws and window regulator motor from the window regulator sub–assembly.



HINT:
At the time of reassembly, please refer to the following items.
▶ Tighten the bolts in the order shown in the illustration.



▶ Apply MP grease to the window regulator assembly.

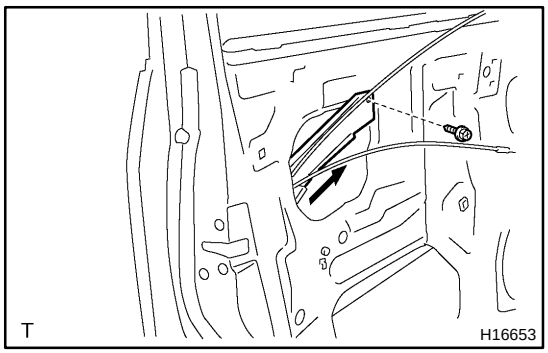
NOTICE:

At the time of reassembly, please refer to the following item.

Do not apply grease to the spring of the window regulator assembly.

18. REMOVE DOOR LOCK

(a) Disengage the 2 control cables from the clamp.
(b) Remove the clamp.



(c) Remove the screw and cable protector.
(d) Disconnect the 2 control links from the outside handle and lock cylinder.
(e) Disconnect the connector.
(f) Remove the bolt, 3 screws and door lock.

HINT:
Remove the door lock through the service hole.

Torque:
Bolt: 5.0 N·m (51 kgf·cm, 44 in.·lbf)
Screw: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

HINT:
▶ At the time of reassembly, please refer to the following items.
▶ Apply adhesive to 3 screws.
Part No. 08833–00070, THREE BOND 1324 or equivalent.

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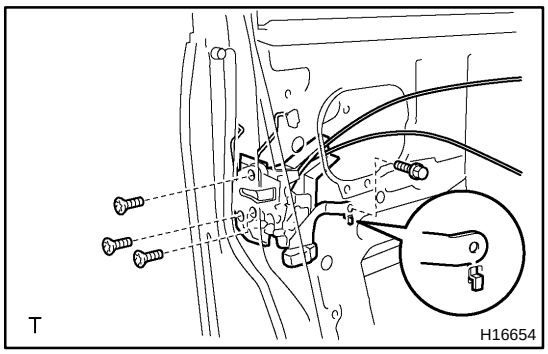
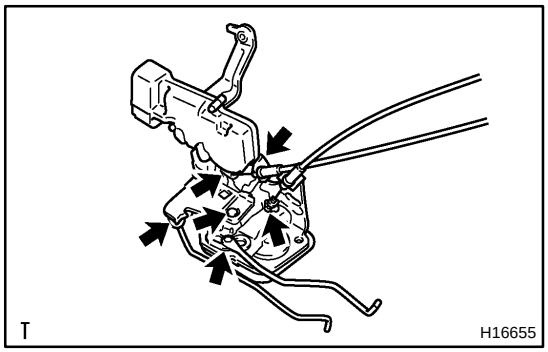


▶ Install the door lock as shown in the illustration.

(g) Remove the 2 screws and door lock outer cover from the door lock.



HINT:

At the time of reassembly, please refer to the following item.

Apply MP grease to the sliding and rotating parts of the door lock.

19. REMOVE OUTSIDE HANDLE WITH LOCK CYLINDER

(a) Remove the service hole plug.

(b) Remove the 2 bolts and outside handle with lock cylinder.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(c) Remove the bolt and lock cylinder from the outside handle.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

20. REMOVE FRONT DOOR WEATHERSTRIP

Using a clip remover, remove the front door weatherstrip.

21. REMOVE NO. 2 FRONT DOOR WEATHERSTRIP

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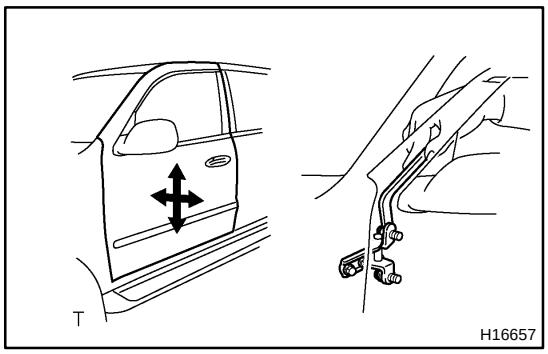
BO45N–01

ADJUSTMENT

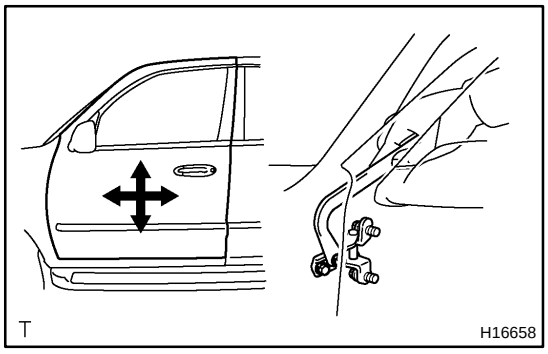


1. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Using SST, adjust the door by loosening the body side hinge bolts.

SST 09812–00010

Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)



2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

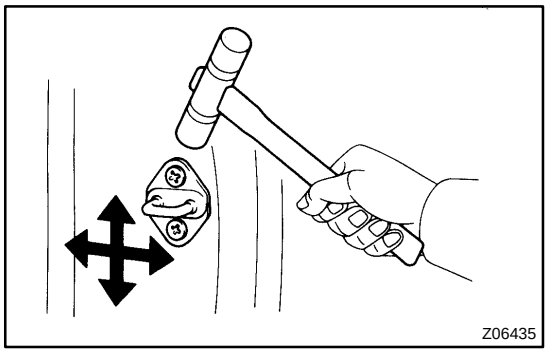
Adjust the door by loosening the door side hinge bolts.

HINT:

Substitute the standard bolt for the centering bolts.

(See page BO–7)

Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door lock linkages are adjusted correctly.

(b) Adjust the striker position by slightly loosening the striker mounting screws, and hitting the striker with a hammer.

(c) Tighten the striker mounting screws again.

Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

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BO45O–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–10).

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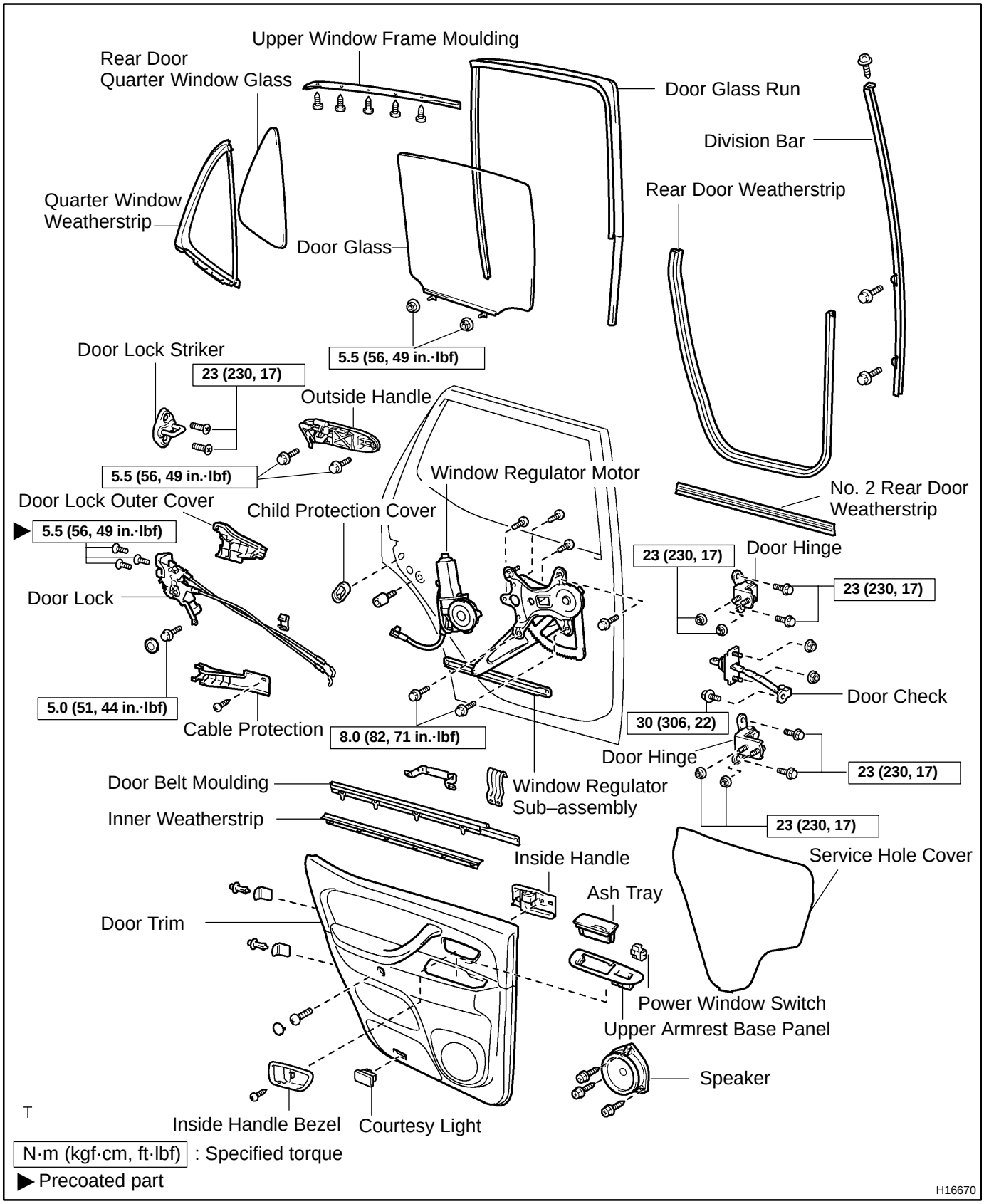
REAR DOOR

COMPONENTS

BO45P–01



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BO45Q–01

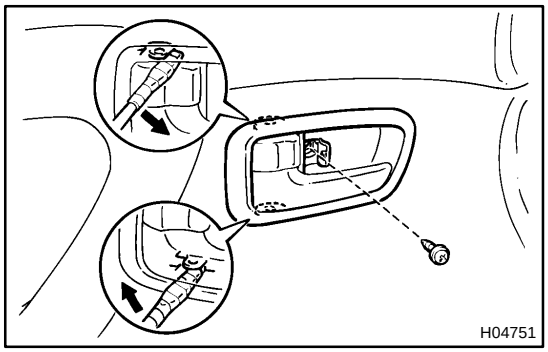
DISASSEMBLY

1. REMOVE INSIDE HANDLE BEZEL

(a) Using a screwdriver, open the cover.

HINT:

Tape the screwdriver tip before use.



(b) Remove the screw.

(c) Using a screwdriver, remove the inside handle bezel as shown in the illustration.

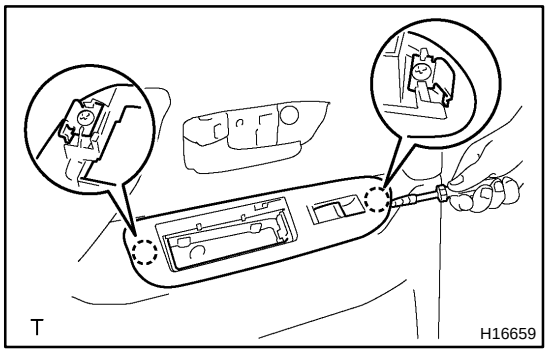
HINT:

Tape the screwdriver tip before use.

2. REMOVE COURTESY LIGHT

3. REMOVE UPPER ARMREST BASE PANEL WITH POWER WINDOW SWITCH

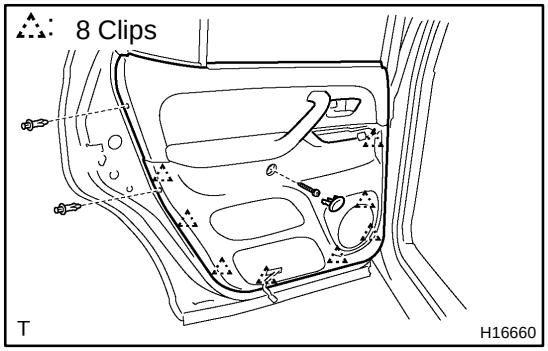
(a) Remove the ash tray.



(b) Using a screwdriver, remove the upper armrest base panel with power window switch.

(c) Disconnect the connector.

(d) Remove the power window switch from the upper armrest base panel.



4. REMOVE DOOR TRIM

(a) Using a screwdriver, remove the cap.

HINT:

Tape the screwdriver tip before use.

(b) Remove the screw and 2 clips.

(c) Insert a screwdriver between the door trim and door panel to pry the door trim.

HINT:

Tape the screwdriver tip before use.

(d) Pull the door trim upward to remove the door trim.

(e) Remove the inner weatherstrip from the door trim.

5. REMOVE SPEAKER

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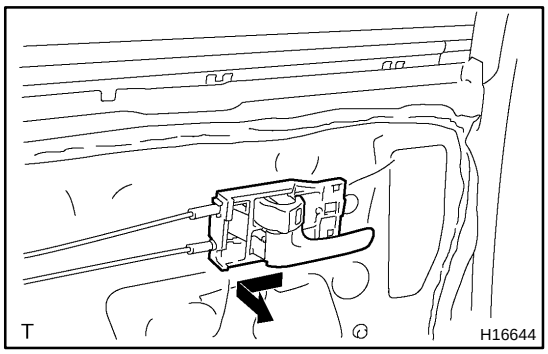
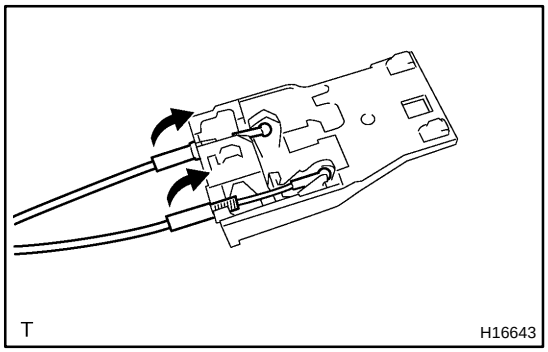


6. REMOVE INSIDE HANDLE

(a) Slide the inside handle backward to remove it.



(b) Disconnect the 2 cables from inside handle as shown in the illustration.

7. REMOVE SERVICE HOLE COVER

(a) Using a clip remover, remove the clamp and grommets.

(b) Remove the service hole cover.

NOTICE:

Do not tear the cover.

HINT:

At the time of reassembly, please refer to the following item.

Bring out the 2 control cables and wire harness through the service hole cover.

8. REMOVE DIVISION BAR

HINT:

Insert a shop rag inside the door panel to prevent scratching the glass.

(a) Open the door glass until the bolts appear in the service hole.

(b) Remove the 2 door glass set nuts.

(c) Remove the door glass from the glass bracket and lower the door glass into the door panel.

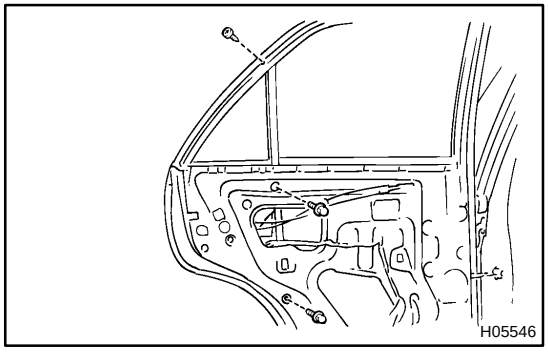
NOTICE:

Do not damage the door glass.

HINT:

Position the door glass toward the front as much as possible.

(d) Remove the door glass run.



(e) Remove the 2 bolts and screw.

(f) Pull the division bar forward.

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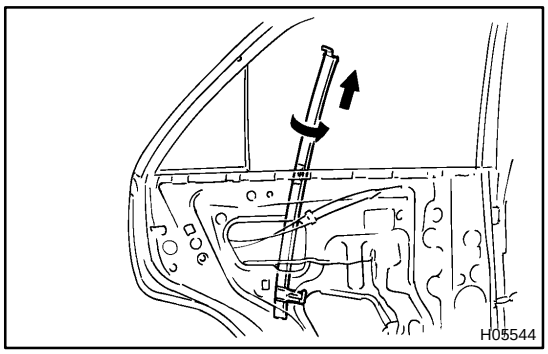


(g) Rotate the division bar 90° and pull it upward as shown in the illustration.

9. REMOVE REAR DOOR QUARTER WINDOW GLASS

(a) Remove the rear door quarter window glass.

NOTICE:

Do not damage the glass.

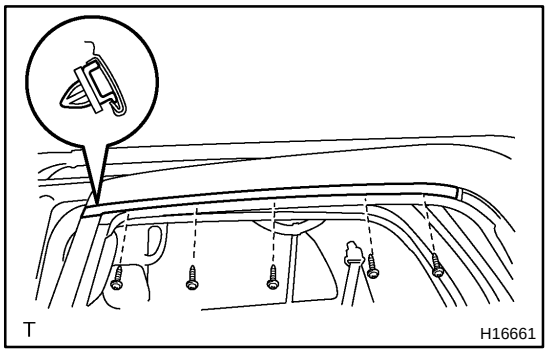
(b) Remove the quarter window weatherstrip from the glass.

10. REMOVE DOOR GLASS

Pull the glass up out of the panel carefully.

HINT:

Insert a shop rag inside the panel to prevent scratching the glass.



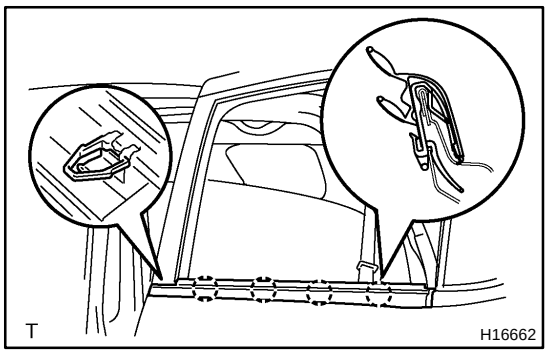
11. REMOVE UPPER WINDOW FRAME MOULDING

(a) Remove the 5 screws.

(b) Using a screwdriver or clip remover, remove the upper window frame moulding.

HINT:

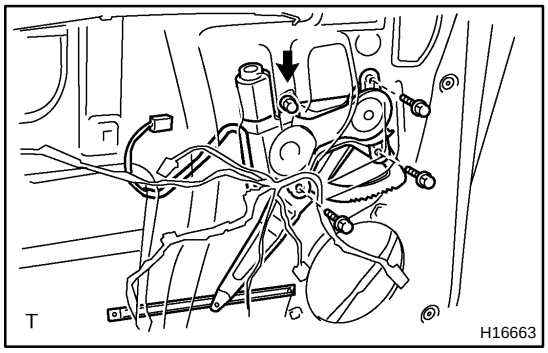
Tape the screwdriver tip before use.



12. REMOVE DOOR BELT MOULDING

(a) Apply protective tape to the outer surface as shown in the illustration, to keep the surface from being scratched.

(b) Using a moulding remover, remove the door belt moulding.



13. REMOVE WINDOW REGULATOR ASSEMBLY

(a) Disconnect the connector.

(b) Remove the 3 bolts.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(c) Loosen the bolt, then remove the window regulator assembly.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

HINT:

Remove the window regulator assembly through the service hole.

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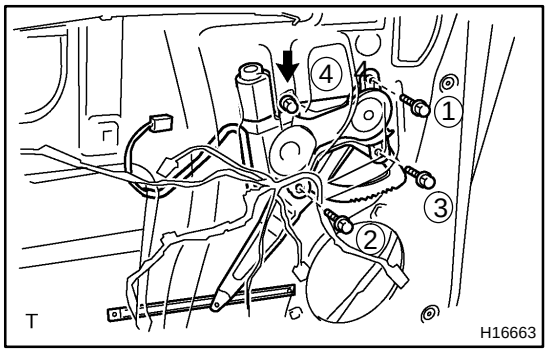
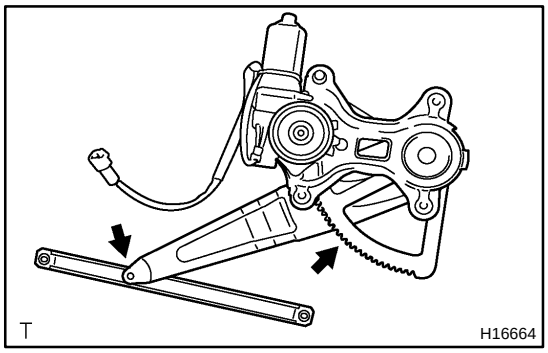
(d) Remove the 3 screws and window regulator motor from the window regulator sub–assembly.



HINT:
At the time of reassembly, please refer to the following items.
▶ Tighten the bolts in the order shown in the illustration.



▶ Apply MP grease to the window regulator assembly.

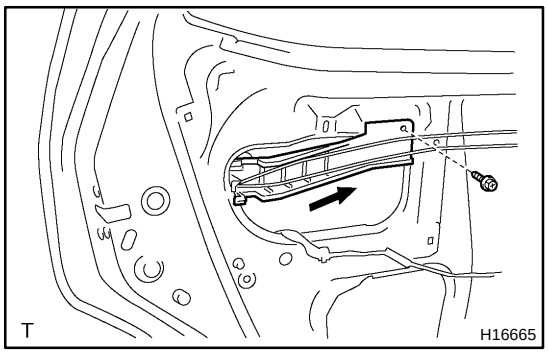
NOTICE:

At the time of reassembly, please refer to the following item.

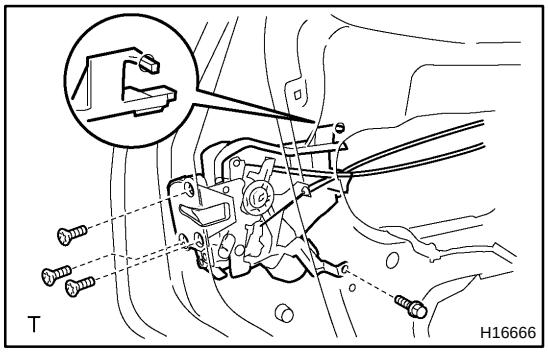
Do not apply grease to the spring of the window regulator assembly.

14. REMOVE DOOR LOCK

(a) Disengage the 2 control cables from the clamp.
(b) Remove the clamp.



(c) Remove the screw and cable protector.
(d) Disconnect the connector.



(e) Remove the bolt, 3 screws and door lock.

HINT:
Remove the door lock through the service hole.

Torque:
Bolt: 5.0 N·m (51 kgf·cm, 44 in.·lbf)
Screw: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

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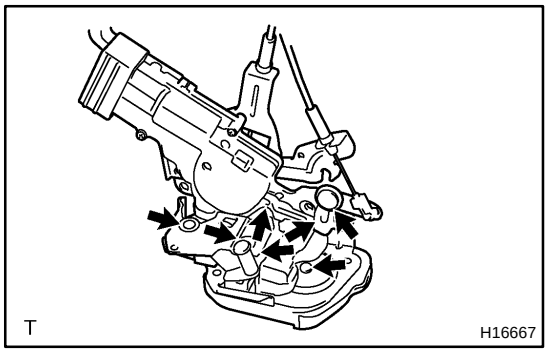
HINT:

- ▶ At the time of reassembly, please refer to the following items.
- ▶ Apply adhesive to 3 screws.
  Part No. 08833–00070, THREE BOND 1324 or equivalent.
- ▶ Install the door lock as shown in the illustration.

(f) Remove the 2 screws and door lock outer cover from the door lock.



HINT:

At the time of reassembly, please refer to the following item.

Apply MP grease to the sliding and rotating part of the door lock.

15. REMOVE OUTSIDE HANDLE
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

16. REMOVE REAR DOOR WEATHERSTRIP

17. REMOVE REAR DOOR OUTSIDE LOWER MOULDING

18. REMOVE NO. 2 REAR DOOR WEATHERSTRIP

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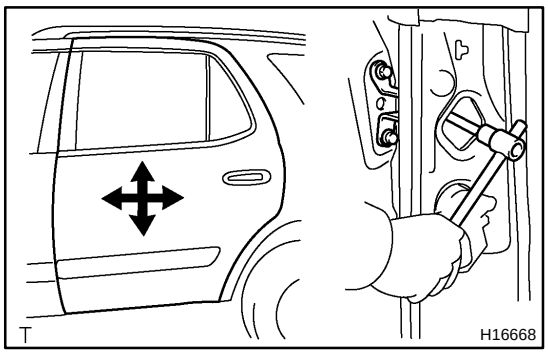
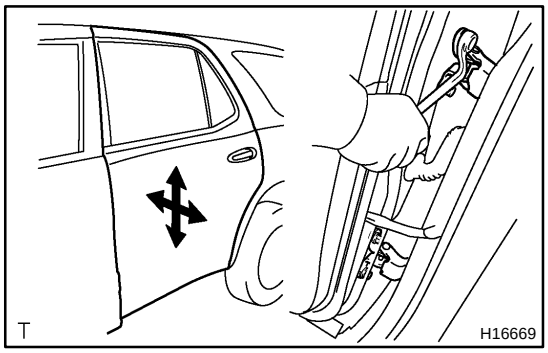
BO45R–01

ADJUSTMENT



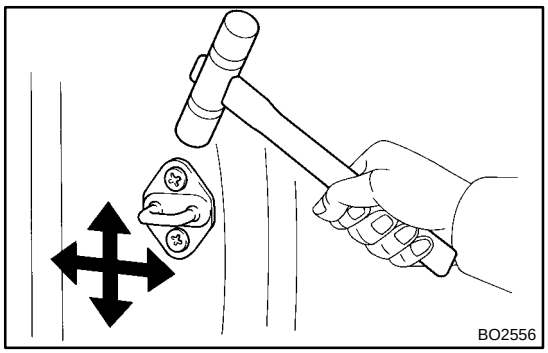
1. ADJUST DOOR IN FORWARD/ REARWARD AND VERTICAL DIRECTIONS

(a) Remove the front and rear door scuff plates.
(b) Remove the center pillar lower garnish.
(c) Remove the front seat outer belt (See page BO–101).
(d) Loosen the body side hinge nuts to adjust.
Torque: 23 N·m (230 kgf·cm, 17 ft·lbf)
(e) Install the front seat outer belt and center pillar lower garnish (See page BO–101).
(f) Install the front and rear door scuff plates.



2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.
Torque: 23 N·m (230 kgf·cm, 17 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door lock linkages are adjusted correctly.
(b) Loosen the striker mounting screws to adjust.
Torque: 23 N·m (230 kgf·cm, 17 ft·lbf)
(c) Using a plastic hammer, tap the striker to adjust it.

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BO45S–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–24).

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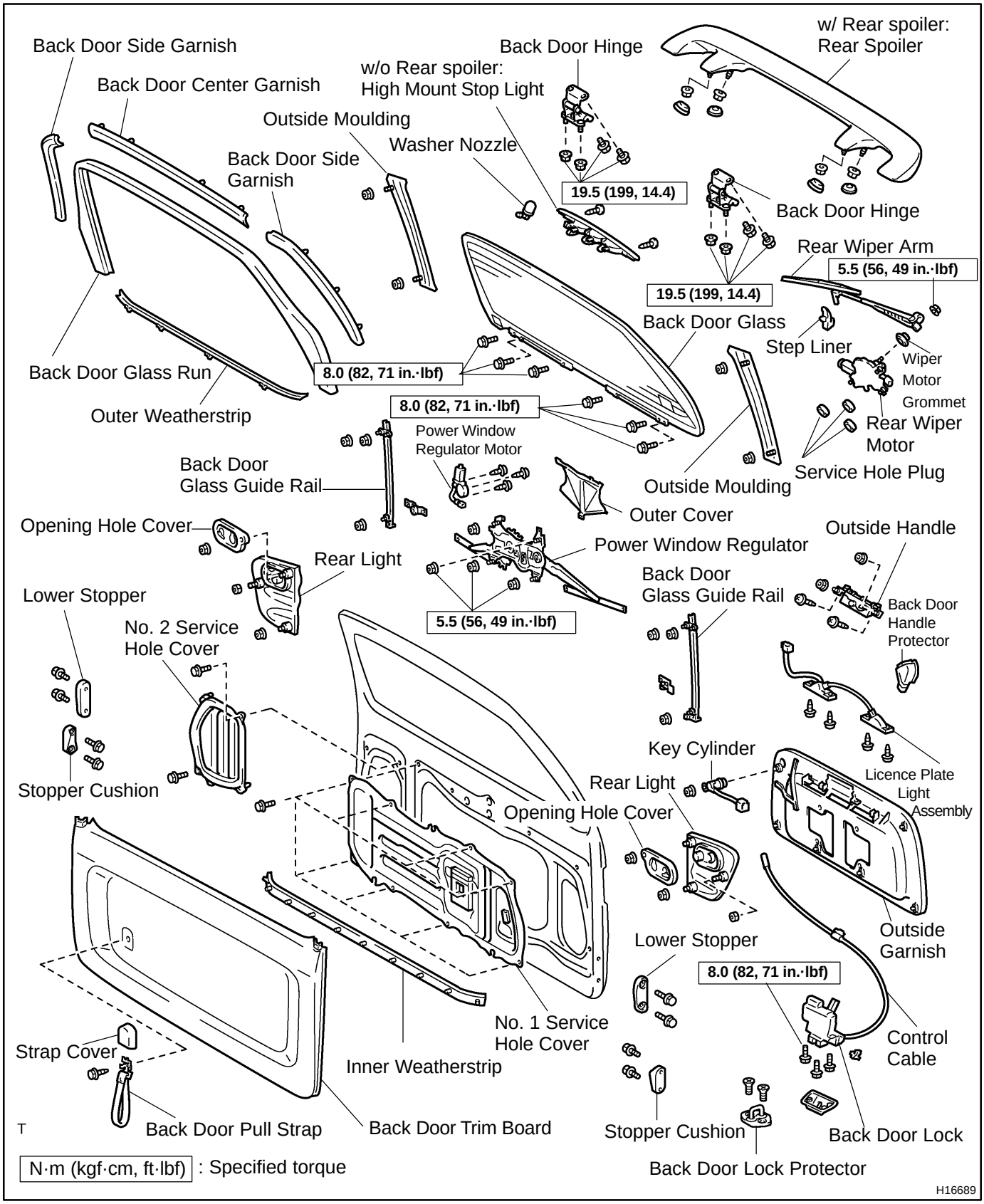
BACK DOOR

COMPONENTS

BO45T–01



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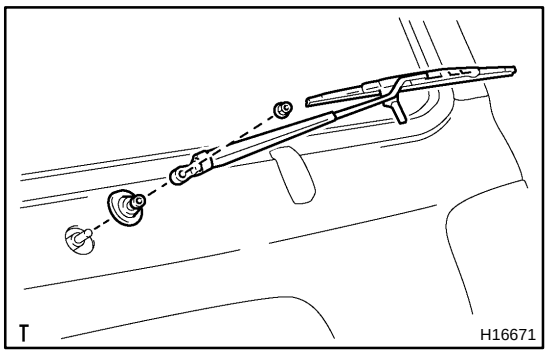
BO45U–01

DISASSEMBLY



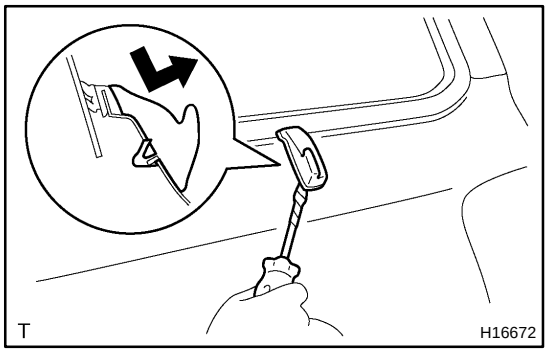
1. REMOVE REAR WIPER ARM

(a) Open the cover.

(b) Remove the nut and rear wiper arm.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(c) Remove the rear wiper motor grommet.

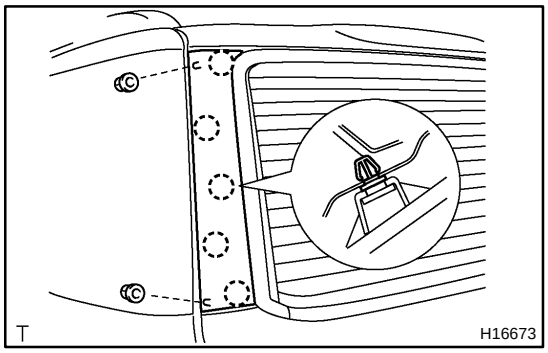


2. REMOVE STEP LINER

Using a screwdriver, remove the step liner.

HINT:

Tape the screwdriver tip before use.



3. REMOVE OUTSIDE MOULDING

(a) Remove the 2 nuts.

(b) Using a screwdriver, remove the outside moulding.

(c) Employ the same manner described above to the other side.

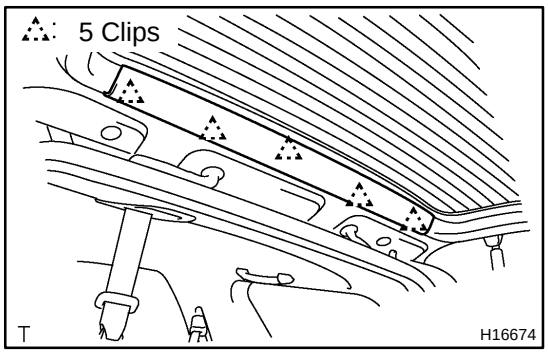
4. REMOVE BACK DOOR PULL STRAP

(a) Using a screwdriver, remove the strap cover.

HINT:

Tape the screwdriver tip before use.

(b) Remove the screw and back door pull strap.

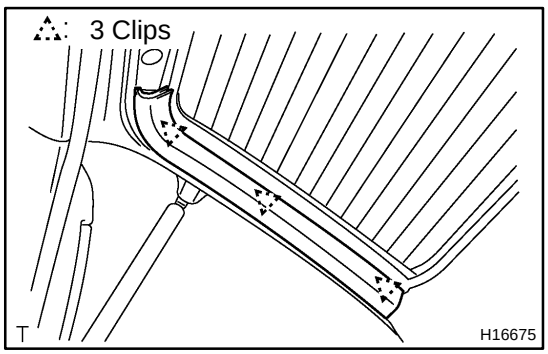


5. REMOVE BACK DOOR CENTER GARNISH

Using a screwdriver, remove the back door center garnish.

HINT:

Tape the screwdriver tip before use.



6. REMOVE BACK DOOR SIDE GARNISH

(a) Using a screwdriver, remove the back door side garnish.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.

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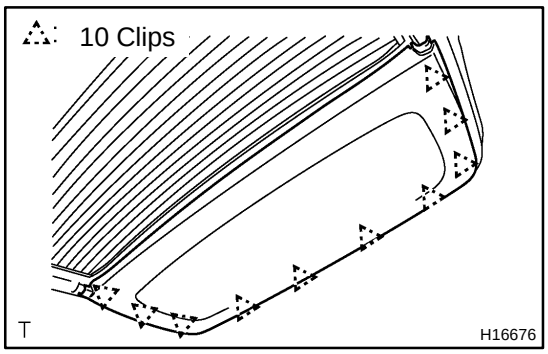


7. REMOVE BACK DOOR TRIM BOARD

(a) Insert a screwdriver between the back door and back door trim board to pry the back door trim board out.

NOTICE:

Be careful not to damage the back door and back door trim board.

HINT:

Tape the screwdriver tip before use.

(b) Pull the back door trim board to remove it as shown in the illustration.

8. REMOVE INNER WEATHERSTRIP

Using a screwdriver, remove the inner weatherstrip from the back door trim board.

HINT:

Tape the screwdriver tip before use.

9. REMOVE NO. 1 SERVICE HOLE COVER

10. REMOVE NO. 2 SERVICE HOLE COVER

11. REMOVE BACK DOOR ECU

(a) Using a drill of less than ø3.2 mm (0.126 in.), drill out the 2 rivet heads.

HINT:

Gentry and vertically put the drill to the rivets, and cut the rivet flanges.

CAUTION:

Take care as the cut rivets are hot.

NOTICE:

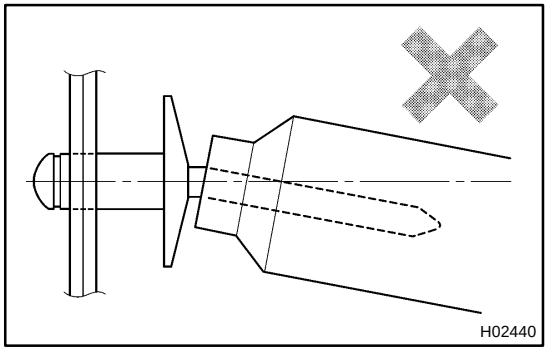
Prizing the hole with a drill can lead to damage to the rivet hole or the drill itself.

(b) Remove the back door ECU.

HINT:

At the time of reassembly, please refer to the following item.

Using an air riveter with nose piece No. 1 or a hand riveter with nose piece No. 1 to install new 3 rivets to the front door outside lower moulding.



NOTICE:

- **At the time of reassembly, please refer to the following items.**
- **Do not prize a riveter, as riveter is damaged, it is not tightened and the mandrel is bent.**

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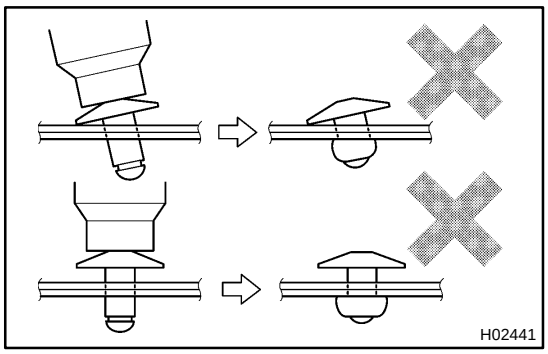
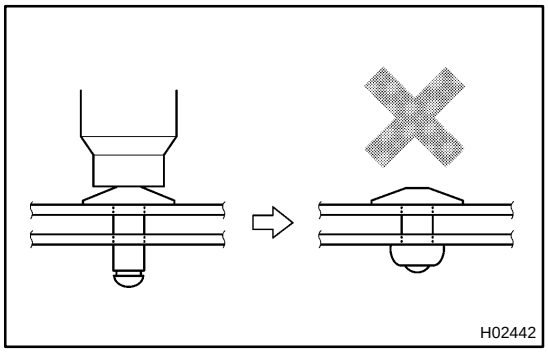
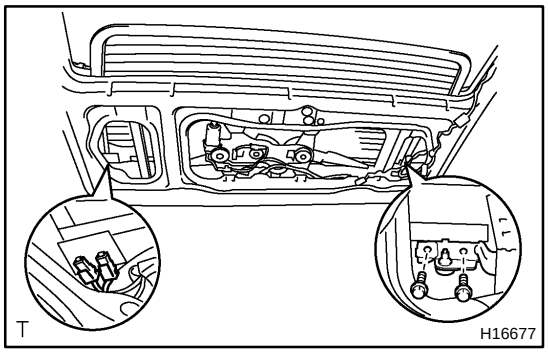


▶ **Do not tilt the riveter disconnect the rivet from the material while handling a riveter, as the materials are not tightened firmly.**



▶ **Install the rivet while attaching materials, as they are not tightened firmly.**

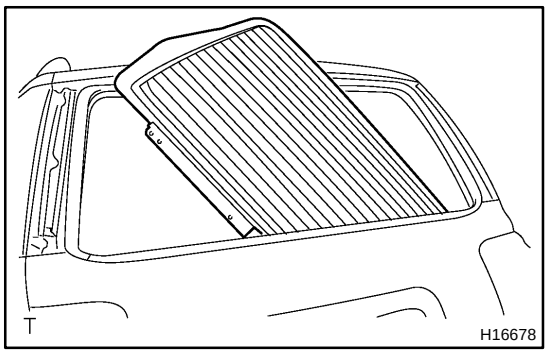


12. REMOVE BACK DOOR GLASS

(a) Open the back door glass until the bolts appear in the service hole.

(b) Disconnect the connectors.

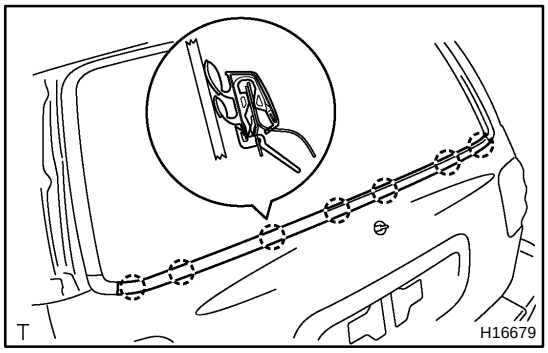
(c) Remove the 2 bolts and guide bracket.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



(d) Remove the 4 bolts and back door glass as shown in the illustration.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

NOTICE:

Be careful not to drop the back door glass.



13. REMOVE OUTER WEATHERSTRIP

(a) Apply protective tape to the outer surface as shown in the illustration, to keep the surface from being scratched.

(b) Using a moulding remover, remove the outer weatherstrip.

14. REMOVE BACK DOOR GLASS RUN

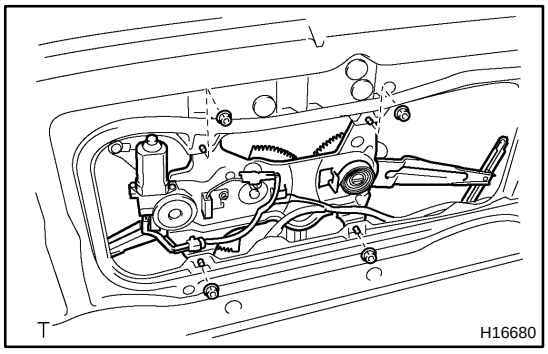
15. REMOVE BACK DOOR GLASS GUIDE RAIL

(a) Disengage the clamps.

(b) Remove the 3 nuts and back door glass guide.

Dardoor.com

(c) Employ the same manner described above to the other side.

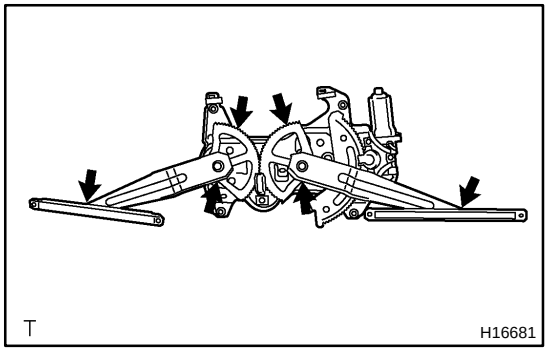


16. REMOVE POWER WINDOW REGULATOR

(a) Disconnect the connector.
(b) Disengage the connector and clamp.
(c) Remove the 4 nuts and power window regulator.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

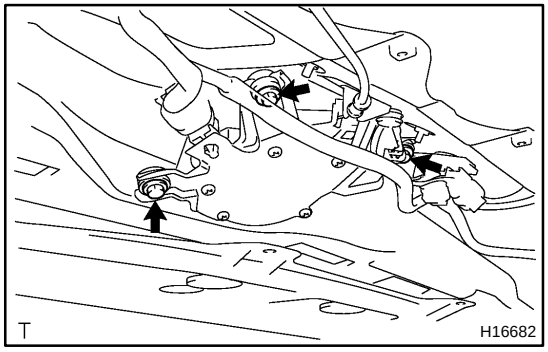
HINT:
Remove the power window regulator through the service hole.

(d) Remove the 3 screws and power window regulator motor from the power window regulator.
(e) Remove the nut and limit switch from the power window regulator.



HINT:
At the time of reassembly, please refer to following item.
Remove the window regulator gear, then apply MP grease to the power window regulator.

NOTICE:
At the time of reassembly, please refer to following item.
Do not apply grease to the spring of the power window regulator.



17. REMOVE REAR WIPER MOTOR

(a) Disconnect the connector.
(b) Disengage the connector and clamp.
(c) Remove the service hole plug.
(d) Unfasten the 3 bolts, then remove the rear wiper motor.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

18. REMOVE BACK DOOR LOCK

(a) Remove the back door handle protector.
(b) Disconnect the control cable from the back door outside handle.

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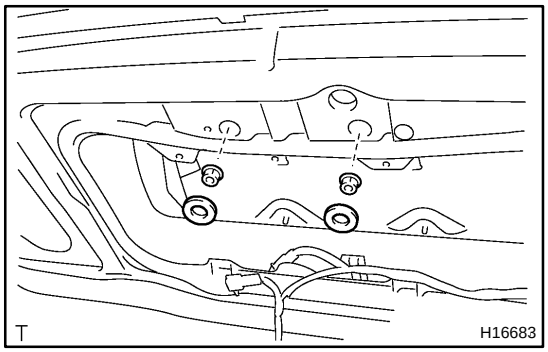
(c) Using a screwdriver, remove the back door lock protector.

HINT:

Tape the screwdriver tip before use.

(d) Remove the 3 bolts and back door lock.

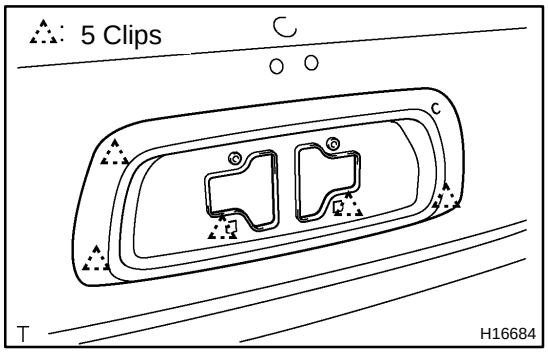
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



19. REMOVE OUTSIDE GARNISH

(a) Remove the 2 service hole plugs.

(b) Remove the 2 nuts.



(c) Using a screwdriver, remove the outside garnish.

HINT:

Tape the screwdriver tip before use.

(d) Remove the 2 screws and outside handle from the outside garnish.

(e) Remove the nut and key cylinder from the outside garnish.

(f) Remove the 4 screws and licence plate light assembly from the outside garnish.

20. w/ Rear spoiler:

REMOVE REAR SPOILER (See page BO–174)

21. w/ o Rear spoiler:

REMOVE HIGH MOUNT STOP LIGHT

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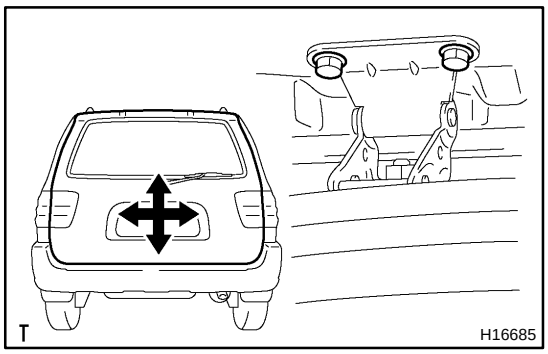
BO45V–01

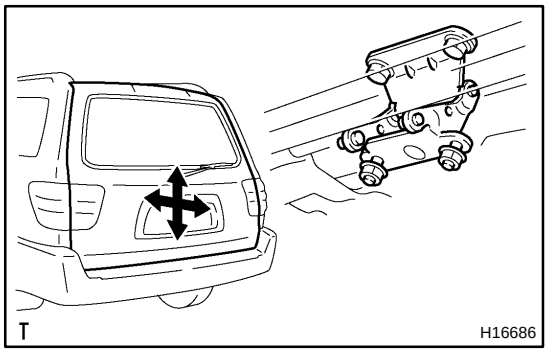
ADJUSTMENT



1. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.

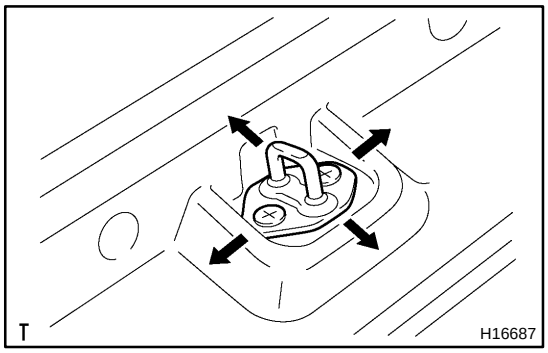
Torque: 19.5 N·m (199 kgf·cm, 14.4 ft·lbf)



2. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Loosen the body side hinge bolts and nuts to adjust.

Torque: 19.5 N·m (199 kgf·cm, 14.4 ft·lbf)



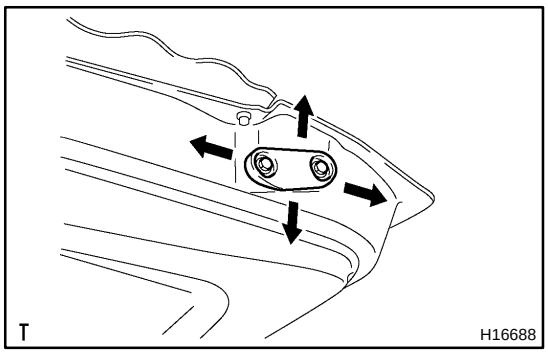
3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door linkages are adjusted correctly.

(b) Loosen the striker mounting screws.

Torque: 27 N·m (275.5 kgf·cm, 19.9 ft·lbf)

(c) Using a plastic hammer, tap the striker to adjust.



4. ADJUST LOWER STOPPER

Loosen the stopper mounting bolts to adjust.

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BO45W–02

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–26).

PERFORM INITIALIZATION (See page IN–20)

Back door power window control system needs initialization when disconnecting the cable from the negative battery terminal.

Dardoor.com

BACK DOOR STAY

BO45X–01

REPLACEMENT

1. REMOVE BACK DOOR STAY

(a) Slide the clip, then remove the back door stay from the back door.

HINT:

While supporting the back door with your hand, remove the back door stay.

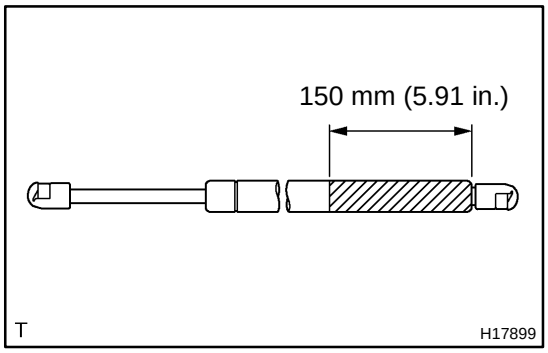
(b) Slide the clip, then remove the bolts and back door stay from the body.

2. IF NECESSARY, REPLACE BACK DOOR STAY

NOTICE:

When handling the back door stay.

- **Do not disassemble the back door stay because the cylinder is filled with pressurized gas.**



- **If the back door stay is to be replaced, drill a 2.0 – 3.0 mm (0.079 – 0.118 in.) hole in the bottom of the back door stay as shown in the illustration to completely release the high–pressure gas before disposing of it.**
- **When drilling, chips may fly out so work carefully.**
- **The gas is colorless, odorless and non–toxic.**
- **When working, handle the back door stay carefully. Never score or scratch the exposed part of the piston rod, and never allow paint or oil to get on it.**
- **Do not turn the piston rod and cylinder with the back door stay fully extended.**

3. INSTALL BACK DOOR STAY

(a) Install the bolts and back door stay to the body.
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

(b) Install the bolts and back door stay to the back door.
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

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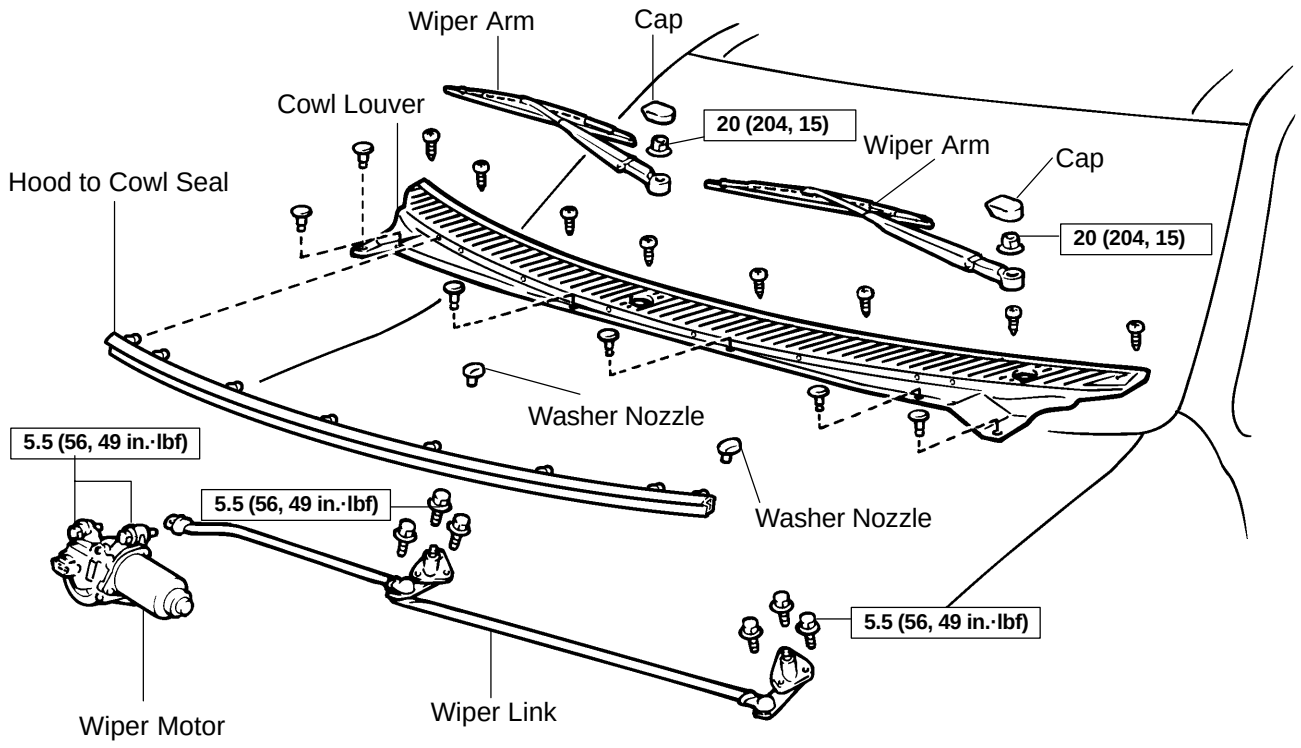
FRONT WIPER AND WASHER

BO45Y–01

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

T

H16690

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BO45Z–01

REMOVAL

1. REMOVE WIPER ARMS

(a) Using a screwdriver, remove the 2 caps.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 nuts and wiper arms.

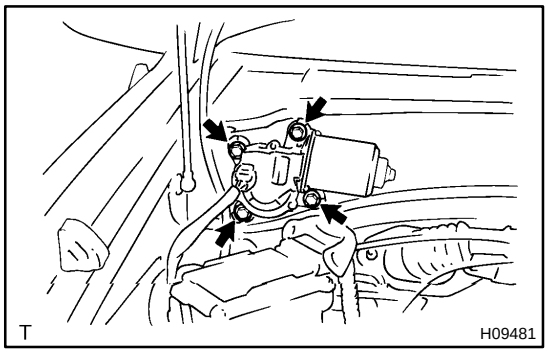
2. REMOVE COWL TOP VENTILATOR LOUVER

(a) Using a clip remover, remove the 6 clips.

(b) Remove the 8 screws and cowl top ventilator louver.

3. REMOVE HOOD TO COWL TOP SEAL

Remove the hood to cowl top seal from the cowl top ventilator louver.



4. REMOVE WIPER MOTOR

(a) Disconnect the connector.

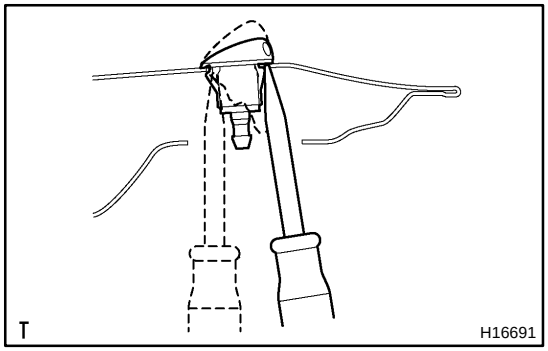
(b) Unfasten the 4 bolts.

(c) Disconnect the wiper motor from the wiper link, then remove the wiper motor.

5. REMOVE WIPER LINK

(a) Remove the 6 bolts.

(b) Remove the wiper link through the service hole.



6. REMOVE WASHER NOZZLE

(a) Disconnect the washer hose.

(b) Using a screwdriver, remove the nozzle.

HINT:

Tape the screwdriver tip before use.

(c) Employ the same manner described above to the other side.

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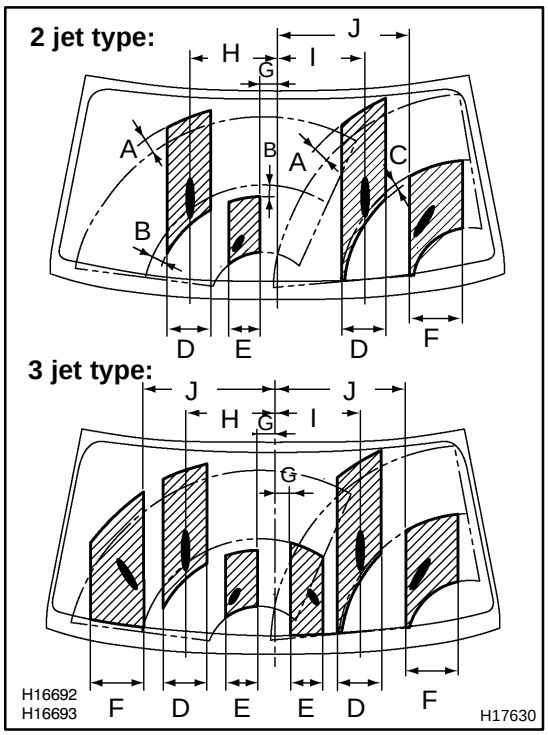
BO460–01



INSPECTION

INSPECT WASHER NOZZLE

While operating the washer, check whether the point where the washer fluid hits the windshield and the surge area are within the range indicated by hatched line.

A: Approx. 50 mm (1.97 in)
B: Approx. 40 mm (1.57 in)
C: Approx. 10 mm (0.39 in)
D: Approx. 150 mm (5.91 in)
E: Approx. 110 mm (4.33 in)
F: Approx. 180 mm (7.09 in)
G: Approx. 60 mm (2.36 in)
H: Approx. 310 mm (12.20 in)
I: Approx. 298 mm (11.69 in)
J: Approx. 455 mm (17.91 in)

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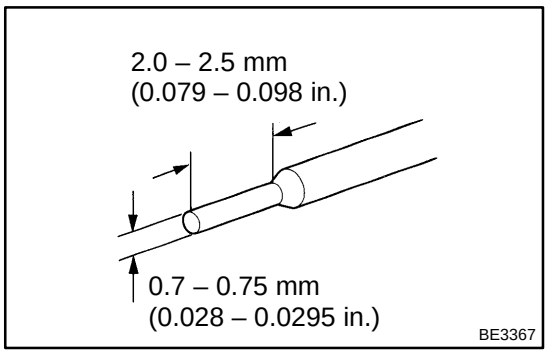
BO461–01



ADJUSTMENT

ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the windshield.

Dardoor.com

BO462–01

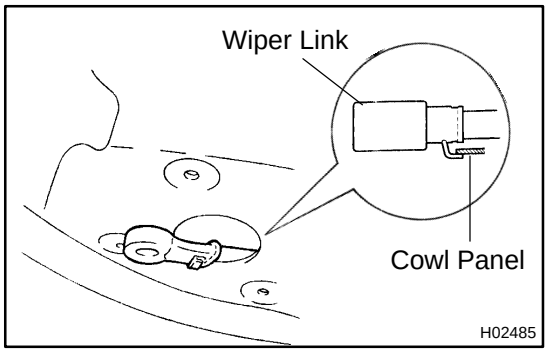
INSTALLATION

1. INSTALL WASHER NOZZLES

2. INSTALL WIPER LINK

Install the wiper link through the service hole, then torque the 6 bolts.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



3. INSTALL WIPER MOTOR

(a) Install the wiper motor to the wiper link.

HINT:

When installing the wiper motor, connect the claw of wiper link to the cowl panel shown in the illustration.

(b) Torque the 4 bolts.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(c) Connect the connector.

4. INSTALL HOOD TO COWL TOP SEAL

Install the hood to cowl top seal to the cowl top ventilator louver.

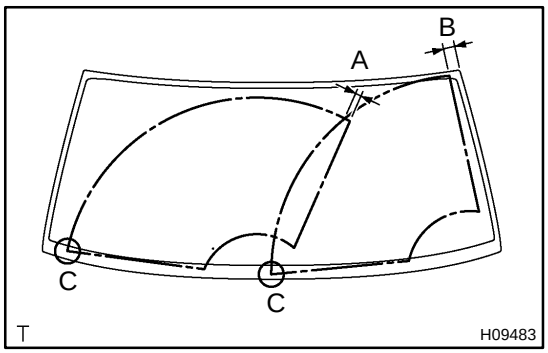
5. INSTALL COWL TOP VENTILATOR LOUVER

Install the cowl top ventilator louver with the 8 screws and 6 clips.

6. INSTALL WIPER ARMS

(a) Operate the wiper once and turn the wiper switch OFF.

(b) Install the wiper arms and tighten the nuts by hand.



(c) Adjust the installation positions of the wiper arms to the positions shown in the illustration.

A: Approx. 25.4 mm (1.000 in)

B: Approx. 40.0 mm (1.574 in)

HINT:

When installing the wiper arms, make sure that the tips of the blades are not beyond the ceramic edge as indicated ”C” part in the illustration.

(d) Torque the 2 nuts.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

(e) Install the 2 caps.

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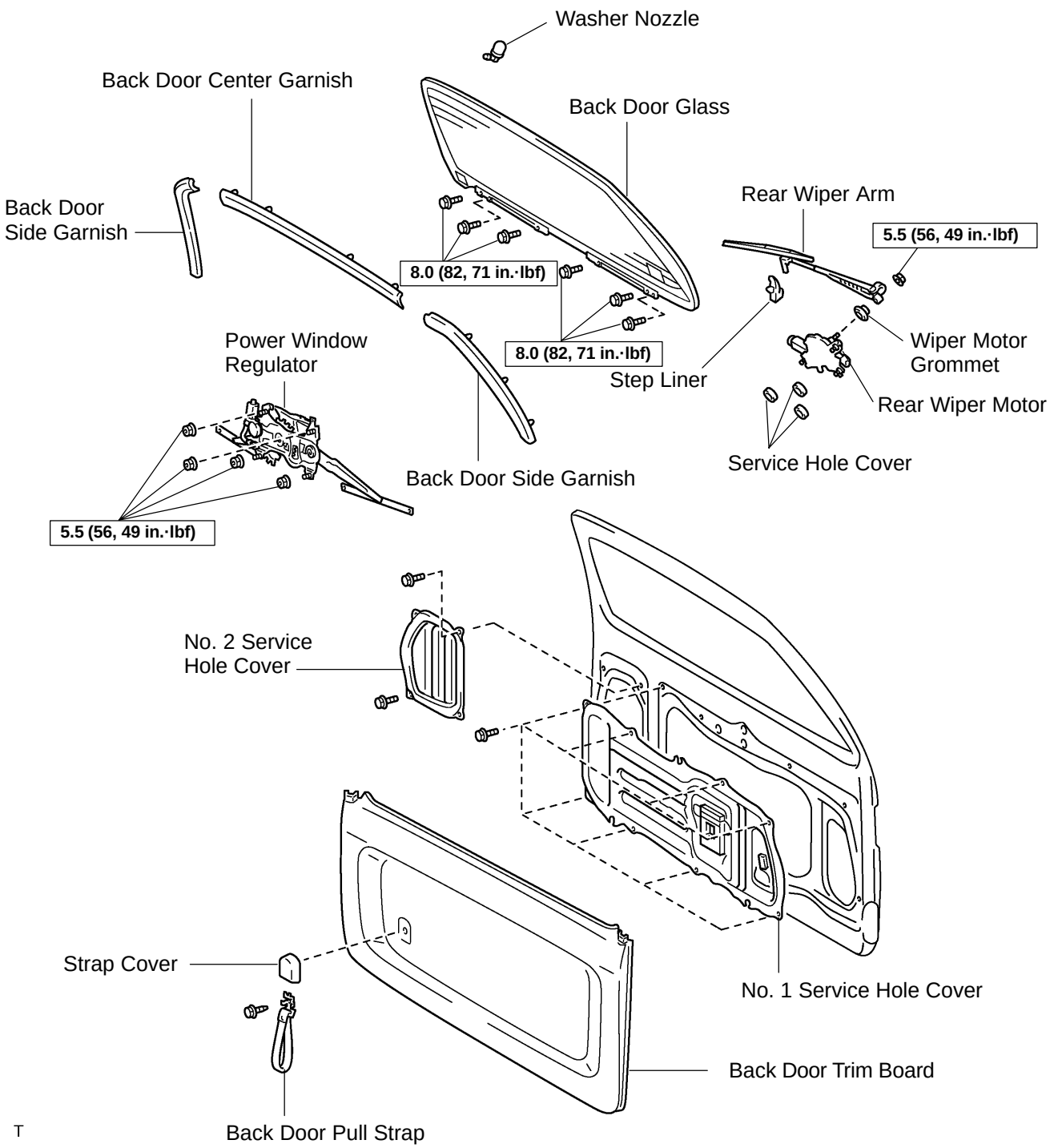
REAR WIPER AND WASHER

COMPONENTS

BO463–01



N·m (kgf·cm, ft·lbf) : Specified torque

H16777

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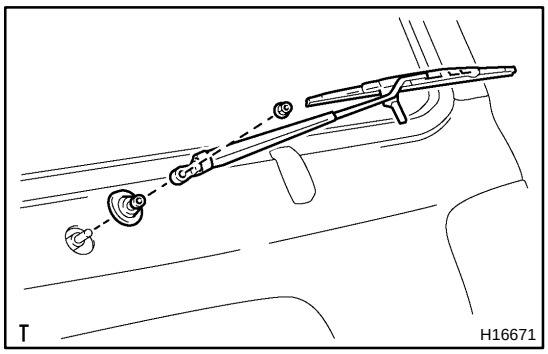
BO464–01

REMOVAL



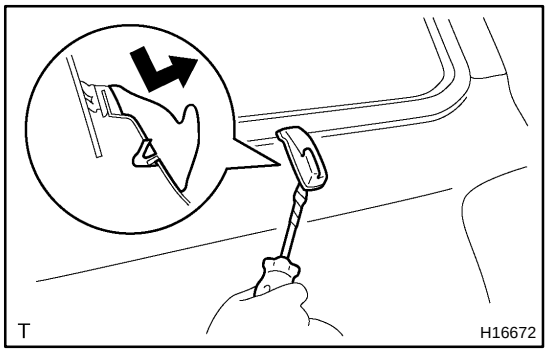
1. REMOVE REAR WIPER ARM

(a) Open the cover.

(b) Remove the nut and rear wiper arm.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(c) Remove the rear wiper motor grommet.



2. REMOVE STEP LINER

Using a screwdriver, remove the step liner.

HINT:

Tape the screwdriver tip before use.

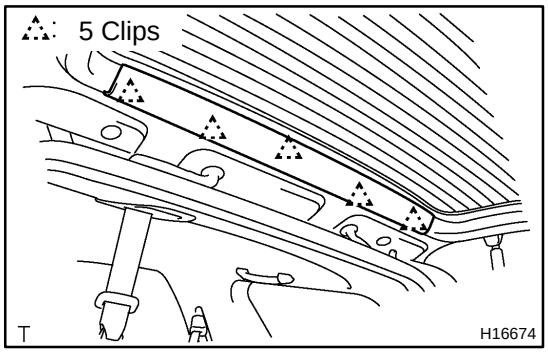
3. REMOVE BACK DOOR PULL STRAP

(a) Using a screwdriver, remove the strap cover.

HINT:

Tape the screwdriver tip before use.

(b) Remove the screw and back door pull strap.

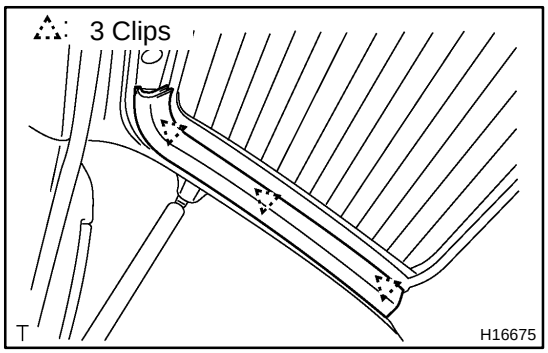


4. REMOVE BACK DOOR CENTER GARNISH

Using a screwdriver, remove the back door center garnish.

HINT:

Tape the screwdriver tip before use.



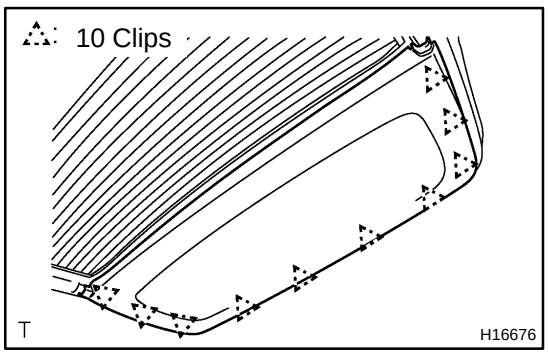
5. REMOVE BACK DOOR SIDE GARNISH

(a) Using a screwdriver, remove the back door side garnish.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



6. REMOVE BACK DOOR TRIM BOARD

(a) Insert a screwdriver between the back door and back door time board to pry the back door trim board out.

NOTICE:

Be careful not to damage the back door and back door trim board.

HINT:

Tape the screwdriver tip before use.

(b) Pull the back door trim board to remove it as shown in the illustration.

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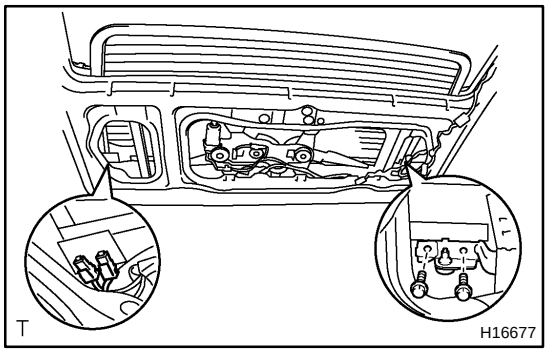
7. REMOVE NO. 1 SERVICE HOLE COVER

8. REMOVE NO. 2 SERVICE HOLE COVER

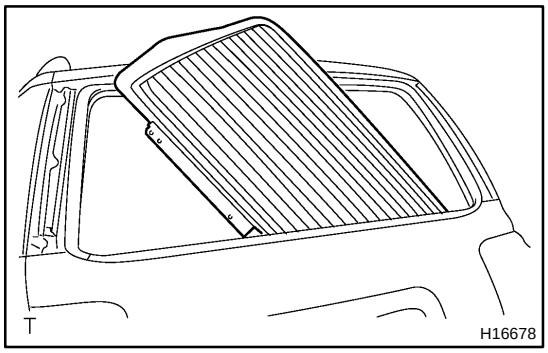


9. REMOVE BACK DOOR GLASS

(a) Open the back door glass until the bolts appear in the service hole.

(b) Disconnect the connector.

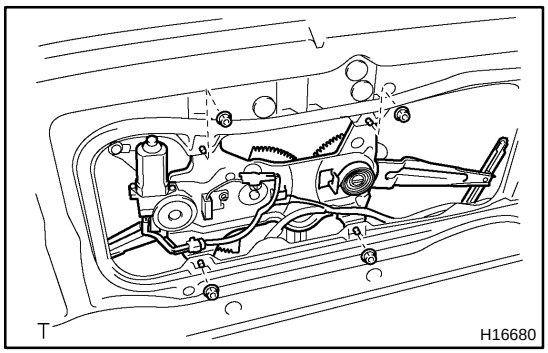
(c) Remove the 2 bolts and guide bracket.



(d) Remove the 4 bolts and back door glass as shown in the illustration.

NOTICE:

Be careful not to drop the back door glass.



10. REMOVE POWER WINDOW REGULATOR

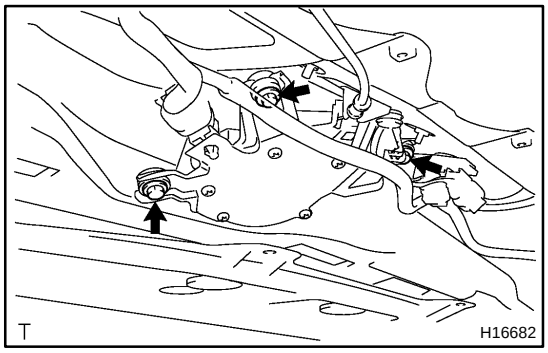
(a) Disconnect the connector.

(b) Disengage the connector and clamp.

(c) Remove the 4 nuts and power window regulator.

HINT:

Remove the power window regulator through the service hole.



11. REMOVE REAR WIPER MOTOR

(a) Disconnect the connector.

(b) Disengage the connector and clamp.

(c) Remove the service hole plug.

(d) Unfasten the 3 bolts, then remove the rear wiper motor.

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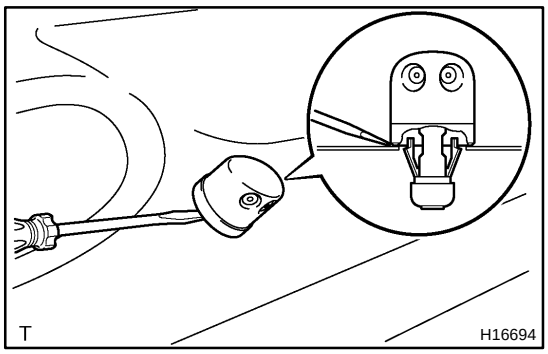

12. REMOVE WASHER NOZZLE

(a) Using a screwdriver, remove the washer nozzle.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the washer hose.

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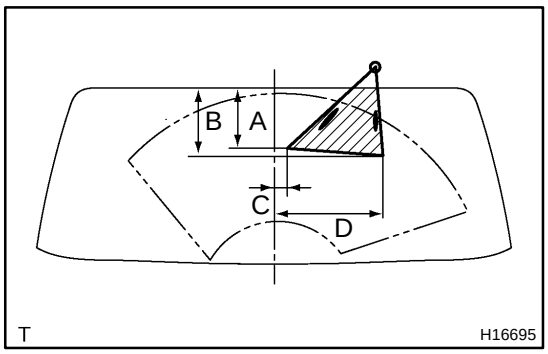
BO465–01



INSPECTION

INSPECT REAR WASHER NOZZLE

While operating the washer, check it the point where the washer fluid hits the back door glass is within the range indicated by the hatched line.

A: Approx. 156 mm (6.14 in)
B: Approx. 180 mm (7.09 in)
C: Approx. 33 mm (1.30 in)
D: Approx. 292 mm (11.50 in)

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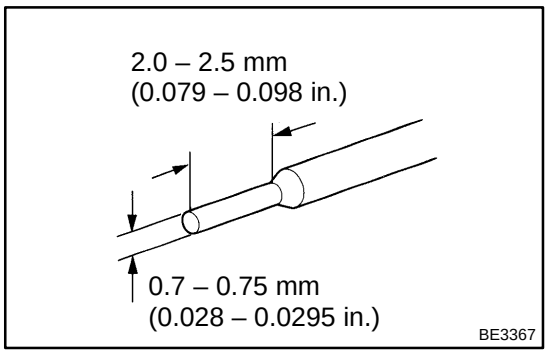
BO466–01



ADJUSTMENT

ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the back door glass.

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BO467–02

INSTALLATION

1. INSTALL WASHER NOZZLE

2. INSTALL REAR WIPER MOTOR

(a) Install the rear wiper motor, then torque the 3 bolts.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(b) Engage the connector and clamp.

(c) Connect the connector.

3. INSTALL POWER WINDOW REGULATOR
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

4. INSTALL BACK DOOR GLASS
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

5. INSTALL NO. 2 SERVICE HOLE COVER

6. INSTALL NO. 1 SERVICE HOLE COVER

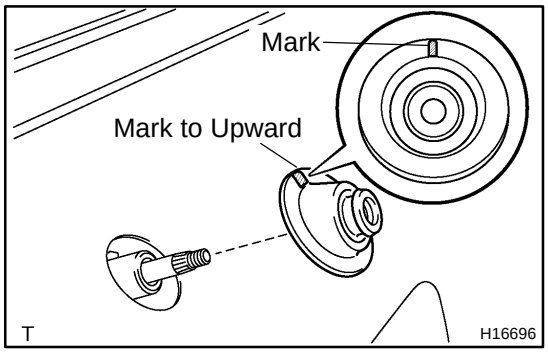
7. INSTALL BACK DOOR TRIM BOARD

8. INSTALL BACK DOOR SIDE GARNISH

9. INSTALL BACK DOOR CENTER GARNISH

10. INSTALL BACK DOOR PULL STRAP

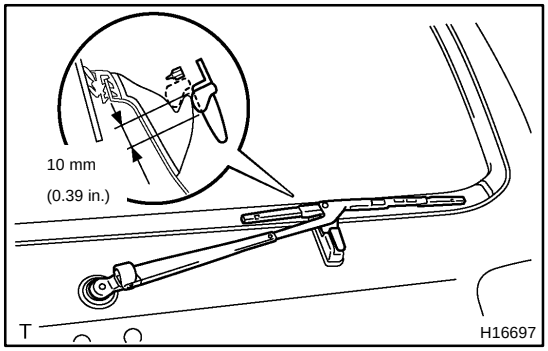
11. INSTALL STEP LINER



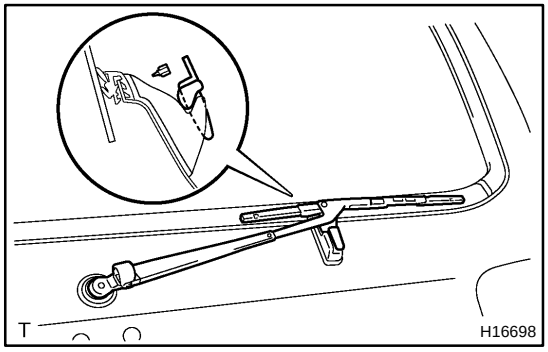
12. INSTALL REAR WIPER ARM

(a) Install the rear wiper motor grommet as shown in the illustration.

(b) Operate the wiper once and turn the wiper switch OFF.



(c) Install the wiper arm as shown in the illustration, then torque the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



(d) Set the wiper arm to rise–up position as shown in the illustration.

(e) Close the cover.

13. PERFORM INITIALIZATION (See page IN–20)

Back door power window control system needs initialization when disconnecting the cable from the negative battery terminal.

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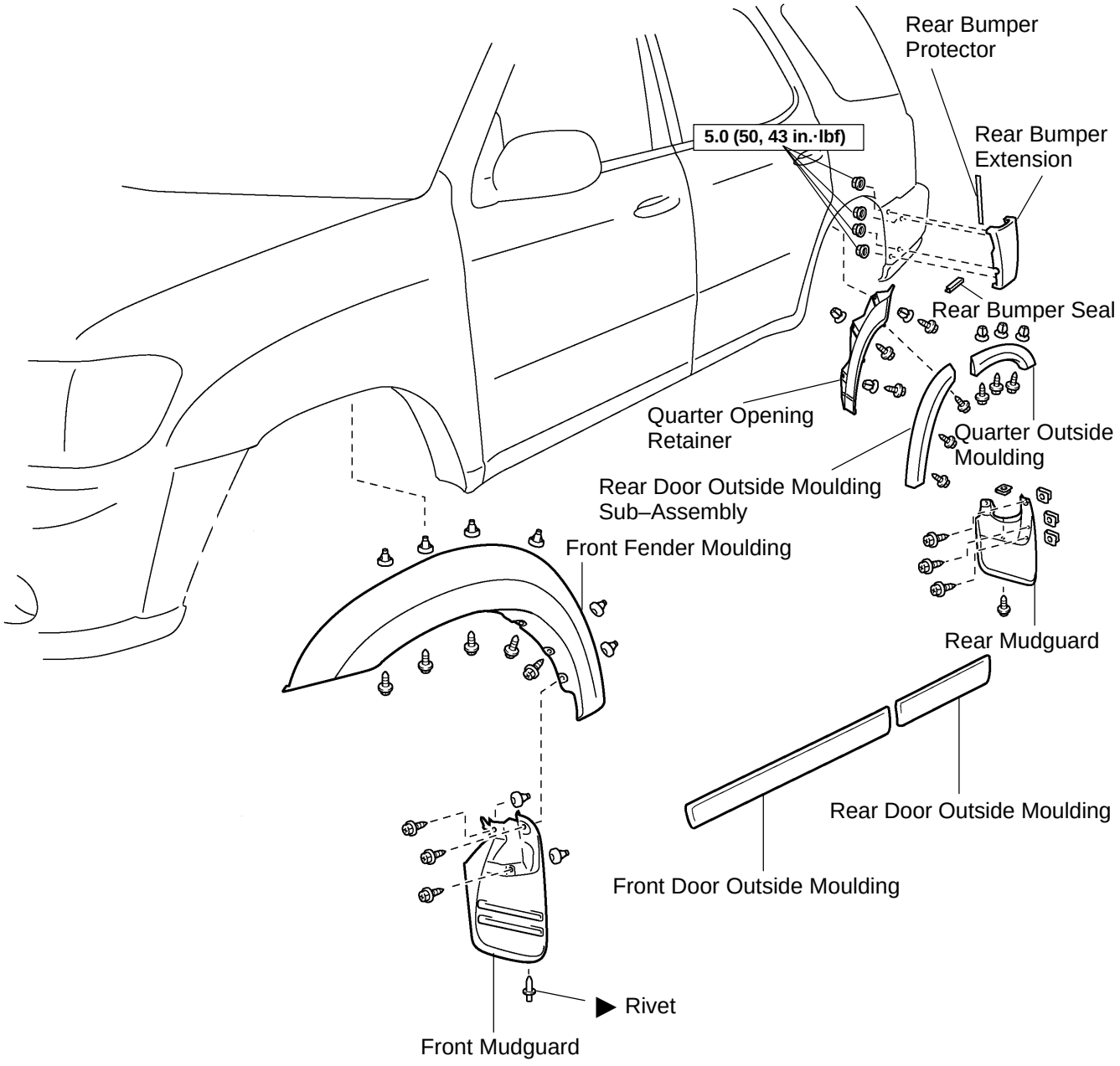
BODY OUTSIDE MOULDING

COMPONENTS

BO468–03



N·m (kgf·cm, ft·lbf) : Specified torque

▶ Non–reusable part

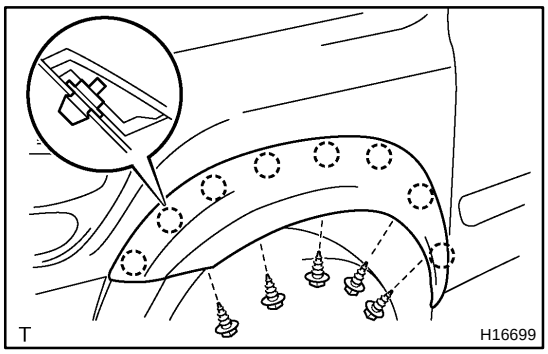
T

H24888

Dardoor.com

BO469–02

REMOVAL



1. REMOVE FRONT FENDER MOULDING

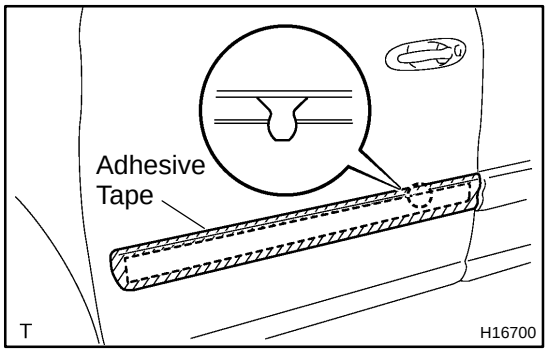
(a) Remove the 3 screws and front mudguard.

(b) Remove the 5 screws.

(c) Using a moulding remover, remove the front fender moulding.

HINT:

Tape the moulding remover tip before use.



2. REMOVE FRONT DOOR OUTSIDE MOULDING

(a) Apply protective tape to the outer surface as shown in the illustration, to keep the surface from being scratched.

(b) Using a heat light, heat the moulding to 40–60 ˚C (104 – 140 ˚F)

NOTICE:

Do not heat moulding excessively.

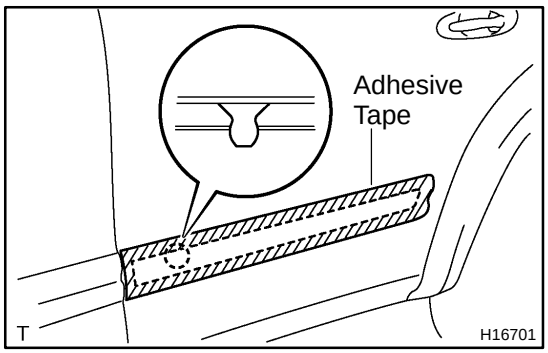
(c) Tie both piano wire ends to wooden blocks or similar objects.

(d) Cut the adhesive tape by pulling the piano wire.

NOTICE:

- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the door panel.**

(e) Remove the moulding.



3. REMOVE REAR DOOR OUTSIDE MOULDING

(a) Apply protective tape to the outer surface as shown in the illustration, to keep the surface from being scratched.

(b) Using a heat light, heat the moulding to 40 – 60 ˚C (104 – 140 ˚F)

NOTICE:

Do not heat moulding excessively.

(c) Tie both piano wire ends to wooden blocks or similar objects.

(d) Cut the adhesive tape by pulling the piano wire.

NOTICE:

- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the door panel.**

(e) Remove the moulding.

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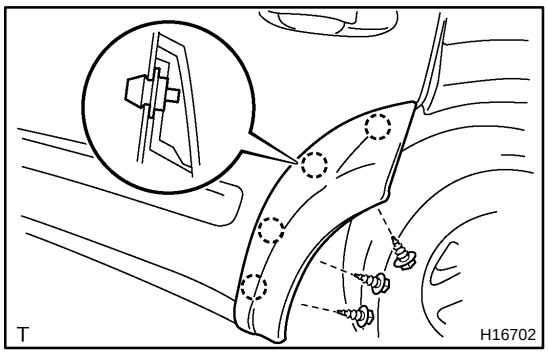


4. REMOVE REAR DOOR OUTSIDE MOULDING SUB–ASSEMBLY

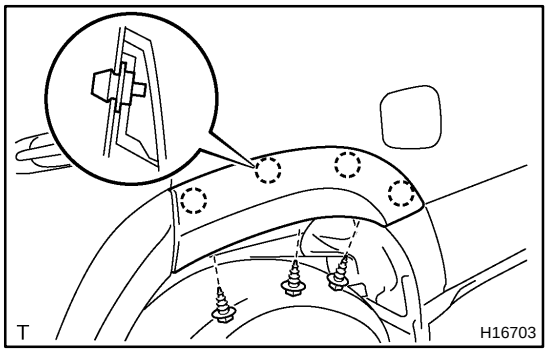
(a) Remove the 3 screws.

(b) Using a moulding remover, remove the rear door outside moulding sub–assembly.

HINT:

Tape the moulding remover tip before use.

(c) Remove the 3 screws and quarter opening retainer.



5. REMOVE QUARTER OUTSIDE MOULDING

(a) Remove the 3 screws.

(b) Using a moulding remover, remove the quarter outside moulding.

HINT:

Tape the moulding remover tip before use.

6. REMOVE REAR BUMPER EXTENSION

(a) Remove the 4 screws and rear mudguard.

(b) Remove the rear bumper cover.

(c) Remove the 4 nuts and rear bumper extension.

Dardoor.com

BO46A–02

INSTALLATION

1. INSTALL REAR BUMPER EXTENSION

(a) Install the rear bumper extension with the 4 nuts.
Torque: 5.0 N·m (50 kgf·cm, 43 in.·lbf)

(b) Install the rear bumper cover.

(c) Install the rear mudguard with the 4 screws.

2. INSTALL QUARTER OUTSIDE MOULDING

Install the quarter outside moulding with the 3 screws.

3. INSTALL REAR DOOR OUTSIDE MOULDING SUB–ASSEMBLY

(a) Install the quarter opening retainer with the 3 screws.

(b) Install the rear door outside moulding sub–assembly with the 3 screws.

4. INSTALL REAR DOOR OUTSIDE MOULDING

(a) Clean the rear door mounting surface.

(1) Using a heat light, heat the rear door mounting surface to 40 – 60 °C (104 – 140 °F)

(2) Remove the adhesive tape from the rear door.

(3) Wipe off the stain with cleaner.

(b) If reusing the moulding:
Clean the rear door outside moulding.

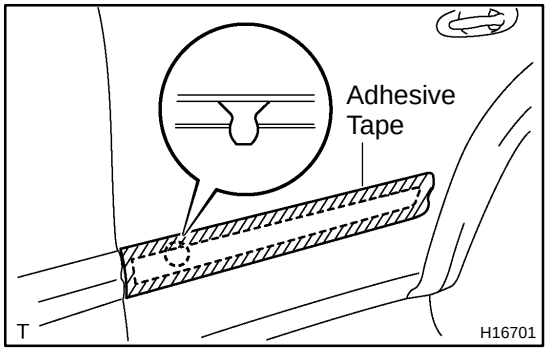
(1) Using a heat light, heat the moulding to 20 – 30 °C (68 – 86 °F)

NOTICE:
Do not heat the moulding excessively.

(2) Remove the adhesive tape from the moulding.

(3) Wipe off the stains with cleaner.

(4) Apply new adhesive tapes to the moulding.



(c) Install the rear door outside moulding.

(1) Using a heat light, heat the rear door panel and moulding
Rear door panel: 40 – 60 °C (104 – 140 °F)
Moulding: 20 – 30 °C (68 – 86 °F)

NOTICE:
Do not heat the rear door and moulding.

(2) Lift the moulding release sheet from face of moulding.

NOTICE:
When the moulding release sheet is removed, make sure that no dirt or dust can get onto the uncoated area.

(3) Align the boss with the corresponding hole in rear door, and press firmly on the moulding.

5. INSTALL FRONT DOOR OUTSIDE MOULDING

(a) Clean the front door mounting surface.

(1) Using a heat light, heat the front door mounting surface to 40 – 60 °C (104 – 140 °F)

(2) Remove the adhesive tape from the front door.

(3) Wipe off the stain with cleaner.

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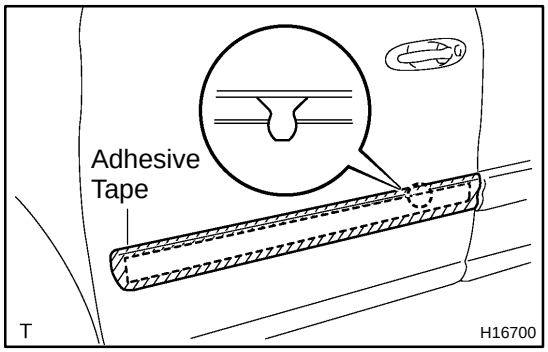
(b) If reusing the moulding:
Clean the front door outside moulding.
(1) Using a heat light, heat the mounting to 20 – 30 ˚C (68 – 86 ˚F)

NOTICE:
Do not heat the moulding excessively.

(2) Remove the adhesive tape from the moulding.
(3) Wipe off the stains with cleaner.
(4) Apply new adhesive tapes to the moulding.



(c) Install the front door outside moulding.
(1) Using a heat light, heat the front door panel and moulding
Front door panel: 40 – 60 ˚C (104 – 140 ˚F)
Moulding: 20 – 30 ˚C (68 – 86 ˚F)

NOTICE:
Do not heat the front door and moulding.

(2) Lift the moulding release sheet from face of moulding.

NOTICE:
When the moulding release sheet is removed, make sure that no dirt or dust can get onto the uncoated area.

(3) Align the boss with the corresponding hole in front door, and press firmly on the moulding.

6. INSTALL FRONT FENDER MOULDING

(a) Install the front fender moulding with the 5 screws.
(b) Install the front mudguard with the 3 screws.

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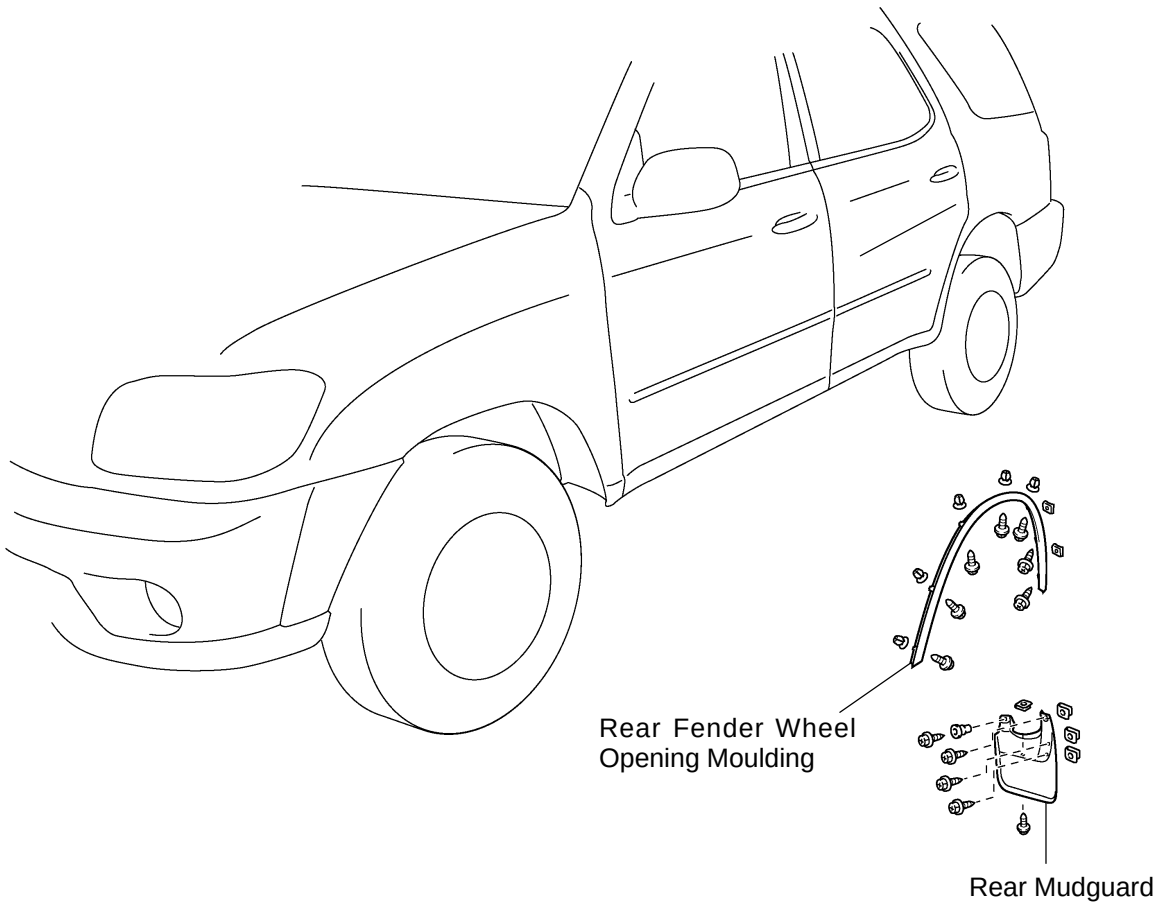
WHEEL ARCH MOULDING

COMPONENTS

BO46B–03



▶ Non–reusable Part

H24862

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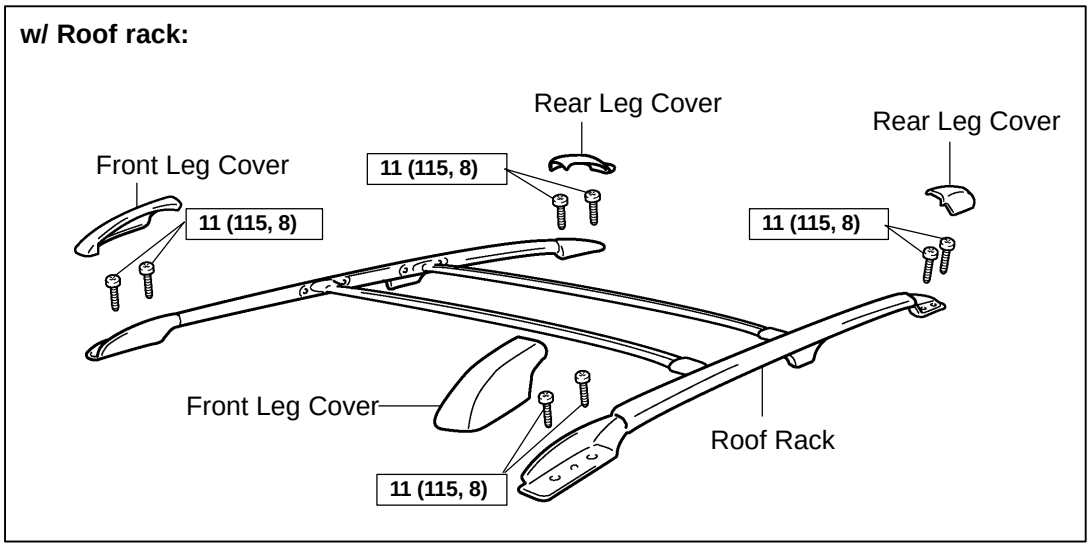
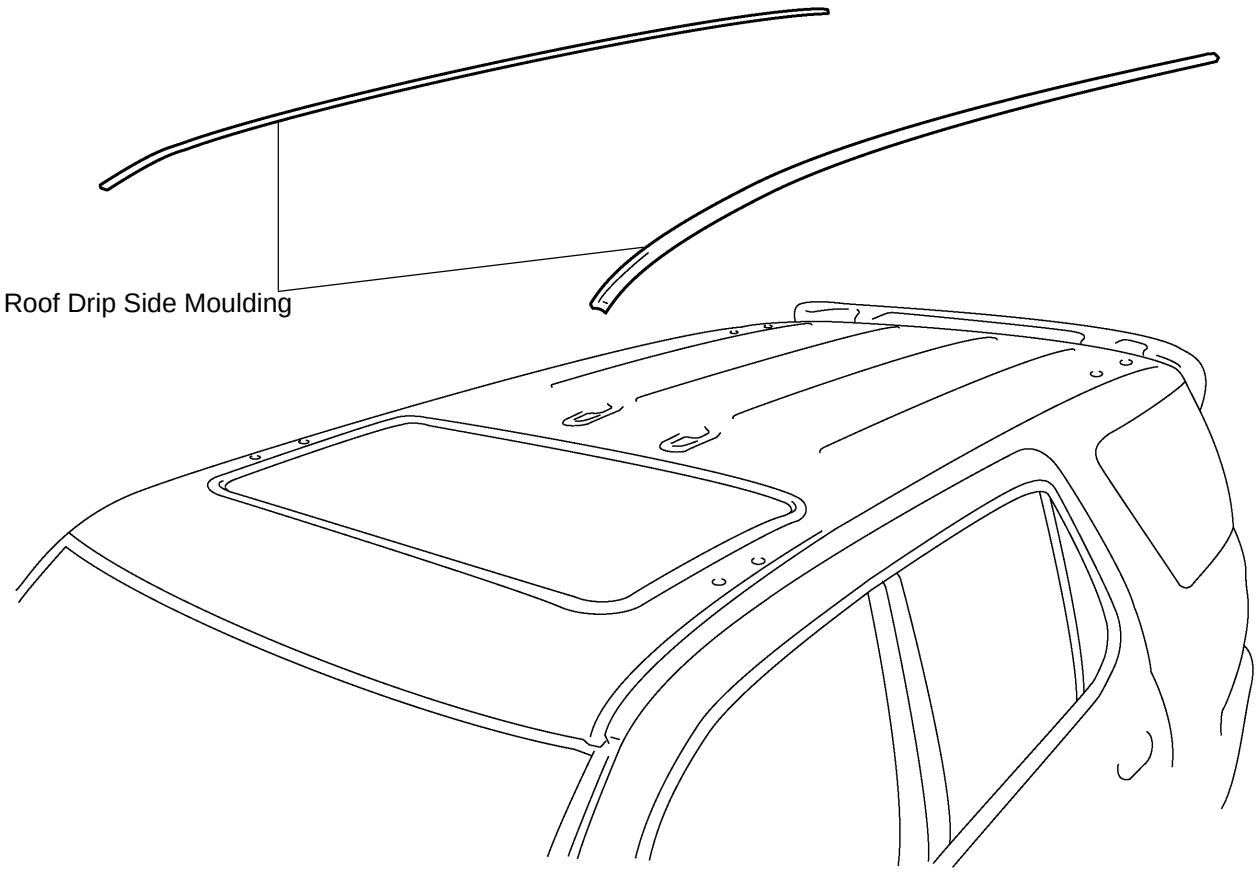
ROOF DRIP SIDE MOULDING

COMPONENTS

BO46C–01





T N·m (kgf·cm, ft·lbf) : Specified torque

H16710

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BO46D–01

REMOVAL

1. w/ Roof rack:
REMOVE ROOF RACK (See page BO–173)

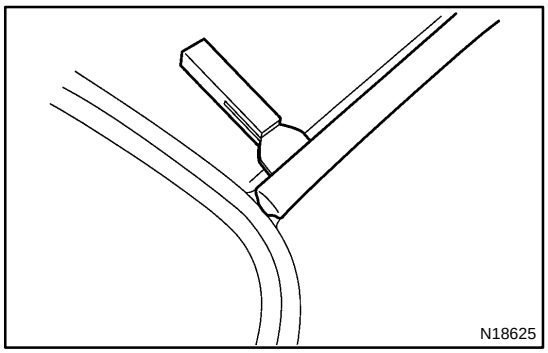
2. REMOVE ENDS OF ROOF DRIP SIDE MOULDING

(a) Apply protective tape to the outer surface to keep the surface from being scratched.

(b) Using a heat light, heat the moulding to 20 – 30 °C (68 – 86 °F)

NOTICE:

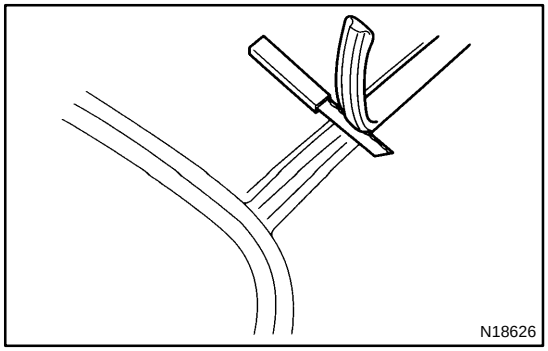
Do not heat the moulding excessively.



(c) Using a scraper, pull off the roof drip side moulding from the front and rear ends.

HINT:

Tape the scraper tip before use.



3. REMOVE ROOF DRIP SIDE MOULDING

(a) Pull off the moulding by cutting the adhesive with a knife at the front and rear ends.

(b) Remove the moulding.

NOTICE:

Do not damage the body with the knife.

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BO46E–01

INSTALLATION

1. CLEAN CONTACT SURFACE OF BODY

(a) Using a heat light, heat the moulding surface to 40 – 60 ˚C (104 – 140˚F).

NOTICE:

Do not heat the body excessively.

(b) Using a knife, cut away any rough areas on the body.

NOTICE:

Be careful not to damage the body.

(c) Wipe off stains with cleaner.

2. If reusing the moulding:
CLEAN MOULDING

(a) Using a heat light, heat the moulding surface to 20 – 30 ˚C (68 – 86˚F).

NOTICE:

Do not heat the moulding excessively.

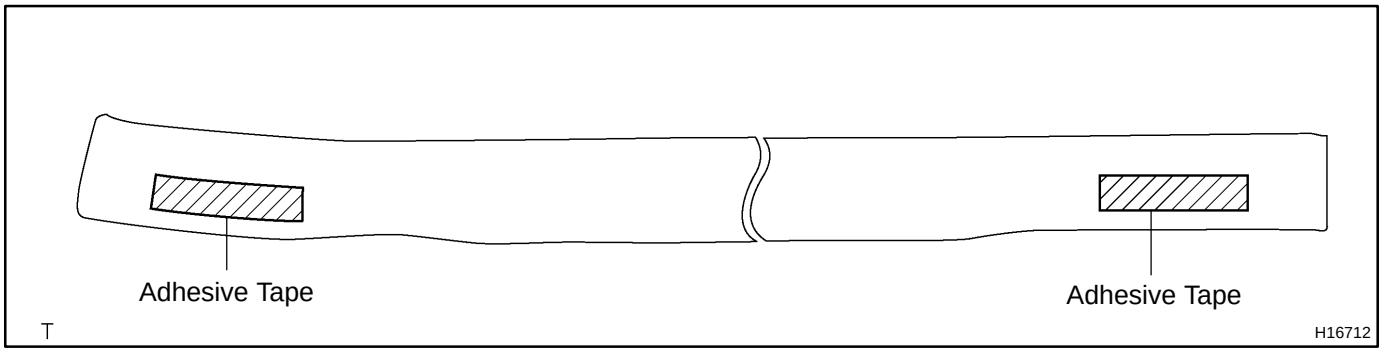
(b) Using a knife, cut the remaining adhesive from the moulding.

NOTICE:

Be careful not to damage the moulding.

(c) Wipe off stains with cleaner.

(d) Apply a new adhesive tape to the moulding as shown in the illustration.



3. COAT CONTACT SURFACE OF BODY WITH PRIMER ”M”

Using a brush, coat the contact surface on the body with Primer M as shown in the illustration.

NOTICE:

- **Allow 3 minutes or more to dry the primer coated surface.**
- **Do not coat the adhesive.**

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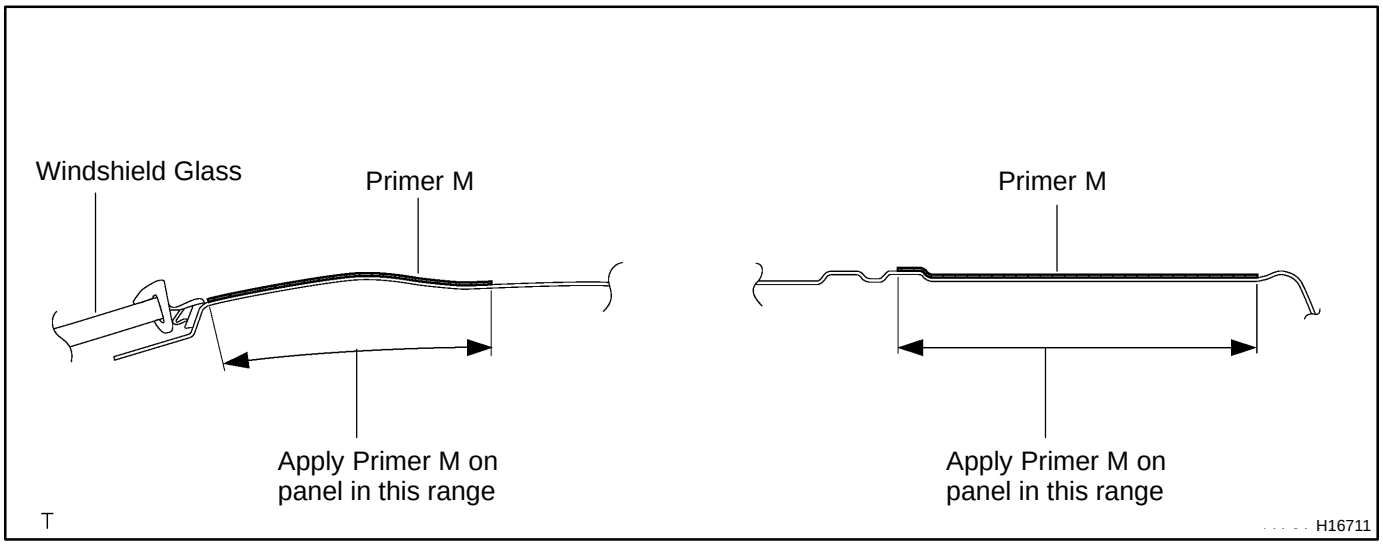
▶ **Do not keep any of the opened Primer M for later use.**



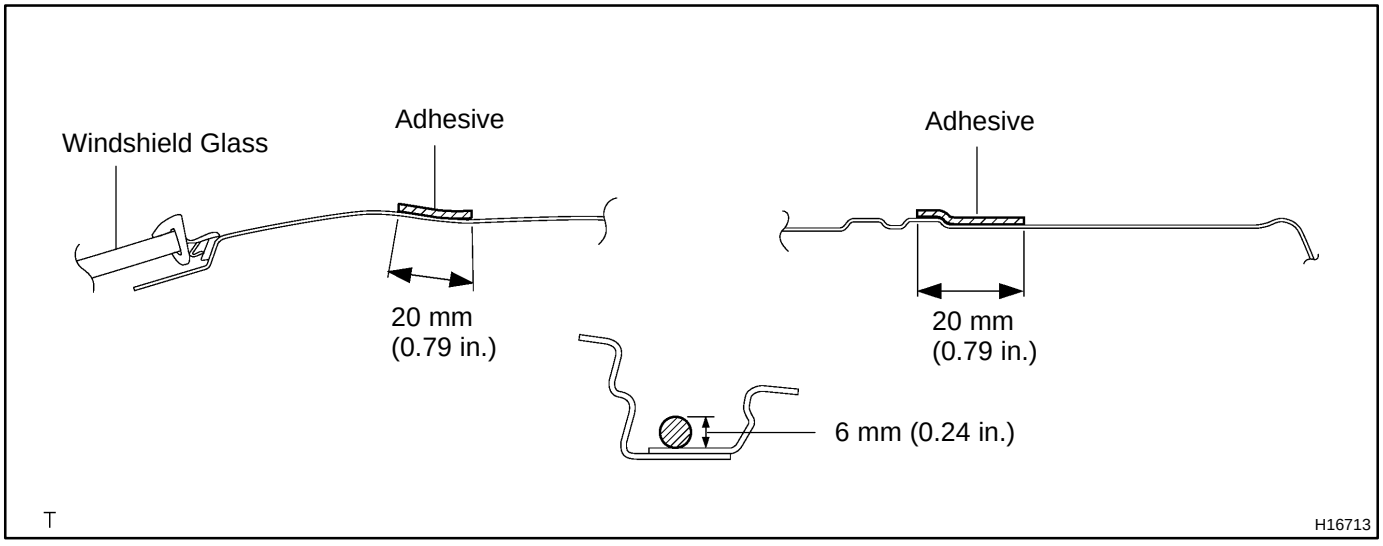
4. APPLY ADHESIVE

(a) Cut off the tip of cartridge nozzle.
Part No. 08850–00801 or equivalent.

HINT:
After cutting off the tip, use all adhesive within the time described in the table below.

Temperature	Tackfree time
35 ˚C (95 ˚F)	15 minutes
20 ˚C (68 ˚F)	100 minutes
5 ˚C (41 ˚F)	8 minutes

(b) Load the cartridge into the sealer gun.
(c) Apply adhesive to the hatched area in the illustration for both front and rear of the vehicle.



5. INSTALL ROOF DRIP SIDE MOULDING

(a) Using a heat light, heat the moulding to 20 – 30 ˚C (68 – 86 ˚F)

NOTICE:
Do not heat the moulding excessively.

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(b) Lift the moulding release sheet from the face of moulding.

NOTICE:

When the moulding release sheet is removed, make sure that no dirt or dust can get onto the coated area.

(c) Install the moulding.

NOTICE:

- **Make sure that the body and moulding are heated to a proper temperature.**
- **Do not depress the adhesive coated parts excessively but just hold them down with your thumb.**
- **Scrape off any overflowing adhesive with a plastic spatula and clean the surface with a dry rag.**
- **Take care not to drive the vehicle during the time described in the table below.**

Temperature	Minimum time prior to driving the vehicle
35 ˚C (95 ˚F)	1.5 hours
20 ˚C (68 ˚F)	5 hours
5˚C (41˚ F)	24 hours

6. w/ Roof rack:

INSTALL ROOF RACK (See page BO–173)

Torque: 11 N·m (115kgf·cm, 8 ft·lbf)

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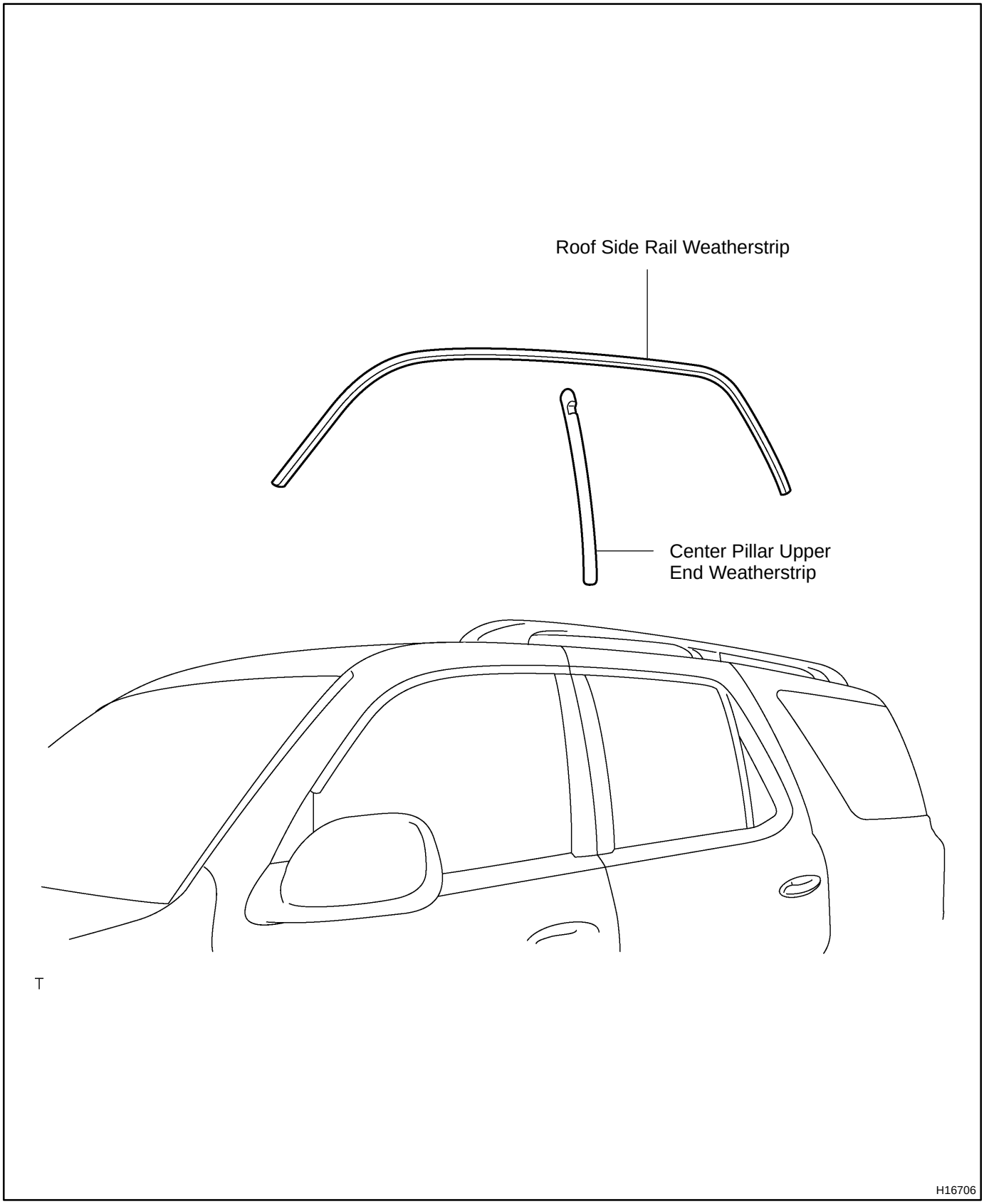
ROOF DRIP SIDE FINISH MOULDING

BO46F–01

COMPONENTS



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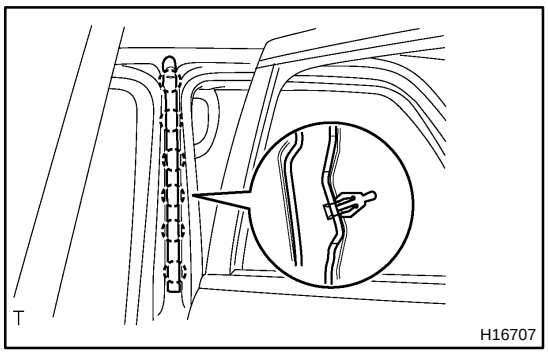
BO46G–01

REMOVAL

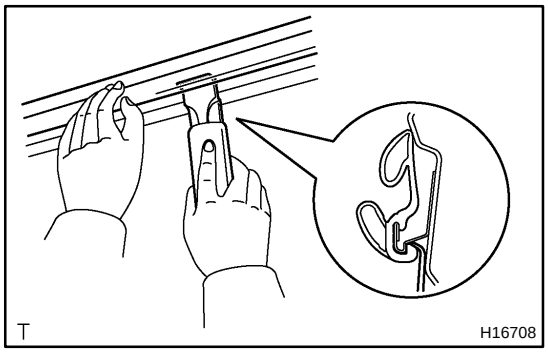


1. REMOVE CENTER PILLAR UPPER END WEATHERSTRIP

Using a screwdriver, remove the weatherstrip.

HINT:

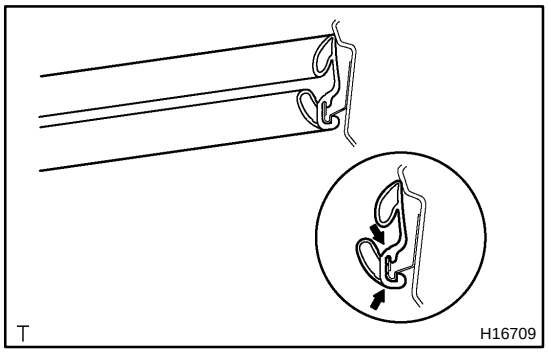
Tape the screwdriver tip before use.



2. REMOVE ROOF SIDE RAIL WEATHERSTRIP

Using SST, pull off the roof side rail weatherstrip from end.

SST 09806–30010



HINT:

At the time of installation, please refer to the following item.

Attach the upper edge of the weatherstrip to body flange. Tap on the weatherstrip by hand.

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INSTALLATION

Installation is in the reverse order of removal (See page BO–58).

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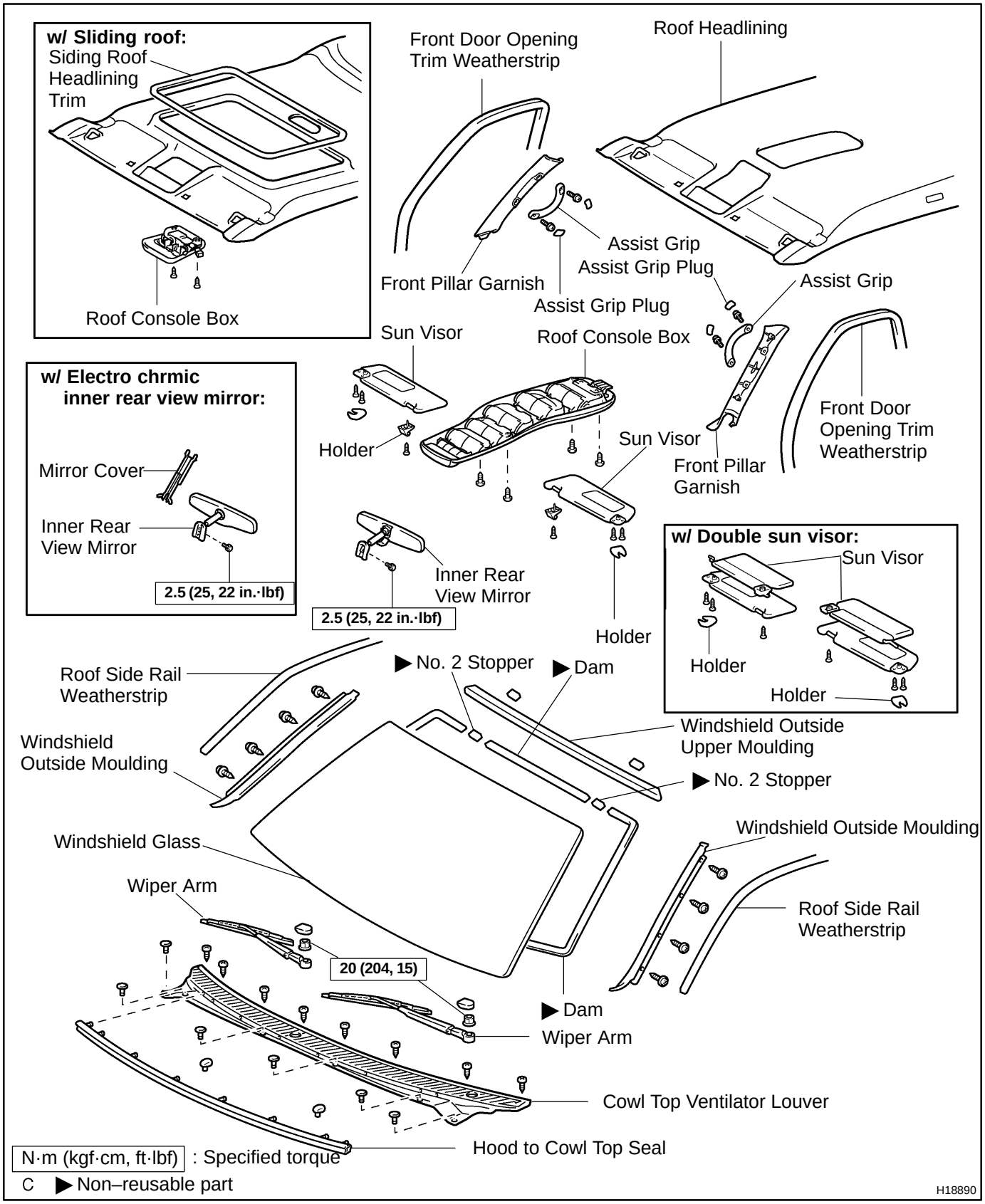
WINDSHIELD

COMPONENTS

BO46I–02



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BO4HJ–01

REMOVAL

1. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIPS

2. REMOVE FRONT PILLAR GARNISH

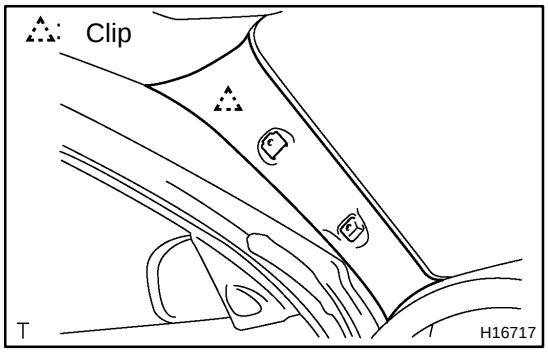
(a) Remove the assist grip.

(1) Using a screwdriver, remove the 2 assist grip plugs.

HINT:

Tape the screwdriver tip before use.

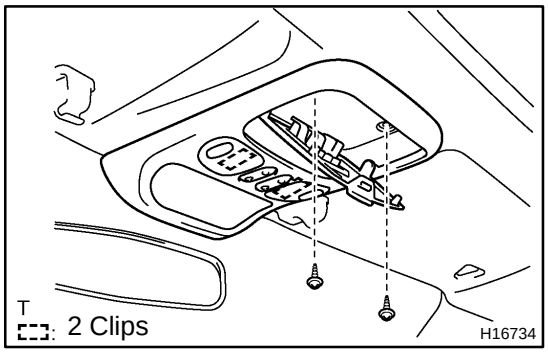
(2) Remove the 2 screws and assist grip.



(b) Remove the front pillar garnish.

(c) Use the same manner described above to the other side.

3. REMOVE SUN VISORS AND HOLDERS



4. w/ Sliding roof:
REMOVE ROOF CONSOLE BOX

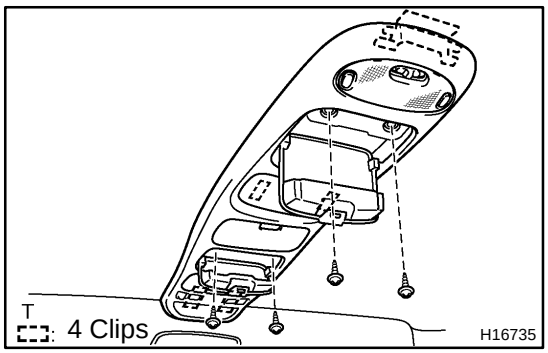
(a) Remove the 2 screws.

(b) Using a screwdriver, remove the roof console box.

HINT:

Tape the screwdriver tip before use.

(c) Disconnect the connectors.



5. w/o Sliding roof:
REMOVE ROOF CONSOLE BOX

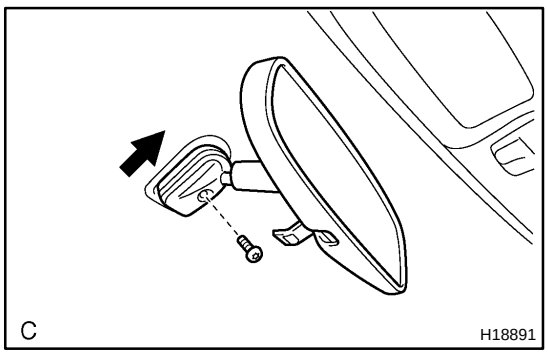
(a) Remove the 4 screws.

(b) Using a screwdriver, remove the roof console box.

HINT:

Tape the screwdriver tip before use.

(c) Disconnect the connectors.



6. w/o Electro chromic inner rear view mirror:
REMOVE INNER REAR VIEW MIRROR

Remove the torx screw and inner rear view mirror as shown in the illustration.

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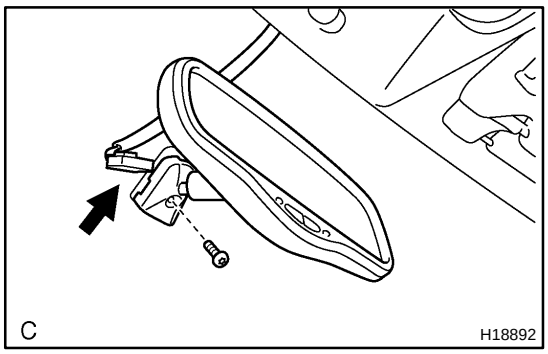


7. w/ Electro chromic inner rear view mirror: REMOVE INNER REAR VIEW MIRROR

(a) Remove the mirror cover.
(b) Disconnect the connector.
(c) Remove the torx screw and inner rear view mirror.

8. REMOVE WIPER ARMS

(a) Using a screwdriver, remove the 2 caps.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 nuts and wiper arms.

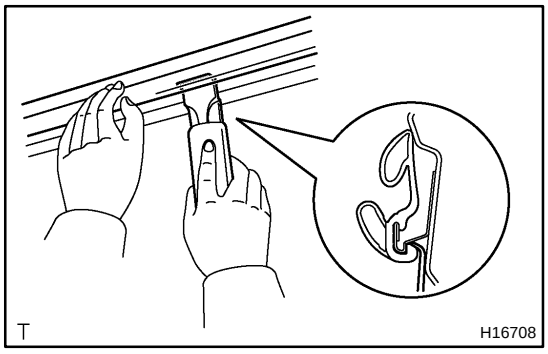
9. REMOVE COWL TOP VENTILATOR LOUVER

(a) Remove the hood to cowl top seal.
(b) Using a clip remover, remove the 6 clips.
(c) Remove the 8 screws and cowl top ventilator louver.

10. REMOVE ROOF SIDE RAIL WEATHERSTRIP

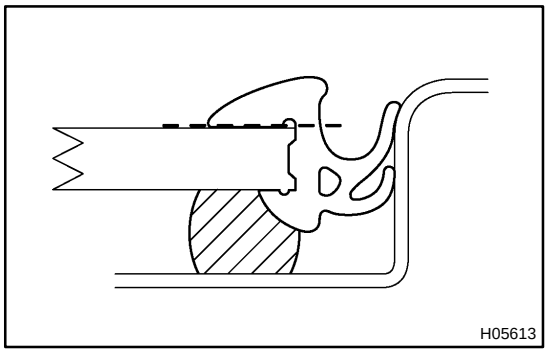
Using SST, pull off the roof side rail weatherstrip from front end.

SST 09806–30010



11. REMOVE WINDSHIELD OUTSIDE MOULDINGS

Remove the 8 screws and windshield outside mouldings.

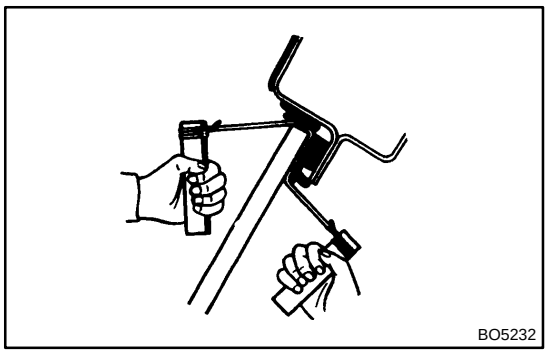


12. REMOVE WINDSHIELD OUTSIDE UPPER MOULDING

Using a knife, cut off the moulding as shown in the illustration.

NOTICE:

Do not damage the body with the knife.

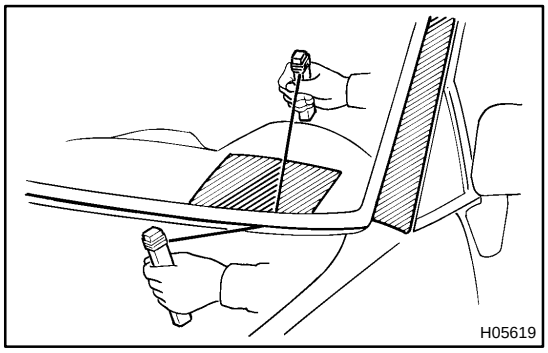


13. REMOVE WINDSHIELD GLASS

(a) Push piano wire through between the body and glass from the interior.
(b) Tie both wire ends to wooden blocks or similar objects.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.



NOTICE:

When separating the glass, be careful not to damage the paint and exterior ornaments. To prevent scratching the safety pad when removing the windshield, place a plastic sheet between the piano wire and the safety pad.

(c) Cut the adhesive by pulling the piano wire around it.
(d) Remove the glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting off the glass.

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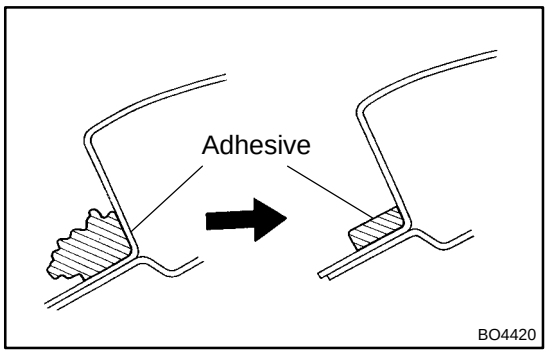
BO4HK–01

INSTALLATION



1. CLEAN AND SHARE CONTACT SURFACE OF BODY

(a) Using a knife, cut away any rough areas on the body.

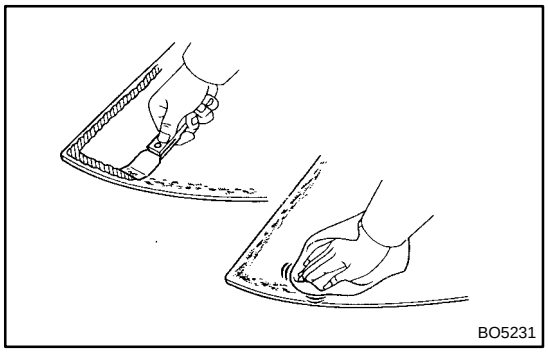
HINT:

Leave the adhesive on the body as much as possible.

(b) Clean the cut surface of the adhesive with a shop rag saturated in cleaner.

HINT:

Even if the adhesive has been removed, clean the body.



2. CLEAN REMOVE GLASS

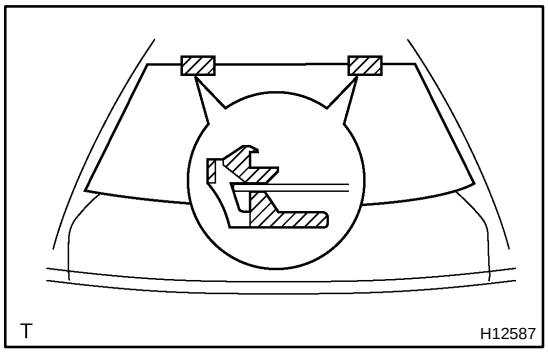
(a) Remove the damaged No. 2 stoppers and dams.

(b) Using a scraper, remove the adhesive sticking to the glass.

(c) Clean the glass with cleaner.

NOTICE:

- **Be careful not to damage the glass.**
- **Do not touch the glass face after cleaning it.**



3. w/ No. 1 stopper:

REPLACE NO. 1 STOPPERS

(a) Remove the damaged stoppers.

(b) Cut off the old adhesive around the stopper installation area.

NOTICE:

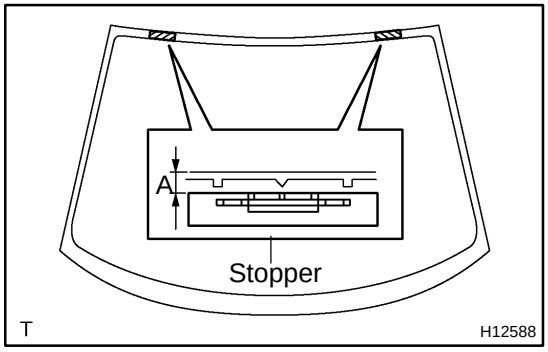
Be careful not to damage the body.

(c) Clean the installation area.

(d) Attach new stoppers to the body so that the notches on the body will align with the stoppers as shown in the illustration.

HINT:

Make sure that the stoppers are installed facing the correct direction.



4. INSTALL NEW NO. 2 STOPPERS

Attach new stoppers to the glass so that the ceramic notches on the glass will align with the stoppers as shown in the illustration.

HINT:

Make sure that the stoppers are installed facing the correct direction.

A:

w/ No. 1 stopper: 8.0 mm (0.315 in.)

w/o No. 1 stopper: 8.9 mm (0.350 in.)

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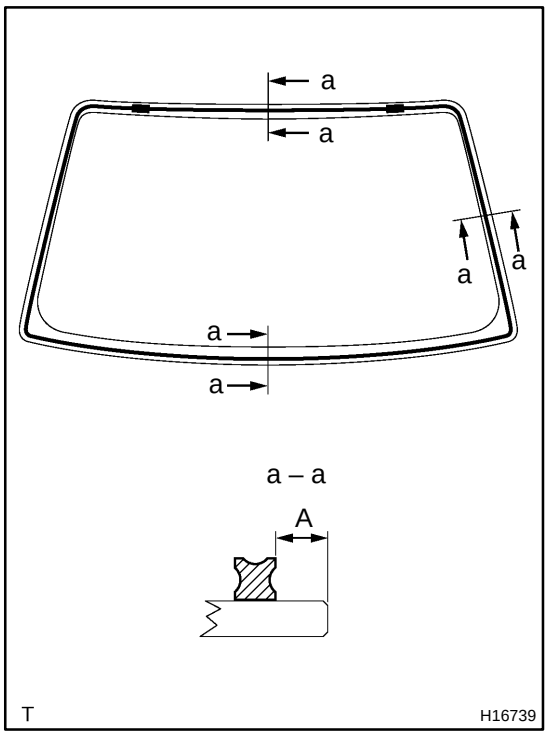
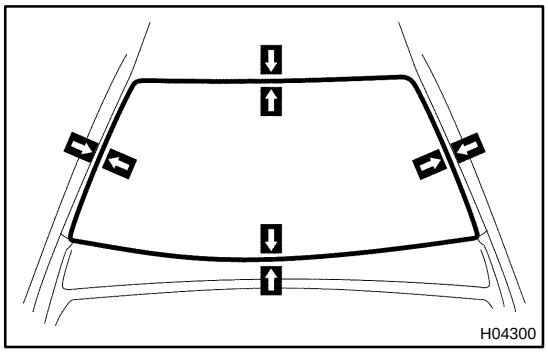


5. INSTALL NEW DAMS

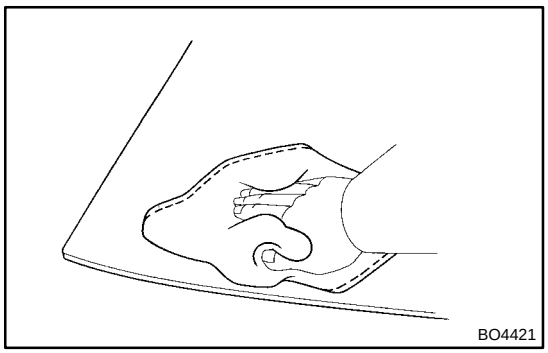
Install new dams with adhesive tape as shown in the illustration.

A: 7.0 mm (0.276 in.)



6. POSITION GLASS

(a) Place the glass in the correct position.
(b) Check that all contacting parts of the glass rim are set perfectly even.
(c) Place reference marks on the glass and body.
(d) Remove the glass.

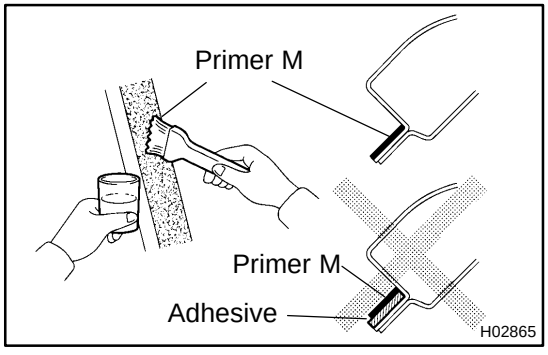


7. CLEAN CONTACT SURFACE OF GLASS

Using a cleaner, clean the contact surface which is black–colored area around the entire glass rim.

NOTICE:

Do not touch the glass face after cleaning it.



8. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat Primer M to the exposed part of body on the vehicle side.

NOTICE:

- **Allow 3 minutes or more to dry the primer coated surface.**
- **Do not coat Primer M to the adhesive.**
- **Do not keep any of the opened Primer M for later use.**

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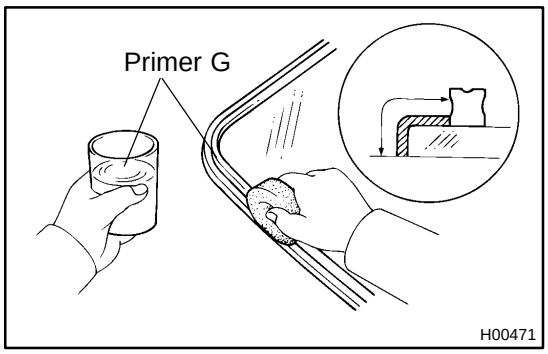


9. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G as shown in the illustration.

(b) When the primer is coated wrongly to the area other than the specified, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Allow 3 minutes or more to dry the primer coated surface.**
- **Do not keep any of the opened Primer G for later use.**

10. APPLY ADHESIVE

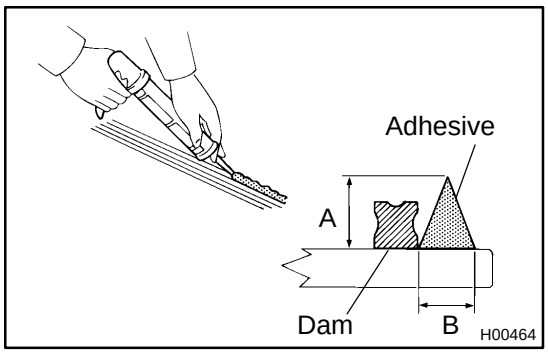
(a) Cut off the tip of the cartridge nozzle.
Part No. 08850–00801 or equivalent

HINT:

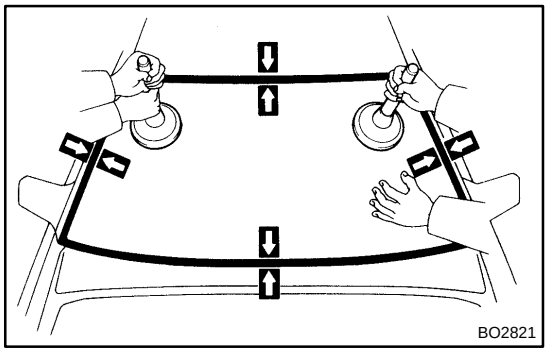
After cutting off the tip, use all adhesive within the time described in the table below.

Temperature	Tackfree time
35˚C (95 ˚F)	15 minutes
20˚C (68 ˚F)	100 minutes
5˚C (41 ˚F)	8 hours

(b) Load the cartridge into the sealer gun.



(c) Coat the glass with adhesive as shown in the illustration.
A: 12.0 mm (0.472 in.)
B: 8.0 mm (0.315 in.)



11. INSTALL WINDSHIELD GLASS AND MOULDING

(a) Install the glass, aligning the reference marks using a suction rubber.

HINT:

Check to see that the stoppers are attached to the body correctly.

(b) Lightly press the glass front surface for close contact.

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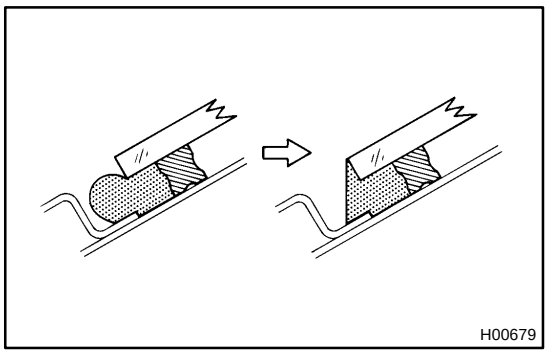
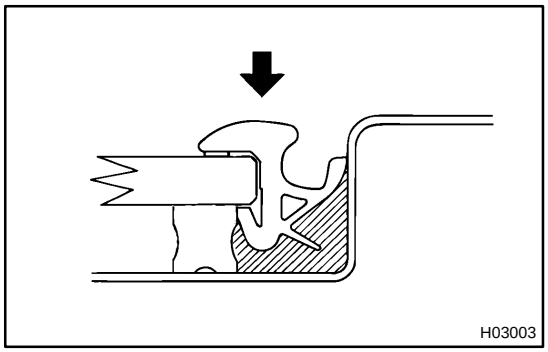


(c) Correct insufficient or protruded adhesive agent using a spatula.

HINT:

Apply the adhesive agent up to the windshield glass edge.



(d) Install a new windshield outside upper moulding to the windshield glass before the adhesive agent hardens.

HINT:

Install the moulding, aligning the center of moulding with the center of body.

(e) Remove any excessive adhesive agent before it hardens.

(f) Hold the glass and moulding in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

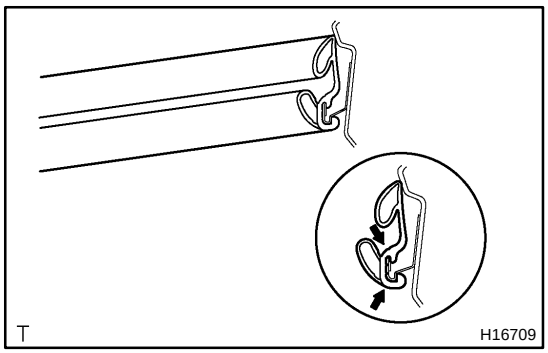
Temperature	Minimum time prior to driving the vehicle
35˚C (95 ˚F)	1.5 hours
20˚C (68 ˚F)	5 hours
5˚C (41 ˚F)	24 hours

12. INSTALL WINDSHIELD OUTSIDE MOULDINGS

13. INSPECT FOR LEAK AND REPAIR

NOTICE:

Contact a leak test after the hardening time has elapsed.



14. INSTALL ROOF SIDE RAIL WEATHERSTRIP

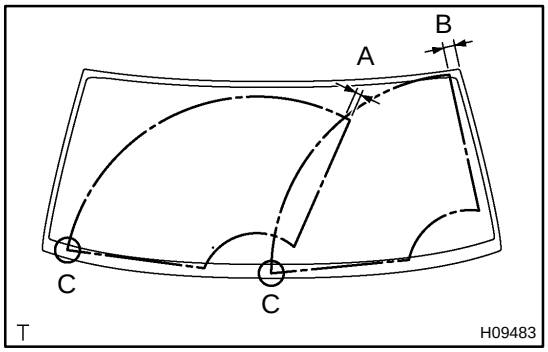
Attach the upper edge of the weatherstrip to body flange. Tap on the weatherstrip by hand.

15. INSTALL COWL TOP VENTILATOR LOUVER

16. INSTALL WIPER ARMS

(a) Operate the wipers once and turn the wiper switch OFF.

(b) Install the wiper arms and tighten the nuts by hand.



(c) Adjust the installation positions of the wiper arms to positions shown in the illustration.

A: Approx. 25.4 mm (1.000 in.)

B: Approx. 40.0 mm (1.575 in.)

HINT:

When installing the wiper arms, make sure that the tips of the blades are not beyond the ceramic edge as indicated ”C” part in the illustration.

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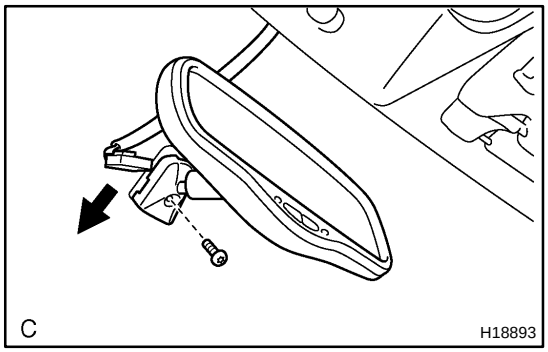
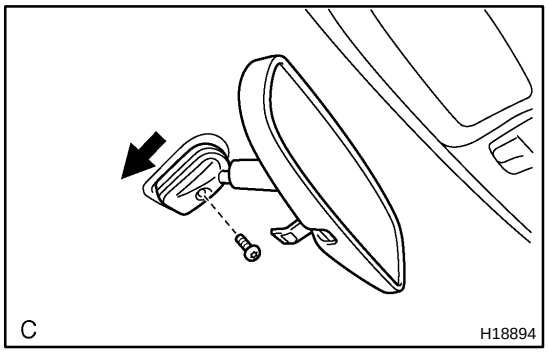
(d) Torque the 2 nuts.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)
(e) Install the 2 cap.



17. w/ Electro chromic inner rear view mirror: INSTALL INNER REAR VIEW MIRROR
(a) Install the inner rear view mirror and torx screw.
Torque: 2.5 N·m (25 kgf·cm, 22 in.·lbf)
(b) Connect the connector.
(c) Install the mirror cover.



18. w/o Electro chromic inner rear view mirror: INSTALL INNER REAR VIEW MIRROR
Instll the inner rear view mirror and torx screw.
Torque: 2.5 N·m (25 kgf·cm, 22 in.·lbf)
19. INSTALL ROOF CONSOLE BOX
20. INSTALL SUN VISORS AND HOLDERS
21. INSTALL FRONT PILLAR GARNISHES
22. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIPS

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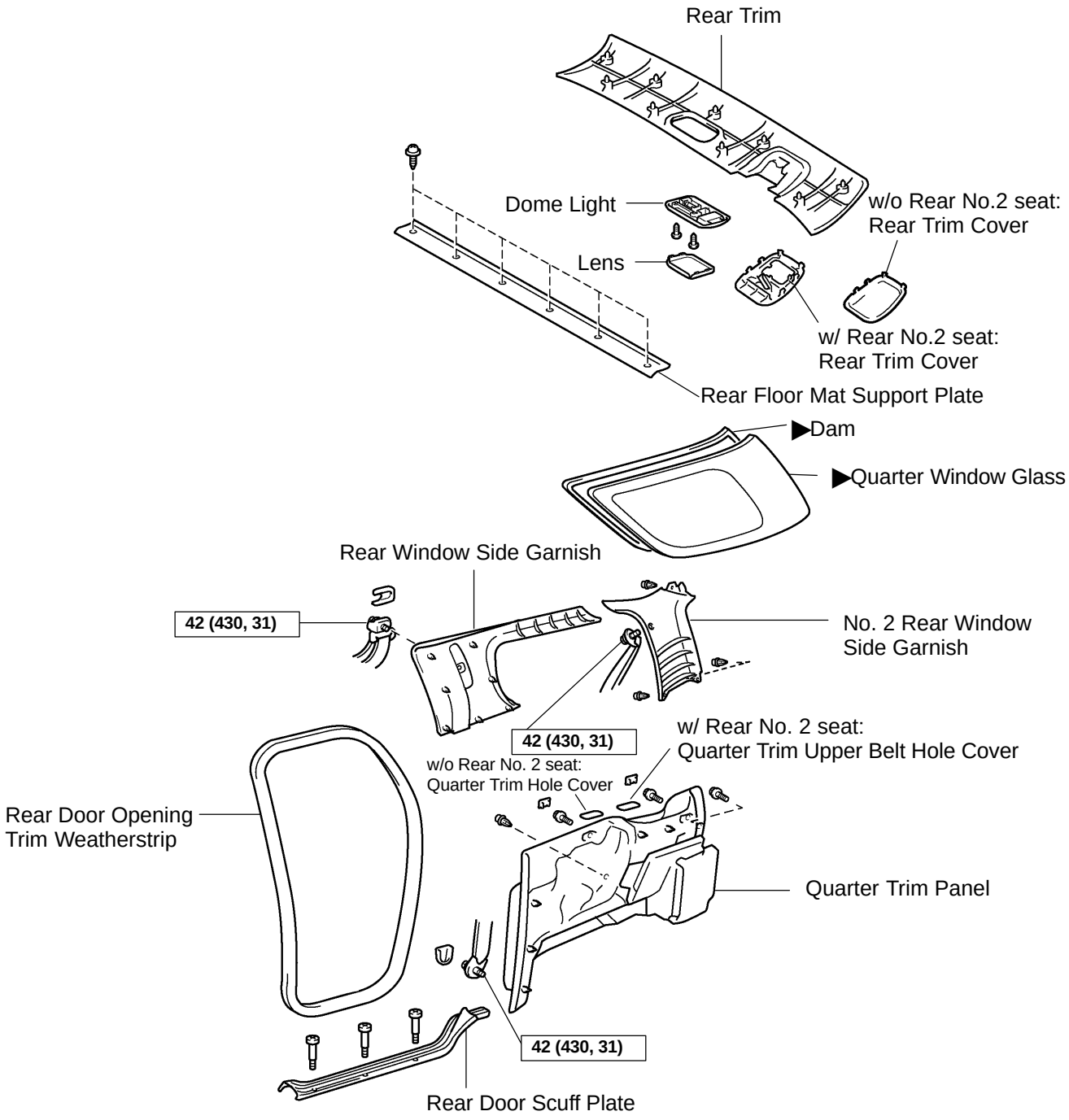
QUARTER WINDOW GLASS

COMPONENTS

BO46L–01



T

N·m (kgf·cm, ft·lbf) : Specified Torque

▶ Non–reusable part

H16781

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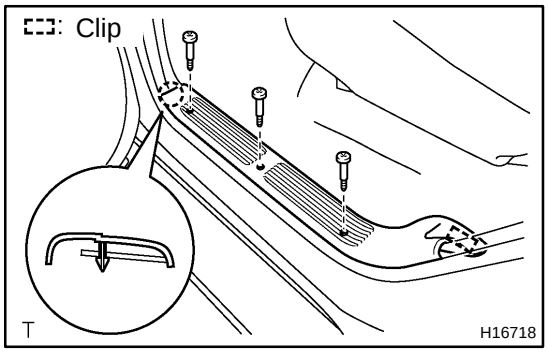
BO46M–02

REMOVAL

1. w/ Rear No. 2 seat:
REMOVE REAR NO. 2 SEAT



2. REMOVE REAR DOOR SCUFF PLATE

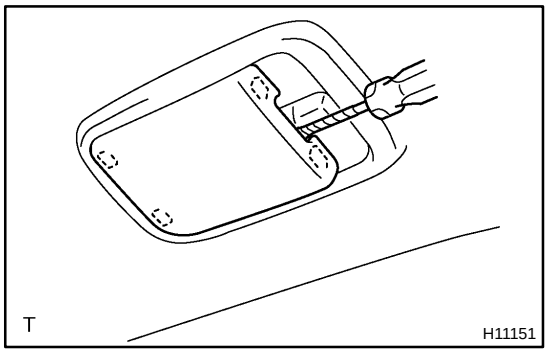
(a) Remove the 3 screws.

(b) Using a screwdriver, remove the rear door scuff plate.

HINT:

Tape the screwdriver tip before use.

3. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP



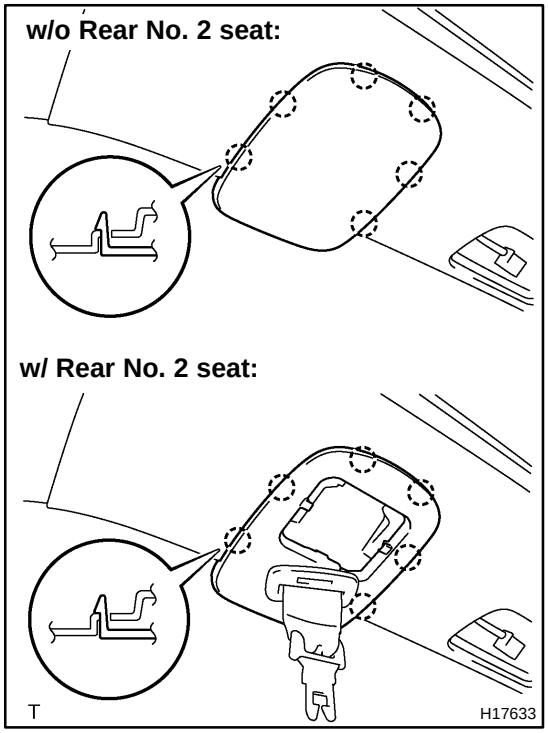
4. REMOVE DOME LIGHT

(a) Using a screwdriver, remove the lens.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and dome light, then disconnect the connector.



5. REMOVE REAR TRIM COVER

Using a screwdriver, remove the rear trim cover.

HINT:

Tape the screwdriver tip before use.

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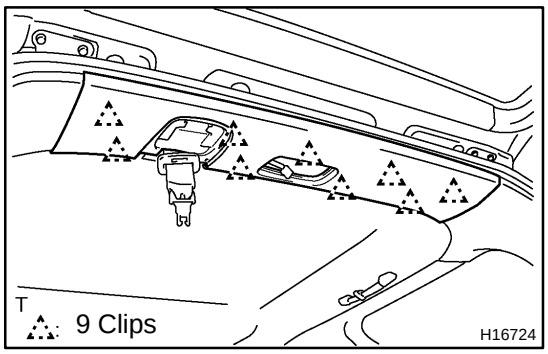


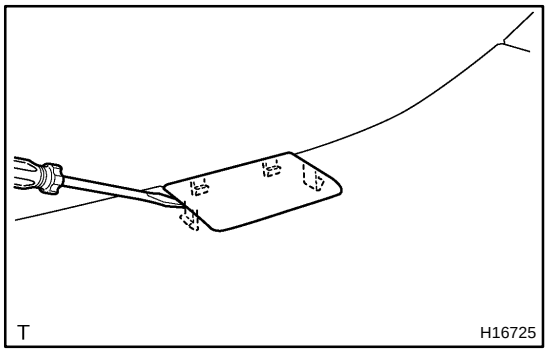
6. REMOVE REAR TRIM

Using a screwdriver, remove the rear trim.

HINT:

Tape the screwdriver tip before use.

7. REMOVE REAR FLOOR MAT SUPPORT PLATE

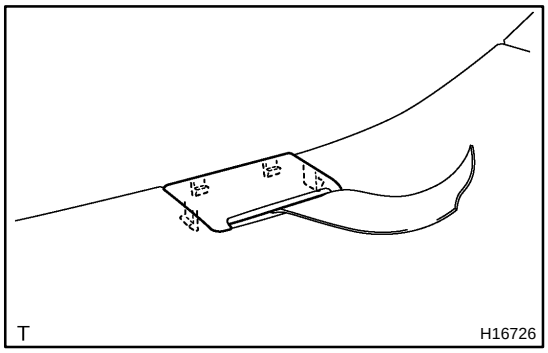


8. w/o Rear No. 2 seat:
REMOVE QUARTER TRIM HOLE COVER

Using a screwdriver, remove the quarter trim hole cover.

HINT:

Tape the screwdriver tip before use.



9. w/ Rear No. 2 seat:
REMOVE QUARTER TRIM UPPER BELT HOLE COVER

Using a screwdriver, remove the quarter trim upper belt hole cover.

HINT:

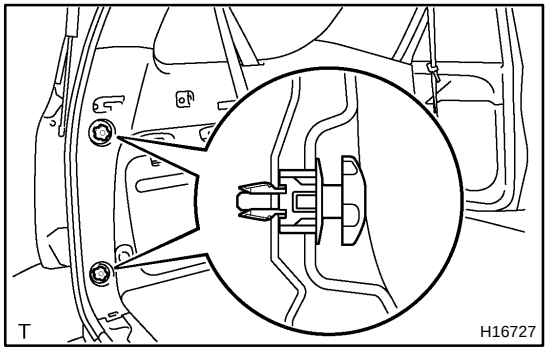
Tape the screwdriver tip before use.

10. REMOVE QUARTER TRIM PANEL

(a) w/o Tonneau cover:
Using a screwdriver, remove the 2 No. 1 tonneau cover holder caps.

HINT:

Tape the screwdriver tip before use.



(b) Remove the 2 package holder net hooks.

(c) Remove the rear No. 1 seat outer belt floor anchor.

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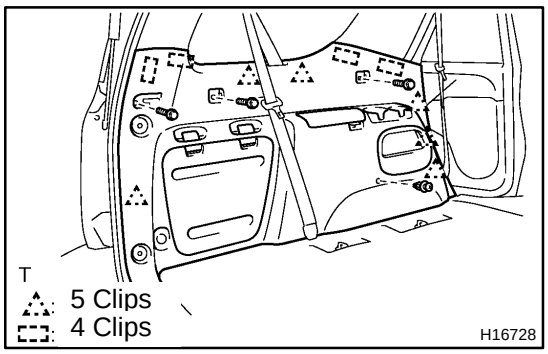
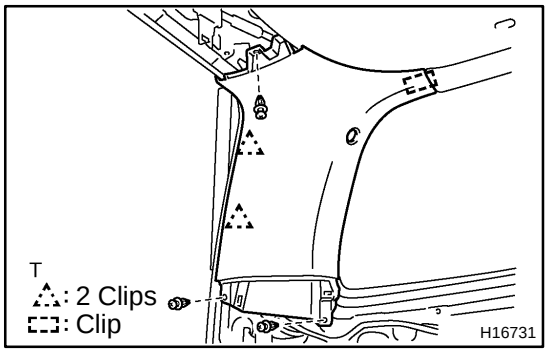


(d) Remove the 3 bolts, clip and quarter trim panel, then disconnect the connector.

11. w/ Rear No. 2 seat:
REMOVE REAR NO. 2 SEAT OUTER BELT SHOULDER ANCHOR



12. REMOVE NO. 2 REAR WINDOW SIDE GARNISH

Remove the 2 clips and No. 2 rear window side garnish.

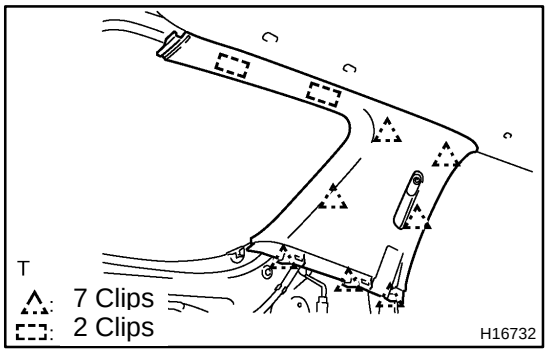
13. REMOVE REAR NO. 1 SEAT OUTER BELT SHOULDER ANCHOR

(a) Using a screwdriver, remove the anchor cap.

HINT:

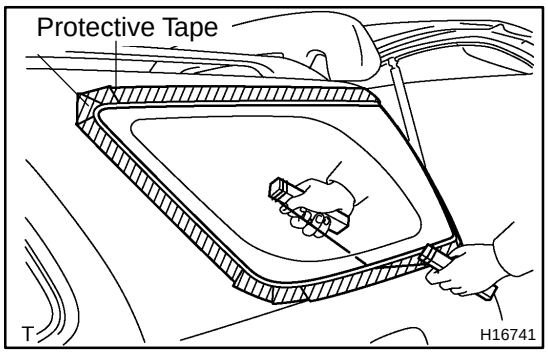
Tape the screwdriver tip before use.

(b) Remove the rear No. 1 seat outer belt shoulder anchor.



14. REMOVE REAR WINDOW SIDE GARNISH

Remove the rear window side garnish.



15. REMOVE QUARTER WINDOW GLASS

(a) w/ Glass antenna:
Disconnect the connectors from the glass antenna terminals.

(b) Push a piano wire through from the interior.

(c) Tie both wire ends to wooden blocks or similar objects.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.

NOTICE:

When separating the glass, take care not to damage the paint and interior.

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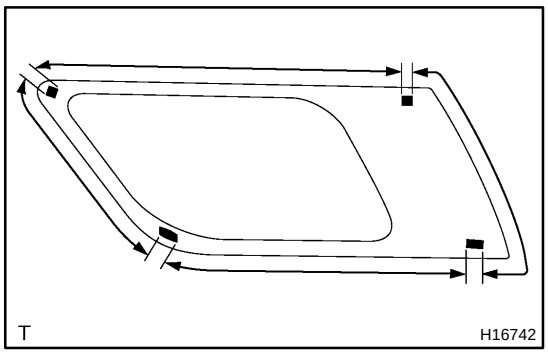
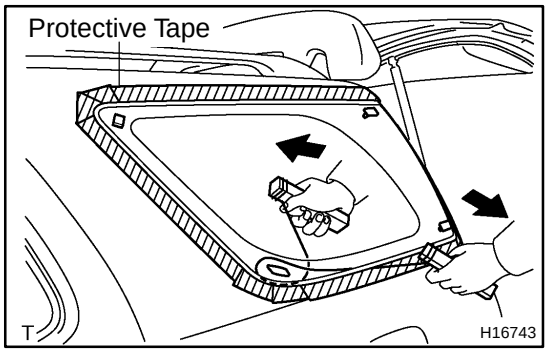


(d) Cut the adhesive by pulling the piano wire around it.

HINT:

Cut the adhesive areas as shown in the illustration, leaving the adhesive where the clips are.



(e) Push the piano wire through as shown in the illustration, cut off the adhered part to the clips.

(f) Remove the glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting off the glass.

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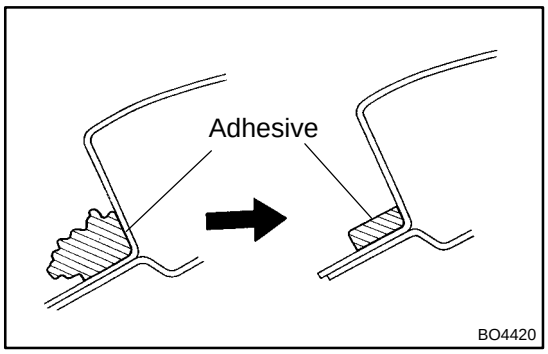
BO46N–01

INSTALLATION



1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

(a) Using a knife, cut away any rough areas on the body.

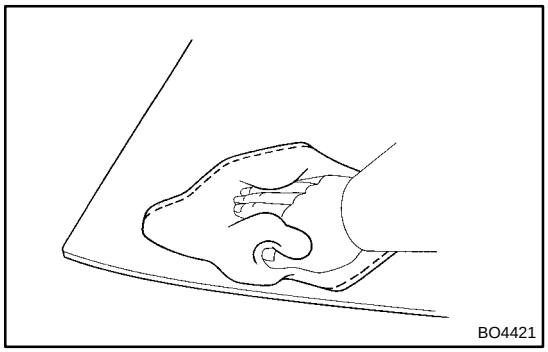
HINT:

Leave the adhesive on the body as much as possible.

(b) Clean the cut surface of the adhesive with a shop rag saturated in cleaner.

HINT:

Even if all the adhesive has been removed, clean the body.

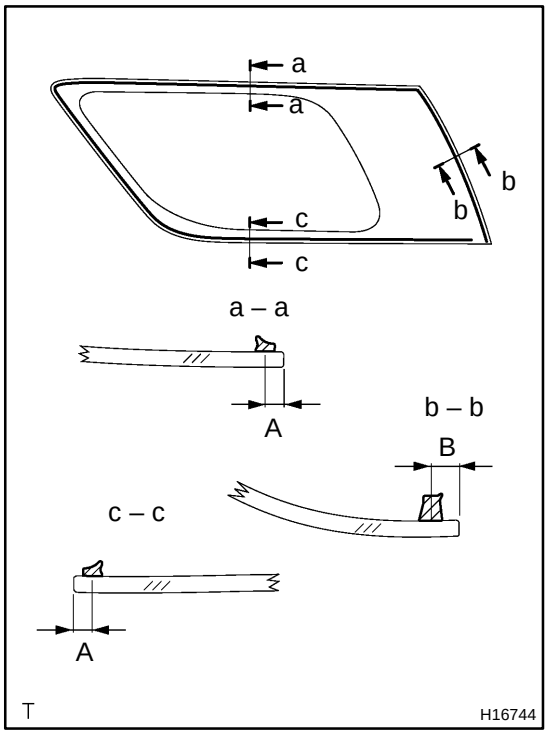


2. CLEAN CONTACT SURFACE OF NEW GLASS

Using a cleaner, clean the contact surface around the entire glass rim.

NOTICE:

Do not touch the glass face after cleaning it.

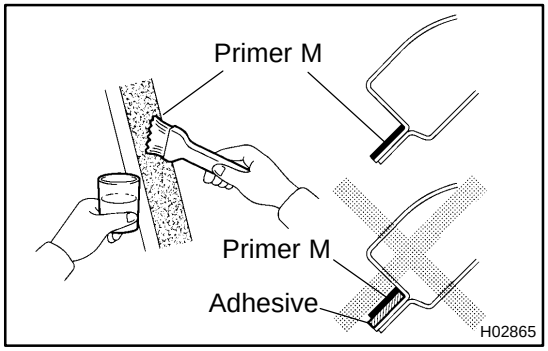


3. INSTALL NEW DAMS

Install new dams with adhesive tape as shown in the illustration.

A: 5.1 mm (0.201 in.)

B: 7.2 mm (0.283 in.)



4. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat Primer M to the exposed part of body on the vehicle side.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat Primer M to the adhesive.**
- **Do not keep any of the opened Primer M for later use.**

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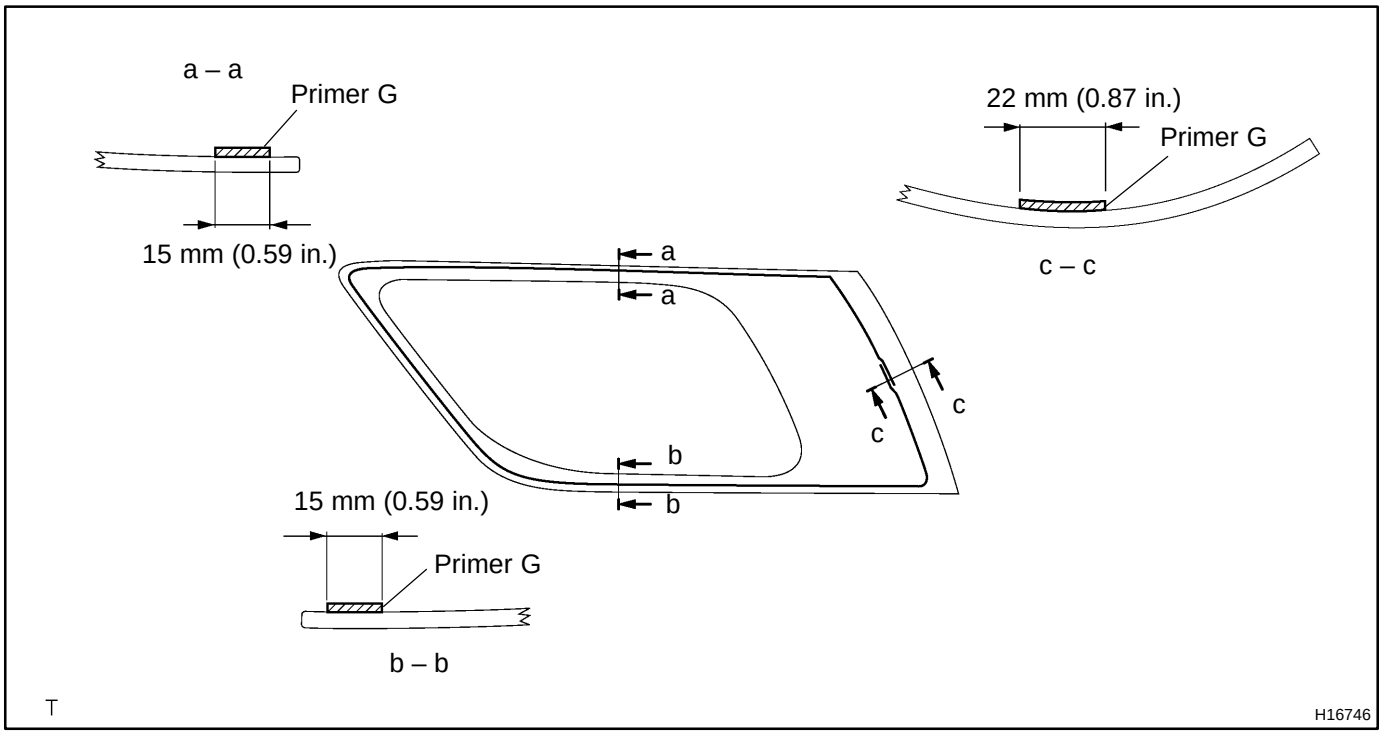
5. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G as shown in the illustration on the following page.

(b) When the primer is coated wrongly to the area other than the specified, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**



6. APPLY ADHESIVE

(a) Cut off the tip of the cartridge nozzle.
Part No. 08850–00801 or equivalent.

HINT:
After cutting off the tip, use all adhesive within the time described in the table below.

Temperature	Tackfree time
35 ˚C (95 ˚F)	15 minutes
20 ˚C (68 ˚F)	100 minutes
5 ˚C (41 ˚F)	8 hours

(b) Load the cartridge into the sealer gun.

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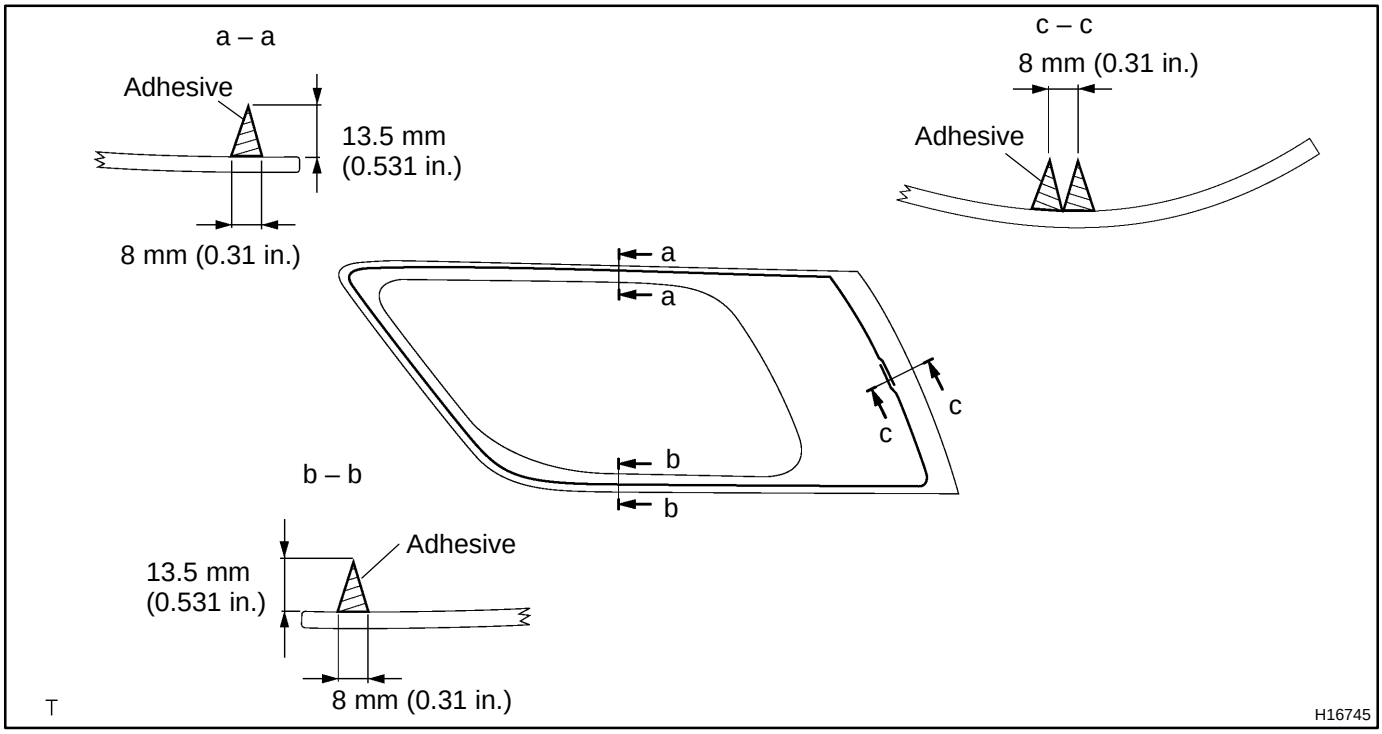
(c) Coat the glass with adhesive as shown in the illustration on the following page.
Adhesive height: 13.5 mm (0.531 in.)
Adhesive width: 8.0 mm (0.315 in.)



7. INSTALL GLASS

(a) Install the glass to the body.

(b) Hold the glass in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

Temperature	MInimum time prior to driving the vehicle
35 ˚C (95 ˚F)	1.5 hours
20 ˚C (68 ˚F)	5 hours
5 ˚C (41 ˚F)	24 hours

8. INSPECT FOR LEAK AND REPAIR

(a) Conduct a leak test after the hardening time has elapsed.

(b) Seal any leak with sealant.
Part No. 08833–00030 or equivalent

9. INSTALL REAR WINDOW SIDE GARNISH

10. INSTALL REAR No. 1 SEAT OUTER BELT SHOULDER ANCHOR
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

11. INSTALL No. 2 REAR WINDOW SIDE GARNISH

12. w/ Rear No. 2 seat:
INSTALL REAR No. 2 SEAT OUTER BELT SHOULDER ANCHOR
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

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13. **INSTALL QUARTER TRIM PANEL**
14. **INSTALL REAR No. 1 SEAT OUTER BELT FLOOR ANCHOR**
    Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)
15. **w/ Rear No. 2 seat:**
    INSTALL QUARTER TRIM UPPER BELT HOLE COVER
16. **w/o Rear No. 2 seat:**
    INSTALL QUARTER TRIM HOLE COVER
17. **INSTALL REAR FLOOR MAT SUPPORT PLATE**
18. **INSTALL REAR TRIM**
19. **INSTALL REAR TRIM COVER**
20. **INSTALL DOME LIGHT**
21. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP**
22. **INSTALL REAR DOOR SCUFF PLATE**
23. **w/ Rear No. 2 seat:**
    INSTALL REAR No. 2 SEAT

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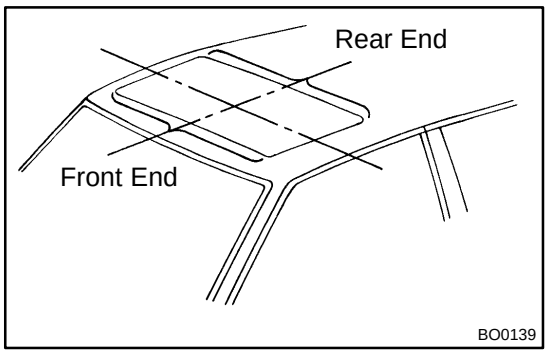

SLIDING ROOF

BO46O–01

ON–VEHICLE INSPECTION

INSPECT SLIDING ROOF GLASS ALIGNMENT

(a) Start the engine and check the operation time of the sliding roof.
Operation time:
Approx. 6 secs.

(b) Check for abnormal noise or binding during operation.

(c) With the sliding roof fully closed, check for water leakage.

(d) Check for a difference in level between the sliding roof weatherstrip and roof panel.
Front end:
0 – 2.0 mm (0 – 0.079 in.)
0 + 1.0 mm (0 + 0.039 in.)
Side end:
0 ± 1.5 mm (0 ± 0.059 in.)
Rear end:
0 – 1.0 mm (0 – 0.039 in.)
0 + 2.0 mm (0 + 0.079 in.)

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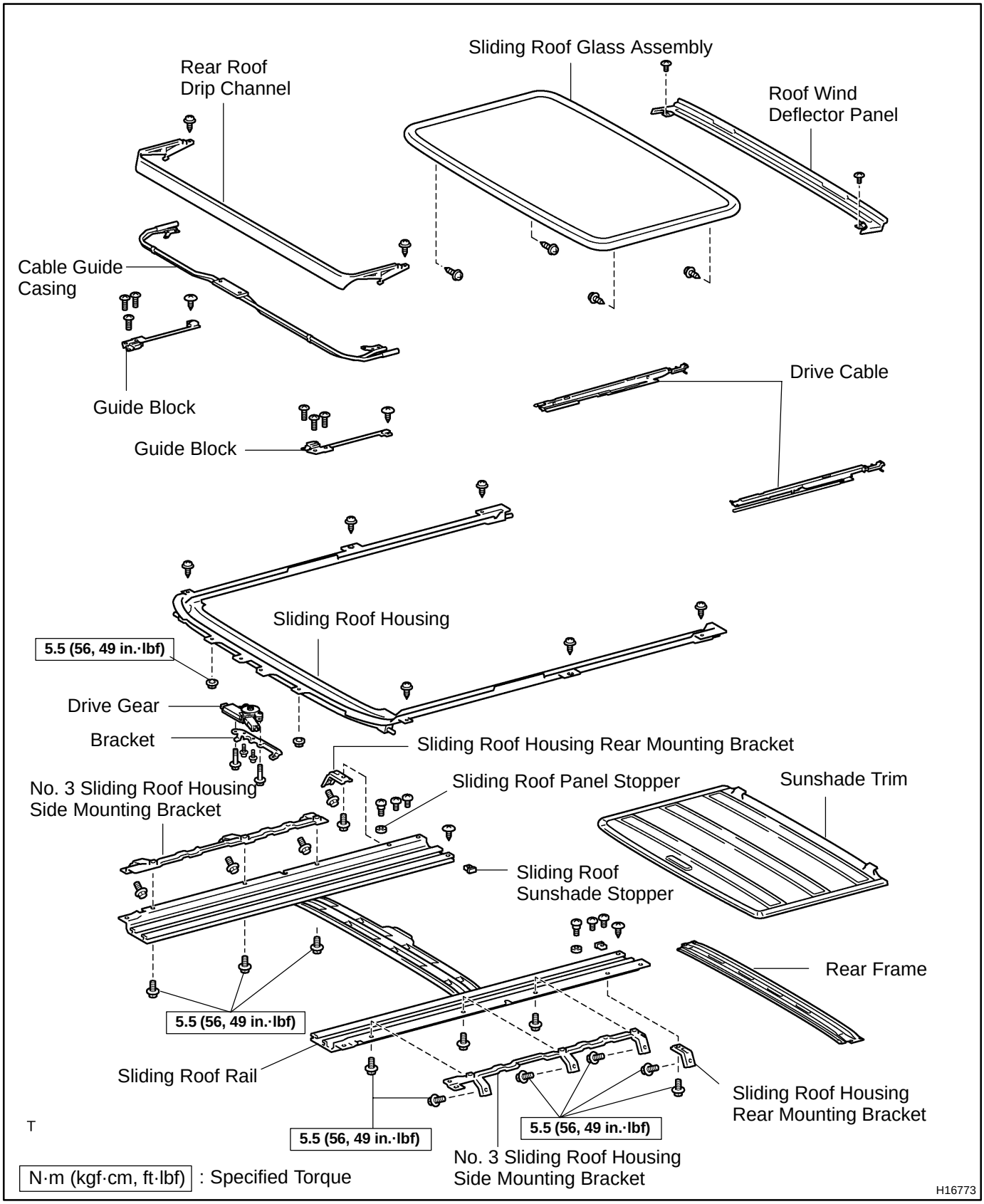
SLIDING ROOF

COMPONENTS

BO46P–02



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BO46Q–02

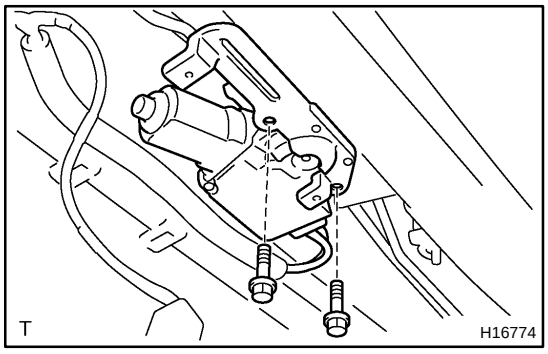
REMOVAL

1. REMOVE ROOF HEADLINING (See page BO–101)

2. REMOVE SLIDING ROOF GLASS ASSEMBLY

(a) Using a torx wrench, remove the 4 screws.

(b) Pull the glass upward to remove it.



3. REMOVE DRIVE GEAR

NOTICE:

Remove the drive gear with the sliding roof fully closed.

(a) Disconnect the connector.

(b) Remove the 2 bolts and drive gear.

(c) Remove the 2 screws and drive gear bracket.

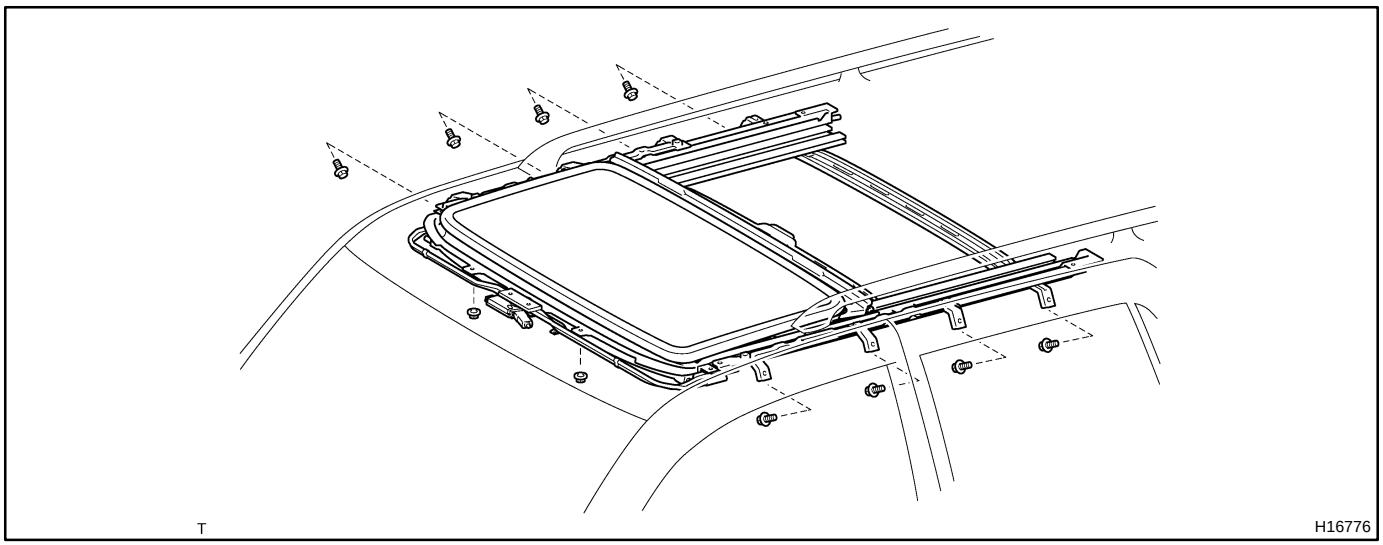
4. REMOVE SLIDING ROOF HOUSING

(a) Disconnect the 4 drain hoses from the housing.

(b) Disengage the wire harness clamps.

(c) Remove the 8 bolts, 2 nuts and sliding roof housing.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



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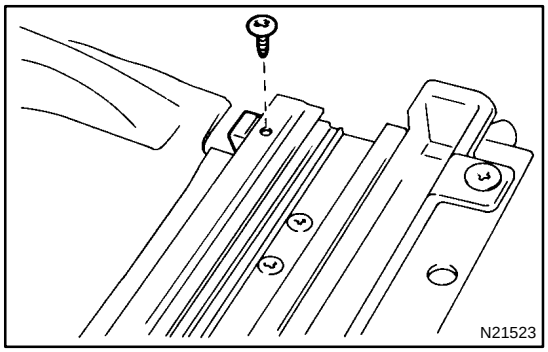
BO46R–01

DISASSEMBLY

1. REMOVE NO. 3 SLIDING ROOF HOUSING SIDE MOUNTING BRACKETS

2. REMOVE SLIDING ROOF HOUSING REAR MOUNTING BRACKETS

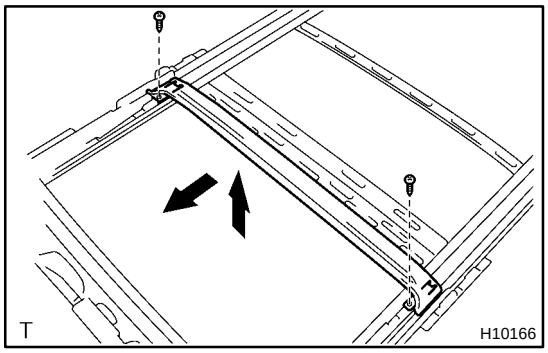


3. REMOVE SLIDING ROOF SUNSHADE STOPPER

(a) Remove the screw and stopper.

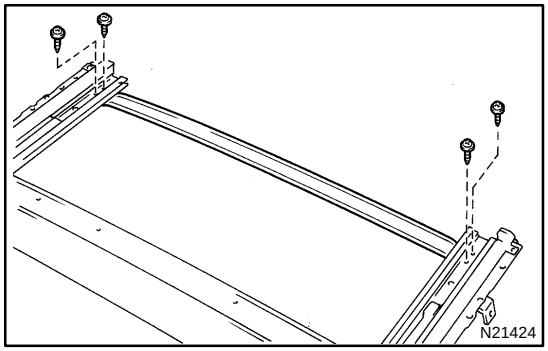
(b) Employ the same manner described above to the other side.

4. REMOVE SUNSHADE TRIM



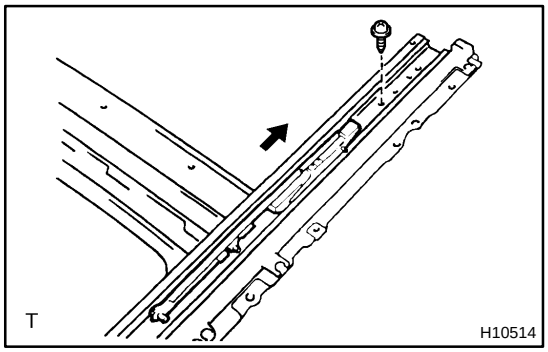
5. REMOVE REAR ROOF DRIP CHANNEL

Remove the 2 screws and rear roof drip channel as shown in the illustration.



6. REMOVE REAR FRAME

Remove the 4 screws and rear frame.



7. REMOVE DRIVE CABLE

(a) Remove the screw and sliding roof panel stopper.

(b) Slide the drive cable rearward, then remove it.

(c) Employ the same manner described above to the other side.

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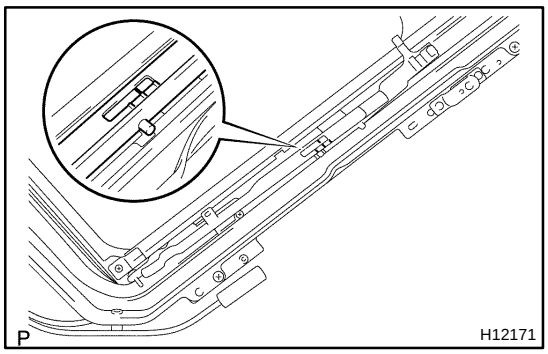
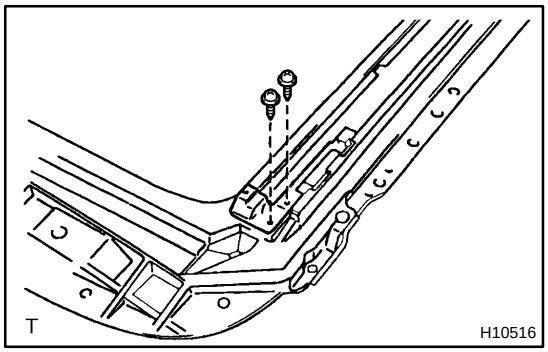


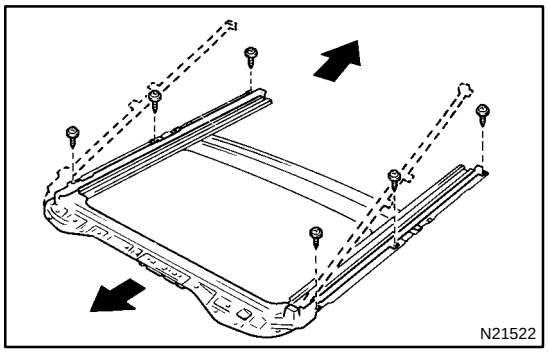
HINT:
At the time of reassembly, please refer to the following items.
- ▶ Adjust the drive cable to a closed and tilted down position.
- ▶ Slide the cable forward or backward to align the 2 marks as shown in the illustration.
- ▶ Slide the cable to the forefront with your hand.

8. REMOVE ROOF WIND DEFLECTOR PANEL



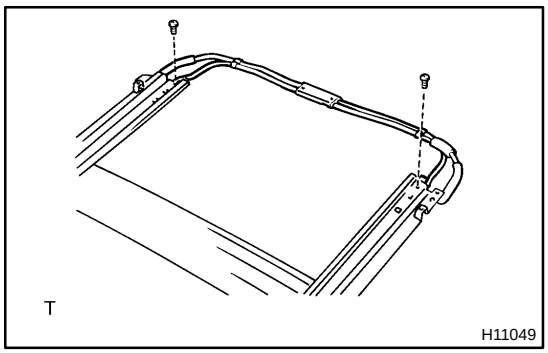
9. REMOVE GUIDE BLOCK

(a) Remove the 2 screws and guide block.
(b) Employ the same manner described above to the other side.



10. REMOVE SLIDING ROOF HOUSING

Remove the 6 screws and sliding roof housing.



11. REMOVE CABLE GUIDE CASING

Remove the 2 screws and cable guide casing.

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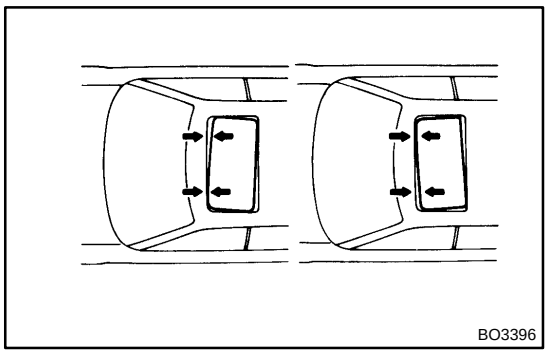
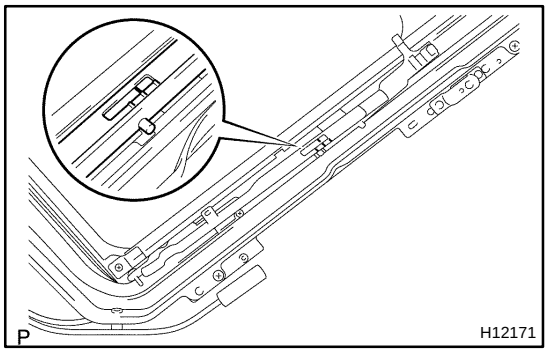
BO46S–01

ADJUSTMENT

ADJUST SLIDING ROOF GLASS IN CLEARANCE



(a) When the front or rear/left or right alignment is not correct, remove the drive gear and sliding roof glass, then adjust the drive cable.



NOTICE:

Remove the drive gear with the sliding roof fully closed.

(b) Adjust by sliding the cable forward or rearward or rearward to align the 2 marks as shown.

(c) Install the driving ear and sliding roof glass.

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BO46T–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–80).

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BO46U–01

INSTALLATION

Installation is in the reverse order of removal (See page BO–79).

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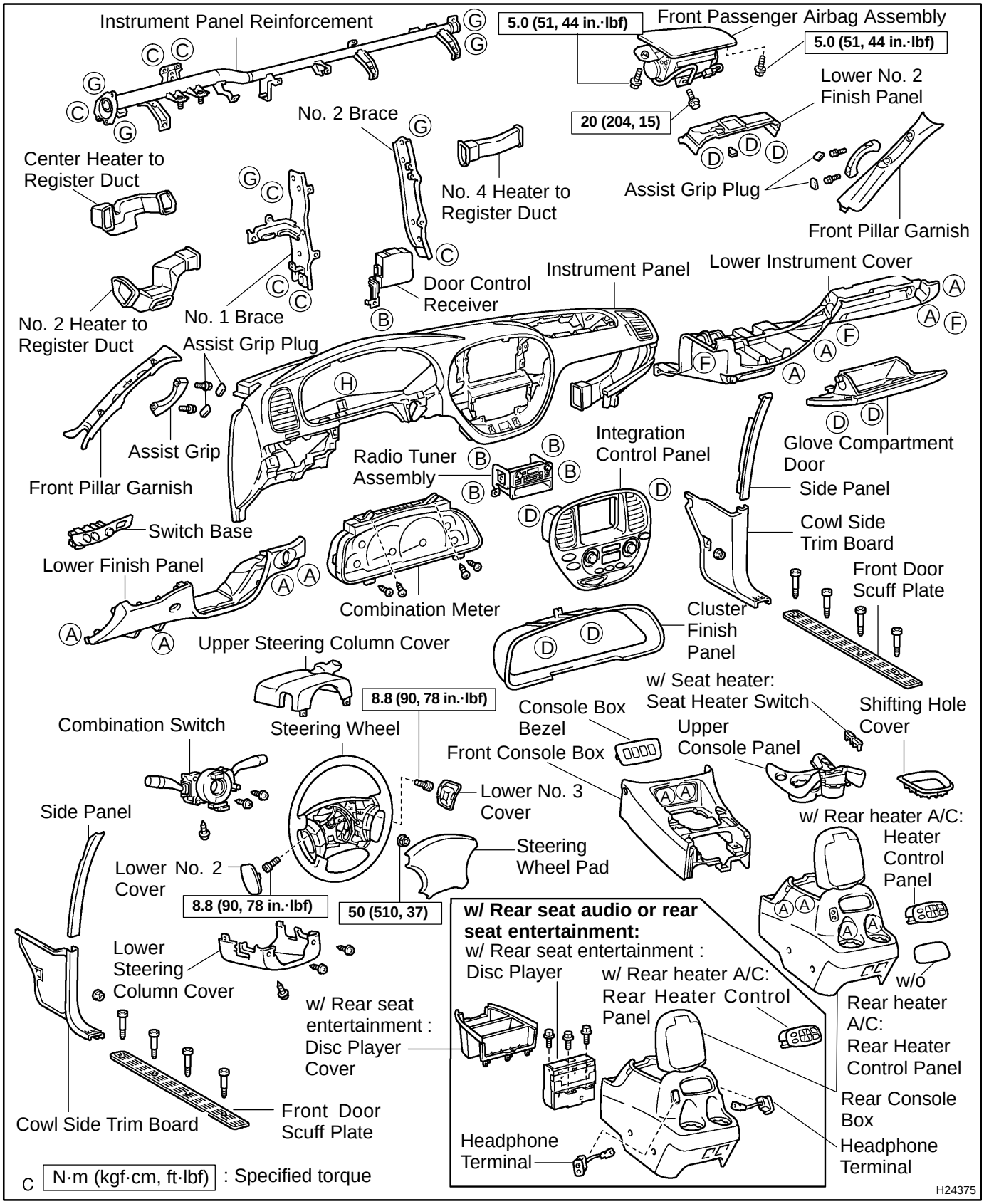
INSTRUMENT PANEL

COMPONENTS

BO4S5–01



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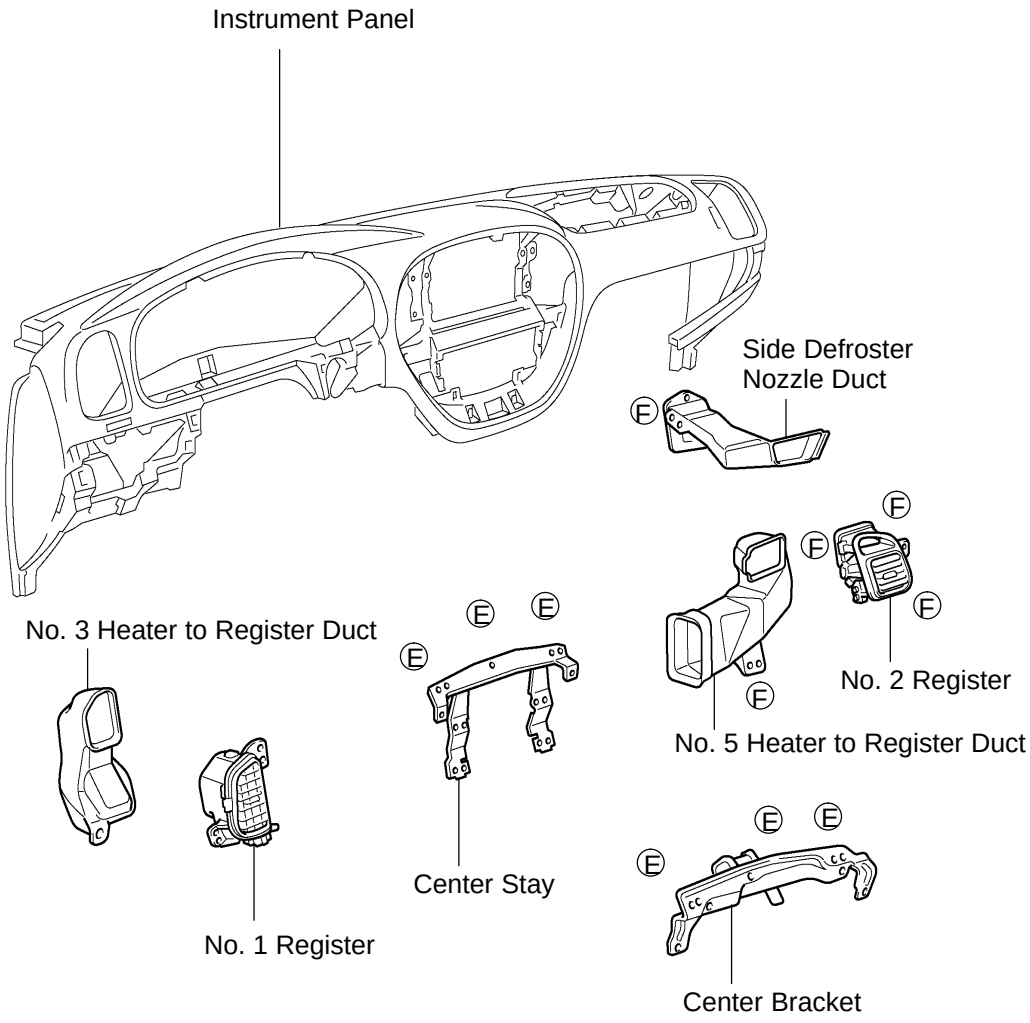

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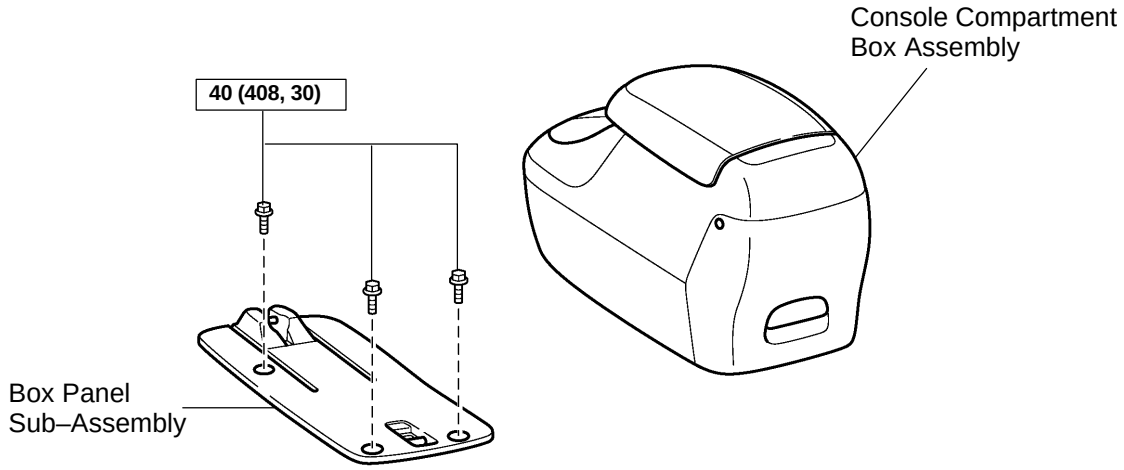

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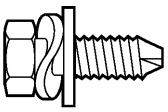
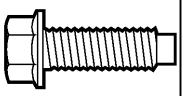
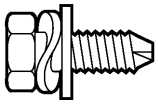
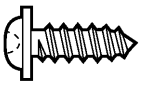
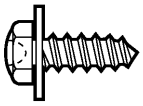
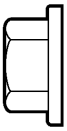
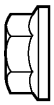
HINT:
Screw shapes and sizes are indicated in the table below. The codes (”A” – ”H”) correspond to those indicated on the previous page.

mm (in.)

	Shape	Size		Shape	Size		Shape	Size
Ⓐ		ø = 6 (0.24) L = 25 (0.98)	Ⓑ		ø = 6 (0.24) L = 14 (0.55)	Ⓒ		ø = 8 (0.31) L = 22 (0.87)
Ⓓ		ø = 5.22 (0.2055) L = 16 (0.63)	Ⓔ		ø = 5 (0.20) L = 16 (0.63)	Ⓕ		ø = 5 (0.20) L = 16 (0.63)
Ⓖ		ø = 8 (0.31)	Ⓗ		ø = 6 (0.24)			

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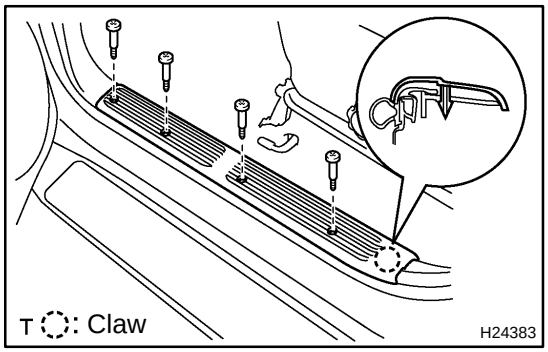
BO4HL–02

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

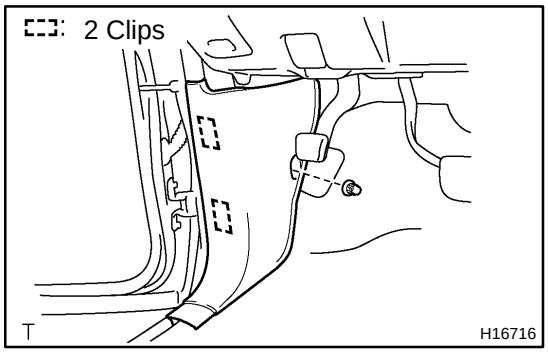
Wait for 90 seconds after disconnecting the cable to prevent the airbag working.



2. REMOVE FRONT DOOR SCUFF PLATE

(a) Remove the 4 screws and front door scuff plate.

(b) Use the same manner described above on the other side.



3. REMOVE COWL SIDE TRIM BOARD

(a) Remove the nut and cowl side trim board.

(b) Use the same manner described above on the other side.

4. REMOVE SIDE PANEL

5. REMOVE FRONT PILLAR GARNISH

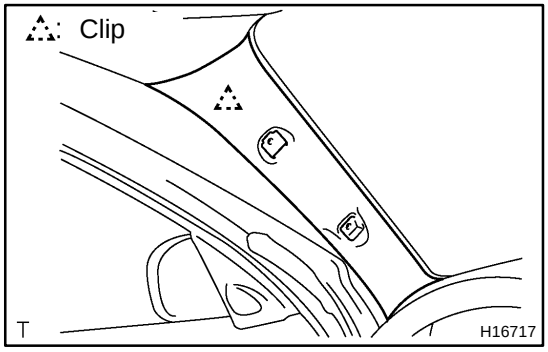
(a) Remove the assist grip.

(1) Using a screwdriver, remove the 2 assist grip plugs.

HINT:

Tape the screwdriver tip before use.

(2) Remove the 2 bolts and assist grip.



(b) Remove the front pillar garnish.

(c) Use the same manner described above on the other side.

6. REMOVE STEERING WHEEL PAD (See page SR–14)

7. REMOVE STEERING WHEEL (See page SR–14)

8. REMOVE STEERING COLUMN COVERS (See page SR–14)

9. REMOVE COMBINATION SWITCH

Disconnect the 4 connectors, remove the 3 screws and combination switch.

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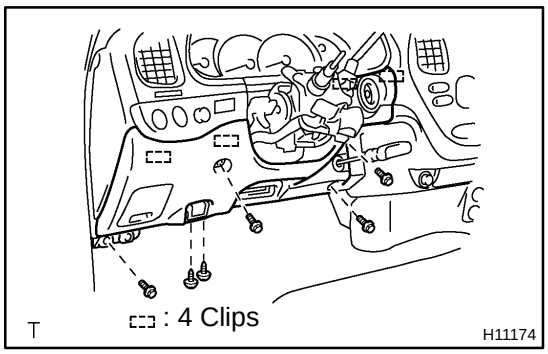
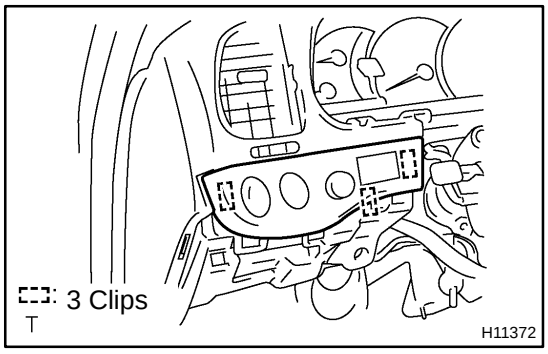


10. REMOVE LOWER FINISH PANEL

(a) Remove the 2 screws and hood lock release lever.

(b) Remove the 4 bolts and lower finish panel.

(c) Disconnect the connector.



11. REMOVE SWITCH BASE

(a) Using a screwdriver, lift up the switch base and remove it.

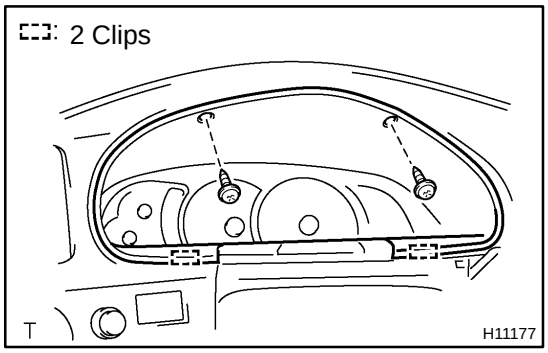
HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connectors.

12. REMOVE NO. 2 HEATER TO REGISTER DUCT

13. REMOVE STEERING COLUMN (See page SR–14)



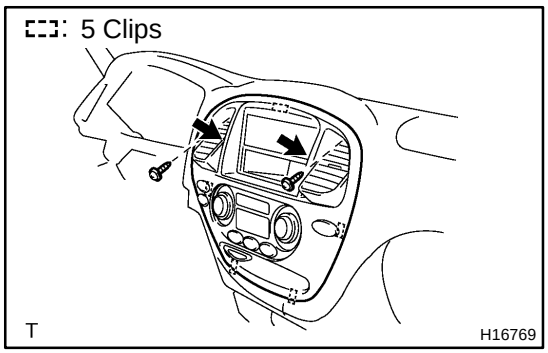
14. REMOVE CLUSTER FINISH PANEL

Remove the 2 screws and cluster finish panel.

15. REMOVE COMBINATION METER

(a) Remove the 4 screws.

(b) Remove the combination meter and disconnect the 4 connectors.



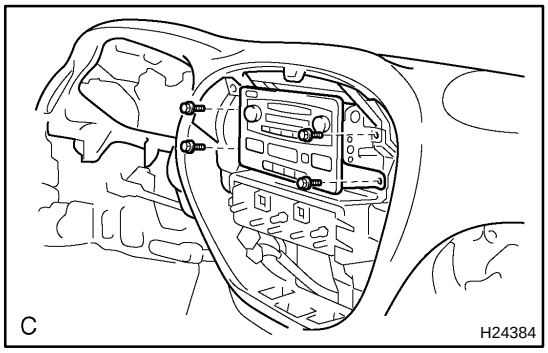
16. REMOVE INTEGRATION CONTROL PANEL

(a) Remove the 2 screws as shown in the illustration.

(b) Using a screwdriver, remove the integration panel, then disconnect the connectors.

HINT:

Tape the screwdriver tip before use.



17. REMOVE RADIO TUNER ASSEMBLY

(a) Disconnect the connector.

(b) Remove the 4 bolts and radio tuner assembly.

18. REMOVE AIR CONDITIONER CONTROL ASSEMBLY (See page AC–103)

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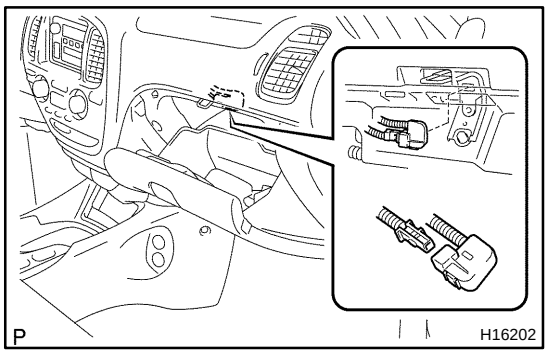


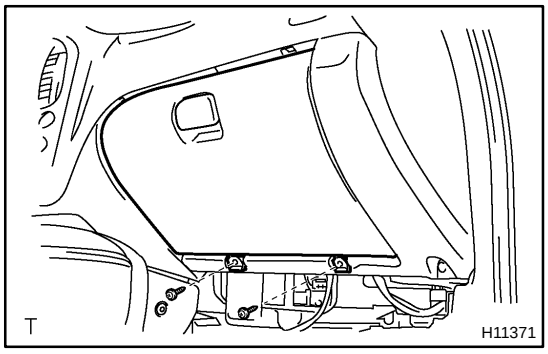
19. DISCONNECT FRONT PASSENGER AIRBAG ASSEMBLY CONNECTOR

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

(a) Using a clip remover, disengage the connector clamp.

(b) Disconnect the connector as shown in the illustration.

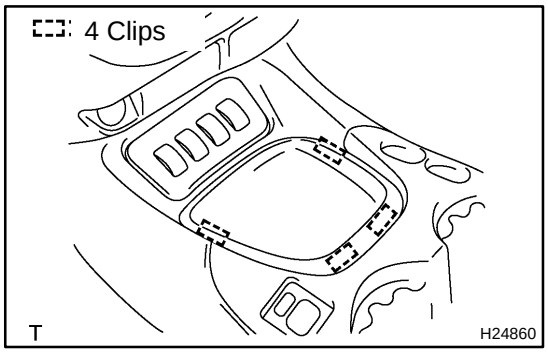


20. REMOVE GLOVE COMPARTMENT DOOR

Remove the 2 screws and glove compartment door.

21. REMOVE LOWER NO. 2 FINISH PANEL

Remove the 3 screws and lower No. 2 finish panel.



22. REMOVE SHIFTING HOLE COVER

Using a screwdriver, remove the shifting hole cover.

HINT:

Tape the screwdriver tip before use.

23. REMOVE UPPER CONSOLE PANEL

(a) w/ Seat heater:

Using a screwdriver, remove the seat heater switches, then disconnect the connectors.

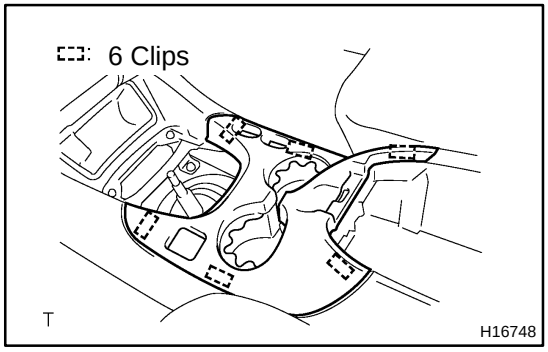
HINT:

Tape the screwdriver tip before use.

(b) Using a screwdriver, remove the power mirror control switch, then disconnect the connector.

HINT:

Tape the screwdriver tip before use.



(c) Using a screwdriver, remove the upper console panel.

HINT:

Tape the screwdriver tip before use.

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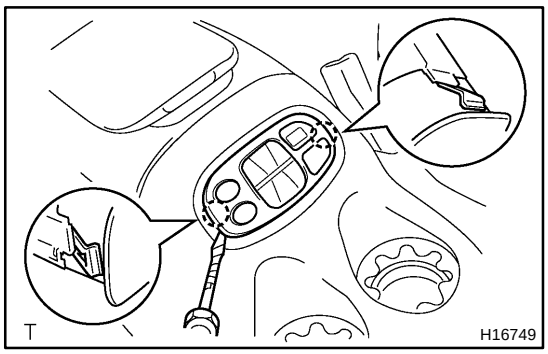
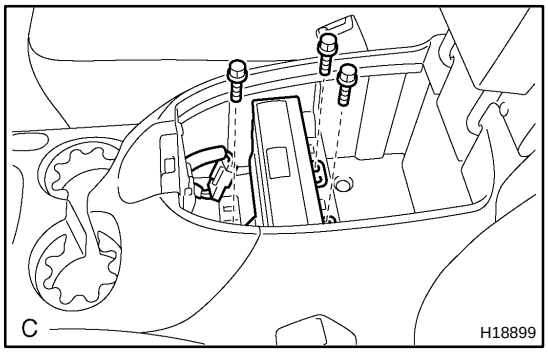


24. REMOVE REAR CONSOLE BOX

(a) w/ Rear heater A/C:
Using a screwdriver, remove the rear heater control panel, then disconnect the connector.

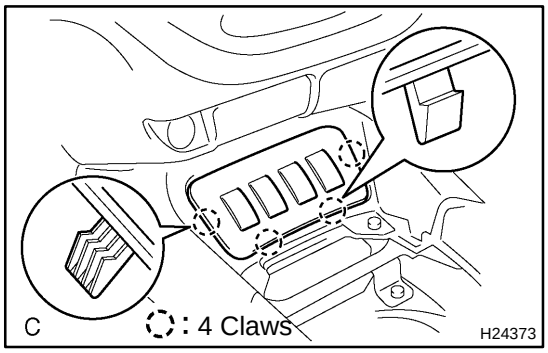
HINT:
Tape the screwdriver tip before use.

(b) w/ Headphone terminal.
Using a screwdriver, remove the headphone terminal and the connector.



(c) w/ Rear seat entertainment:
(1) Remove the disc bracket.
(2) Remove the 3 bolts and disc player.
(3) Disconnect the connector.

(d) Remove the 4 bolts and rear console box.



25. REMOVE CONSOLE BOX BEZEL

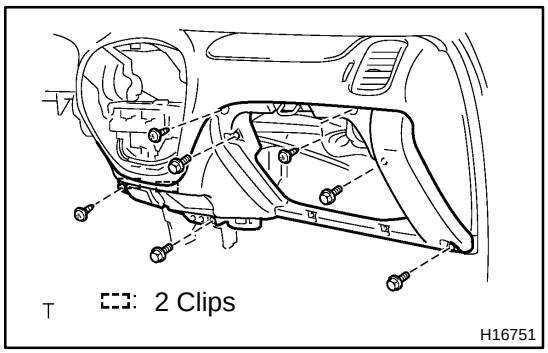
(a) Using a screwdriver, remove the console box bezel.

HINT:
Tape the screwdriver tip before use.

(b) Disconnect the connectors.

26. REMOVE FRONT CONSOLE BOX

Remove the 2 bolts, 2 clips and front console box.

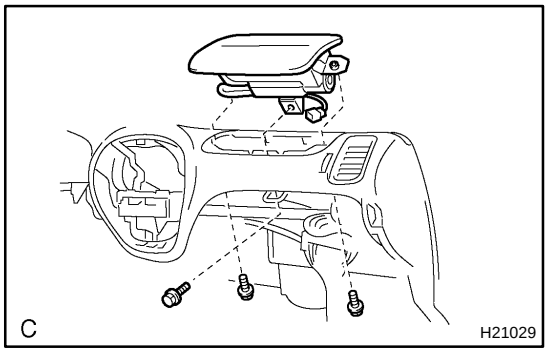


27. REMOVE LOWER INSTRUMENT COVER

(a) Remove the 4 bolts and 3 screws.

(b) Using a screwdriver, remove the lower instrument cover.

HINT:
Tape the screwdriver tip before use.



28. REMOVE PASSENGER AIRBAG ASSEMBLY

(a) Remove the 2 bolts holding the front passenger airbag assembly and instrument panel.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

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(b) Remove the bolt holding the front passenger airbag assembly and instrument panel reinforcement.
Torque: 20 N·m (204 kgf·cm, 15 ft.·lbf)

CAUTION:

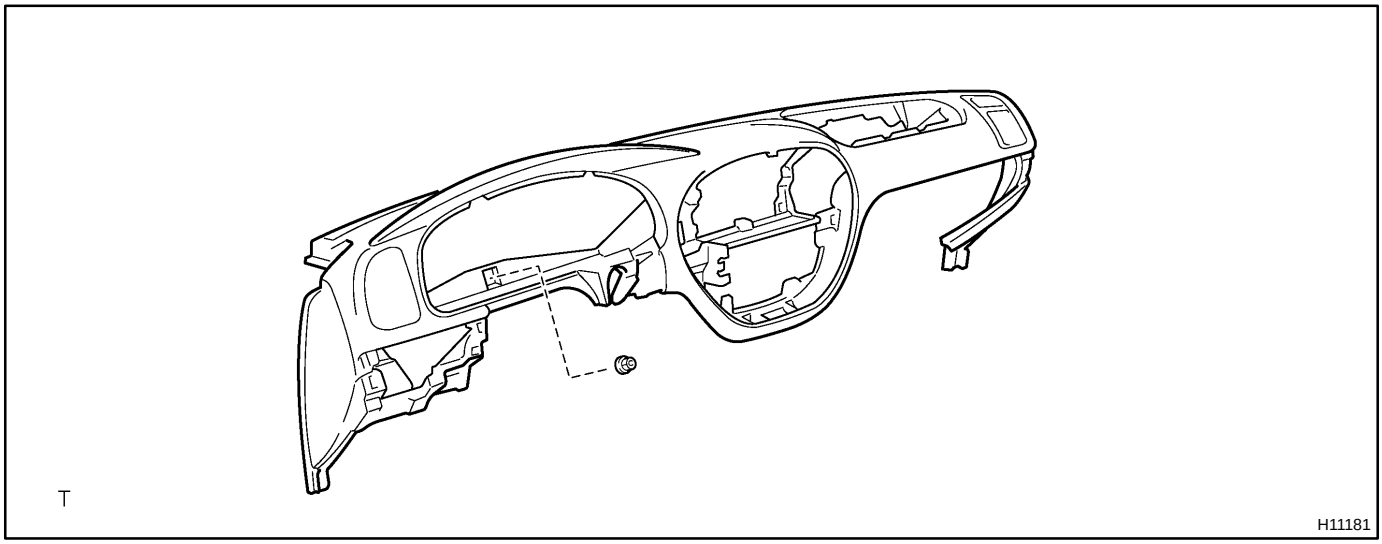
- **Do not store the front passenger airbag assembly with the airbag deployment side facing down.**
- **Never disassemble the front passenger airbag assembly.**

29. REMOVE NO. 4 HEATER TO REGISTER DUCT

30. REMOVE INSTRUMENT PANEL

(a) Remove the nut.

(b) Disconnect the connectors and remove the instrument panel.



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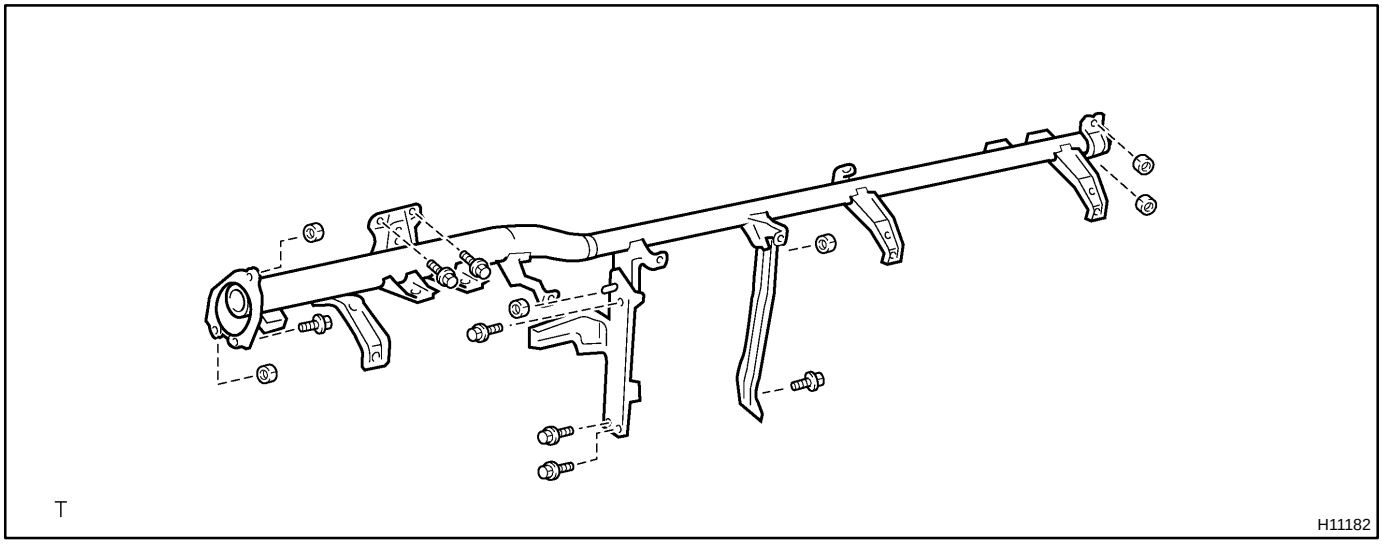
31. REMOVE CENTER HEATER TO REGISTER DUCT

32. REMOVE INSTRUMENT PANEL REINFORCEMENT

(a) Disconnect the connectors.
(b) Remove the bolt and door control receiver.
(c) Remove the 3 bolts, nut and No. 1 brace.
(d) Remove the bolt, nut and No. 2 brace.
(e) Remove the 3 bolts, 4 nuts and instrument panel reinforcement.



33. REMOVE CONSOLE COMPARTMENT BOX ASSEMBLY

34. REMOVE BOX PANEL SUB–ASSEMBLY

Remove the 3 bolts and box panel sub–assembly.

Torque: 40 N·m (408 kgf·cm, 30 ft·lbf)

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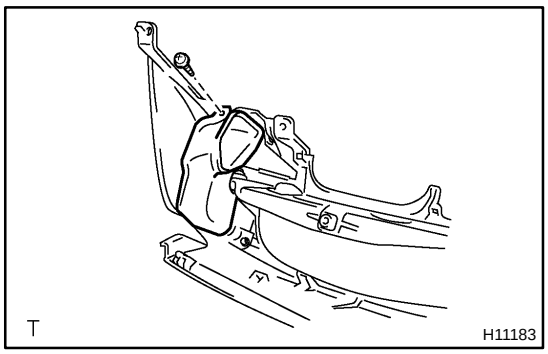
BO439–03

DISASSEMBLY

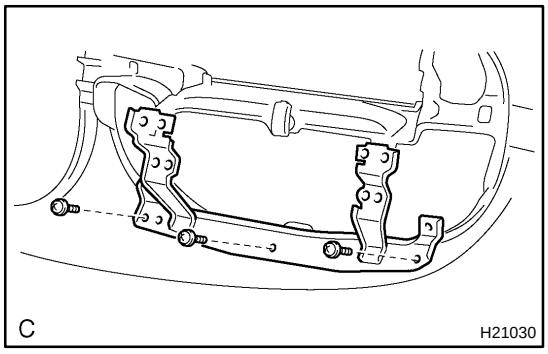


1. REMOVE NO. 3 HEATER TO REGISTER DUCT

Remove the screw and No. 3 heater to register duct

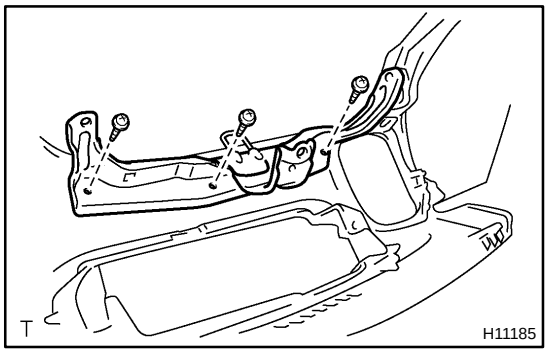
2. REMOVE NO. 1 REGISTER

Remove the 2 screws and No. 1 register.



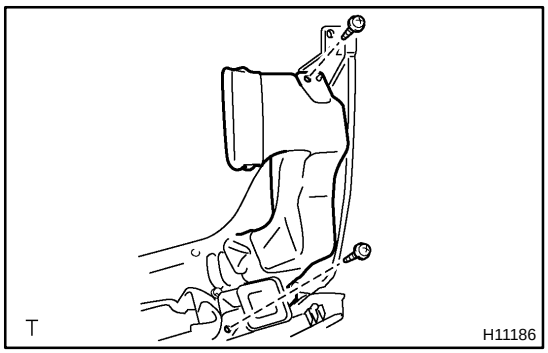
3. REMOVE CENTER STAY

Remove the 3 screws and center stay.



4. REMOVE CENTER BRACKET

Remove the 3 screws and center bracket.

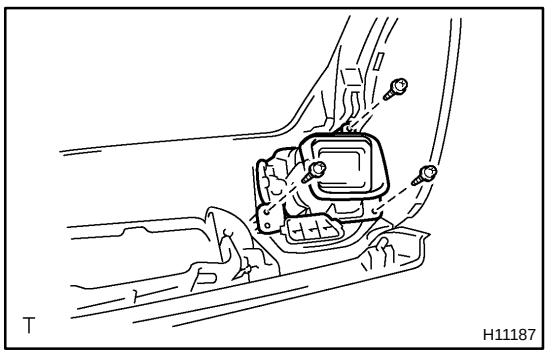


5. REMOVE NO. 5 HEATER TO REGISTER DUCT

Remove the screw and No. 5 heater to register duct.

6. REMOVE SIDE DEFROSTER NOZZLE DUCT

Remove the screw and side defroster nozzle duct.



7. REMOVE NO. 2 REGISTER

Remove the 3 screws and No. 2 register.

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REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–95).

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BO43A–02

INSTALLATION

Installation is in the reverse order of removal (See page BO–89).

1. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

2. PERFORM INITIALIZATION (See page IN–20)

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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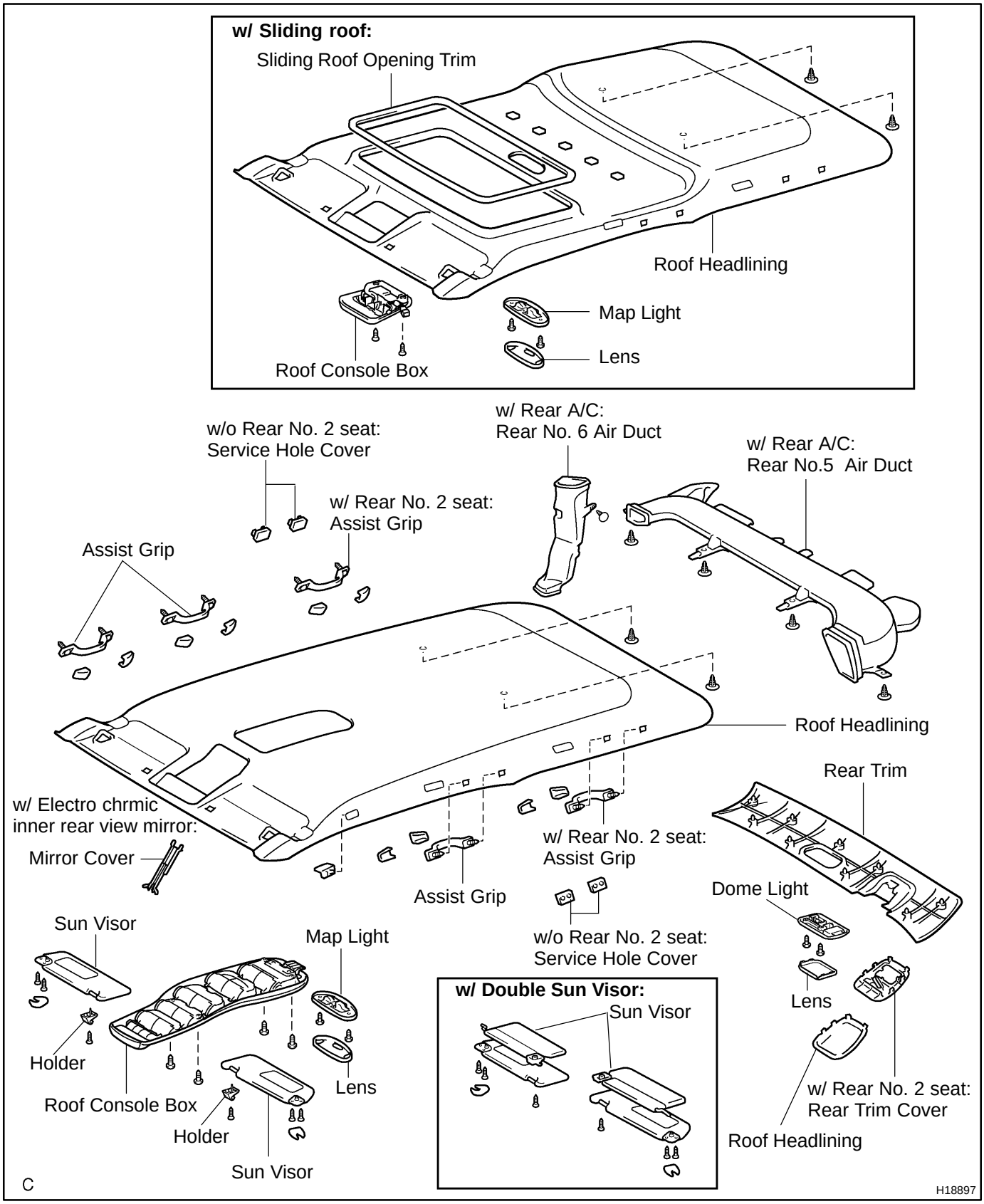
ROOF HEADLINING

BO4HM–01

COMPONENTS



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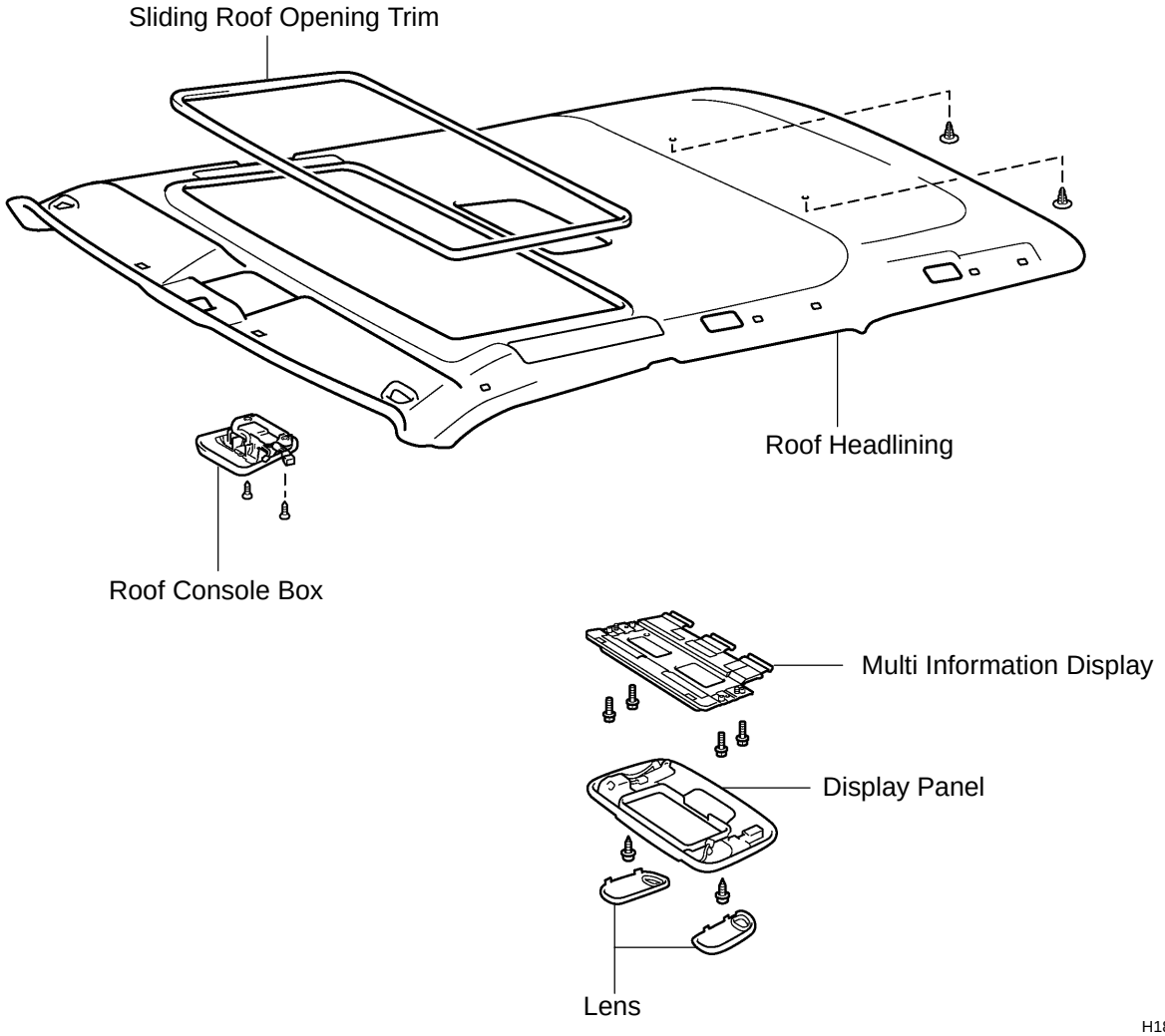
w/ Rear seat entertainment:



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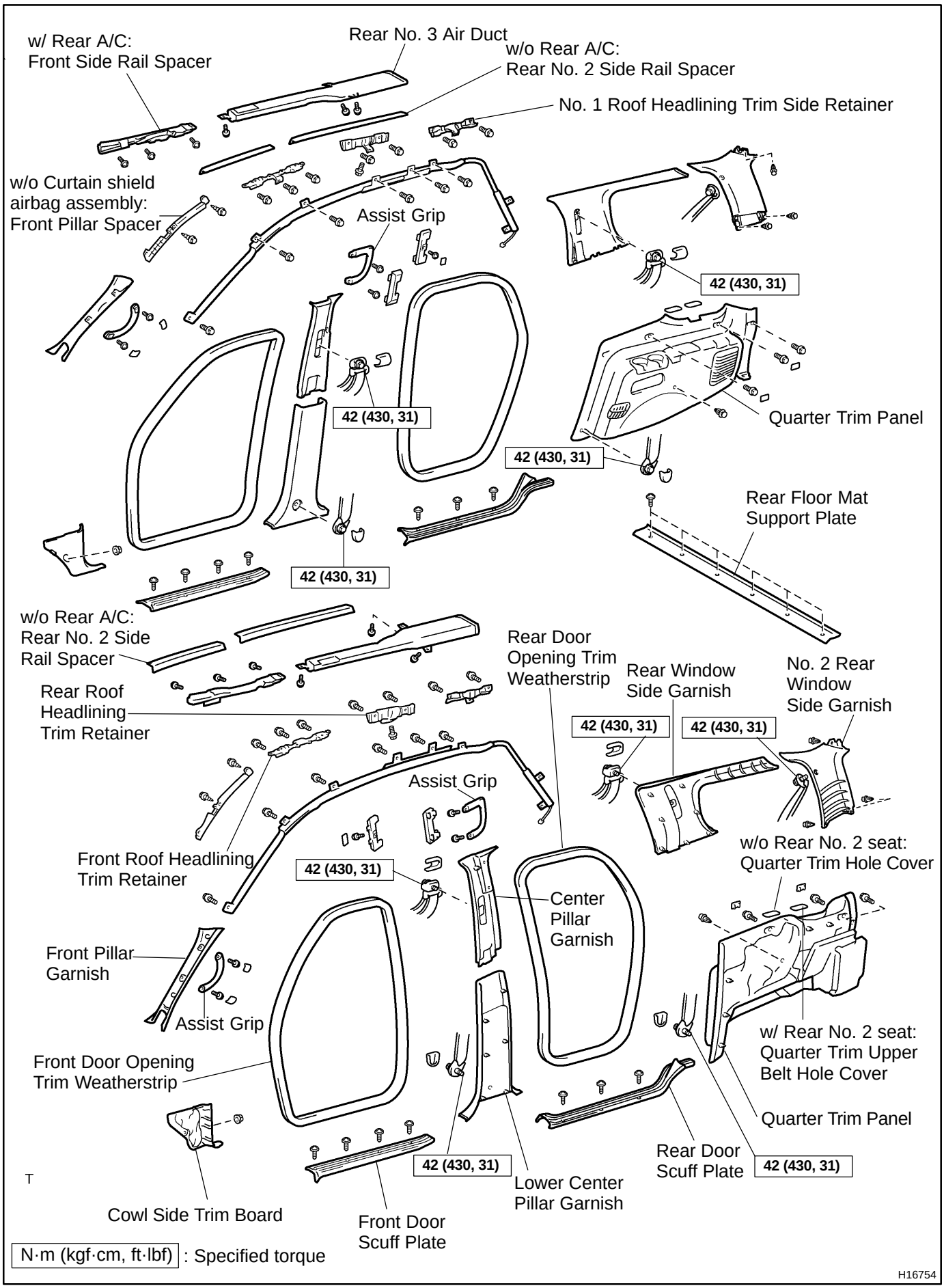
w/ Rear A/C:
Front Side Rail Spacer
Rear No. 3 Air Duct
w/o Rear A/C:
Rear No. 2 Side Rail Spacer
No. 1 Roof Headlining Trim Side Retainer
w/o Curtain shield airbag assembly:
Front Pillar Spacer
Assist Grip
42 (430, 31)
Quarter Trim Panel
Rear Floor Mat Support Plate
w/o Rear A/C:
Rear No. 2 Side Rail Spacer
Rear Door Opening Trim Weatherstrip
Rear Window Side Garnish
No. 2 Rear Window Side Garnish
Rear Roof Headlining Trim Retainer
Front Roof Headlining Trim Retainer
w/o Rear No. 2 seat:
Quarter Trim Hole Cover
Center Pillar Garnish
Front Pillar Garnish
w/ Rear No. 2 seat:
Quarter Trim Upper Belt Hole Cover
Front Door Opening Trim Weatherstrip
Rear Door Scuff Plate
Lower Center Pillar Garnish
Cowl Side Trim Board
Front Door Scuff Plate
T
N·m (kgf·cm, ft·lbf) : Specified torque
H16754

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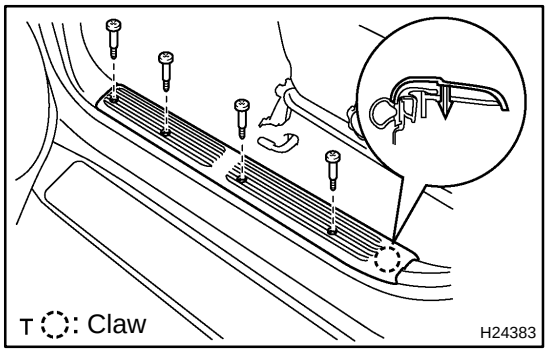
BO4HN–04

REMOVAL

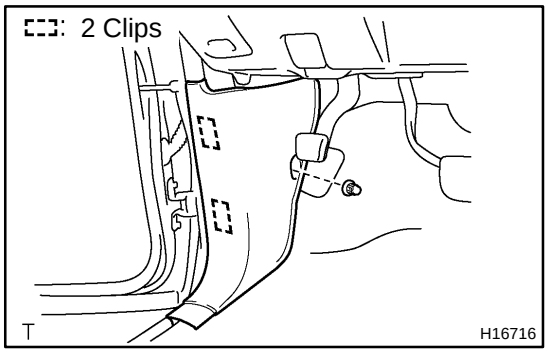
1. w/ Rear No 2 seat:
REMOVE REAR NO. 2 SEAT



2. REMOVE FRONT DOOR SCUFF PLATE

(a) Remove the 4 screws and front door scuff plate.

(b) Use the same manner described above to the other side.



3. REMOVE COWL SIDE TRIM BOARD

(a) Remove the nut and cowl side trim board.

(b) Use the same manner described above to the other side.

4. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP

5. REMOVE FRONT PILLAR GARNISH

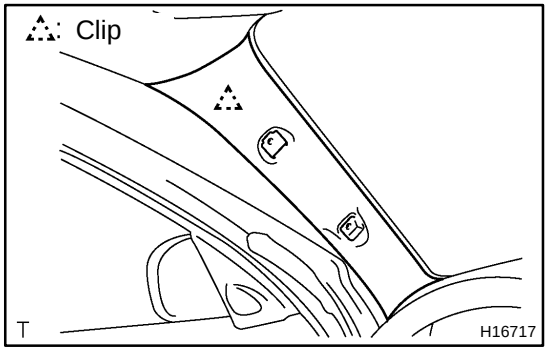
(a) Remove the assist grip.

(1) Using a screwdriver, remove the 2 assist grip plugs.

HINT:

Tape the screwdriver tip before use.

(2) Remove the 2 screws and assist grip.



(b) Remove the front pillar garnish.

(c) Use the same manner described above to the other side.

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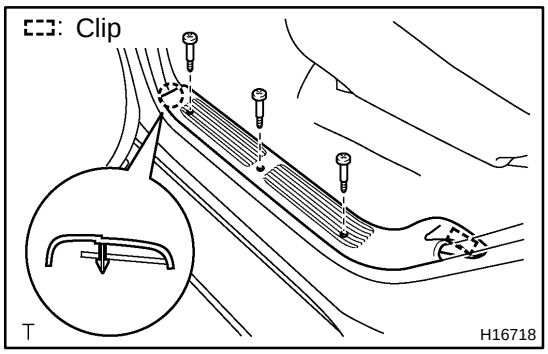


6. REMOVE REAR DOOR SCUFF PLATE

(a) Remove the 3 screws.

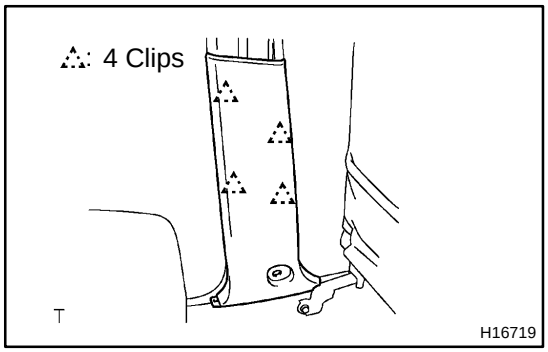
(b) Using a screwdriver, remove the rear door scuff plate.

HINT:

Tape the screwdriver tip before use.

(c) Use the same manner described above to the other side.

7. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIPS



8. REMOVE LOWER CENTER PILLAR GARNISH

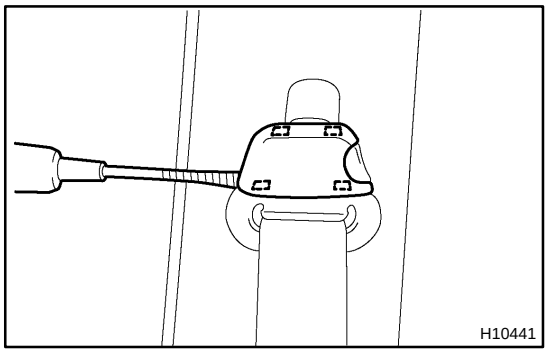
(a) Remove the front seat outer belt floor anchor.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

(b) Using a screwdriver, remove the lower center pillar garnish.

HINT:

Tape the screwdriver tip before use.

(c) Use the same manner described above to the other side.



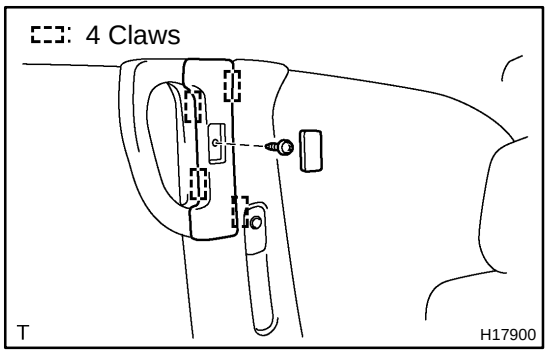
9. REMOVE FRONT SEAT OUTER BELT SHOULDER ANCHOR

(a) Using a screwdriver, remove the anchor cap.

HINT:

Tape the screwdriver tip before use.

(b) Remove the front seat outer belt shoulder anchor.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



10. w/ Curtain shield airbag assembly: REMOVE ASSIST GRIP

(a) Using a screwdriver, remove the cap.

HINT:

Tape the screwdriver tip before use.

(b) Remove the screw.

(c) Using a screwdriver, remove the No. 2 assist grip plug.

HINT:

Tape the screwdriver tip before use.

(d) Remove the 2 screws and assist grip.

(e) Use the same manner described above to the other side.

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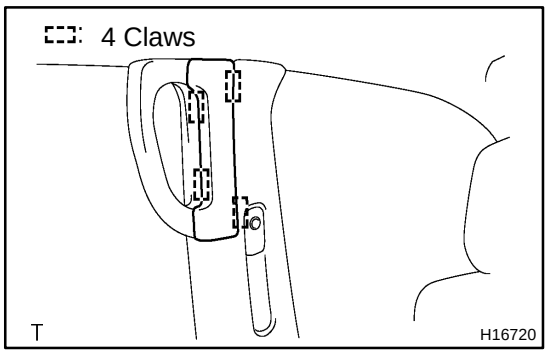


11. w/o Curtain shield airbag asseindly:
REMOVE ASSIST GRIP

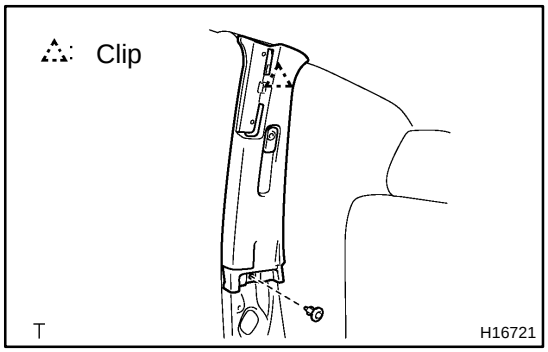
(a) Using a screwdriver, remove the No. 2 assist grip piug.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and assist grip.

(c) Use the same manner described above to the other side.

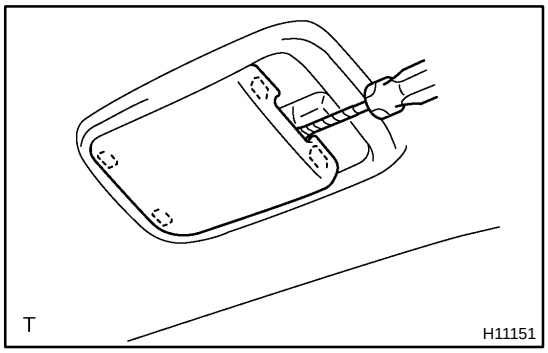


12. REMOVE CENTER PILLAR GARNISH

(a) Remove the clip.

(b) Remove the center pillar garnish.

(c) Use the same manner described above to the other side.



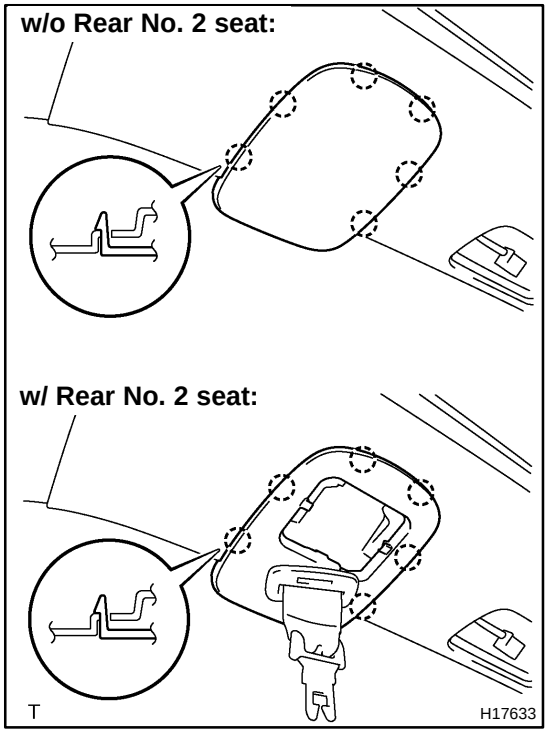
13. REMOVE DOME LIGHT

(a) Using a screwdriver, remove the lens.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and dome light, then disconnect the connector.



14. REMOVE REAR TRIM COVER

Using a screwdriver, remove the rear trim cover.

HINT:

Tape the screwdriver tip before use.

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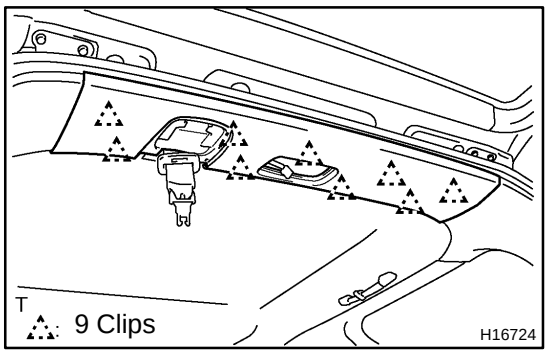


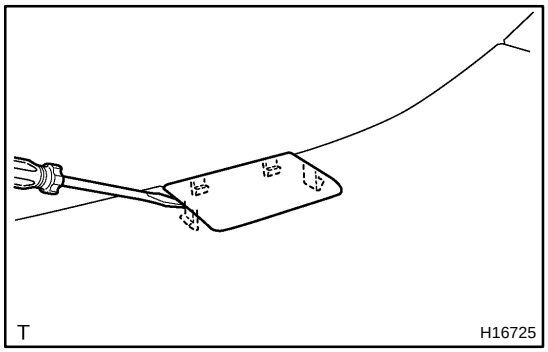
15. REMOVE REAR TRIM

Using a screwdriver, remove the rear trim.

HINT:

Tape the screwdriver tip before use.

16. REMOVE REAR FLOOR MAT SUPPORT PLATE



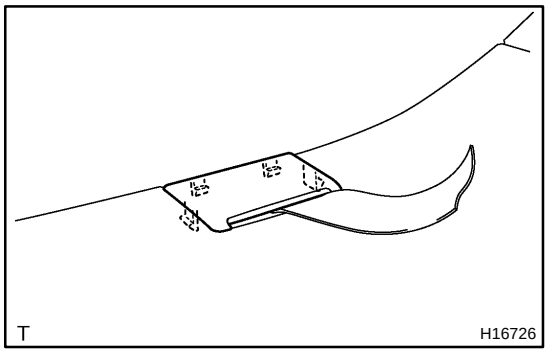
17. w/o Rear No. 2 seat:
REMOVE QUARTER TRIM HOLE COVER

(a) Using a screwdriver, remove the quarter trim hole cover.

HINT:

Tape the screwdriver tip before use.

(b) Use the same manner described above to the other side.



18. w/ Rear No. 2 seat:
REMOVE QUARTER TRIM UPPER BELT HOLE COVER

(a) Using a screwdriver, remove the quarter trim upper belt hole cover.

HINT:

Tape the screwdriver tip before use.

(b) Use the same manner described above to the other side.

19. REMOVE QUARTER TRIM PANEL LH

(a) w/o Rear A/C:

Using a screwdriver, remove the deck side trim cover.

HINT:

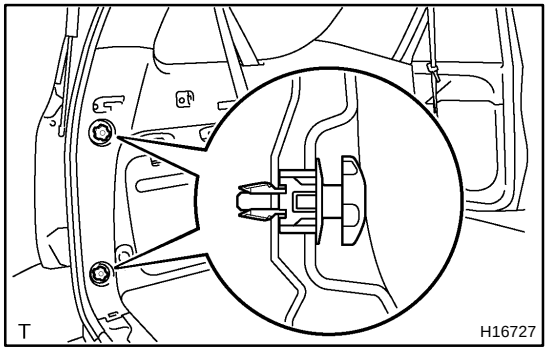
Tape the screwdriver tip before use.

(b) w/o Tonneau cover:

Using a screwdriver, remove the 2 No. 1 tonneau cover holder caps.

HINT:

Tape the screwdriver tip before use.



(c) Remove the 2 package holder net hooks.

(d) Remove the rear No. 1 seat outer belt floor anchor.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

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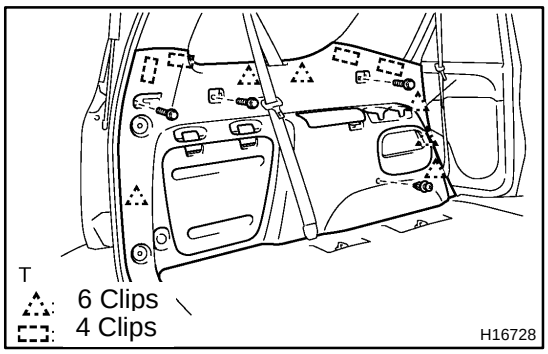
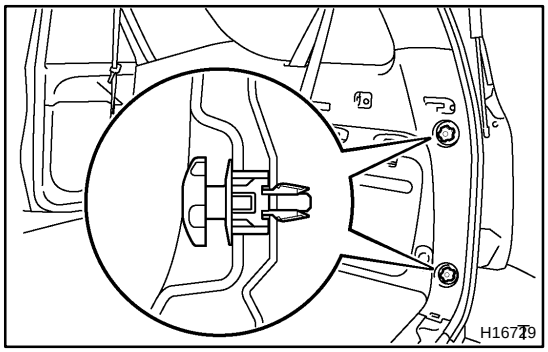


(e) Remove the 3 bolts, clip and quarter trim panel LH, then disconnect the connector.

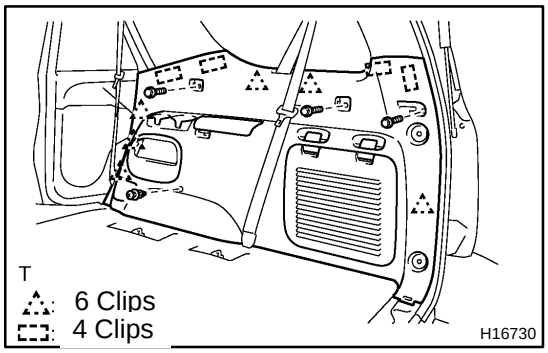
20. REMOVE QUARTER TRIM PANEL RH

(a) w/o Tonneau cover:
Using a screwdriver, remove the 2 No. 1 tonneau cover holder caps.

HINT:
Tape the screwdriver tip before use.

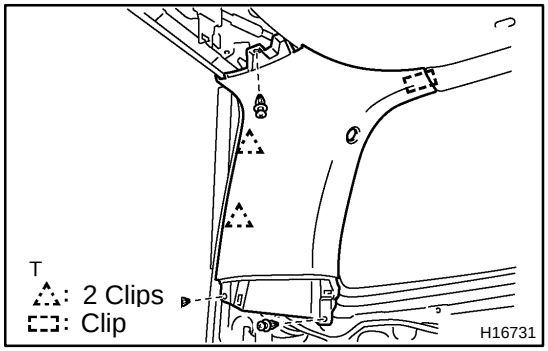


(b) Remove the 2 package holder net hooks.
(c) Remove the rear No. 1 seat outer belt floor anchor.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



(d) Remove the 3 bolts, clip and quarter trim panel RH.

21. w/ Rear No. 2 seat:
REMOVE REAR NO. 2 SEAT OUTER BELT SHOULDER ANCHORS
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



22. REMOVE NO. 2 REAR WINDOW SIDE GARNISH

(a) Remove the 3 clips and No. 2 rear window side garnish.
(b) Use the same manner described above to the other side.

23. REMOVE REAR NO. 1 SEAT OUTER BELT SHOULDER ANCHOR

(a) Using a screwdriver, remove the anchor cap.

HINT:
Tape the screwdriver tip before use.

(b) Remove the rear No. 1 seat outer belt shoulder anchor.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)
(c) Use the same manner described above to the other side.

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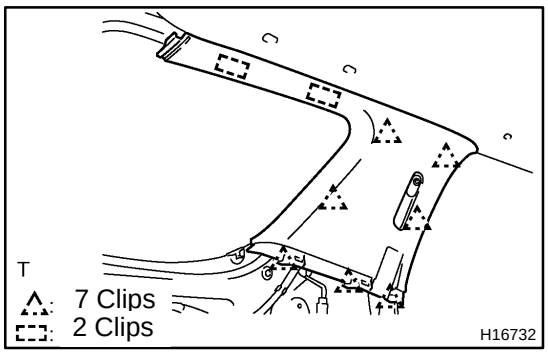
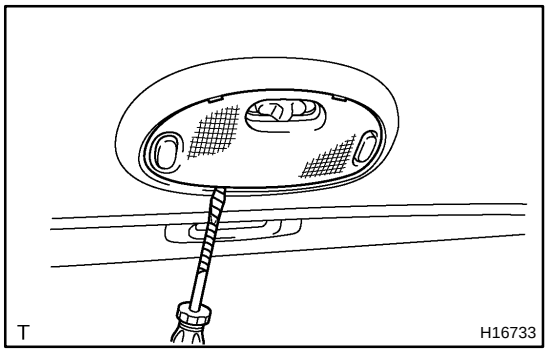


24. REMOVE REAR WINDOW SIDE GARNISH

(a) Remove the rear window side garnish.

(b) Use the same manner described above to the other side.



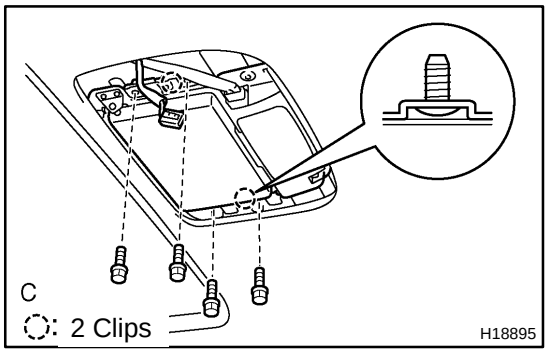
25. w/ Sliding roof:
REMOVE MAP LIGHT

(a) Using a screwdriver, remove the lens.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and map light, then disconnect the connector.



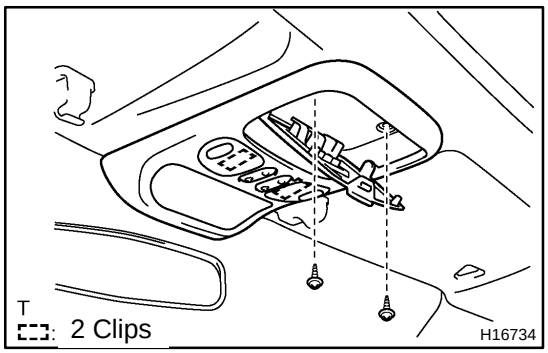
26. w/ Rear seat entertainment:
REMOVE INFORATION DISPLAY

(a) Remove the 2 lenses.

(b) Remove the 2 screws and display panel, then disconnect the connector.

(c) Remove the 4 dolts and multi information display, then disconnect the connector.

27. w/ Electro chrmic inner rear view mirror:
REMOVE MIRROR COVER



28. w/ Sliding roof:
REMOVE ROOF CONSOLE BOX

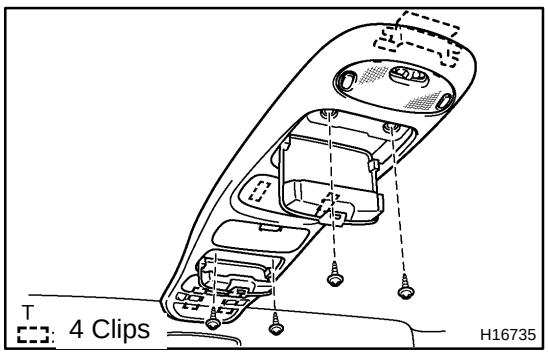
(a) Remove the 2 screws.

(b) Using a screwdriver, remove the roof console box.

HINT:

Tape the screwdriver tip before use.

(c) Disconnect the connector.



29. w/o Sliding roof:
REMOVE ROOF CONSOLE BOX

(a) Remove the 4 screws.

(b) Using a screwdriver, remove the roof console box.

HINT:

Tape the screwdriver tip before use.

(c) Disconnect the connectors.

30. REMOVE ASSIST GRIPS

31. w/ Sliding roof:
REMOVE SLIDING ROOF OPENING TRIM

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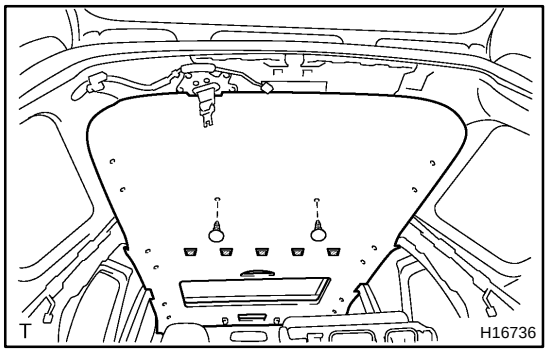
32. REMOVE SUN VISORS AND HOLDERS



33. REMOVE ROOF HEADLINING

(a) Using a clip remover, remove the 2 clips.

(b) Remove the roof headlining.

34. w/ Rear A/C:
REMOVE REAR AIR DUCTS

35. w/ Rear A/C:
REMOVE FRONT SIDE RAIL SPACERS

36. w/o Rear A/C:
REMOVE REAR NO. 2 SIDE RAIL SPACERS

37. w/o Curtain shield airbag assembly:
REMOVE FRONT PILLAR SPACERS

38. REMOVE FRONT ROOF HEADLINING TRIM RETAINERS

39. REMOVE REAR ROOF HEADLINING TRIM RETAINERS

40. REMOVE NO. 1 ROOF HEADLINING TRIM SIDE RETAINERS

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BO46X–01

INSTALLATION

Installation is in the reverse order of removal (See page BO–101).

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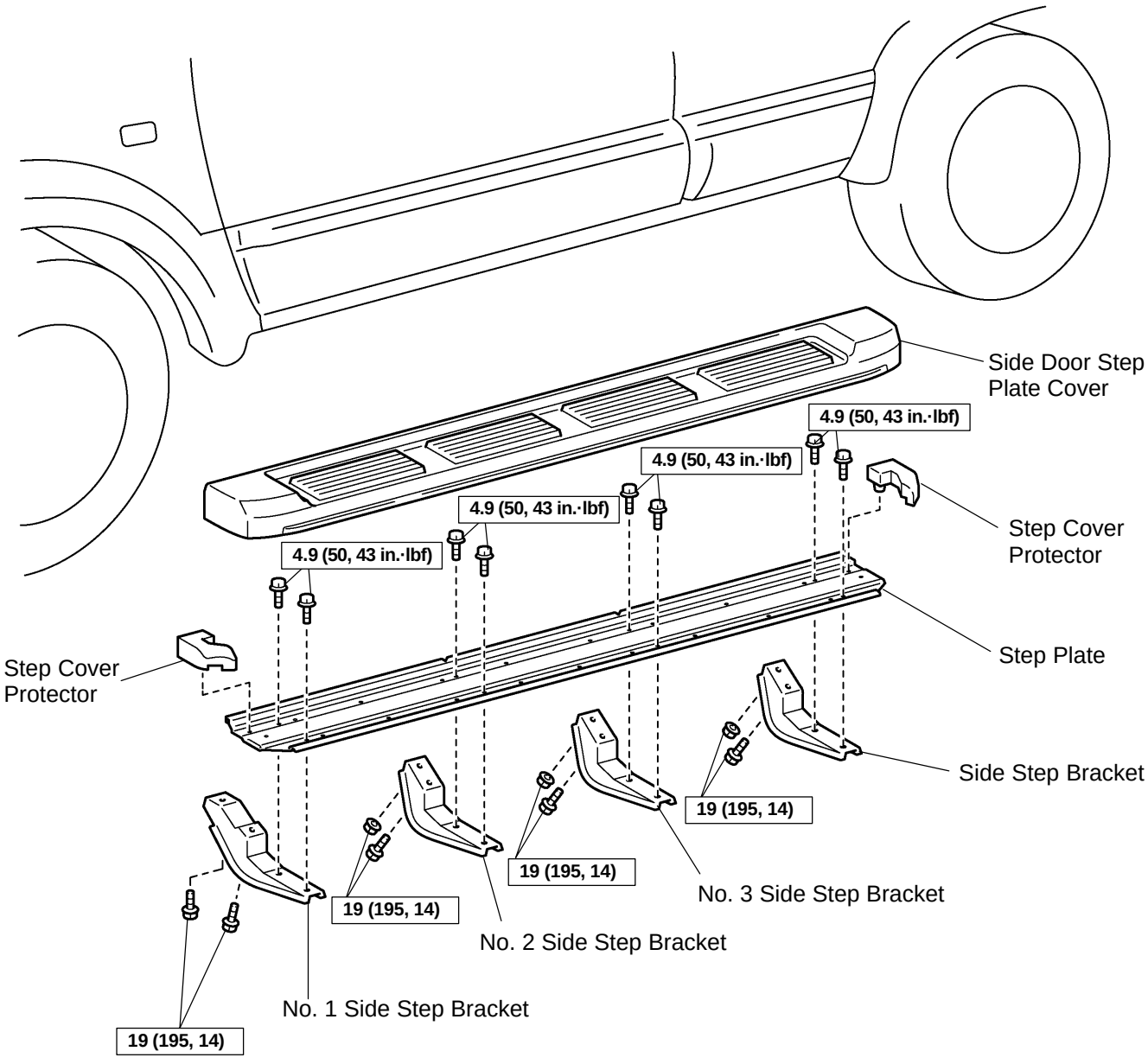
SIDE STEP

COMPONENTS

BO46Y–01



T

N·m (kgf·cm, ft·lbf) : Specified torque

H16753

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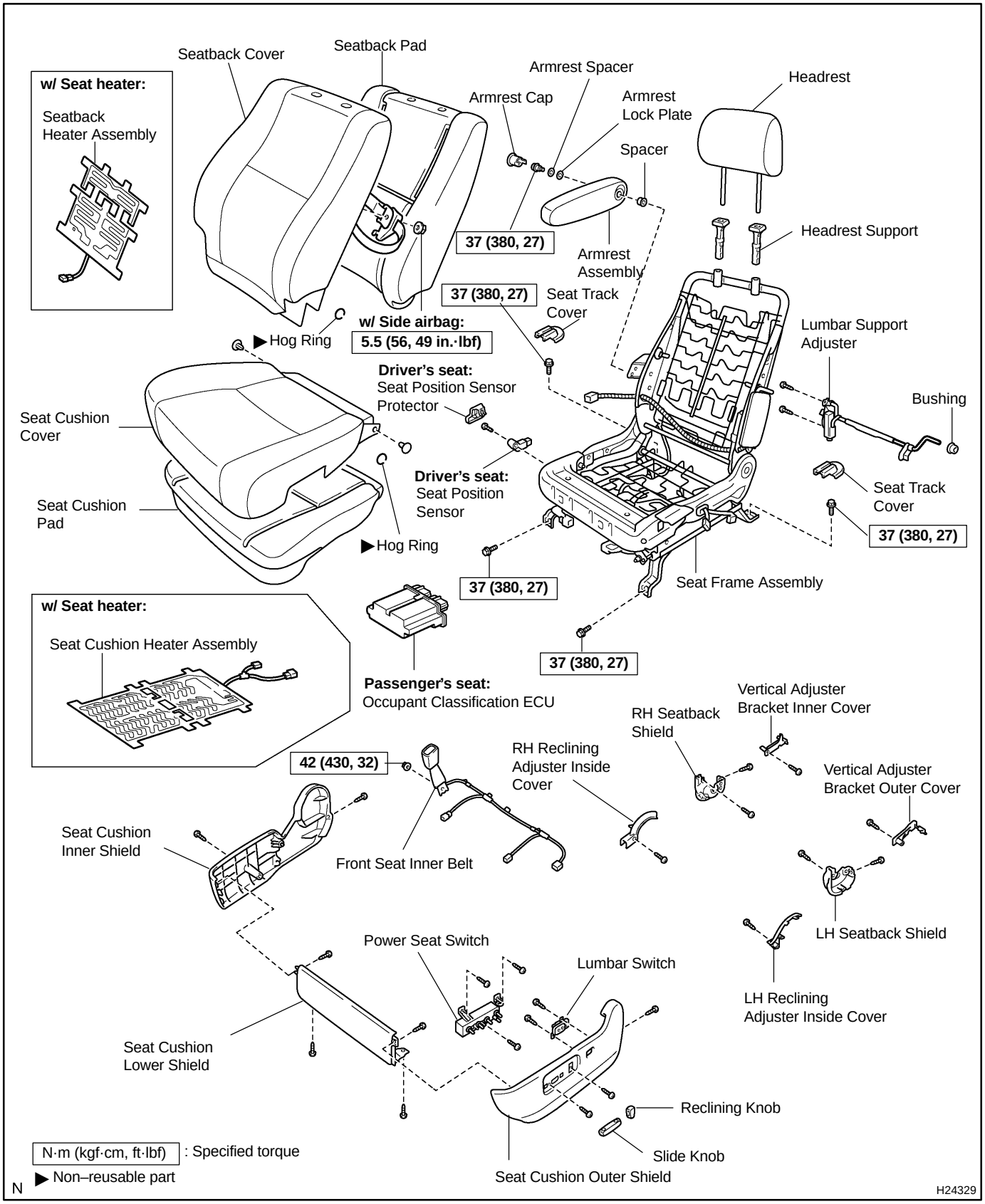
FRONT SEAT (Power Adjuster Type)

BO4S6–01

COMPONENTS

HINT:

The procedures listed below are for the LH side.



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BO4S7–01

REMOVAL

CAUTION:

Work must not be started until at least 90 seconds after the ignition switch is turned to the LOCK position and the negative (–) terminal cable is disconnected from the battery.

(The SRS is equipped with a back–up power source. If work is started within 90 seconds from disconnecting the negative (–) terminal cable of the battery, the SRS may deploy.)

NOTICE:

When removing/installing and overhauling the passenger seat, check the passenger occupant classification system and perform the zero point calibration (see page DI–1128).

HINT:

The procedures listed below are for the LH side.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

2. REMOVE SEAT TRACK COVERS

Using a screwdriver, remove the seat track covers.

HINT:

Tape the screwdriver tip before use.

3. REMOVE FRONT SEAT

(a) Remove the 4 bolts.

(b) Disconnect the connectors.

(c) w/ Side airbag:
Disconnect the airbag connector.

(d) Remove the front seat.

NOTICE:

Be careful not to damage the body.

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BO4S8–01

DISASSEMBLY

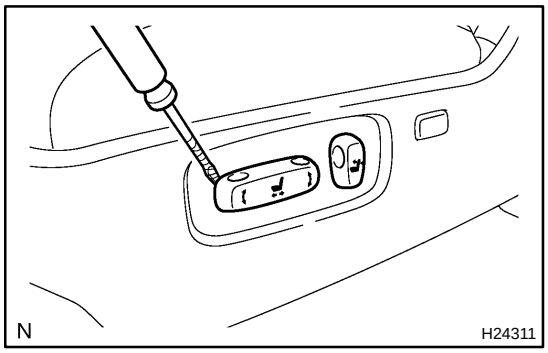
CAUTION:

Wear safety gloves, because the sharp edges and surfaces of the seat frame may cause injury to the hands.

HINT:

- The procedures listed below are for the LH side.
- Tape the screwdriver tip before using it to remove the parts.
- For easy removal of the lumbar support adjuster, release the lumbar support through lumbar switch operation.

1. REMOVE HEADREST

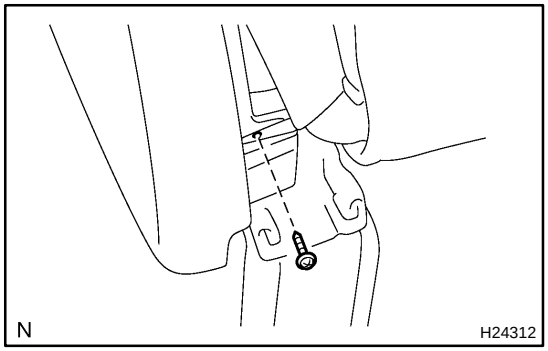


2. REMOVE SLIDE KNOB AND RECLINING KNOB

Using a screwdriver, remove the slide knob and reclining knob.

HINT:

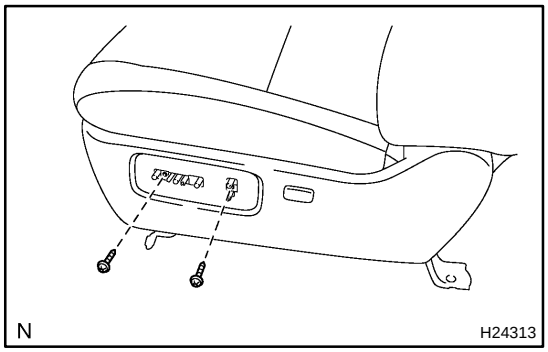
Tape the screwdriver tip before use.



3. REMOVE SEAT CUSHION LOWER SHIELD, SEAT CUSHION OUTER SHIELD AND SEAT CUSHION INNER SHIELD

(a) Remove the screw from the seat cushion outer shield.

(b) Perform the same procedure on the seat cushion inner shield.



(c) Remove the 2 screws from the seat cushion outer shield.

(d) Remove the screw from the seat cushion inner shield.

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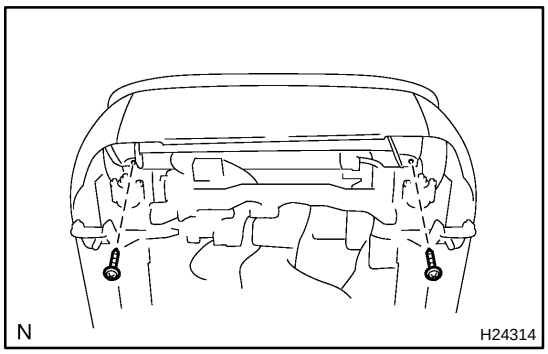
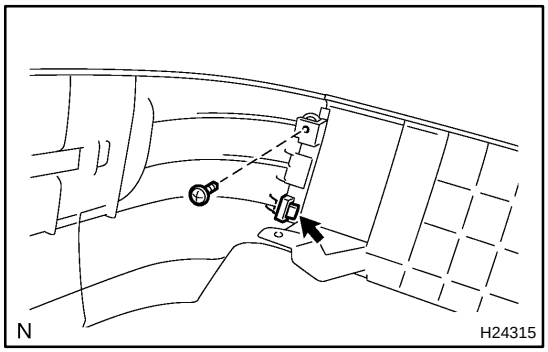


(e) Remove the 2 screws from the seat cushion lower shield.
(f) Disconnect the lumbar switch connector from the seat cushion outer shield, and remove the seat cushion lower shield, outer shield and inner shield.



(g) Remove the screw and separate the seat cushion lower shield and seat cushion outer shield.
(h) Perform the same procedure on the other side.

4. REMOVE FRONT SEAT INNER BELT

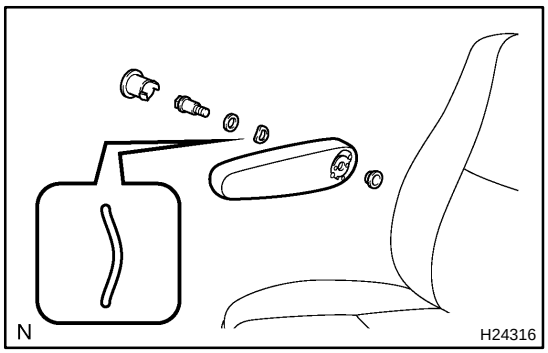
(a) Disconnect the wire harness clamps and connectors.
(b) Remove the nut and front seat inner belt.

5. REMOVE LUMBAR SWITCH

Remove the 2 screws and lumbar switch from the seat cushion outer shield.

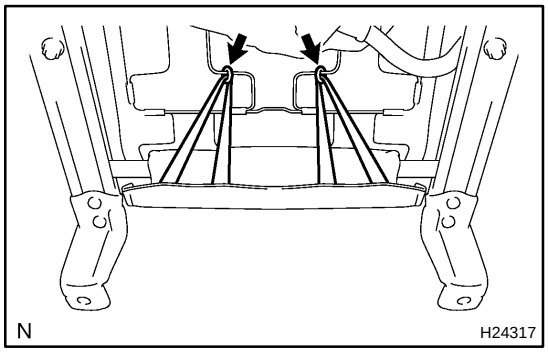
6. REMOVE POWER SEAT SWITCH

Remove the 3 screws and power seat switch.



7. REMOVE ARMREST ASSEMBLY

(a) Using a screwdriver, remove the armrest cap.
(b) Remove the bolt, armrest spacer, armrest lock plate and armrest assembly.
(c) Remove the spacer from the armrest assembly.



8. REMOVE SEATBACK COVER AND PAD

(a) Remove the hog rings from the seat frame assembly.
(b) Open the fastener.

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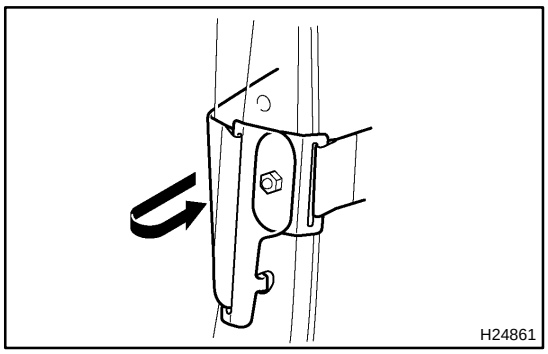
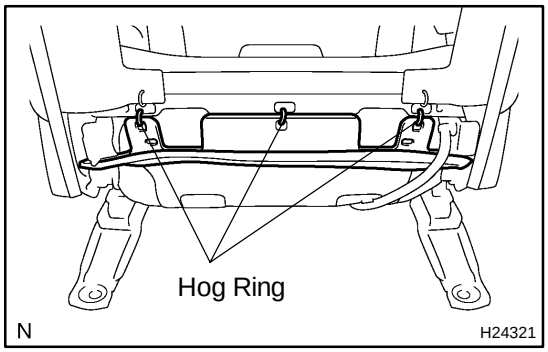
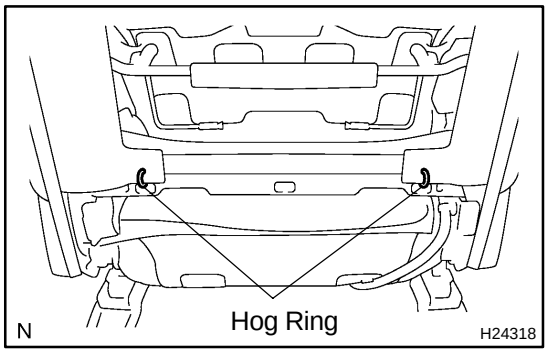


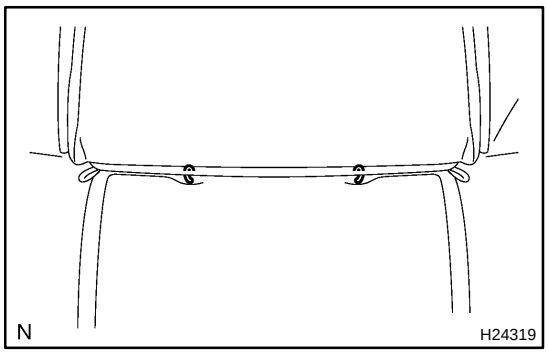
(c) w/ Side airbag:
Remove the nut and disconnect the seatback cover bracket from the seat frame assembly.



(d) Remove the hog rings from the seat frame assembly.



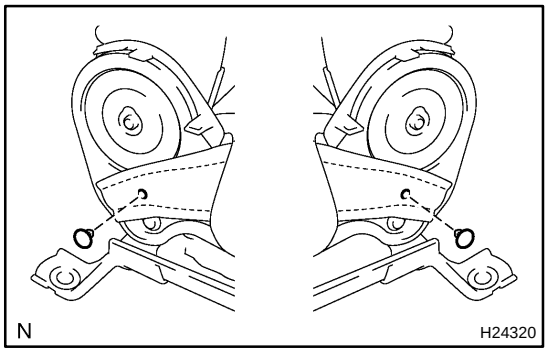
(e) Remove the hog rings from the seat frame assembly.
(f) Remove the seatback cover and pad from the seat frame assembly.



9. REMOVE SEATBACK COVER
(a) Turn up the seatback cover and remove the hog rings.
(b) Remove the 2 headrest supports.
(c) Remove the seatback cover from the seatback pad.

10. w/ Seat heater:
REMOVE SEATBACK HEATER ASSEMBLY
Cut off the tack pins which fasten the seat heater, and then remove the seatback heater assembly from the seatback cover.

11. REMOVE SEAT CUSHION COVER AND PAD
(a) Disconnect the wire harness clamp.
(b) Remove the 2 clips.



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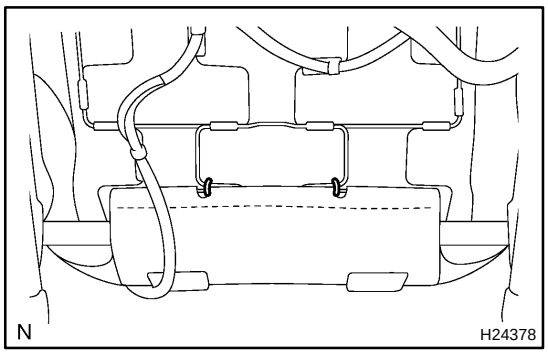
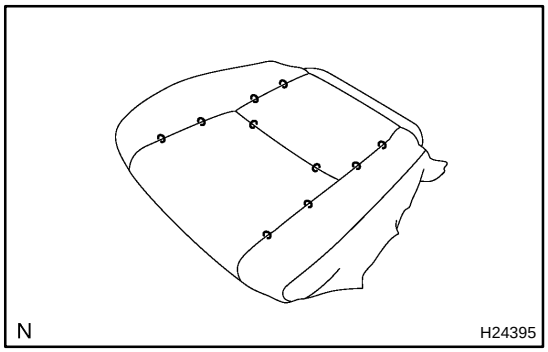


(c) Remove the hog rings from the seat cushion cover.
(d) Unlatch the seat cushion cover hooks, then remove the seat cushion cover and seat cushion pad.

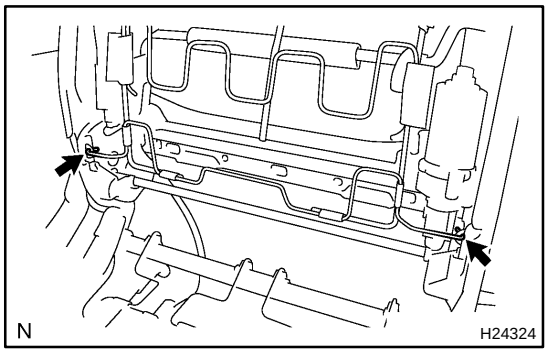


12. REMOVE SEAT CUSHION COVER

Remove the hog rings and seat cushion cover from the seat cushion pad.

13. w/ Seat heater:
REMOVE SEAT CUSHION HEATER ASSEMBLY

Cut off the tack pins which fasten the seat heater, and then remove the seat cushion heater assembly from the seat cushion cover.

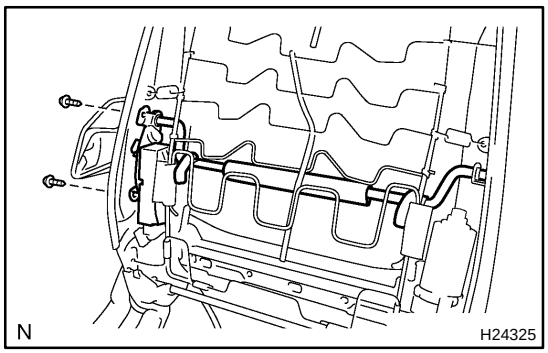


14. REMOVE LUMBAR SUPPORT ADJUSTER

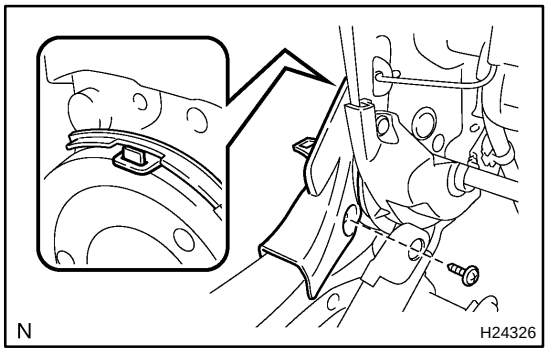
(a) Disconnect the connector.
(b) Disengage the seatback spring edge from the seat frame assembly.

NOTICE:

Be careful when releasing the seatback spring edge, because there is a possibility that the spring may break due to tension by the lumbar support.



(c) Remove the 2 screws and lumbar support adjuster.
(d) Remove the bushing from the lumbar support adjuster.



15. REMOVE RH AND LH RECLINING ADJUSTER INSIDE COVERS

(a) Remove the screw and RH reclining adjuster inside cover.
(b) Disconnect the wire harness clamp.
(c) Perform the same procedure on the other side.

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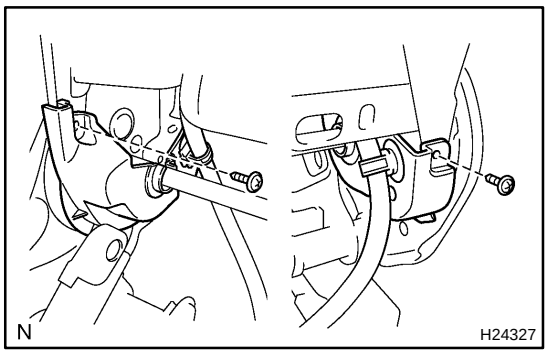

16. REMOVE RH AND LH SEATBACK SHIELDS

(a) Remove the 2 screws and RH seatback shield.

(b) Perform the same procedure on the other side.

17. REMOVE VERTICAL ADJUSTER BRACKET INNER AND OUTER COVERS

(a) Remove the screw and vertical adjuster bracket inner cover.

(b) Perform the same procedure on the other side.

18. Driver's seat:

REMOVE SEAT POSITION SENSOR

(See page RS–104)

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BO4SA–01

REASSEMBLY

CAUTION:

Wear safety gloves, because the sharp edges and surfaces of the seat frame may cause injury to the hands.

HINT:

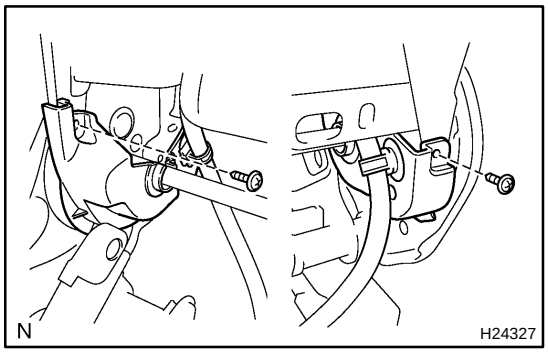
- The procedures listed below are for the LH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS–2).

1. Driver's seat:
INSTALL SEAT POSITION SENSOR
(SEE PAGE RS–108)

2. INSTALL VERTICAL ADJUSTER BRACKET INNER AND OUTER COVERS

(a) Install the vertical adjuster bracket inner cover with the screw.

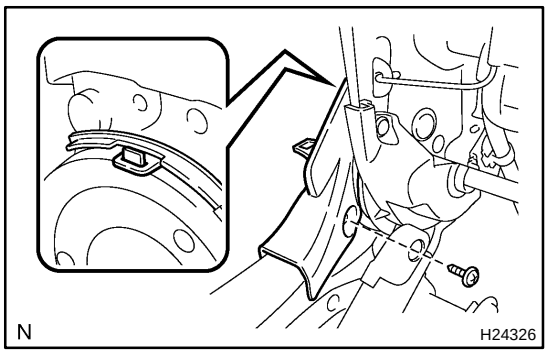
(b) Perform the same procedure on the other side.



3. INSTALL RH AND LH SEATBACK SHIELDS

(a) Install the RH seatback shield with the 2 screws.

(b) Perform the same procedure on the other side.

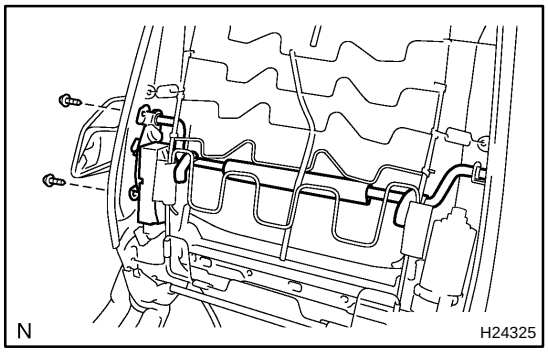


4. INSTALL RH AND LH RECLINING ADJUSTER INSIDE COVERS

(a) Connect the wire harness clamp.

(b) Install the RH reclining adjuster inside cover with the screw.

(c) Perform the same procedure on the other side.



5. INSTALL LUMBAR SUPPORT ADJUSTER

(a) Install a new bushing to the lumbar support adjuster.

(b) Install the lumbar support adjuster with the 2 screws.

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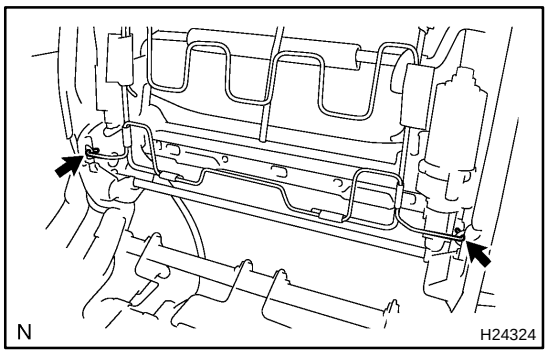


(c) Engage the seatback spring edge with the seat frame assembly.

6. w/ Seat heater:

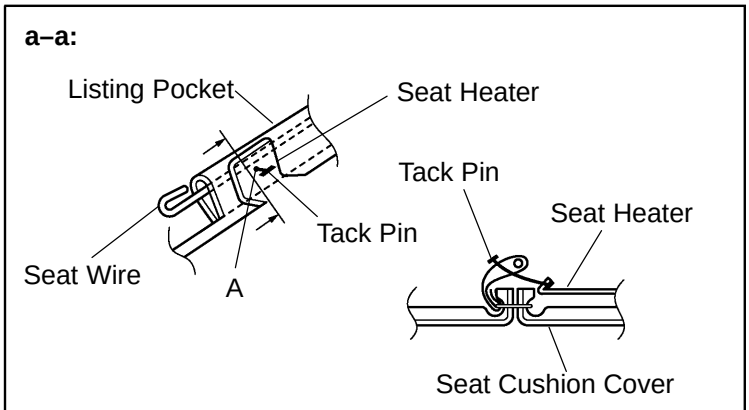
INSTALL SEAT CUSHION HEATER ASSEMBLY

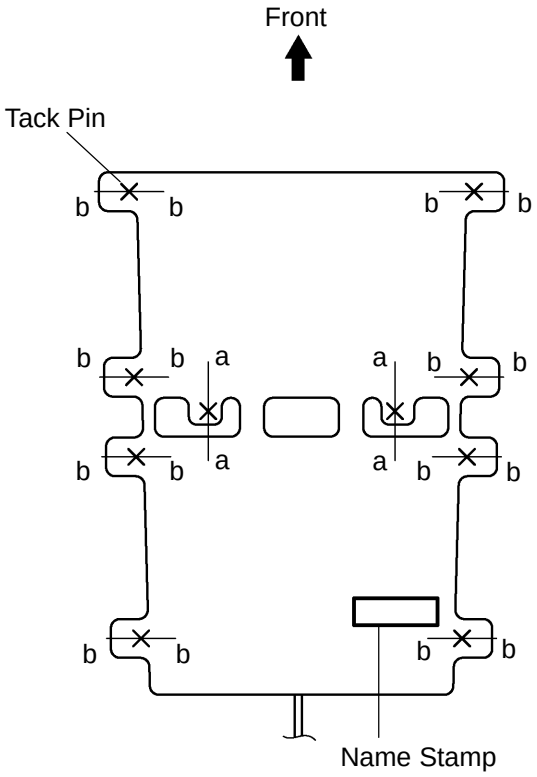
(a) Set the seat cushion heater assembly with the name stamp side facing the seat cushion cover.

(b) Install the seat cushion heater assembly with the 10 tack pins.

NOTICE:

Do not substitute other metal parts for tack pins.





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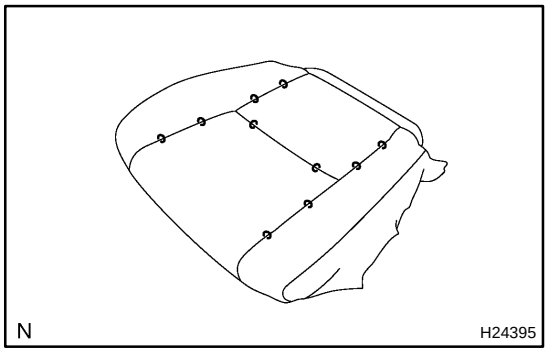

7. INSTALL SEAT CUSHION COVER

Install the seat cushion cover to the seat cushion pad with the hog rings.

HINT:

When installing the hog rings, take as much care as possible to prevent wrinkles.

8. INSTALL SEAT CUSHION COVER AND PAD

(a) Install the seat cushion cover with seat cushion pad, and latch the seat cushion cover hooks.

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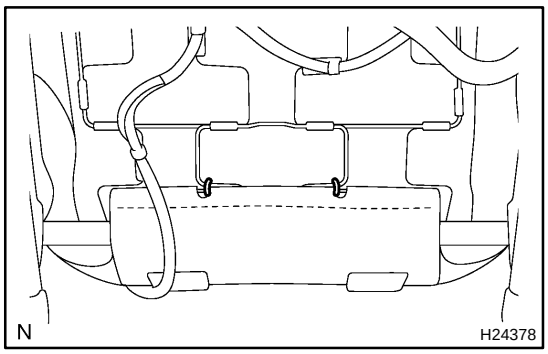
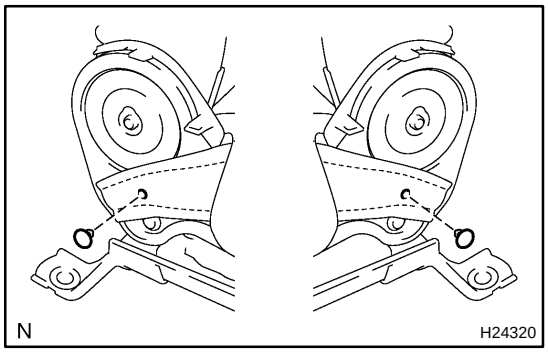


(b) Install the hog rings to the seat cushion cover.

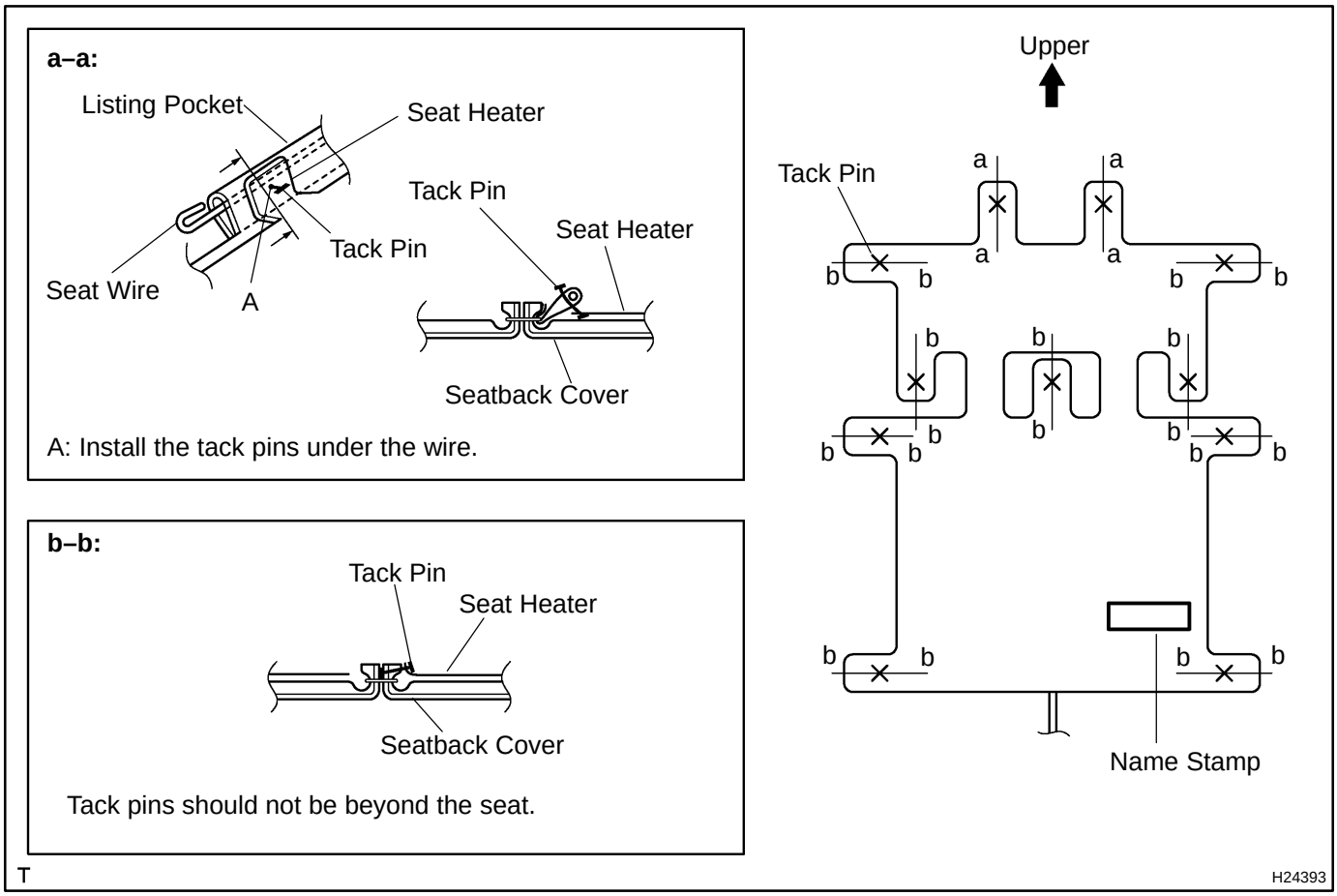


(c) Install the 2 clips.
(d) Connect the wire harness clamp.

9. w/ Seat heater:
INSTALL SEATBACK HEATER ASSEMBLY

(a) Set the seatback heater assembly with the name stamp side facing the seatback cover.
(b) Install the seatback heater assembly with the 11 tack pins.

NOTICE:
Do not substitute other metal parts for tack pins.



10. INSTALL SEATBACK COVER

(a) Install the seatback cover to the seatback pad.
(b) Install the 2 headrest supports.

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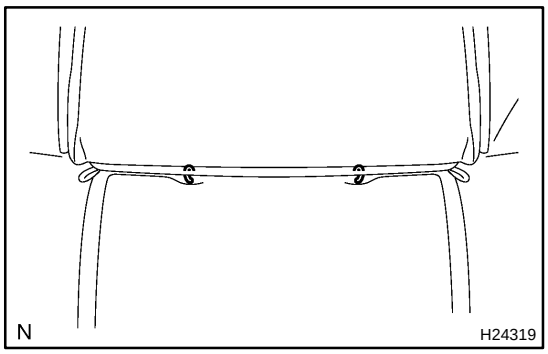
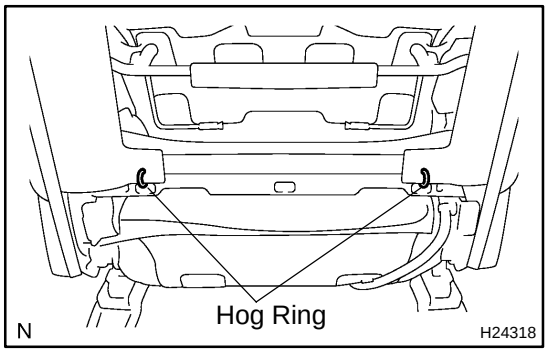


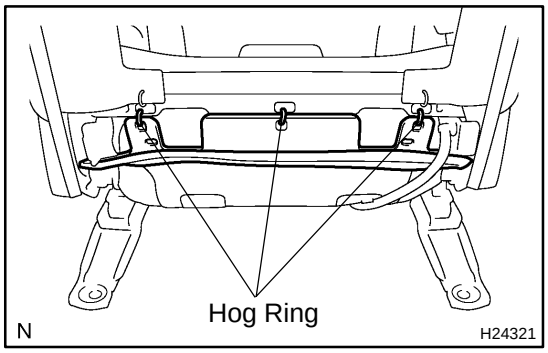
(c) Turn up the seatback cover and install the hog rings.

11. INSTALL SEATBACK COVER AND PAD

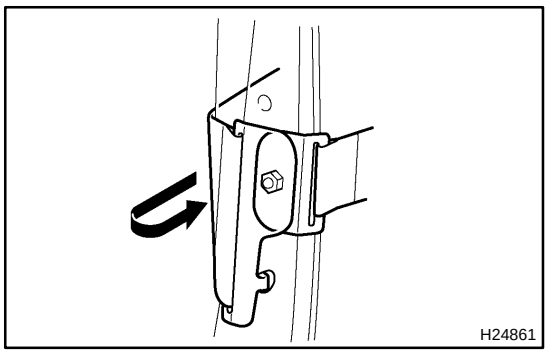
(a) Install the seatback cover and pad to the seat frame assembly.



(b) Install the hog rings to the seat frame assembly.

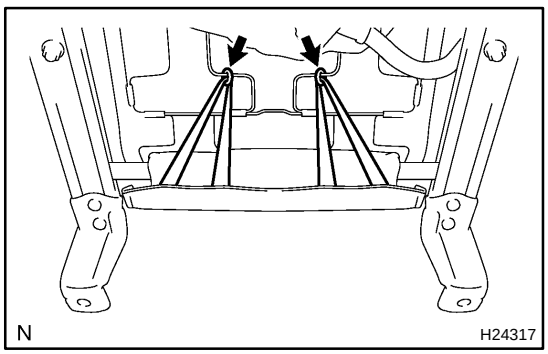


(c) Install the hog rings to the seat frame assembly.



(d) w/ Side airbag:
Connect the seatback cover bracket to the seat frame assembly with the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(e) Close the fastener.



(f) Install the hog rings to the seat frame assembly.

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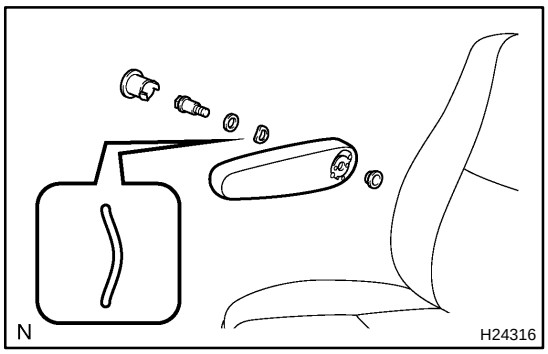


12. INSTALL ARMREST ASSEMBLY

(a) Install the spacer to the armrest assembly.

(b) Install the armrest assembly, armrest lock plate and armrest spacer with the bolt.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

HINT:

Install the armrest lock plate as shown in the illustration.

(c) Install the armrest cap.

13. INSTALL POWER SWITCH

Install the power switch with the 3 screws.

14. INSTALL LUMBAR SWITCH

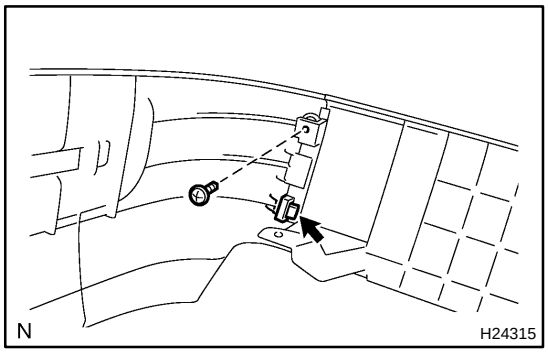
Install the lumbar switch with the 2 screws to the seat cushion outer shield.

15. INSTALL FRONT SEAT INNER BELT

(a) Install the front seat inner belt with the nut.

Torque: 42 N·m (430 kgf·cm, 32 ft·lbf)

(b) Connect the connectors and wire harness clamps.

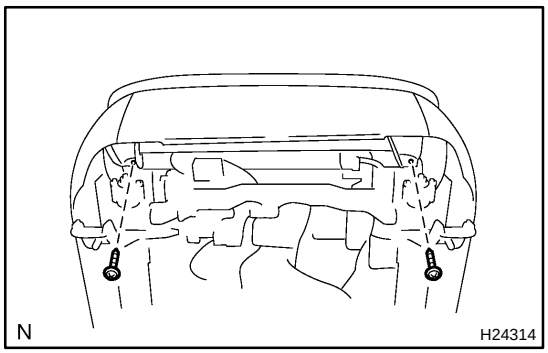


16. INSTALL SEAT CUSHION LOWER SHIELD, SEAT CUSHION OUTER SHIELD AND SEAT CUSHION INNER SHIELD

(a) Assemble the seat cushion lower shield and seat cushion outer shield with the screw.

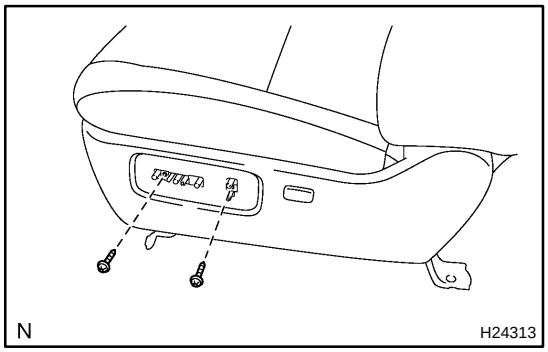
(b) Perform the same procedure on the other side.

(c) Connect the lumbar switch connector to the seat cushion outer shield, and install the seat cushion lower shield, outer shield and inner shield.



(d) Install the 2 screws to the seat cushion lower shield.

(e) Install the screw to the seat cushion inner shield.



(f) Install the 2 screws to the seat cushion outer shield.

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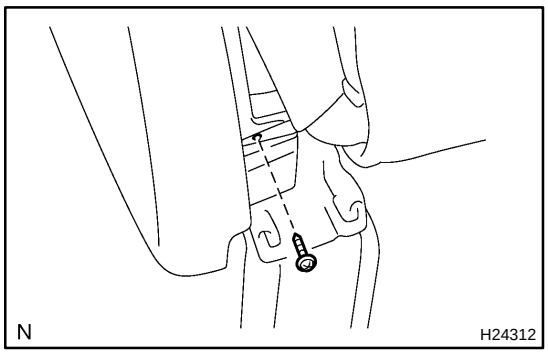

(g) Install the screw to the seat cushion outer shield.
(h) Perform the same procedure on the seat cushion inner shield.

17. INSTALL SLIDE KNOB AND RECLINING KNOB

18. INSTALL HEADREST

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BO4S9–01

INSTALLATION

HINT:

The procedures listed below are for the LH side.

1. INSTALL FRONT SEAT

(a) Mount the front seat to the vehicle.

NOTICE:

Be careful not to damage the vehicle body.

(b) w/ Side airbag:
Connect the airbag connector.

(c) Connect the connectors.

(d) Slide the front seat to the rearmost position.

(e) Tighten the bolts on the front side temporarily, starting from the bolt on the inner side.

(f) Tighten them completely.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

(g) Slide the front seat to the foremost position.

(h) Tighten the bolts on the rear side temporarily, starting from the bolt on the inner side.

(i) Tighten them completely.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

2. INSTALL SEAT TRACK COVERS

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. Passenger's seat:
PERFORM PASSENGER OCCUPANT CLASSIFICATION SYSTEM ZERO POINT CALIBRATION (See page DI–1128)

5. PERFORM INITIALIZATION (See page IN–20)

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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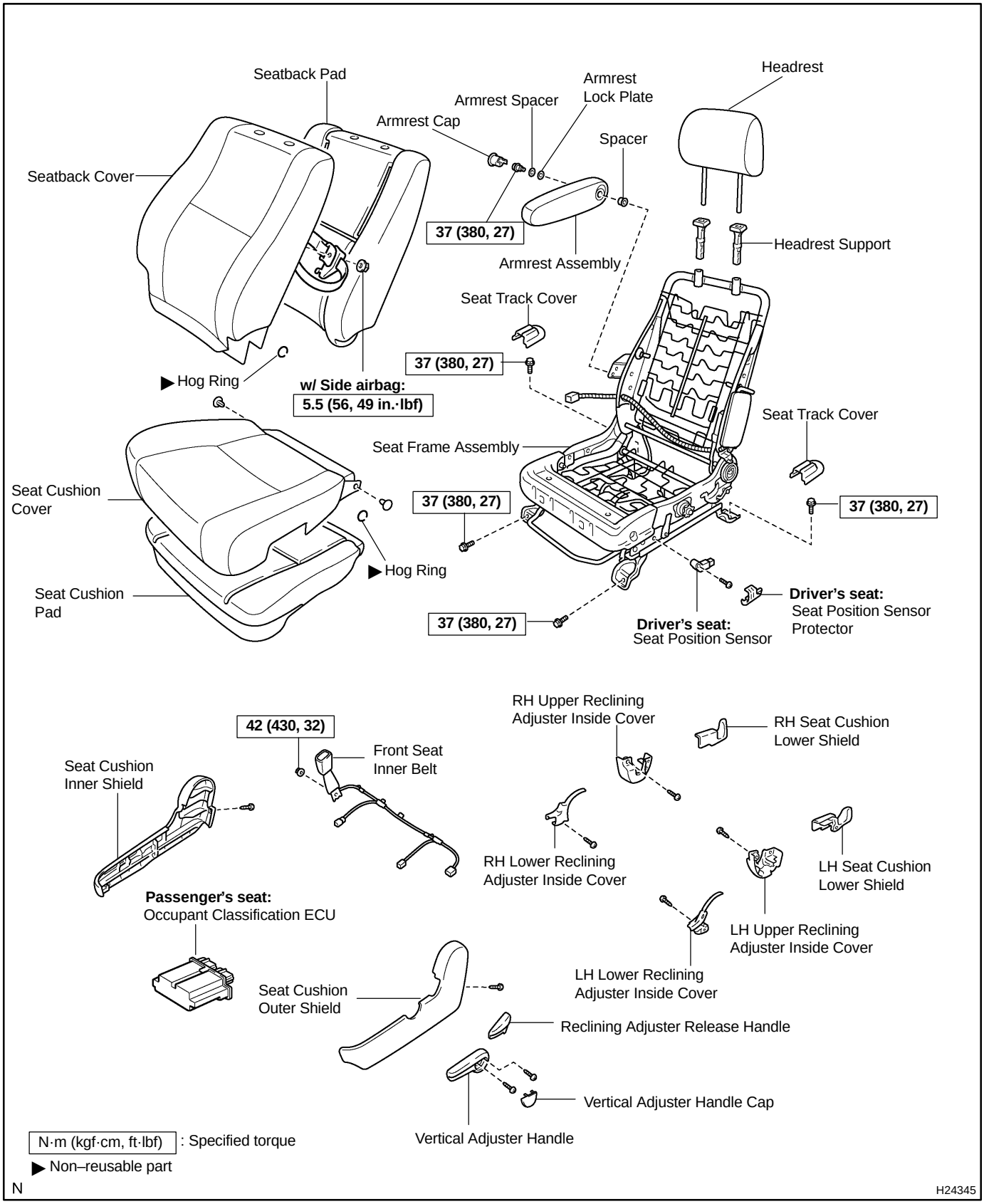
FRONT SEAT (Manual Adjuster Type)

BO4SB–01

COMPONENTS

HINT:

The procedures listed below are for the LH side.



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BO4SC–01

REMOVAL

CAUTION:

Work must not be started until at least 90 seconds after the ignition switch is turned to the LOCK position and the negative (–) terminal cable is disconnected from the battery.

(The SRS is equipped with a back–up power source. If work is started within 90 seconds from disconnecting the negative (–) terminal cable of the battery, the SRS may deploy.)

NOTICE:

When removing/installing and overhauling the passenger seat, check the passenger occupant classification system and perform the zero point calibration (see page DI–1128).

HINT:

The procedures listed below are for the LH side.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

Wait for 90 seconds after disconnecting the cable to prevent the airbag working.

2. REMOVE SEAT TRACK COVERS

Using a screwdriver, remove the seat track covers.

HINT:

Tape the screwdriver tip before use.

3. REMOVE FRONT SEAT

(a) Remove the 4 bolts.

(b) Disconnect the connectors.

(c) w/ Side airbag:
Disconnect the airbag connector.

(d) Remove the front seat.

NOTICE:

Be careful not to damage the vehicle body.

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BO4SD–01

DISASSEMBLY

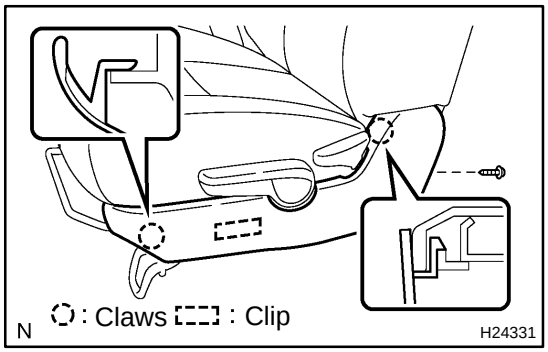
CAUTION:

Wear safety gloves, because the sharp edges and surfaces of the seat frame may cause injury to the hands.

HINT:

- ▶ The procedures listed below are for the LH side.
- ▶ Tape the screwdriver tip before using it to remove the parts.

1. REMOVE HEADREST



2. REMOVE SEAT CUSHION OUTER SHIELD

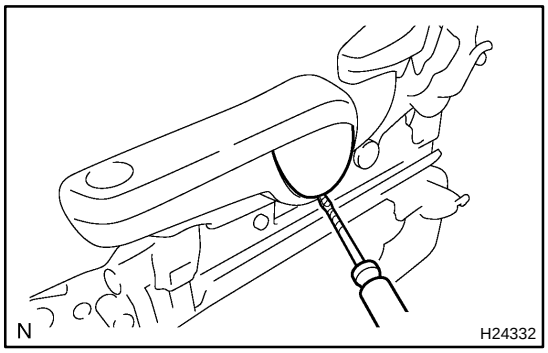
(a) Remove the screw from the seat cushion outer shield.

(b) Using a screwdriver, remove the seat cushion outer shield.

HINT:

Tape the screwdriver tip before use.

3. REMOVE RECLINING ADJUSTER RELEASE HANDLE

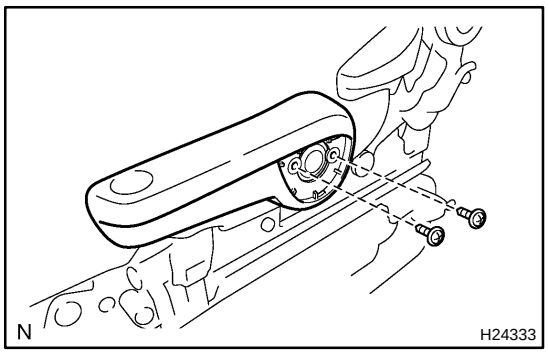


4. REMOVE VERTICAL ADJUSTER HANDLE

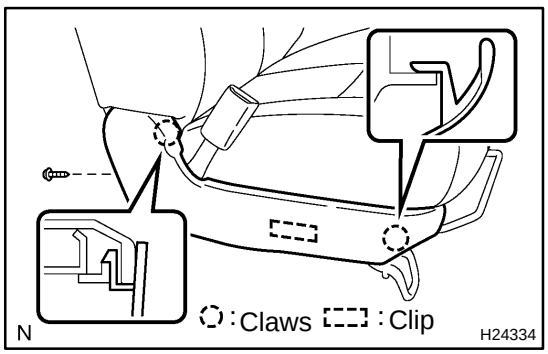
(a) Using a screwdriver, remove the vertical adjuster handle cap.

HINT:

Tape the screwdriver tip before use.



(b) Remove the 2 screws and the vertical adjuster handle.



5. REMOVE SEAT CUSHION INNER SHIELD

(a) Remove the screw from the seat cushion inner shield.

(b) Using a screwdriver, remove the seat cushion inner shield.

HINT:

Tape the screwdriver tip before use.

6. REMOVE FRONT SEAT INNER BELT

(a) Disconnect the wire harness clamps and connectors.

(b) Remove the nut and front seat inner belt.

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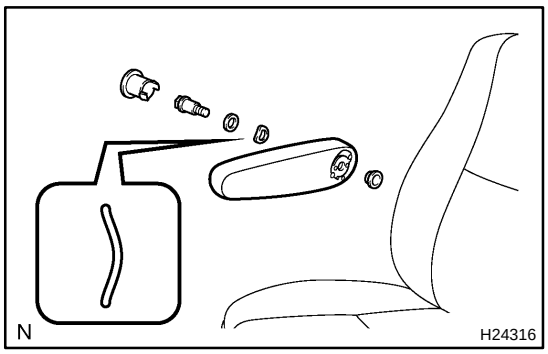
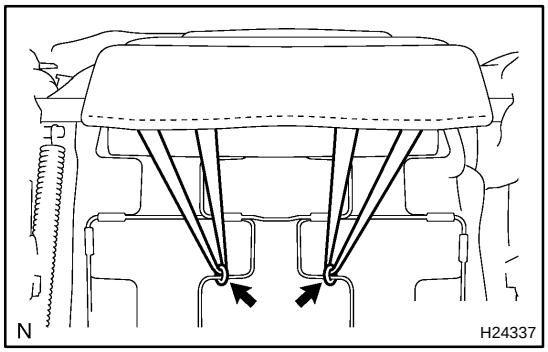


7. REMOVE ARMREST ASSEMBLY

(a) Using a screwdriver, remove the armrest cap.

(b) Remove the bolt, armrest spacer, armrest lock plate and armrest assembly.

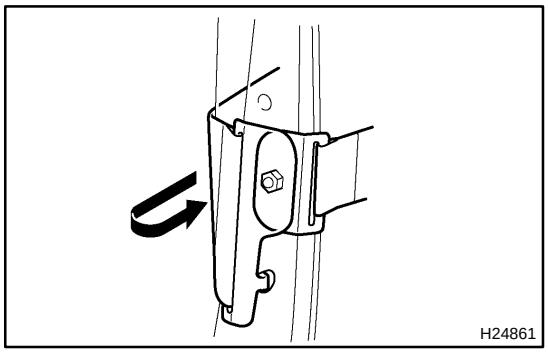
(c) Remove the spacer from the armrest assembly.



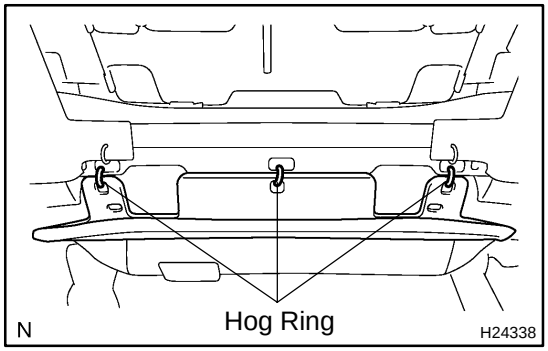
8. REMOVE SEATBACK COVER AND PAD

(a) Remove the hog rings from the seat frame assembly.

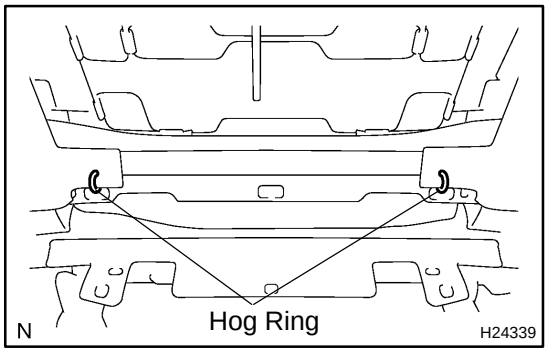
(b) Open the fastener.



(c) w/ Side airbag:
Remove the nut and disconnect the seatback cover bracket from the seat frame assembly.



(d) Remove the hog rings shown in the illustration from the seat frame assembly.



(e) Remove the hog rings shown in the illustration from the seat frame assembly.

(f) Remove the seatback cover and pad from the seat frame assembly.

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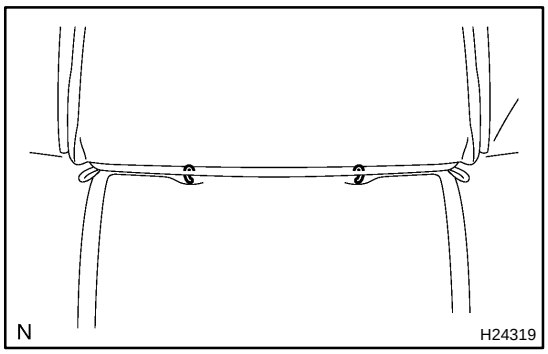
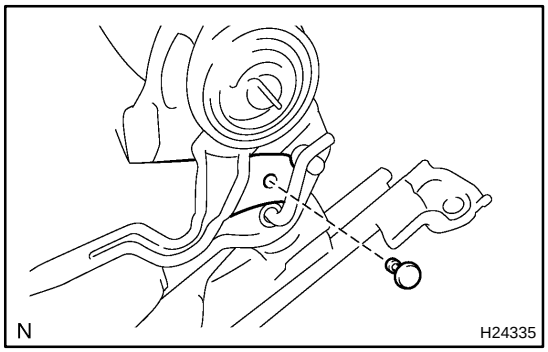


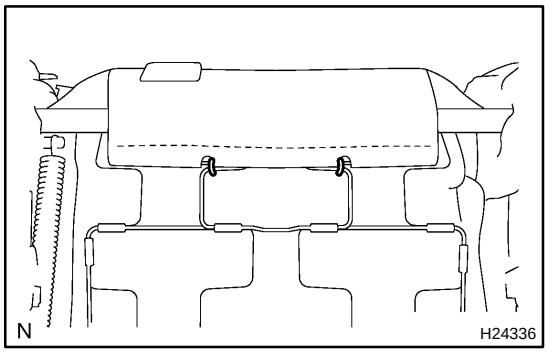
9. REMOVE SEATBACK COVER

(a) Turn up the seatback cover and remove the hog rings.
(b) Remove the 2 headrest supports.
(c) Remove the seatback cover from the seatback pad.

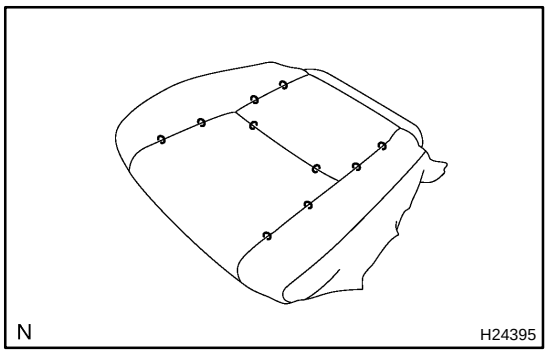


10. REMOVE SEAT CUSHION COVER AND PAD

(a) Remove the clip.
(b) Perform the same procedure on the other side.

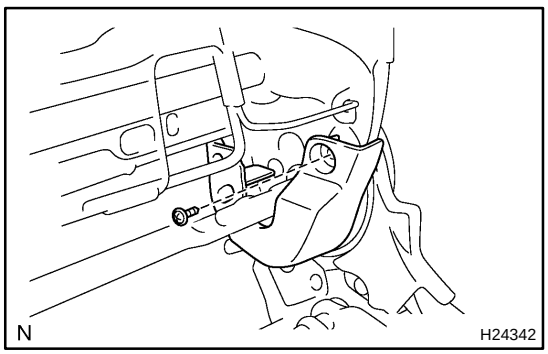


(c) Remove the hog rings from the seat cushion cover.
(d) Unlatch the seat cushion cover hooks, then remove the seat cushion cover with seat cushion pad.



11. REMOVE SEAT CUSHION COVER

Remove the hog rings and seat cushion cover from the seat cushion pad.



12. REMOVE RH AND LH UPPER RECLINING ADJUSTER INSIDE COVERS

(a) Remove the screw and LH upper reclining adjuster inside cover.
(b) Perform the same procedure on the other side.

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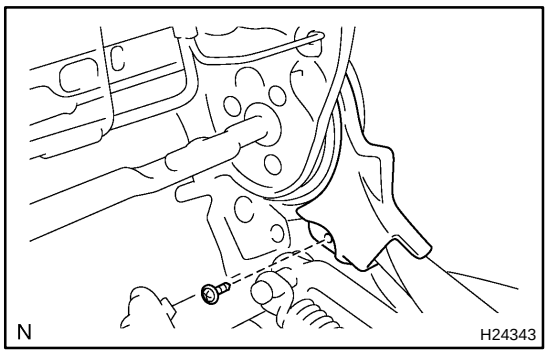
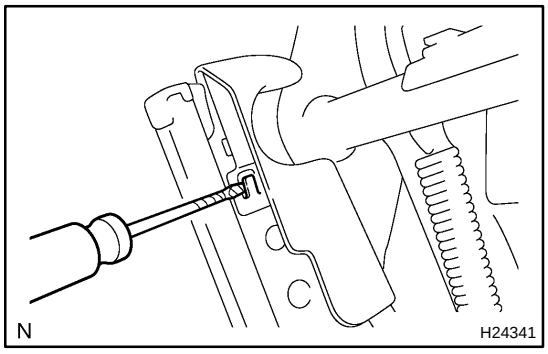


13. REMOVE RH AND LH LOWER RECLINING ADJUSTER INSIDE COVERS

(a) Remove the screw and LH lower reclining adjuster inside cover.

(b) Perform the same procedure on the other side.



14. REMOVE RH AND LH SEAT CUSHION LOWER SHIELDS

(a) Using a screwdriver, disengage the claw and remove the LH seat cushion lower shield.

HINT:

Tape the screwdriver tip before use.

(b) Perform the same procedure on the other side.

15. Driver's seat:
REMOVE SEAT POSITION SENSOR
(See page RS–104)

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BO4SE–01

REASSEMBLY

CAUTION:

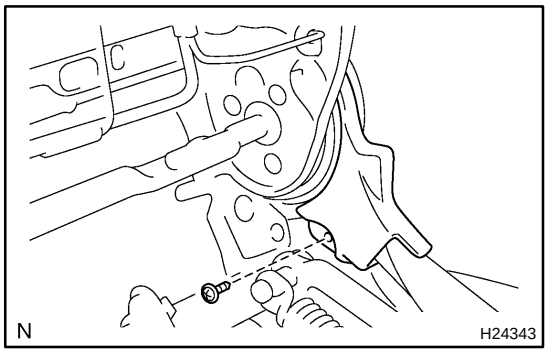
Wear safety gloves, because the sharp edges and surfaces of the seat frame may cause injury to the hands.

HINT:

- The procedures listed below are for the LH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS–2).

1. Driver's seat:
INSTALL SEAT POSITION SENSOR
(SEE PAGE RS–108)

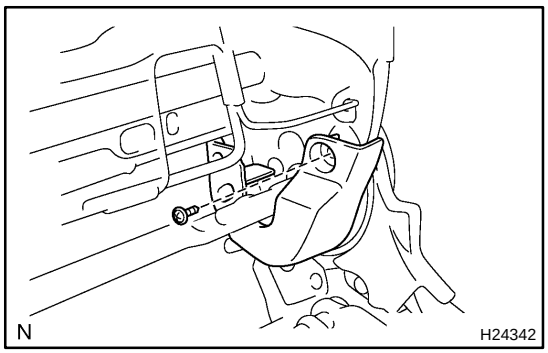
2. INSTALL RH AND LH SEAT CUSHION LOWER SHIELDS



3. INSTALL RH AND LH LOWER RECLINING ADJUSTER INSIDE COVERS

(a) Install the LH lower reclining adjuster inside cover with the screw.

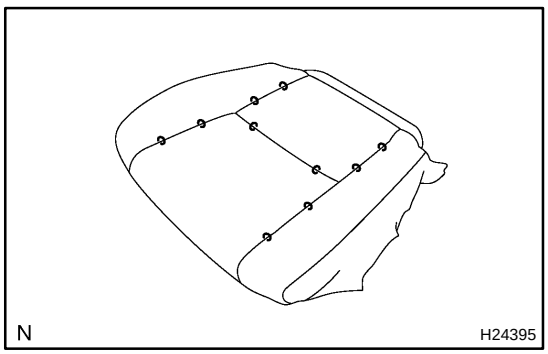
(b) Perform the same procedure on the other side.



4. INSTALL RH AND LH UPPER RECLINING ADJUSTER INSIDE COVERS

(a) Install the LH upper reclining adjuster inside cover with the screw.

(b) Perform the same procedure on the other side.



5. INSTALL SEAT CUSHION COVER

Install the seat cushion cover to the seat cushion pad with the hog rings.

HINT:

When installing the hog rings, take as much care as possible to prevent wrinkles.

6. INSTALL SEAT CUSHION COVER AND PAD

(a) Install the seat cushion cover with seat cushion pad, and latch the seat cushion cover hooks.

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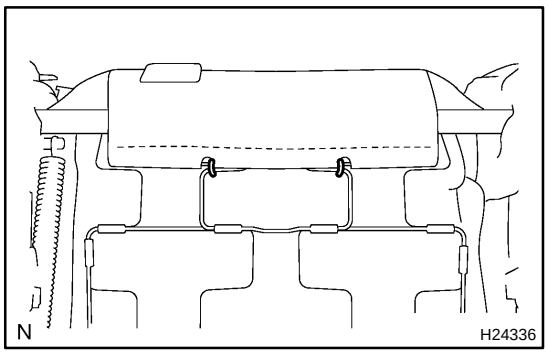
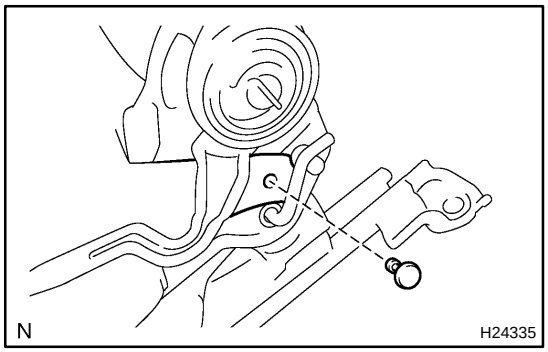


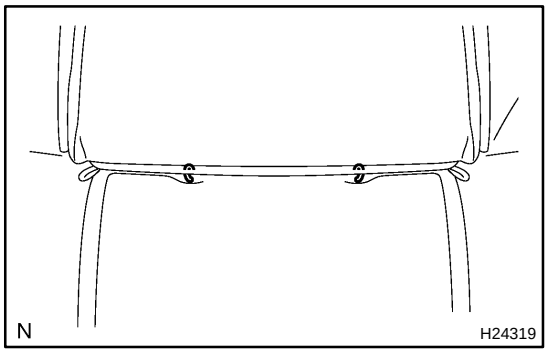
(b) Install the hog rings to the seat cushion cover.



(c) Install the clip.
(d) Perform the same procedure on the other side.

7. INSTALL SEATBACK COVER

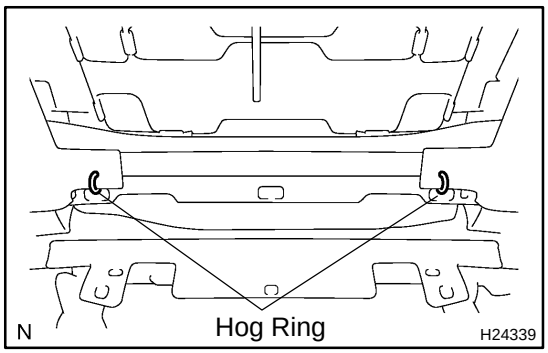
(a) Install the seatback cover to the seatback pad.
(b) Install the 2 headrest supports.



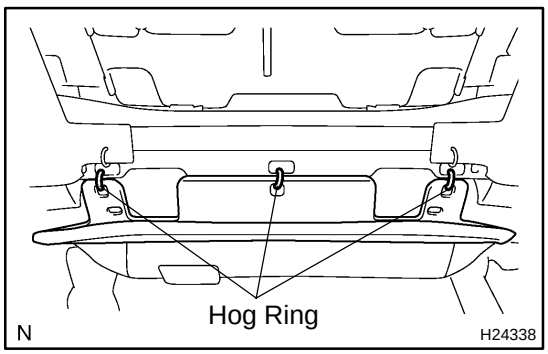
(c) Turn up the seatback cover and install the hog rings.

8. INSTALL SEATBACK COVER AND PAD

(a) Install the seatback cover and pad to the seat frame assembly.



(b) Install the hog rings to the seat frame assembly.



(c) Install the hog rings to the seat frame assembly.

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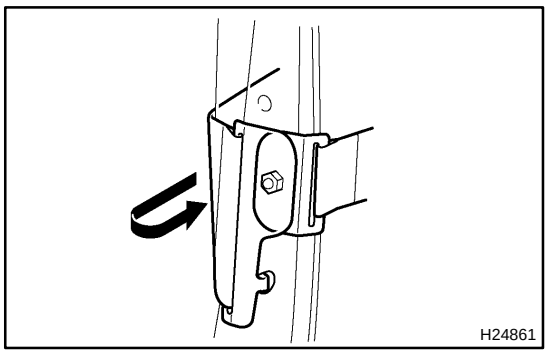
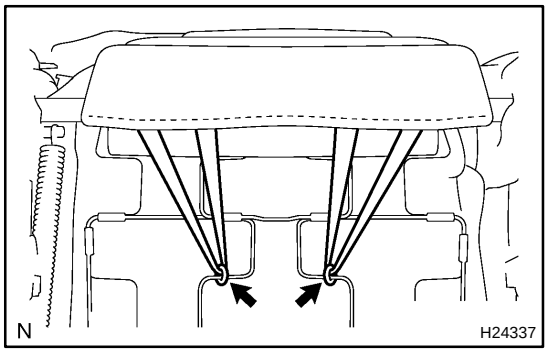
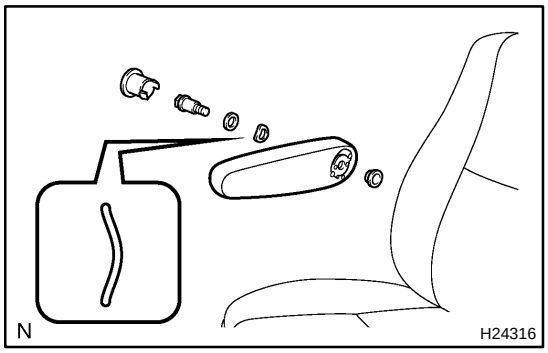


(d) w/ Side airbag:
Connect the seatback cover bracket to the seat frame assembly with the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(e) Close the fastener.



(f) Install the hog rings to the seat frame assembly.



9. INSTALL ARMREST ASSEMBLY

(a) Install the spacer to the armrest assembly.

(b) Install the armrest assembly, armrest lock plate and armrest spacer with the bolt.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

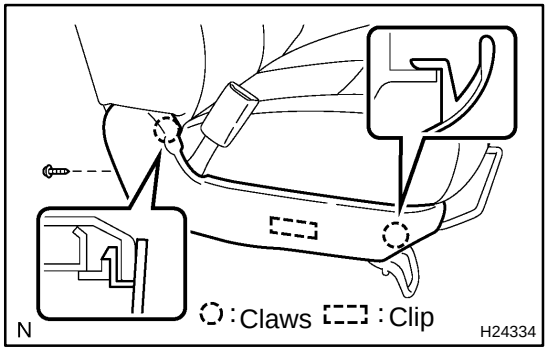
HINT:
Install the armrest lock plate as shown in the illustration.

(c) Install the armrest cap.

10. INSTALL FRONT SEAT INNER BELT.

(a) Install the front seat inner belt with the nut.
Torque: 42 N·m (430 kgf·cm, 32 ft·lbf)

(b) Connect the connectors and wire harness clamps.



11. INSTALL SEAT CUSHION INNER SHIELD

Install the seat cushion inner shield with the screw.

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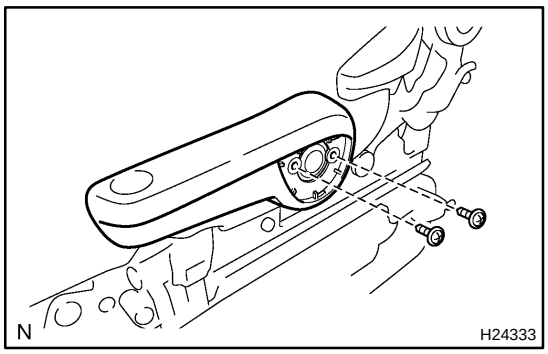
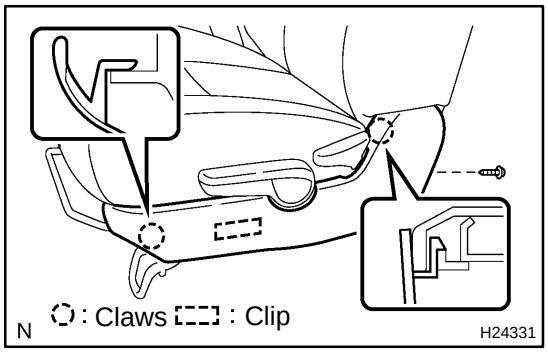


12. INSTALL VERTICAL ADJUSTER HANDLE

(a) Install the vertical adjuster handle with the 2 screws.

(b) Install the vertical adjuster handle cap.

13. INSTALL RECLINING ADJUSTER RELEASE HANDLE



14. INSTALL SEAT CUSHION OUTER SHIELD

Install the seat cushion outer shield with the screw.

15. INSTALL HEADREST

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BO4SF–01

INSTALLATION

HINT:

The procedures listed below are for the LH side.

1. INSTALL FRONT SEAT

(a) Mount the front seat to the vehicle.

NOTICE:

Be careful not to damage the vehicle body.

(b) w/ Side airbag:
Connect the airbag connector.

(c) Connect the connectors.

(d) Slide the front seat to the rearmost position.

(e) Tighten the bolts on the front side temporarily, starting from the bolt on the inner side.

(f) Tighten them completely.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

(g) Slide the front seat to the foremost position.

(h) Tighten the bolts on the rear side temporarily, starting from the bolt on the inner side.

(i) Tighten them completely.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

2. INSTALL SEAT TRACK COVERS

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. Passenger's seat:
PERFORM PASSENGER OCCUPANT CLASSIFICATION SYSTEM ZERO POINT CALIBRATION (See page DI–1128)

5. PERFORM INITIALIZATION (See page IN–20)

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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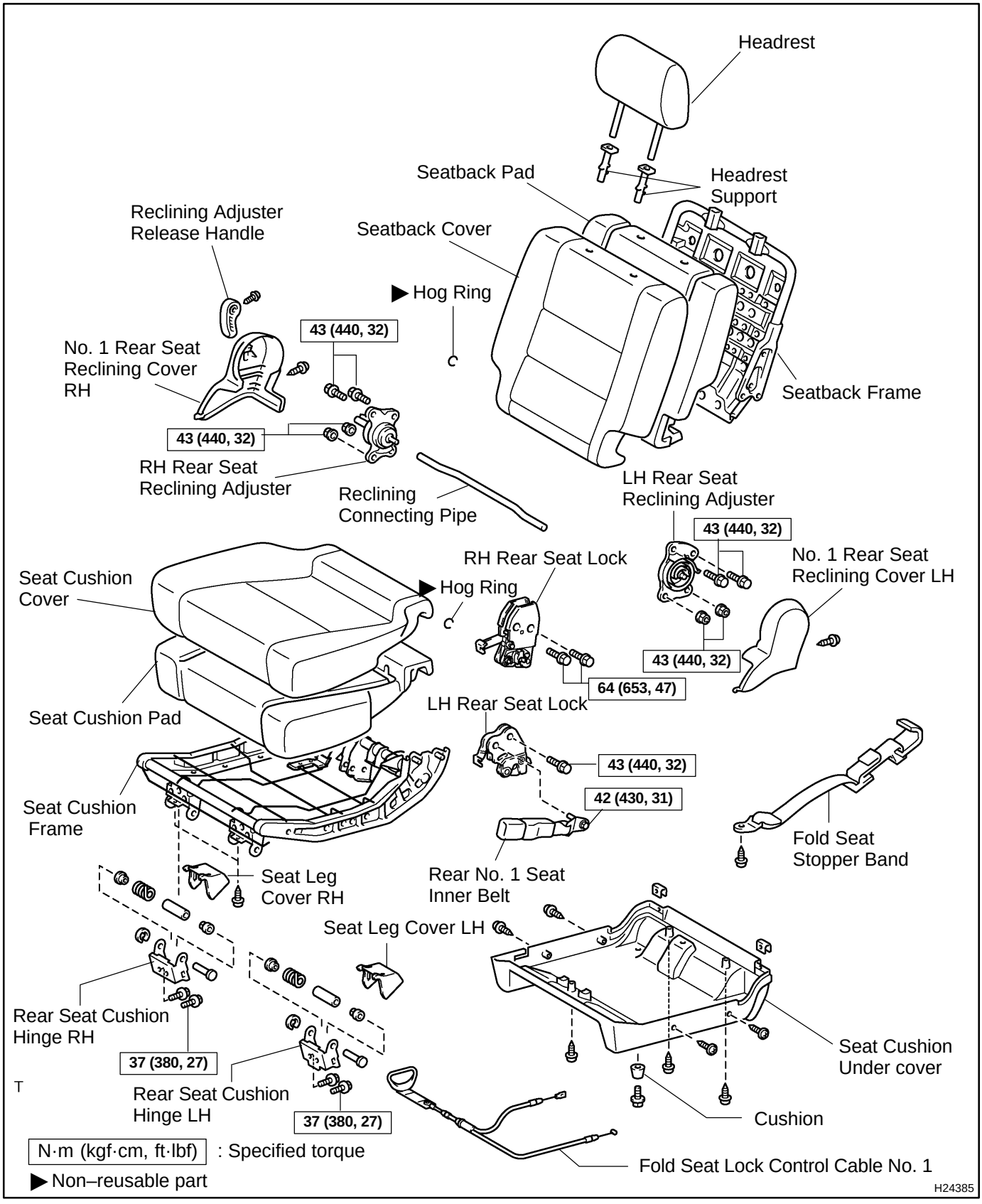
REAR NO.1 SEAT (Separate Type)

BO4R8–02

COMPONENTS

HINT:

The procedures listed below are for the RH side.



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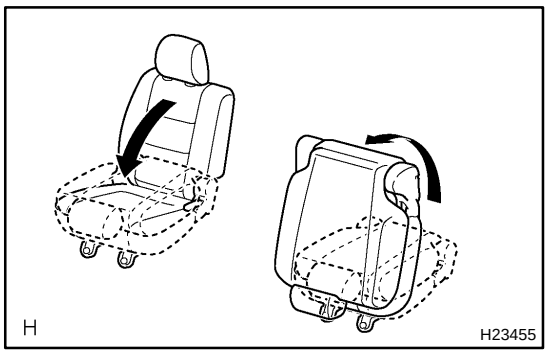
BO4R9–02



REMOVAL

HINT:

The procedures listed below are for the RH side.

1. FOLD REAR SEAT RH

(a) Lower the headrest to the lowest position.

(b) Pull the seatback angle adjusting lever and fold the seatback down.

(c) Unlock the seat legs by pulling up one of the levers on the seat legs, and swing the seat up and forward.

2. REMOVE REAR SEAT RH

(a) Using a screwdriver, remove the 2 seat leg covers.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 4 bolts and rear No.1 seat.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

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BO4SG–01

DISASSEMBLY

CAUTION:

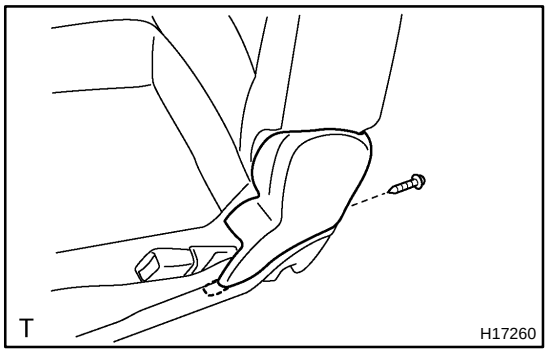
Wear safety gloves, because the sharp edges and surfaces of the seat frame may cause injury to the hands.

HINT:

- The procedures listed below are for the RH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS–2).
- Tape the screwdriver tip before using it to remove the parts.

1. REMOVE HEADREST

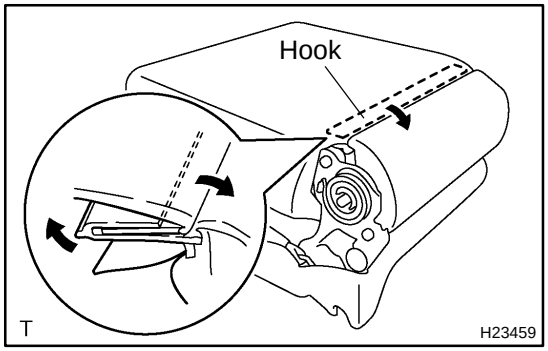
2. REMOVE RECLINING ADJUSTER RELEASE HANDLE



3. REMOVE NO. 1 REAR SEAT RECLINING COVER

(a) Remove the screw and No. 1 rear seat reclining cover.

(b) Perform the same procedure on the other side.



4. REMOVE SEATBACK ASSEMBLY

(a) Tilt the seat forward.

(b) As shown in the illustration, disengage the hook and open the seatback cover.

(c) Remove the 4 bolts and the seatback assembly.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

5. REMOVE SEATBACK COVER

(a) Remove the headrest supports.

(b) Disengage the hooks, and remove the seatback frame from the seatback cover with pad.

(c) Remove the seatback cover from the seatback pad.

HINT:

At the time of reassembly, take as much care as possible to minimize wrinkles when installing hog rings.

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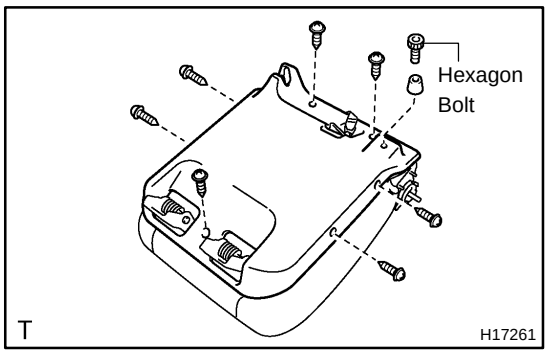

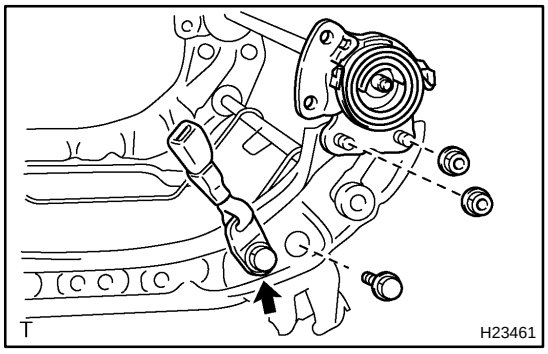

6. REMOVE REAR SEAT CUSHION UNDER COVER

(a) Using a 5 mm hexagon wrench, remove the bolt and cushion.

(b) Remove the 6 screws and rear seat cushion under cover.

(c) Remove the screw and fold seat stopper band.

7. REMOVE FOLD SEAT LOCK CONTROL CABLE NO. 1

Using a screwdriver, remove the fold seat lock control cable No. 1.

HINT:

Tape the screwdriver tip before use.

8. REMOVE LH REAR SEAT RECLINING ADJUSTER AND LH REAR SEAT LOCK

(a) Unfasten the bolt, then remove the rear No. 1 seat inner belt.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

(b) Remove the 2 nuts and LH rear seat reclining adjuster.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

(c) Remove the bolt and LH rear seat lock.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

9. REMOVE RECLINING CONNECTING PIPE

10. REMOVE RH REAR SEAT RECLINING ADJUSTER

Remove the 2 nuts and RH rear seat reclining adjuster.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

11. REMOVE SEAT CUSHION COVER

(a) Remove the seat cushion cover with pad from the seat cushion frame.

(b) Remove the seat cushion cover from the seat cushion pad.

HINT:

At the time of reassembly, take as much care as possible to minimize wrinkles when installing hog rings.

12. REMOVE REAR SEAT CUSHION HINGE LH

(a) Using a screwdriver, remove the E–ring.

(b) Remove the pin, bushings, spring, collar and rear seat cushion hinge.

(c) Remove the rear seat cushion hinge on the other side using the same procedures (a) and (b) described above.

13. REMOVE RH REAR SEAT LOCK

Remove the 2 bolts and RH rear seat lock.

Torque: 64 N·m (653 kgf·cm, 47 ft·lbf)

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REASSEMBLY

Reassembly is in the reverse order of disassembly (see page BO–137).

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BO4RC–02

INSTALLATION

Installation is in the reverse order of removal (see page BO–136).

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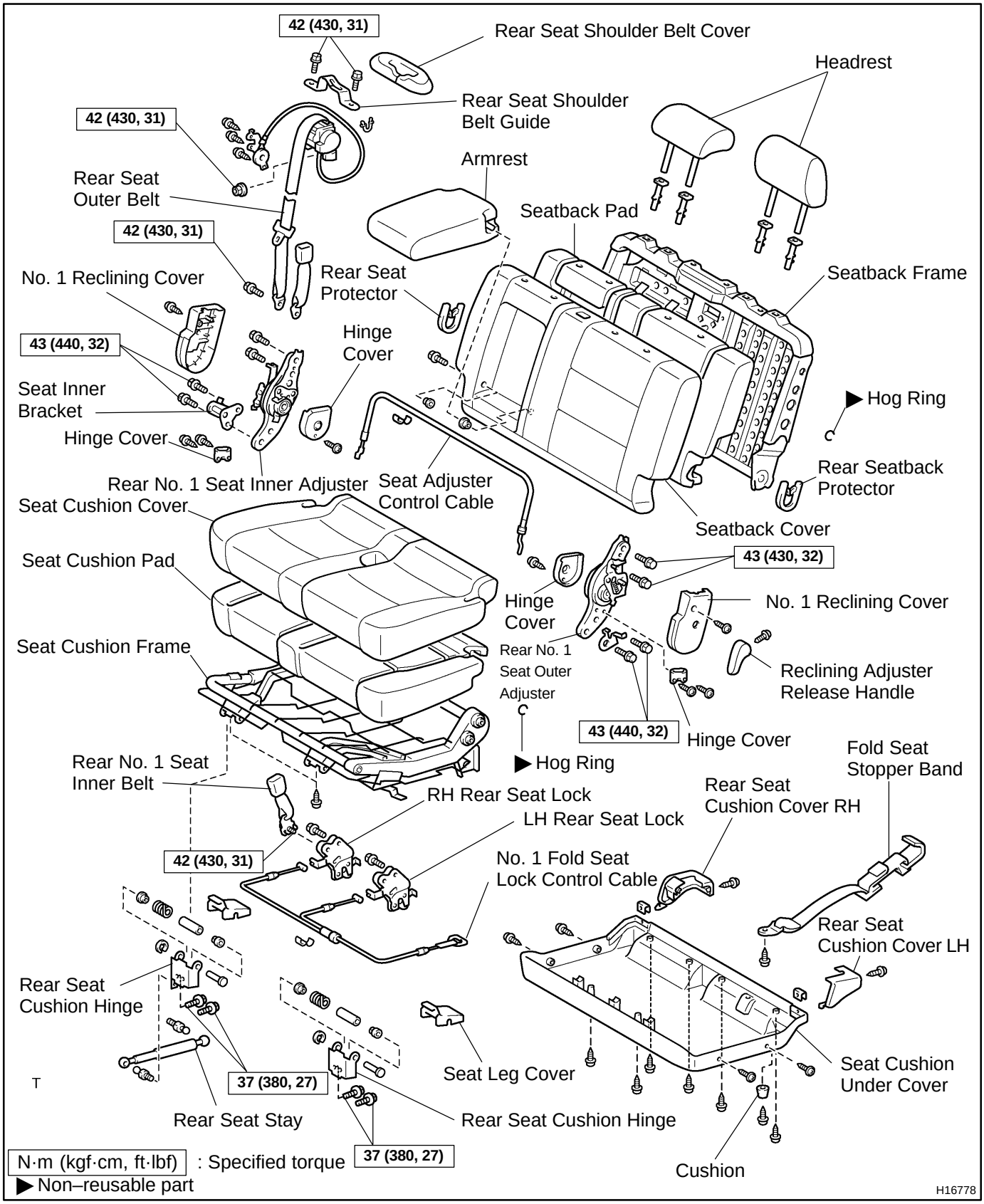
REAR NO.1 SEAT (Split Type LH)

BO4SH–01

COMPONENTS



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BO4SI–01

REMOVAL

REMOVE REAR NO.1 SEAT

(a) Fold the seatback down.

(b) Unlock the seat lock, and swing the whole seat up and forward.

(c) Using a screwdriver, remove the seat leg covers.

HINT:

Tape the screwdriver tip before use.

(d) Remove the 4 bolts and rear No.1 seat.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

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BO4SJ–01

DISASSEMBLY

CAUTION:

Wear safety gloves, because the sharp edges and surfaces of the seat frame may cause injury to the hands.

HINT:

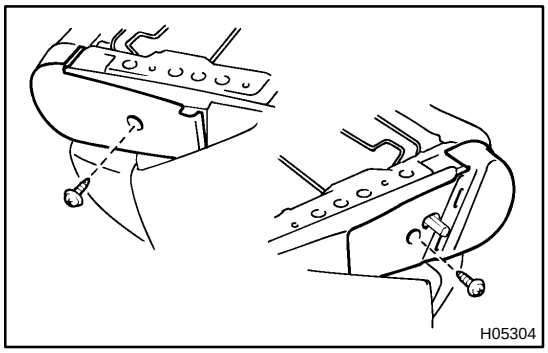
- A bolt without a torque specification is shown in the standard bolt chart (see page SS–2).
- Tape the screwdriver tip before using it to remove the parts.

1. REMOVE HEADREST

2. REMOVE RECLINING ADJUSTER RELEASE HANDLE

3. REMOVE NO. 1 RECLINING COVERS

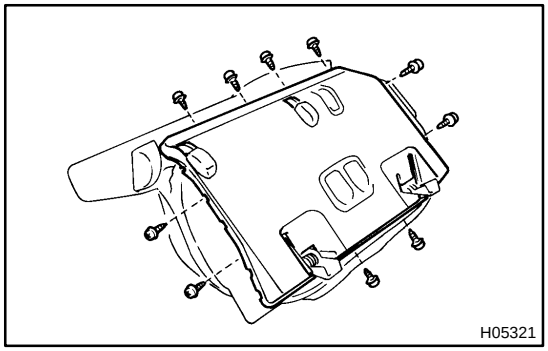
(a) Zip the seat cushion cover open.



(b) Remove the 2 screws and 2 No. 1 reclining covers.

4. REMOVE SEAT CUSHION UNDER COVER

(a) Remove the 2 screws and 2 seat cushion under covers.



(b) Remove the 10 screws and seat cushion under cover sub–assembly.

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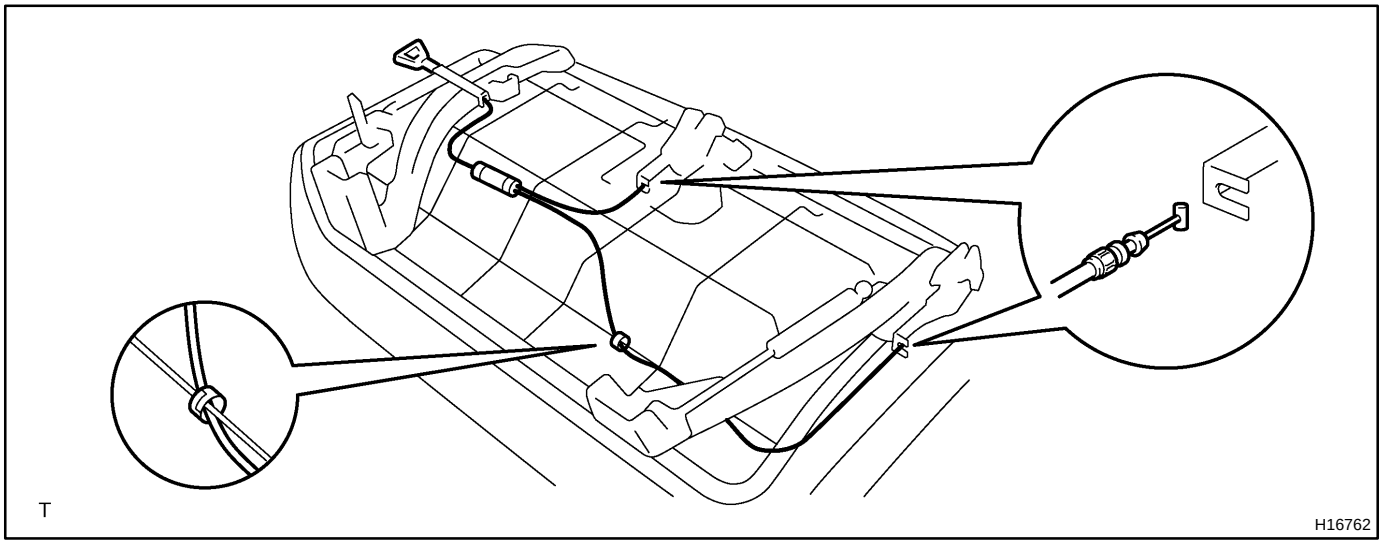
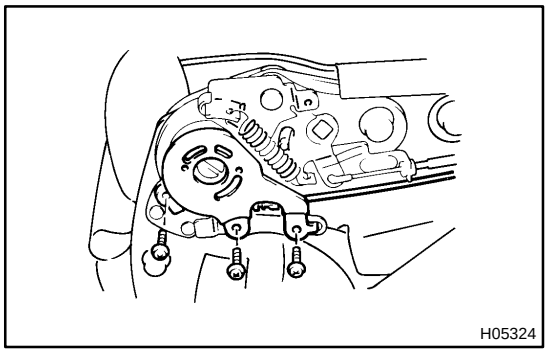
5. REMOVE NO. 1 FOLD SEAT LOCK CONTROL CABLE

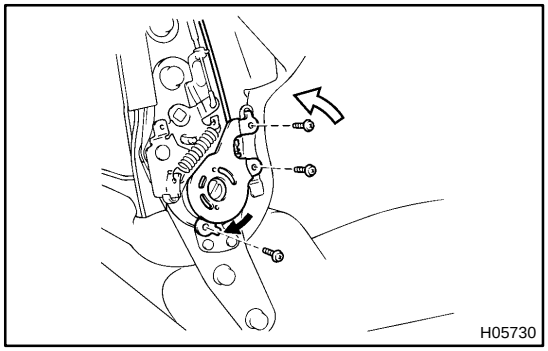
Remove the clamp and No. 1 fold seat lock control cable as shown in the illustration.





6. REMOVE SEATBACK ASSEMBLY

(a) Remove the 3 screws and seat belt reclining detecting part.

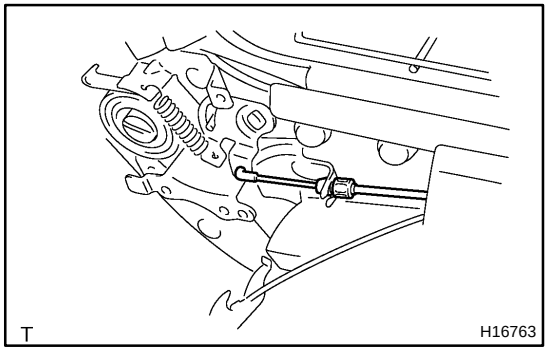


HINT:

At the time of reassembly, please refer to the following items.

- ▶ Tighten the 2 screws on the seatback side.
- ▶ Fold down the seatback forward and raise it up to the first lock position.
- ▶ Turn A to the rear side of the seat cushion for initial positioning.
- ▶ Check visually that the reference holes are penetrated.
- ▶ Tighten the screws on the cushion side of seat belt reclining detecting part.

(b) Remove the reclining connecting wire of LH side edge.



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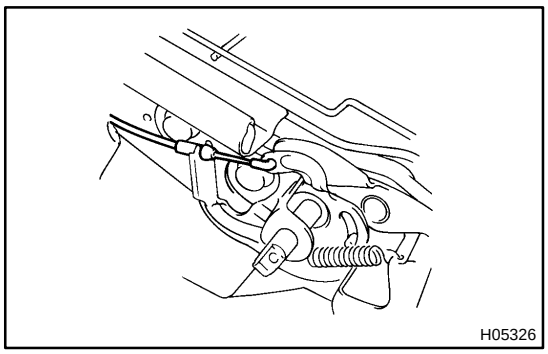
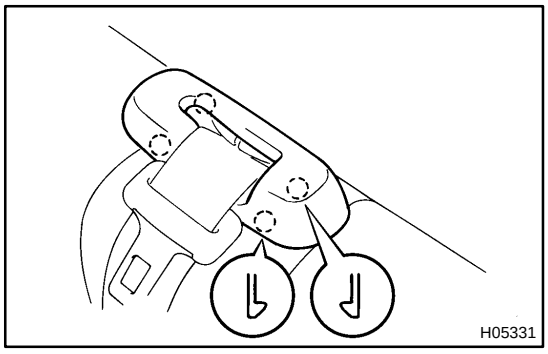


(c) Remove the reclining connecting wire of RH side edge.
(d) Remove the 4 bolts and seatback assembly.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

7. REMOVE ARMREST



8. REMOVE SEATBACK FRAME

(a) Using a screwdriver, remove the rear seat shoulder belt cover.

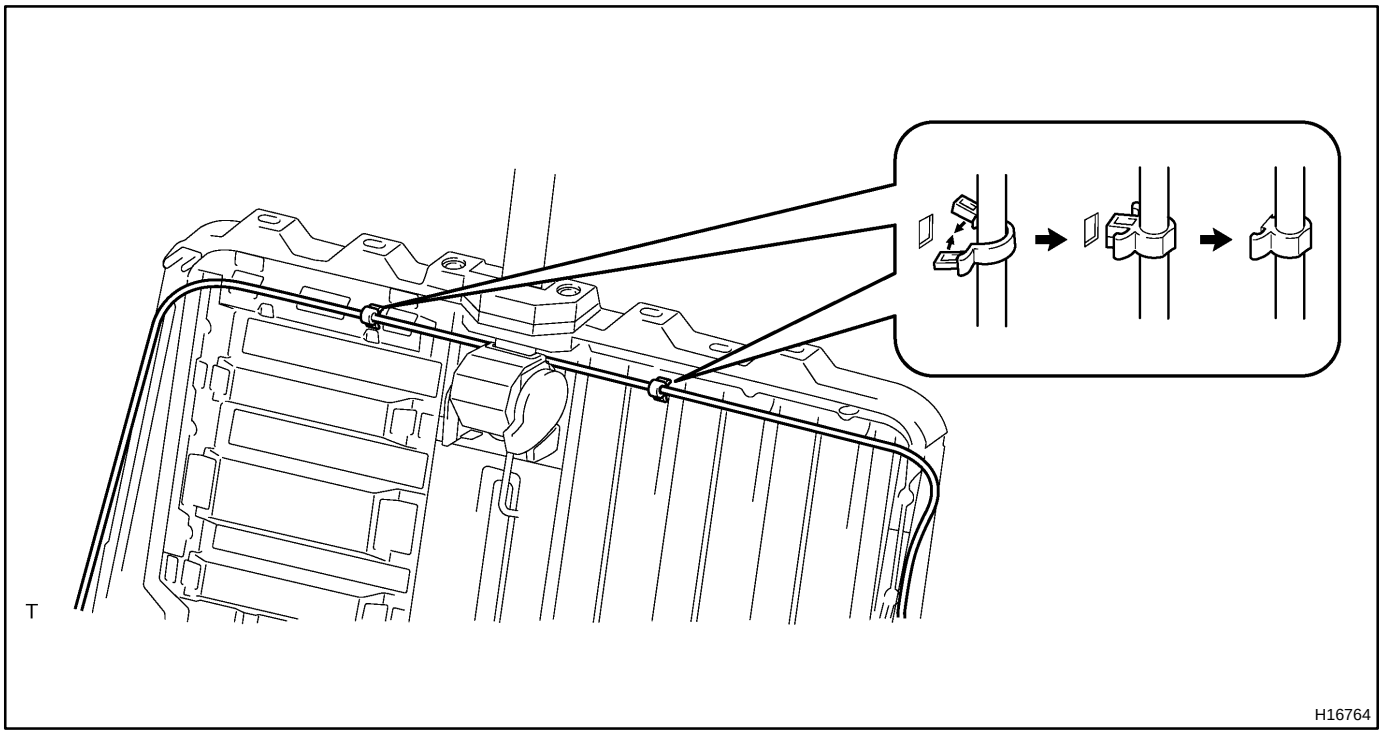
HINT:

Tape the screwdriver tip before use.

(b) Remove the 4 headrest supports
(c) Disengage the hooks, remove the seatback frame.

9. REMOVE SEAT ADJUSTER CONTROL CABLE

Remove the 2 clamps and seat adjuster control cable.



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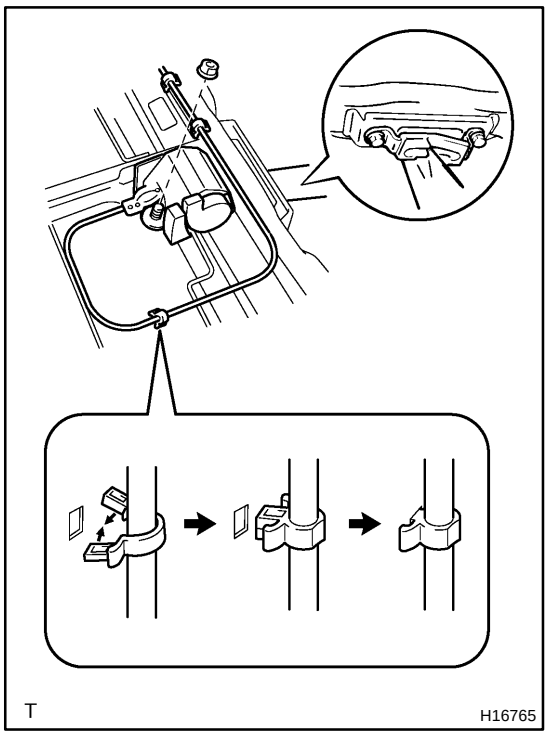


10. REMOVE REAR SEAT OUTER BELT

(a) Remove the 2 bolts and rear seat shoulder belt guide.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

HINT:

At the time of reassembly, please refer to the following item. Install the shoulder belt guide to the seatback frame with a sit the guide facing to the rear side of the vehicle.

(b) Remove the nut, 3 clamps and rear seat outer belt.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

11. REMOVE SEATBACK COVER

Remove the hog rings and seatback cover.

HINT:

At the time of reassembly, please refer to the following item. When instaling hog rings, take care to prevent wrinkles as little as possible.

12. REMOVE SEAT CUSHION FRAME

Remove the hog rings and seat cushion frame.

HINT:

At the time of reassembly, please refer to the following item. When instaling hog rings, take care to prevent wrinkles as little as possible.

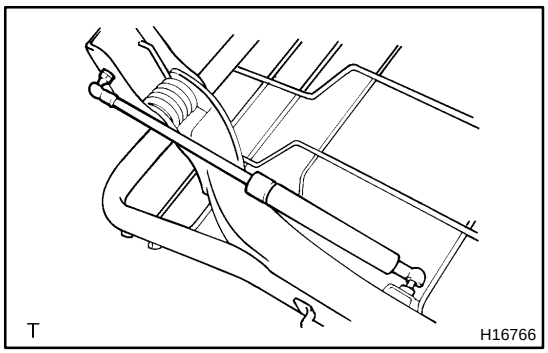
13. REMOVE REAR NO. 1 SEAT ADJUSTER

(a) Remove the 2 bolts and rear No. 1 seat outer adjuster.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

(b) Remove the 2 bolts and rear No. 1 seat inner adjuster.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

(c) Remove the 4 screws and 2 hinges covers from the rear No. 1 seat outer and inner adjusters.

(d) Remove the 2 screws and 2 reclining inner covers from the rear No. 1 seat outer and inner adjuster.



14. REMOVE REAR SEAT STAY

Remove the 2 bolts and rear seat stay.

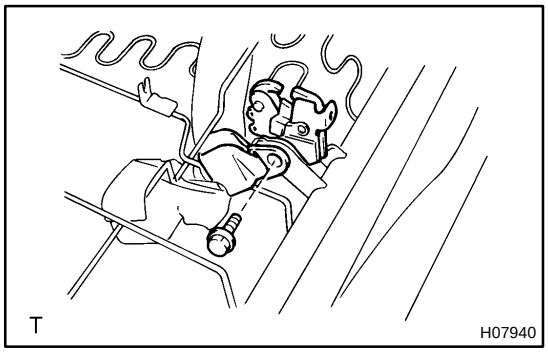
15. REMOVE REAR SEAT CUSHION HINGE

(a) Using a screwdriver, remove the spring nut and E–rings.

(b) Remove the 2 hinge pins, 2 cushion spacers, 2 cushion support springs and 2 rear seat cushion hinges.

16. REMOVE LH REAR SEAT LOCK

Unfasten the bolt, then remove the inner belt and LH rear seat lock.



17. REMOVE RH REAR SEAT LOCK

(a) Remove the screw and rear seat lock cover.

(b) Remove the bolt, seat belt anchor and inner belt.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

(c) Remove the RH rear seat lock.

Dardoor.com

BO4SK–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–143).

Dardoor.com

BO4SL–01

INSTALLATION

Installation is in the reverse order of removal (See page BO–142).

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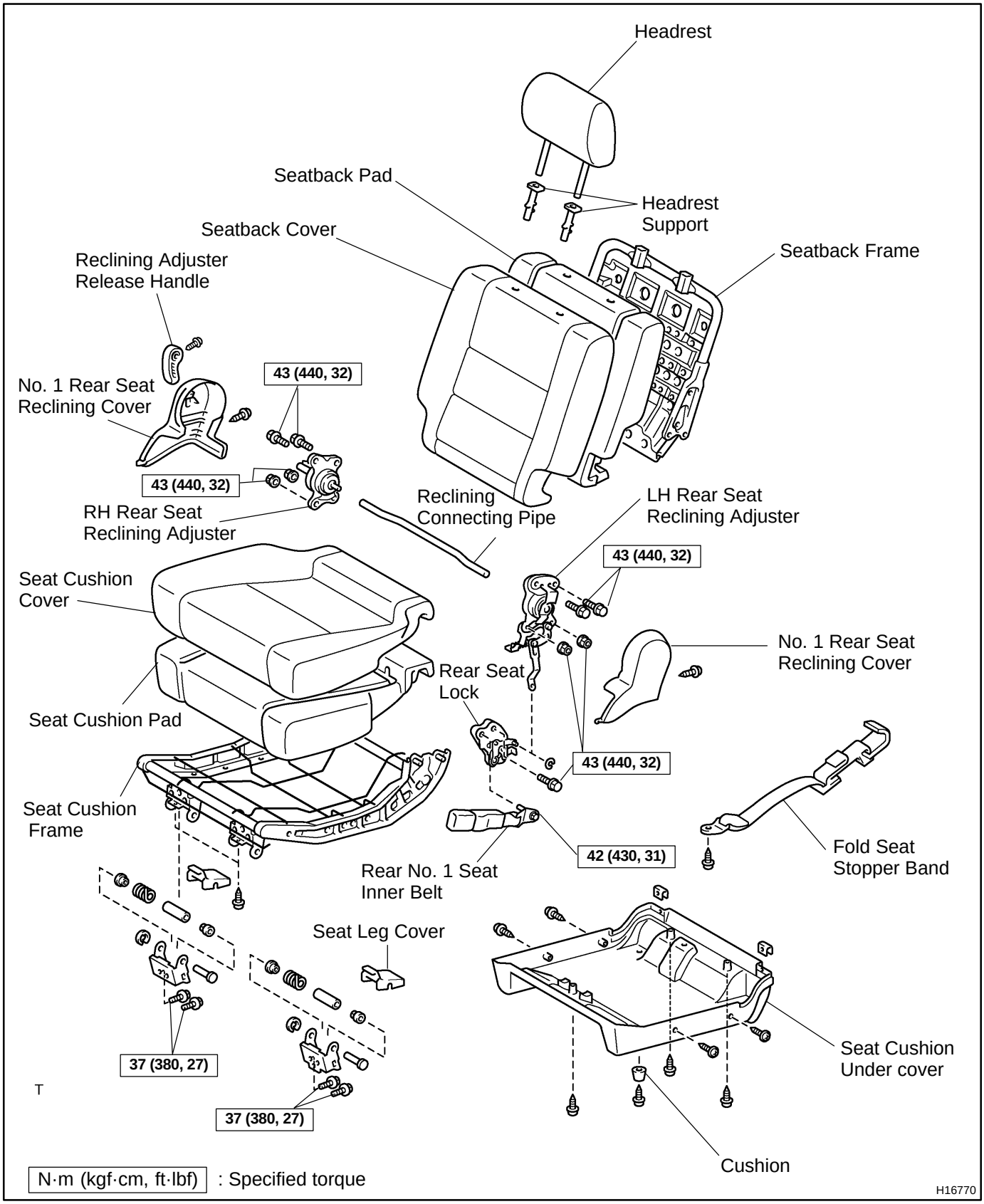
REAR NO.1 SEAT (Split Type RH)

BO4SM–01

COMPONENTS



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BO4SN–01

REMOVAL

REMOVE REAR NO.1 SEAT

(a) Fold the seatback down.

(b) Unlock the seat lock, and swing the whole seat up and forward.

(c) Using a screwdriver, remove the seat leg covers.

HINT:

Tape the screwdriver tip before use.

(d) Remove the 4 bolts and rear No.1 seat.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

Dardoor.com

BO4SO–01

DISASSEMBLY

CAUTION:

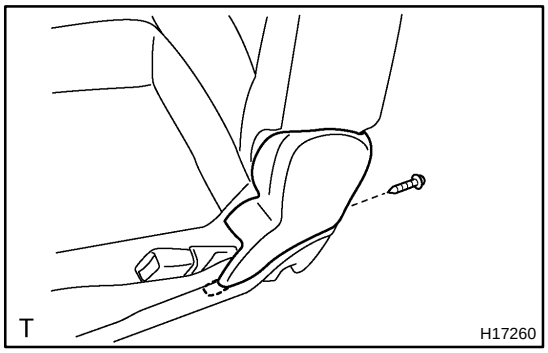
Wear safety gloves, because the sharp edges and surfaces of the seat frame may cause injury to the hands.

HINT:

- ▶ A bolt without a torque specification is shown in the standard bolt chart (see page SS–2).
- ▶ Tape the screwdriver tip before using it to remove the parts.

1. REMOVE HEADREST

2. REMOVE RECLINING ADJUSTER RELEASE HANDLE



3. REMOVE NO. 1 REAR SEAT RECLINING COVER

(a) Remove the screw and No. 1 rear seat reclining cover.

(b) Employ the same manner described above to the other side.

4. REMOVE SEATBACK ASSEMBLY

Remove the 4 bolts and seatback assembly.

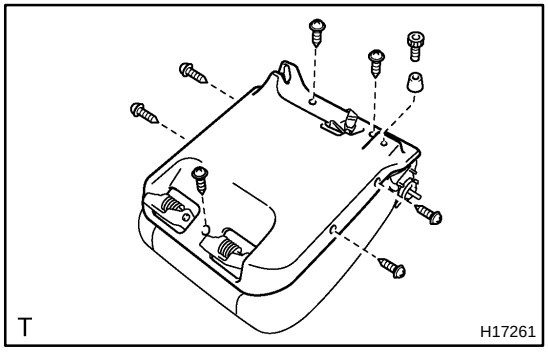
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

5. REMOVE SEATBACK COVER

(a) Remove the headrest supports.

(b) Remove the seatback frame from the seatback cover with pad.

(c) Remove the seatback cover from the seatback pad.



6. REMOVE REAR SEAT CUSHION UNDER COVER

(a) Remove the screw and cushion.

(b) Remove the 7 screws and rear seat cushion under cover.

(c) Remove the screw and fold seat stopper band.

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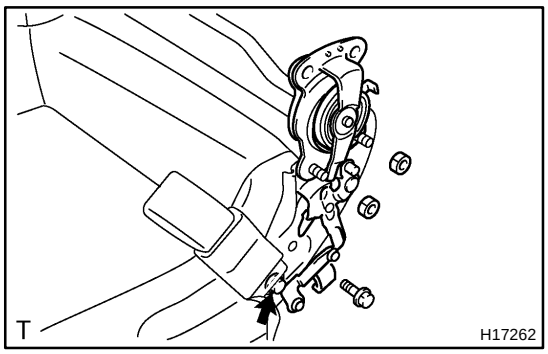

7. REMOVE LH REAR SEAT RECLINING ADJUSTER AND REAR SEAT LOCK

(a) Unfasten the bolt, then remove the rear No. 1 seat inner belt.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

(b) Remove the bolt, 2 nut and LH rear seat reclining adjuster with rear seat lock.

Torque:
bolt: 43 N·m (440 kgf·cm, 32 ft·lbf)
nut: 43 N·m (440 kgf·cm, 32 ft·lbf)

(c) Using a screwdriver, remove the E–ring, then remove the LH rear seat reclining adjuster from the rear seat lock.

8. REMOVE RECLINING CONNECTING PIPE

9. REMOVE RH REAR SEAT RECLINING ADJUSTER

Remove the 2 nuts and RH rear seat reclining adjuster.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

10. REMOVE SEAT CUSHION COVER

(a) Remove the seat cushion cover with pad from the seat cushion frame.

(b) Remove the seat cushion cover from the seat cushion pad.

11. REMOVE REAR SEAT CUSHION HINGE

(a) Using a screwdriver, remove the E–ring.

(b) Remove the pin, bushings, spring, collar and rear seat cushion hinge.

(c) Employ the same manner described above to the other side.

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BO4SP–01

INSPECTION

INSPECT RECLINING LOCK POSITION SLIPPING OFF

When reclining the seat, inspect that the RH and LH rear seat reclining adjusters are released at the same time.

HINT:

When the reclining lock position slips off, disassemble the seat to adjust the position.

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BO4SQ–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–151).

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BO4SR–01

INSTALLATION

Installation is in the reverse order of removal (See page BO–150).

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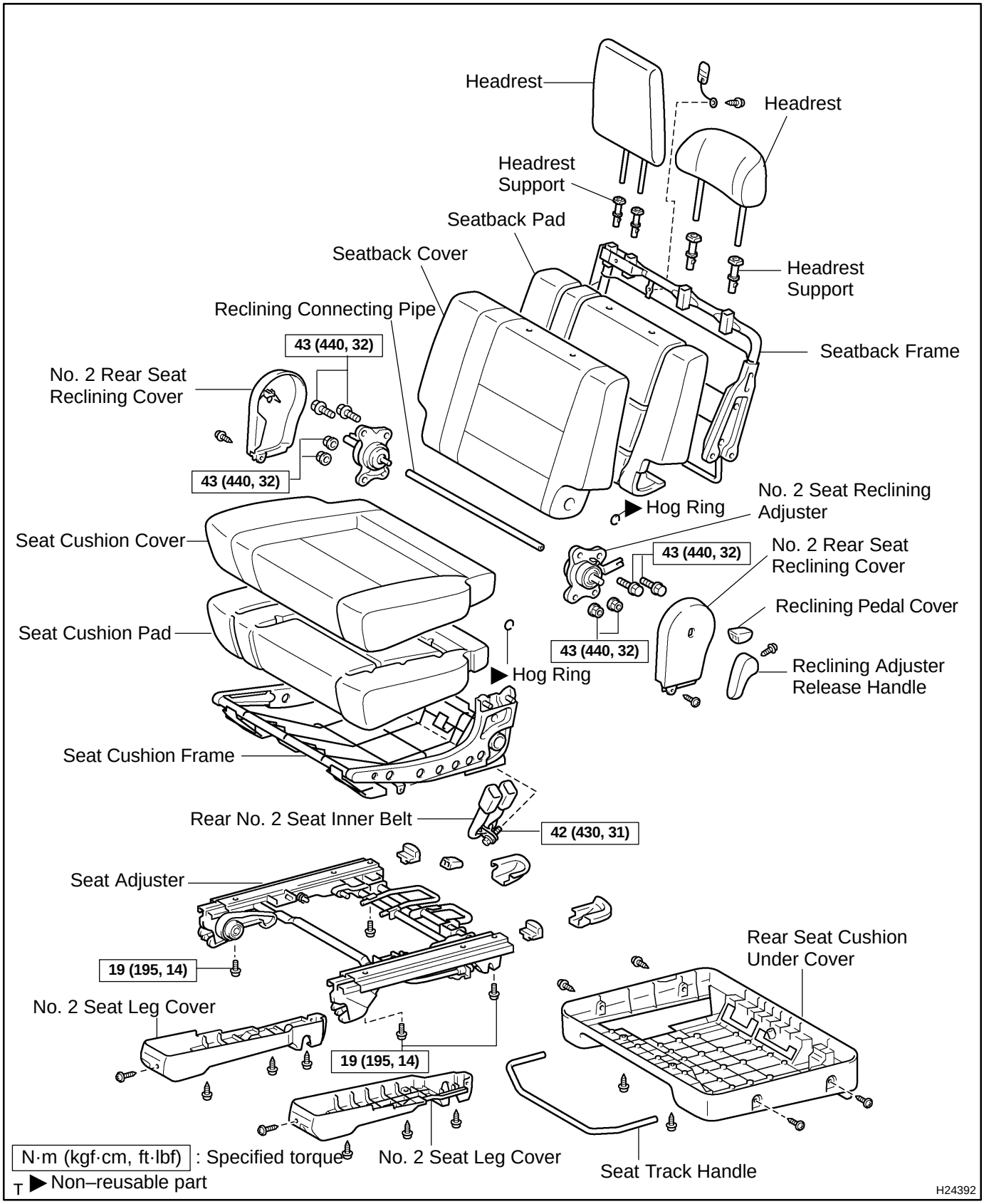
REAR NO.2 SEAT

BO47L–04

COMPONENTS

HINT:

The procedures listed below are for the LH side.



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BO47M–02

DISASSEMBLY

CAUTION:

Wear safety gloves, because the sharp edges and surfaces of the seat frame may cause injury to the hands.

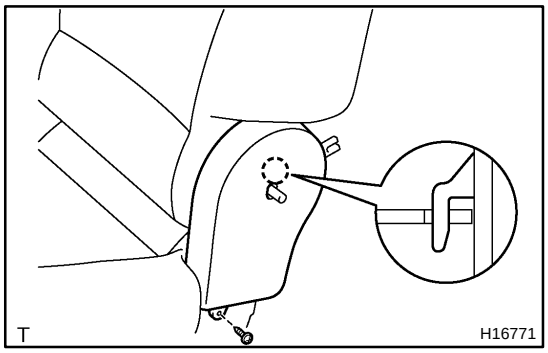
HINT:

- The procedures listed below are for the LH side.
- A bolt without a torque specification is shown in the standard bolt chart (see page SS–2).

1. REMOVE HEADRESTS

2. REMOVE RECLINING ADJUSTER RELEASE HANDLE

3. REMOVE RECLINING PEDAL COVER



4. REMOVE NO. 2 REAR SEAT RECLINING COVER

(a) Remove the screw.

(b) Remove the No. 2 rear seat reclining cover as shown in the illustration.

(c) Employ the same manner described above to the other side.

5. REMOVE SEATBACK ASSEMBLY

Remove the 4 bolts and seatback assembly.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

6. REMOVE SEATBACK COVER

(a) Remove the seatback cover with pad from the seatback frame.

(b) Remove the seatback cover from the seatback pad.

7. REMOVE NO. 2 SEAT RECLINING ADJUSTER

Remove the 4 nuts, 2 No. 2 seat reclining adjusters and reclining connecting pipe.

8. REMOVE NO. 2 SEAT LEG COVERS

9. REMOVE RECLINING REMOVE CONTROL LEVER

10. REMOVE SEAT TRACK HANDLE

11. REMOVE REAR SEAT CUSHION UNDER COVER

12. REMOVE SEAT CUSHION ASSEMBLY

Remove the 4 screws and seat cushion assembly

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

13. REMOVE SEAT CUSHION COVER

(a) Remove the rear No. 2 seat inner belt.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

(b) Remove the seat cushion cover with pad from the seat cushion frame.

(c) Remove the seat cushion cover from the seat cushion pad.

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BO47N–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–157).

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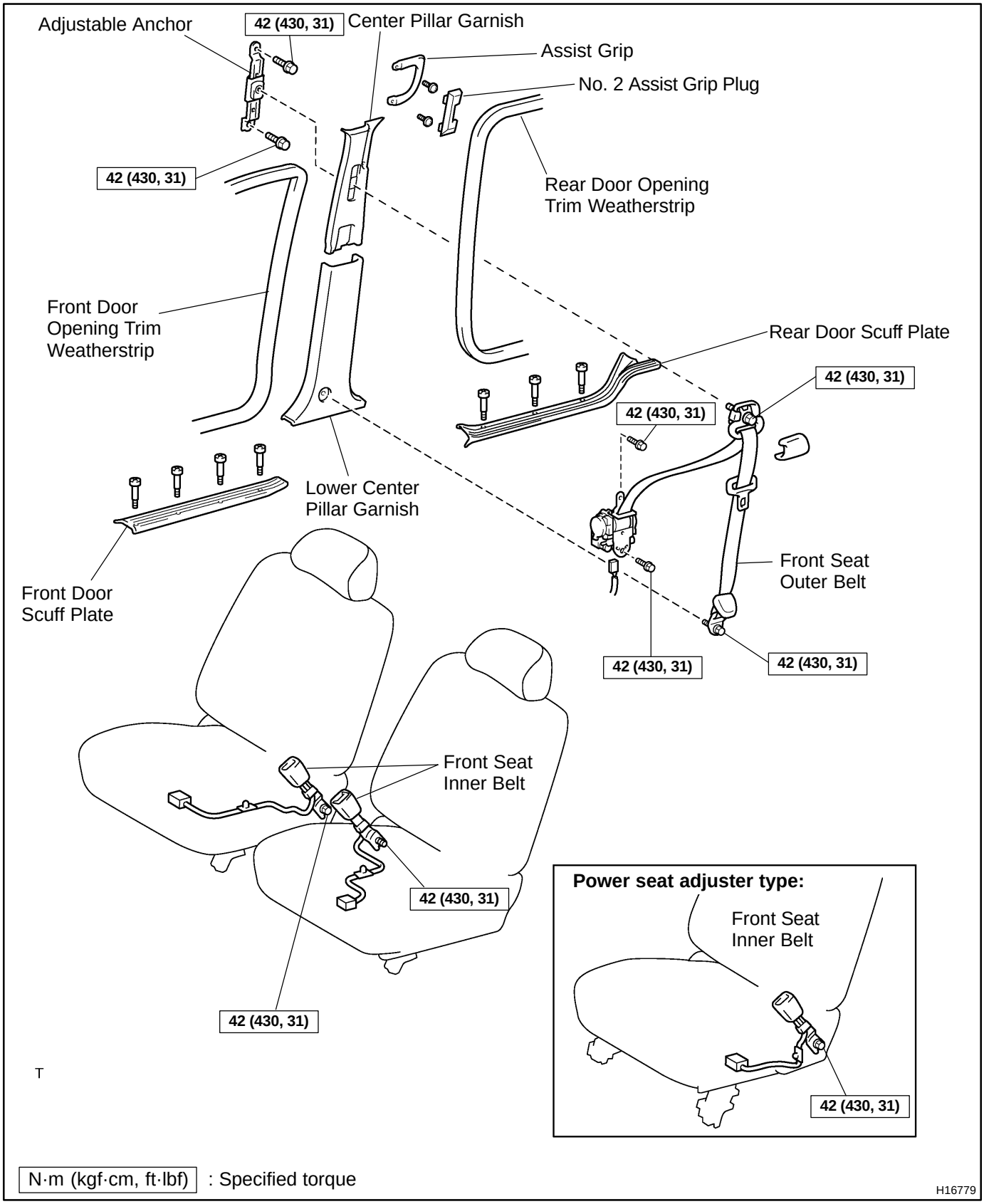
SEAT BELT

COMPONENTS

BO47O–02



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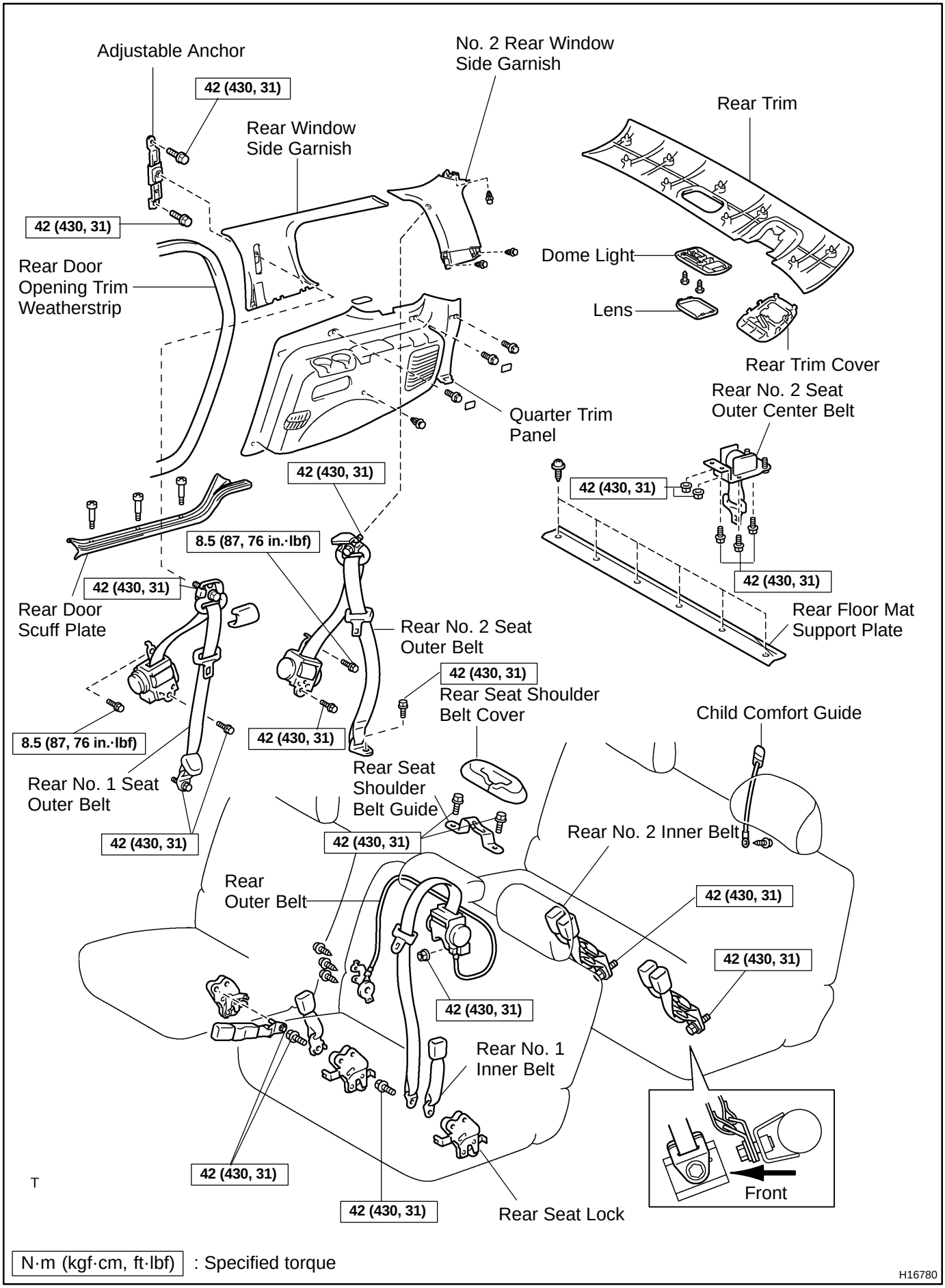
Adjustable Anchor
42 (430, 31)
No. 2 Rear Window Side Garnish
Rear Window Side Garnish
Rear Trim
42 (430, 31)
Dome Light
Lens
Rear Door Opening Trim Weatherstrip
Rear Trim Cover
Rear No. 2 Seat Outer Center Belt
Quarter Trim Panel
42 (430, 31)
42 (430, 31)
8.5 (87, 76 in.·lbf)
42 (430, 31)
Rear Floor Mat Support Plate
Rear Door Scuff Plate
Rear No. 2 Seat Outer Belt
42 (430, 31)
Rear Seat Shoulder Belt Cover
Child Comfort Guide
8.5 (87, 76 in.·lbf)
42 (430, 31)
Rear No. 1 Seat Outer Belt
Rear Seat Shoulder Belt Guide
42 (430, 31)
42 (430, 31)
Rear No. 2 Inner Belt
Rear Outer Belt
42 (430, 31)
42 (430, 31)
42 (430, 31)
Rear No. 1 Inner Belt
T
42 (430, 31)
42 (430, 31)
Rear Seat Lock
Front
N·m (kgf·cm, ft·lbf) : Specified torque
H16780

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BO47P–01

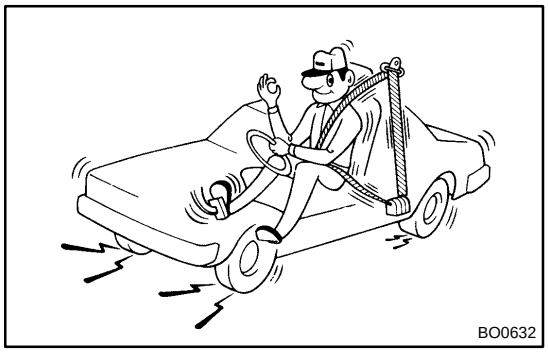
INSPECTION

CAUTION:

Replace the seat belt assembly (outer belt, inner belt, bolts, nuts or sill–bar) if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.

1. RUNNING TEST (IN SAFE AREA)

(a) Fasten the front seat belts.


BO0632

(b) Drive the car at 10 mph (16 km/h) and slam on the brakes. Check that the belt locks and cannot be extended at this time.

HINT:

Conduct this test in a safe area. If the belt does not lock, remove the belt mechanism assembly and conduct the following static check. Also, whenever installing a new belt assembly, verify the proper operation before installation.

2. Driver's seat belt (ELR):

STATIC TEST

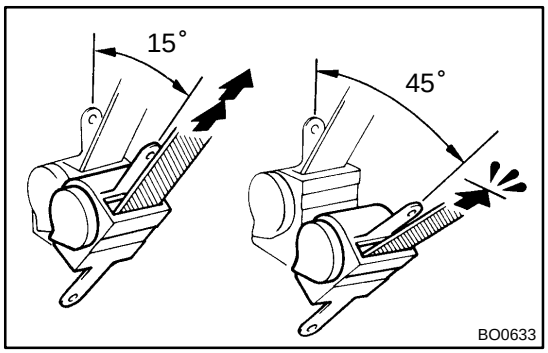
(a) Make sure that the belt locks when pulled out quickly.

(b) Remove the locking retractor assembly.

HINT:

Before removing the pretensioner connector, be sure to read the precautionary notice in the RS section.

(c) Tilt the retractor slowly.



BO0633

(d) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out over 45 degrees of tilt.

If a problem is found, replace the assembly.

3. Except driver's seat belt (ELR/ALR):

STATIC TEST

(a) Make sure that the belt locks when pulled out quickly.

(b) Pull out the whole belt, then retract the belt slightly and pull it out again

(c) Make sure that the belt cannot be extended further.

If a problem is found, replace the assembly.

(d) Remove the locking retractor assembly.

HINT:

Front passenger's seat belt only:

Before removing the pretensioner connector, be sure to read the precautionary notice in the RS section.

(e) Tilt the retractor slowly.

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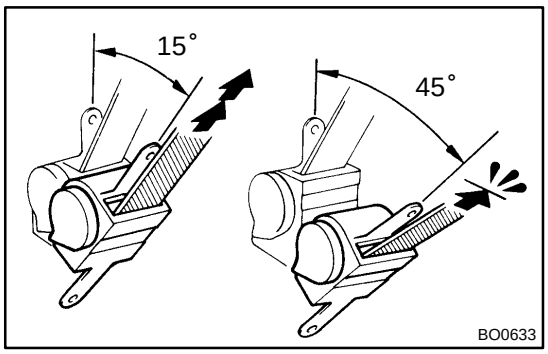
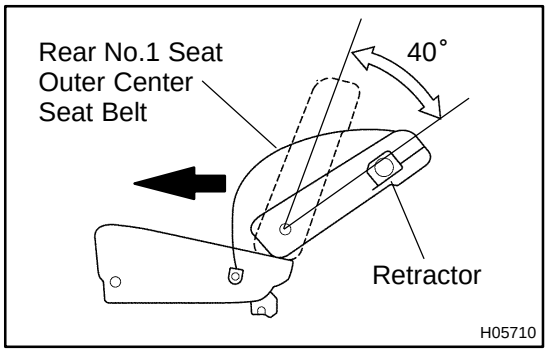


(f) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out at over 45 degrees of tilt.

If a problem is found, replace the assembly.

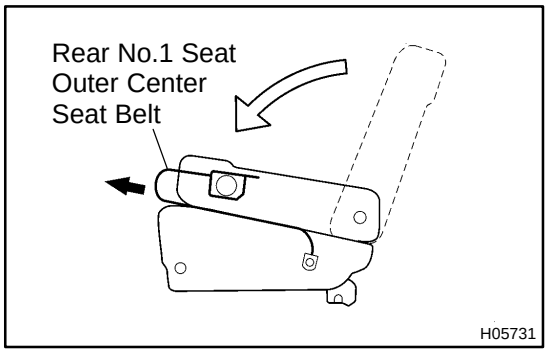


4. INSPECT REAR NO.1 SEAT CENTER BELT

(a) After extracting 300 mm (11.81 in.), check that the belt is locked when suddenly extracted.

(b) Check that the belt can be extracted 300 mm (11.81 in.) without being locked when the seat is reclined as shown in the illustration.

(c) Check that the belt is locked when the belt is extracted by a certain amount under (a) condition.



(d) When folding down the seatback forward and extracting the seat belt slowly, check that the belt is locked after a certain length (approx. 500 mm (19.69 in.)) of the belt has been extracted.

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SEAT BELT PRETENSIONER

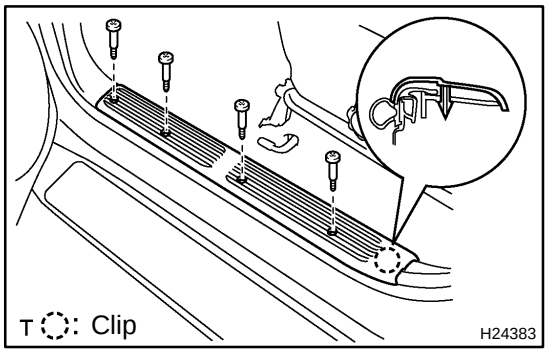
BO47Q–03

REMOVAL

NOTICE:

- **If the wiring connector of the supplemental restraint system is disconnected with the ignition switch at ON or ACC, diagnostic trouble codes will be recorded.**
- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**

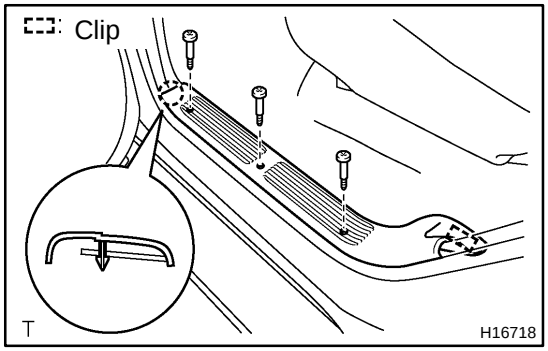
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL



2. REMOVE FRONT DOOR SCUFF PLATE

Remove the 4 screws and front door scuff plate.

3. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP



4. REMOVE REAR DOOR SCUFF PLATE

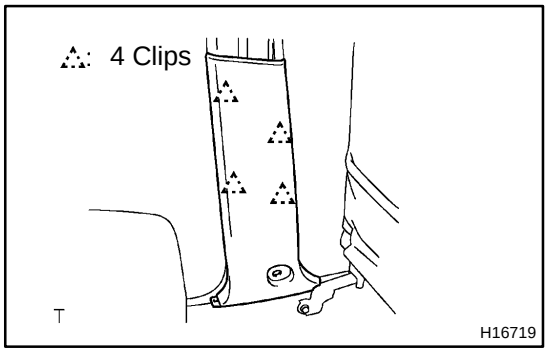
(a) Remove the 3 screws.

(b) Using a screwdriver, remove the rear door scuff plate.

HINT:

Tape the screwdriver tip before use.

5. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP



6. REMOVE LOWER CENTER PILLAR GARNISH

(a) Remove the front seat outer belt floor anchor.

(b) Using a screwdriver, remove the lower center pillar garnish.

HINT:

Tape the screwdriver tip before use.

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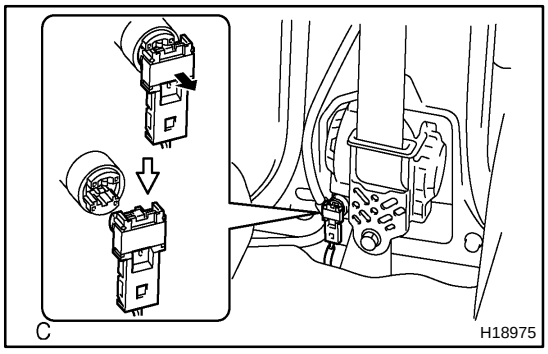
7. REMOVE RETRACTOR OF FRONT SEAT OUTER BELT

(a) Never disassemble the front seat outer belt.

NOTICE:

When removing the retractor of front seat outer belt, take care not to pull the seat belt pretensioner wire harness.



(b) Disconnect the connector.
Using a screwdriver, pull the locking button of the pretensioner connector to your side to release the lock.

HINT:

Tape the screwdriver tip before use.

(c) Remove the 3 bolts and the front seat outer belt assembly.

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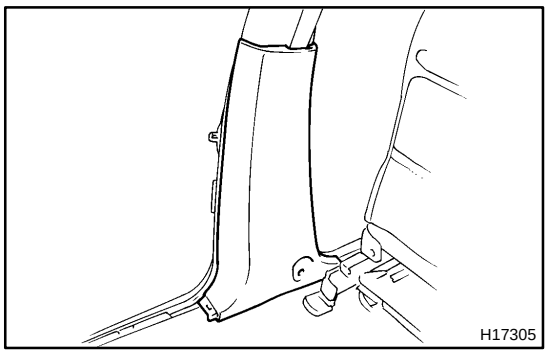
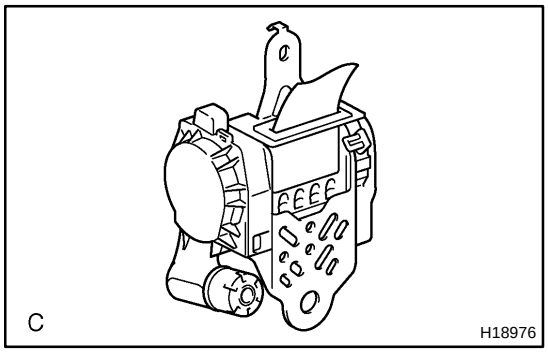
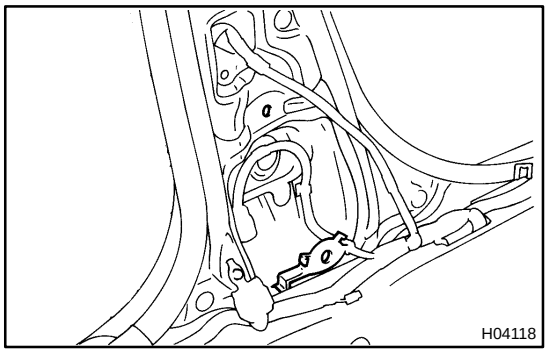
BO47R–03







INSPECTION

1. PRETENSIONER IS NOT ACTIVATED

(a) Perform a diagnostic system check (See page DI–1147).

(b) Perform a visual check which includes the following items with the front seat outer belt removed from the vehicle.

- ▶ Check for cuts and cracks in, or marked discoloration of the center pillar lower garnish.
- ▶ Check for cuts and cracks in wire harness, and for chipping in connectors.
- ▶ Check for deformation of the center pillar.

CAUTION:

For removal and installation of the front seat outer belt, see page BO–163 and BO–172.

Be sure to follow the correct procedure.

2. PRETENSIONER IS ACTIVATED

(a) Perform a diagnostic system check (See page DI–1147).

(b) Perform a visual check which includes the following items with the front seat outer belt removed from the vehicle.

- ▶ Check for deformation of the center pillar.
- ▶ Check for damage on the connector and wire harness.

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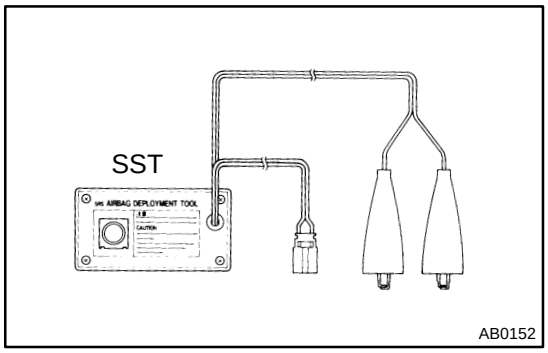
BO47S–02

DISPOSAL

HINT:

When scrapping vehicle equipped with a SRS or disposing of a front seat outer belt (with seat belt pretensioner), always first deploy the airbag in accordance with the procedure given in RS section or activate the seat belt pretensioner. If any abnormality occurs with the airbag deployment or seat belt pretensioner activation, contact the SERVICE DEP. of the TOYOTA MOTOR SALES, U.S.A. INC. When disposing of a front seat outer belt (with seat belt pretensioner) activated in a collision, follow the same procedure given in step 1–(d) in ”DISPOSAL”.



CAUTION:

- **Never dispose of front seat outer belt which has inactivated pretensioner.**
- **The seat belt pretensioner produces a sizeable exploding sound when it activates, so perform the operation out–of–door and where it will not create a nuisance to nearby residents.**
- **When activating the seat belt pretensioner, always use the specified SST. (SRS Airbag Deployment Tool) Perform the operation in a place away from electrical noise.**

  SST 09082–00700, 09082–00740
- **When activating a front seat outer belt (with seat belt pretensioner), perform the operation at least 10 m (33 ft) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated pretensioner.**

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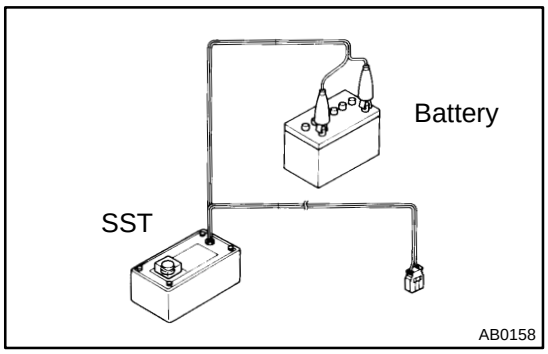
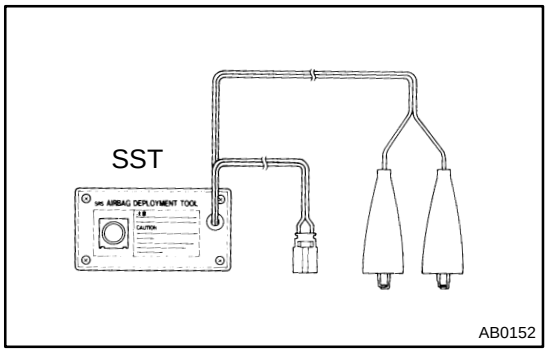


1. SEAT BELT PRETENSIONER ACTIVATION WHEN SCRAPPING VEHICLE

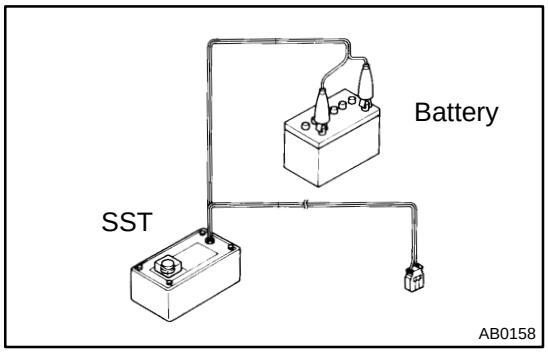
HINT:
Have a battery ready as the power source to activate the seat belt pretensioner.



(a) Check functioning of SST.

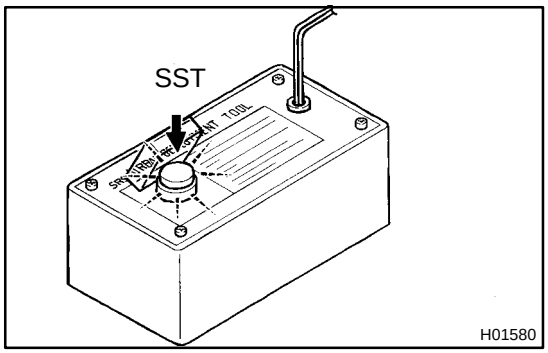
CAUTION:
When activating the seat belt pretensioner, always use the specified SST: SRS Airbag Deployment Tool.

SST 09082–00700, 09082–00740



(1) Connect the SST to battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (–) terminal.

HINT:
Do not connect the yellow connector which will be connected with the seat belt pretensioner.



(2) Check functioning of SST.
Press the SST activation switch, and check the LED of the SST activation switch lights up.

CAUTION:
If the LED lights up when the activation switch is not being pressed, SST malfunction is probable, so definitely do not use the SST.

(b) Front seat outer belt on left side of 4–door vehicle:
Disconnect the pretensioner connector.
(1) Remove the front door scuff plate.
(2) Remove the back door scuff plate.
(3) Remove the rear quarter trim panel.
(4) Remove the quarter trim panel.

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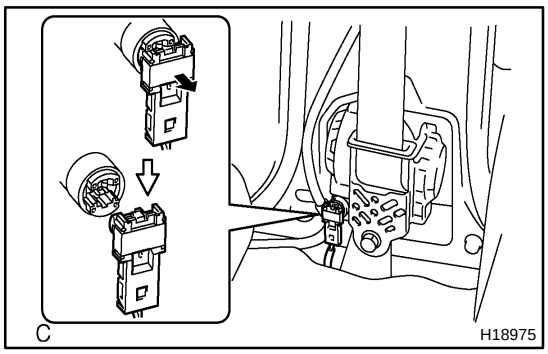


(5) Disconnect the pretensioner connector as shown in the illustration.

(6) Buckle the front seat belt and check that there is no looseness and slack in the front seat inner belt and front seat outer belt.

(c) Other front seat outer belts:

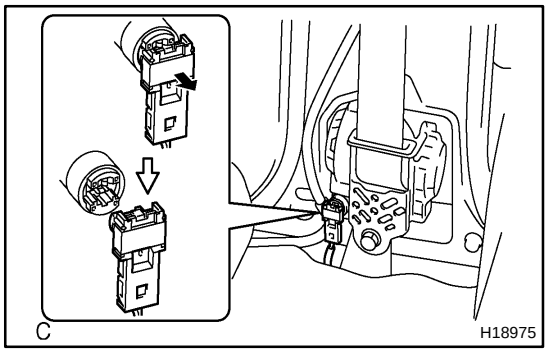
Disconnect the pretensioner connector.

(1) Remove the front door scuff plate.

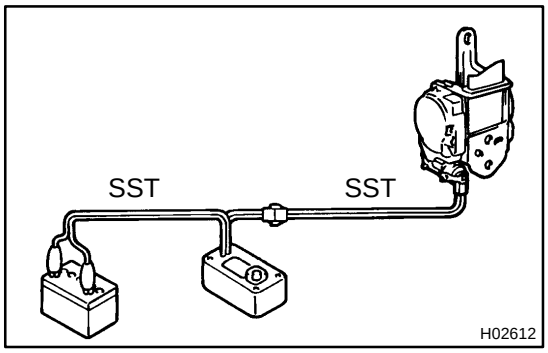
(2) Remove the slide door scuff plate.

(3) Remove the center pillar lower garnish.

(4) Disconnect the pretensioner connector as shown in the illustration.



(5) Buckle the front seat belt and check that there is no looseness and slack in the front seat inner belt and front seat outer belt.

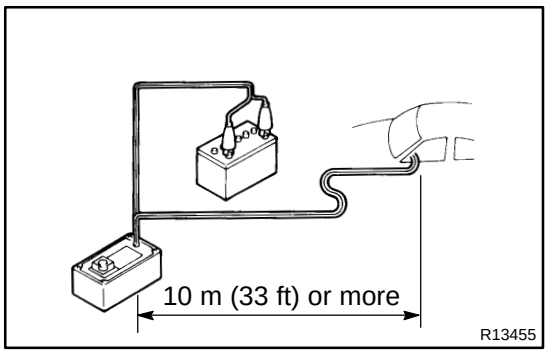


(6) Connect the 2 SST each other, then connect them to the seat belt pretensioner.

SST 09082–00700, 09082–00740

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock secondary lock of the twin lock.



(7) Move the SST to at least 10mm (33 ft) away from the front of the vehicle.

(8) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(9) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (–) terminal.

(d) Activate seat belt pretensioner.

(1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and activate the seat belt pretensioner.

HINT:

The seat belt pretensioner operates simultaneously as the LED of the SST activation switch lights up.

(e) Dispose of the front seat outer belt (with seat belt pretensioner).

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CAUTION:

- **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated seat belt pretensioner.**

  When scrapping a vehicle, activate the seat belt pretensioner and scrap the vehicle with activated front seat outer belt still installed.

2. ACTIVATION WHEN DISPOSING OF FRONT SEAT OUTER BELT ONLY

NOTICE:

- **When disposing of the front seat outer belt (with seat belt pretensioner) only, never use the customer's vehicle to activate the seat belt pretensioner.**
- **Be sure to follow the procedure given below when activating the seat belt pretensioner.**

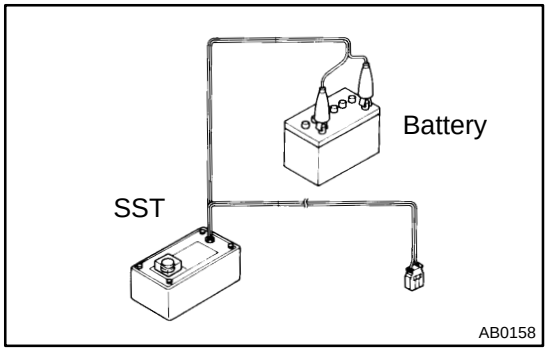
HINT:

Have a battery ready as the power source to activate the seat belt pretensioner.

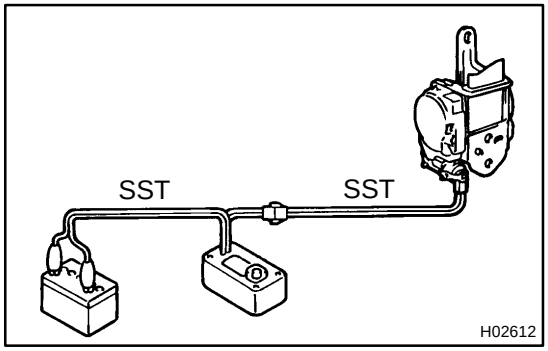
(a) Remove the front seat outer belt (See page BO–159).

HINT:

Cut the belt near the seat belt retractor.



(b) Check functioning of SST (See step 1–(a)).
SST 09082–00700, 09082–00740



(c) Install the SST.
(1) Connect the 2 SST each other, then connect them to the seat belt pretensioner.
SST 09082–00700, 09082–00740

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.

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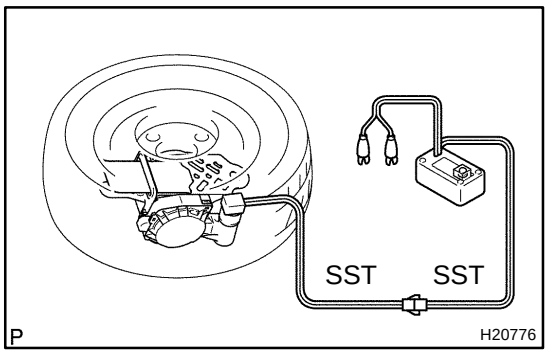


(2) Place the front seat outer belt on the ground and cover it with the disc wheel with tire.

NOTICE:

Place the front seat outer belt as shown in the illustration.

(3) Move the SST to at least 10 m (33 ft) away from the disc wheel.

NOTICE:

Take care not to damage the SST wire harness.

(d) Activate the seat belt pretensioner.

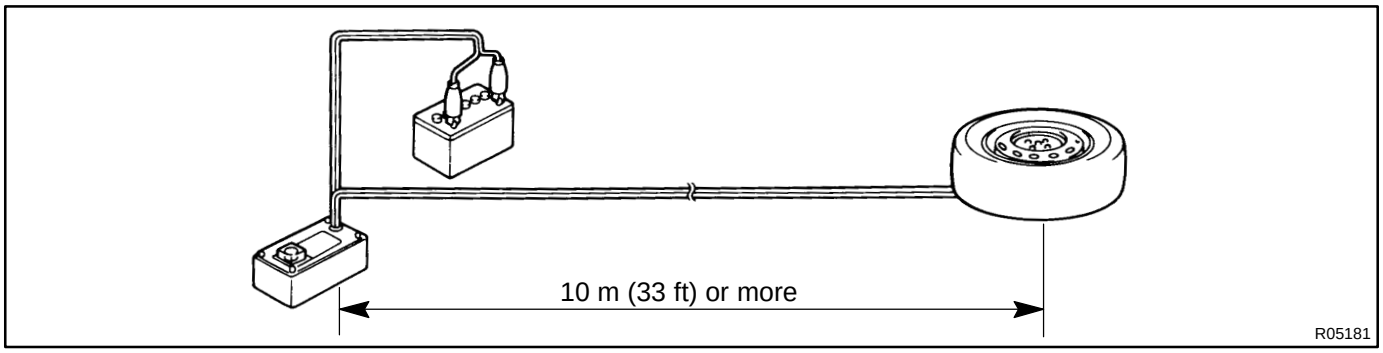
(1) Connect the SST red clip to the battery positive (+) terminal and black clip to the battery negative (–) terminal.

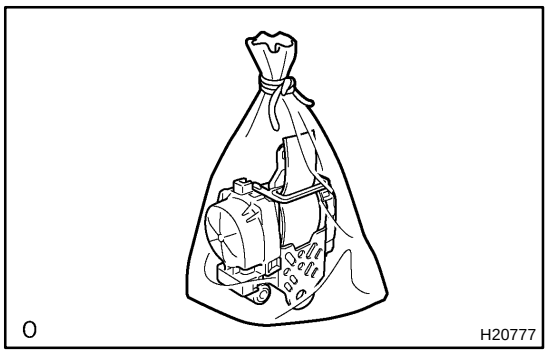
(2) Check that no one is within 10 m (33 ft) area around the disc wheel.

(3) Press the SST activation switch and activate the seat belt pretensioner.

HINT:

The seat belt pretensioner operates simultaneously as the LED of the SST activation switch lights up.





(e) Dispose of the front seat outer belt (with seat belt pretensioner).

CAUTION:

- **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated seat belt pretensioner.**

(1) Remove the disc wheel and SST.

(2) Place the front seat outer belt in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts.

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BO47T–01

REPLACEMENT

REPLACE REQUIREMENTS

In the following cases, replace the seat belt pretensioner.

- If the seat belt pretensioner has been activated.
- If the seat belt pretensioner has been found to be faulty in troubleshooting.
- If the front seat outer belt has been found to be faulty during the check in items 1–(b) or 2–(b).
- If the front seat outer belt has been dropped.

CAUTION:

For removal and installation of the seat belt pretensioner, see page BO–163 and BO–172.
Be sure to follow the correct procedure.

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BO47U–03

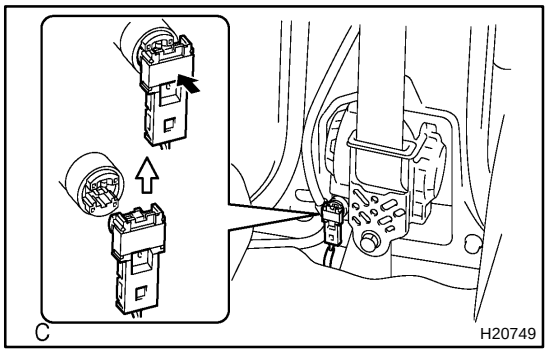
INSTALLATION

NOTICE:

- **Never use seat belt pretensioner from another vehicle. When replacing parts, replace them with new parts.**
- **Make sure that the front seat outer belt is installed to the specified torque.**
- **If the front seat outer belt has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front seat outer belt with a new one.**
- **When installing the front seat outer belt, take care that the wiring does not interfere with other parts and is not pinched between other parts.**

1. Other front seat outer belts:
INSTALL RETRACTOR OF FRONT SEAT OUTER BELT

(a) Install the retractor of front seat outer belt with the 2 bolts.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



(b) Connect the pretensioner connector as shown in the illustration.

2. INSTALL LOWER CENTER PILLAR GARNISH

(a) Install the lower center pillar garnish.

(b) Install the front seat outer belt floor anchor.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

3. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP

4. INSTALL REAR DOOR SCUFF PLATE

5. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP

6. INSTALL FRONT DOOR SCUFF PLATE

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

8. PERFORM INITIALIZATION (See page IN–20)

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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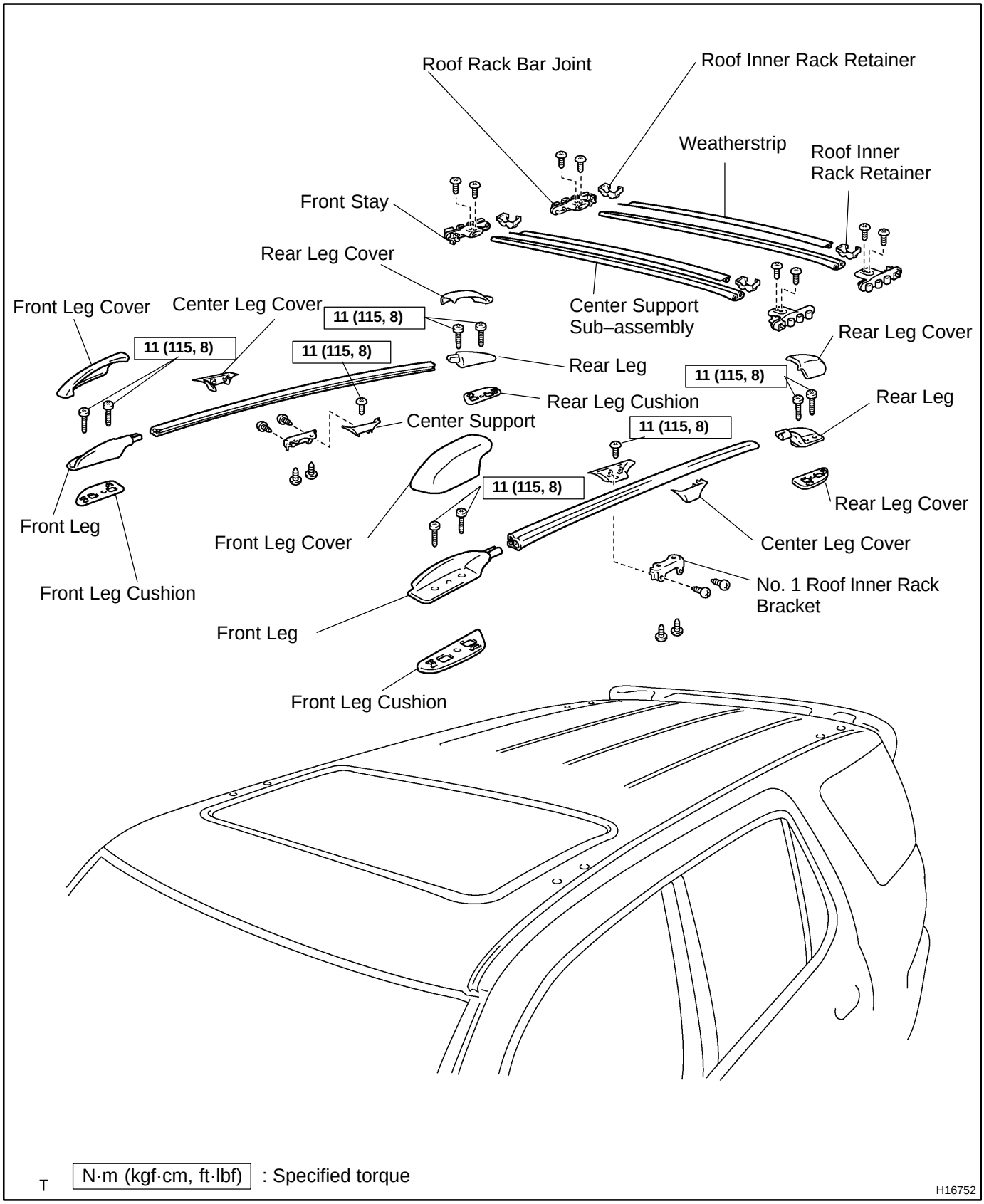
ROOF RACK

COMPONENTS

BO47V–04



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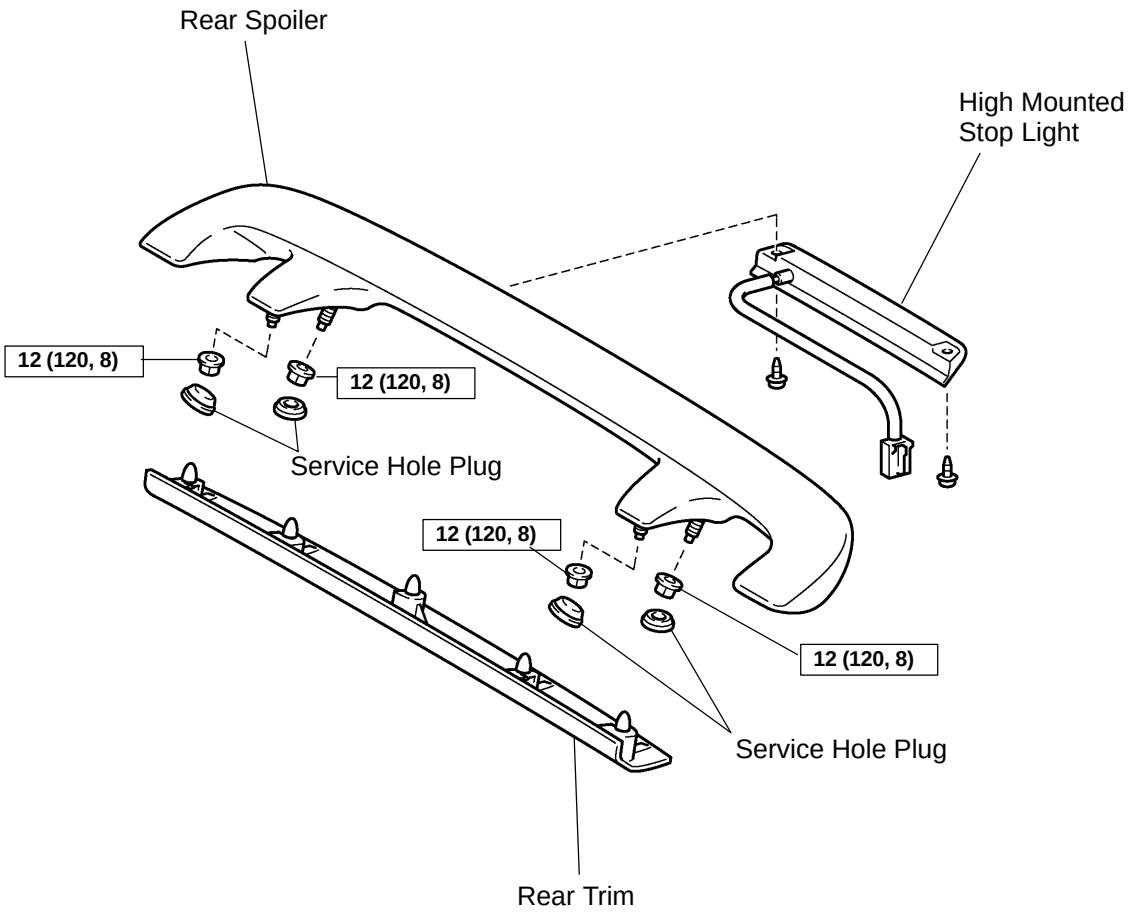
SPOILER

COMPONENTS

BO47W–01



T

N·m (kgf·cm, ft·lbf) : Specified torque

H16756

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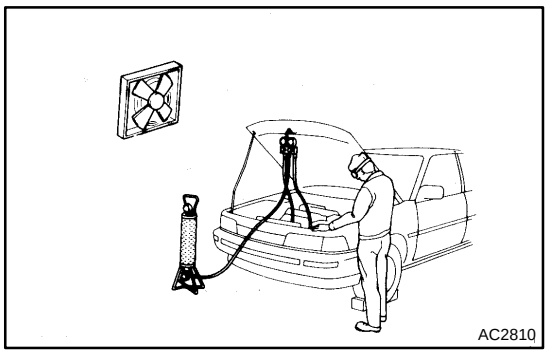

AC2810

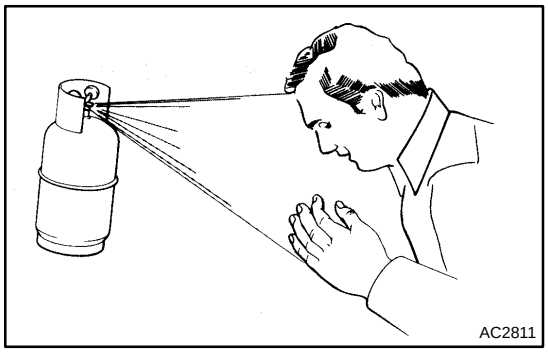
AIR CONDITIONING SYSTEM

AC1JS–06

PRECAUTION

1. DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME

2. ALWAYS WEAR EYE PROTECTION


AC2811

3. BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN

If liquid refrigerant gets in your eyes or on your skin.

(a) Wash the area with lots of cool water.

CAUTION:

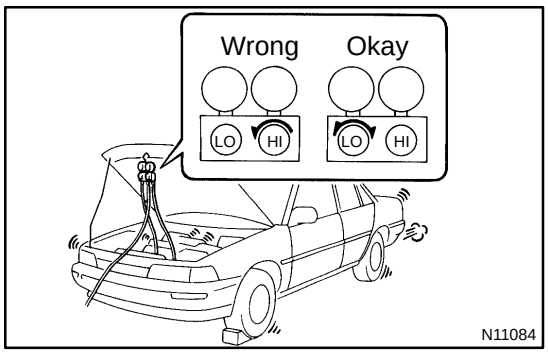
Do not rub your eyes or skin.

(b) Apply clean petroleum jelly to the skin.

(c) Go immediately to a physician or hospital for professional treatment.

4. NEVER HEAT CONTAINER OR EXPOSE IT TO OPEN FLAME

5. BE CAREFUL NOT TO DROP CONTAINER OR NOT TO APPLY PHYSICAL SHOCKS TO IT



N11084

6. DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERATION SYSTEM

If there is not enough refrigerant in the refrigerant system, oil lubrication will be insufficient and compressor burnout may occur. Necessary care should be taken to avoid this.

7. DO NOT OPEN PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING

If the high pressure valve is opened, refrigerant flows in the reverse direction and could cause the charging cylinder to rupture, so open and close only the low pressure valve.

8. BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT

If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating, etc.

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9. SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

The SEQUOIA is equipped with an SRS (Supplemental Restraint System) such as the driver, passenger, side, and curtain shield airbags. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

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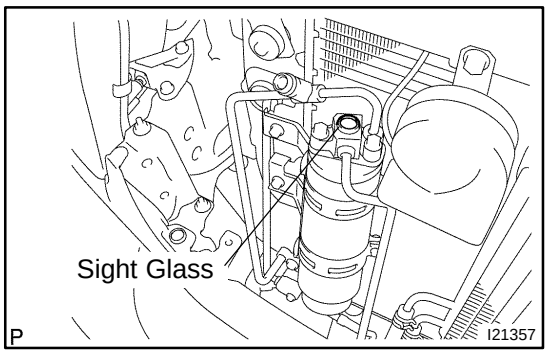
AC1JT–06



ON–VEHICLE INSPECTION

1. INSPECT REFRIGERANT VOLUME

Observe the sight glass on the liquid tube.

Test conditions:

- Running engine at 1,500 rpm
- Single A/C:
  Front blower speed control dial at ”HI” position
- Dual A/C:
  Front and rear blower speed set at ”HI” position
- A/C switch ON
- Single A/C:
  Front temperature control dial at ”MAX. COOL” position
- Dual A/C:
  Front temperature control dial at ”MAX. COOL” position
  Rear temperature control set at 18.5˚C (65˚F)
- Fully open the doors

Item	Symptom	Amount of refrigerant	Remedy
1	Bubbles are present in sight glass continuously	Insufficient*	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles are present in sight glass	None, sufficient or too much	Refer to items 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
4	Temperature between compressor inlet and outlet is noticeably different	Correct or too much	Refer to items 5 and 6
5	Immediately after air conditioning is turned off, refrigerant in sight glass stays clear	Too much	(1) Discharge refrigerant (2) Evacuate air and charge proper amount of purified refrigerant
6	When air conditioning is turned off, refrigerant foams and then stays clear	Correct	–

*: Bubbles in the sight glass with ambient temperature higher than usual can be considered normal if cooling is sufficient.

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2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

This is a method for checking the A/C system by using a manifold gauge set. Read the manifold gauge pressure when the conditions below are met.

Test conditions:

- Temperature at the air inlet with R/F switch set at RECIRC is 30 to 35˚C (86 to 95˚F)
- Engine running at 1500 rpm
- Blower speed control switch at ”HI” position
- Temperature control dial at ”MAX. COOL” position
- Dual A/C:
  Rear temperature control set at 18.5˚C (65˚F)

HINT:

Gauge indications may vary slightly due to ambient temperature conditions.

(1) Normally functioning refrigeration system.
Gauge reading:

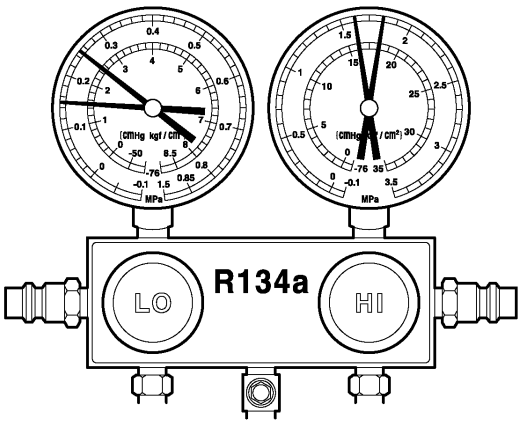
Single A/C:

Gauge	MPa	kgf·cm^2
Low pressure	0.15 to 0.25	1.5 to 2.5
High pressure	1.6 to 1.8	16 to 18

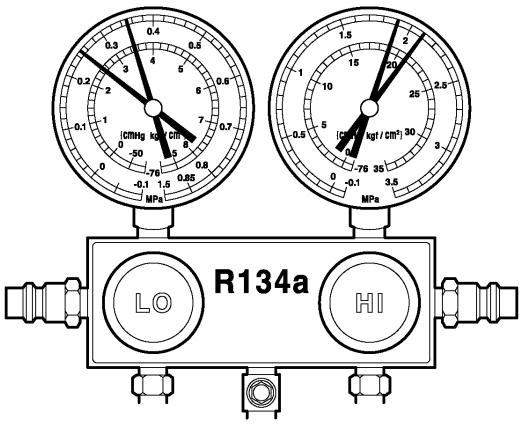
Dual A/C:

Gauge	MPa	kgf·cm^2
Low pressure	0.25 to 0.35	2.5 to 3.5
High pressure	1.9 to 2.1	19 to 21

Single A/C:



Dual A/C:



N I21803

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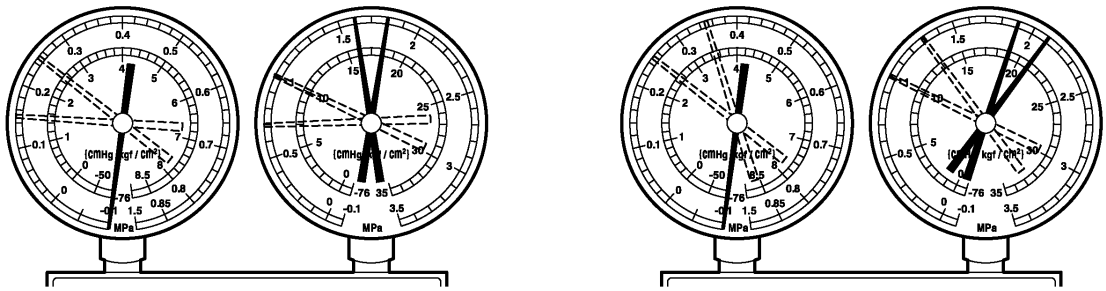
(2) Moisture present in refrigeration system.

Condition: Periodically cools and then fails to cool

Single A/C:

Dual A/C:



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I21804

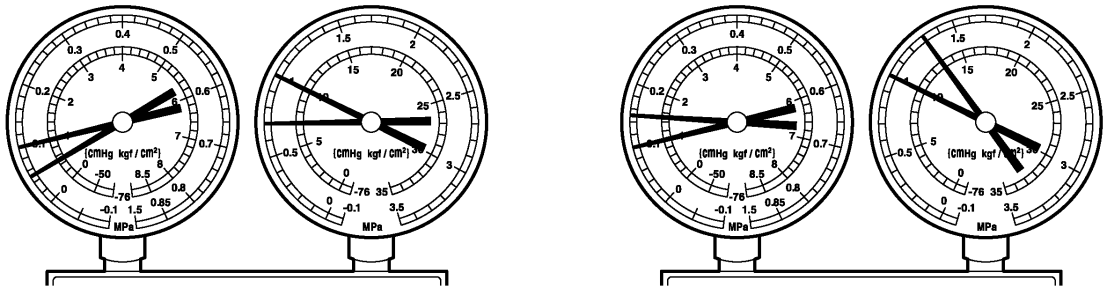
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
During operation, pressure on low pressure side cycles between vacuum and normal	Moisture in refrigeration system freezes at expansion valve orifice and temporarily stops cycle, but normal state is restored after the ice melts	▶Drier in oversaturated state ▶Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant	(1) Replace receiver (2) Remove moisture in cycle by repeatedly evacuating air (3) Charge proper amount of new refrigerant

(3) Insufficient cooling

Condition: Insufficient cooling

Single A/C:

Dual A/C:



N

I22613

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
▶Pressure low on both low and high pressure sides ▶Bubbles seen in sight glass continuously ▶Insufficient cooling performance	Gas leakage in refrigeration system	▶Insufficient refrigerant in system ▶Refrigerant leaking	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Charge proper amount of refrigerant (3) If indicated pressure value is near 0 when connected to gauge, create the vacuum after inspecting and repairing the location of the leak

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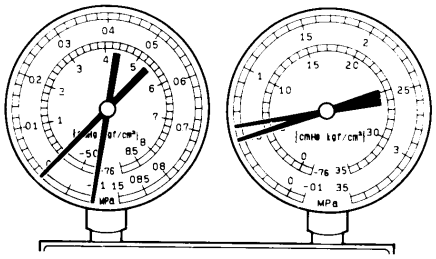
(4) Poor circulation of refrigerant

Condition: Insufficient cooling

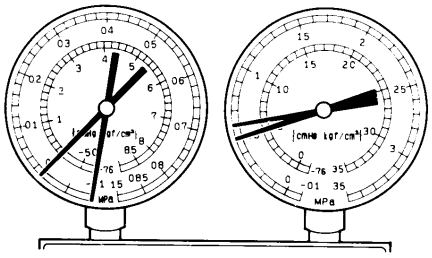


I01389

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
▶Pressure low on both low and high pressure sides ▶Frost on tube from receiver to unit	Refrigerant flow obstructed by dirt in receiver	Receiver clogged	Replace receiver

(5) Refrigerant does not circulate

Condition: Does not cool (Cools from time to time in some cases)



I01449

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
▶Vacuum indicated on low pressure side, very low pressure indicated on high pressure side ▶Frost or dew seen on piping on both sides of receiver/ drier or expansion valve	▶Refrigerant flow obstructed by moisture or dirt in refrigeration system ▶Refrigerant flow obstructed by gas leakage from expansion valve	Refrigerant does not circulate	(1) Check expansion valve (2) Clean out dirt in expansion valve by blowing with air (3) Replace receiver (4) Evacuate air and charge new refrigerant to proper amount (5) For gas leakage from expansion valve, replace expansion valve

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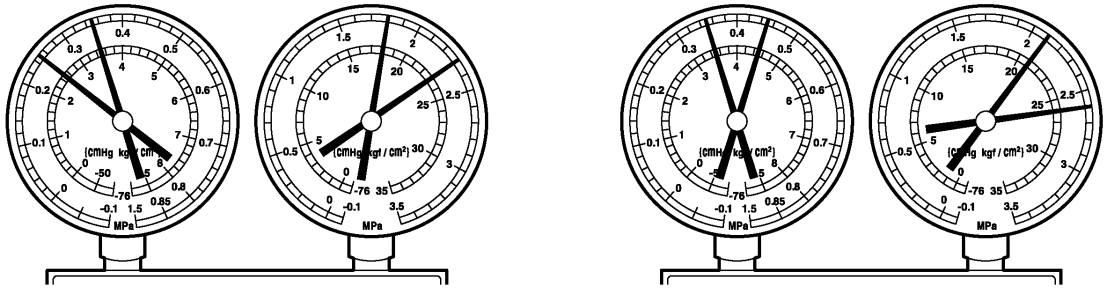
(6) Refrigerant overcharged or insufficient cooling of condenser

Condition: Insufficient cooling

Single A/C:

Dual A/C:



N I22614

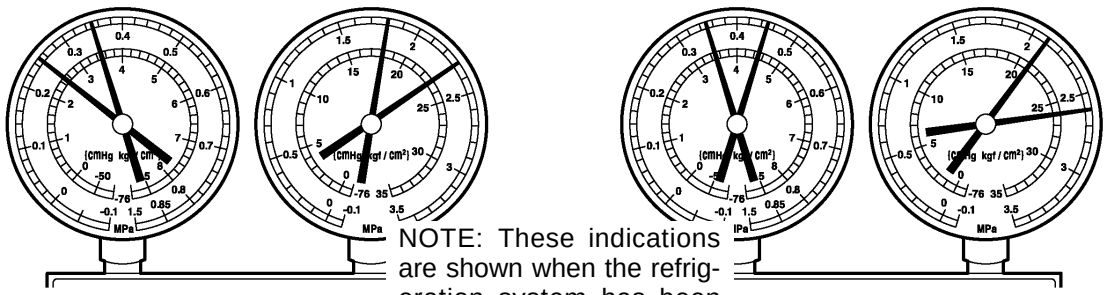
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
▶Pressure too high on both low and high pressure sides ▶No air bubbles seen through the sight glass even when the engine rpm is lowered	▶Unable to develop sufficient performance due to excessive refrigerant ▶Insufficient cooling of condenser	▶Excessive refrigerant in cycle→refrigerant overcharged ▶Condenser cooling insufficient→condenser fins clogged or cooling fan faulty	(1) Clean condenser (2) Check cooling fan with fluid coupling operation (3) If (1) and (2) are in normal state, check amount of refrigerant and charge proper amount of refrigerant

(7) Air present in refrigeration system

Condition: Insufficient cooling

Single A/C:

Dual A/C:



NOTE: These indications are shown when the refrigeration system has been opened and the refrigerant has been charged without vacuum purging.

N I22614

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
▶Pressure too high on both low and high pressure sides ▶The low pressure piping hot to the touch ▶Bubbles seen in sight glass	Air in refrigeration system	▶Air present in refrigeration system ▶Insufficient vacuum purging	(1) Check compressor oil to see if it is dirty or insufficient (2) Evacuate air and charge new refrigerant

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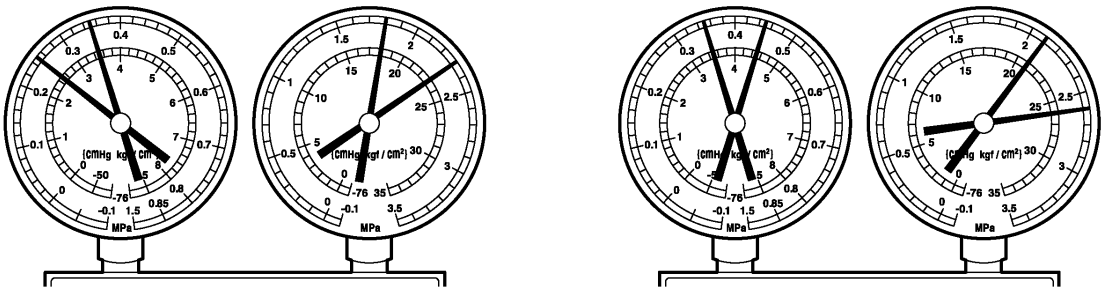
(8) Expansion valve malfunction

Condition: Insufficient cooling

Single A/C:

Dual A/C:



N

I22614

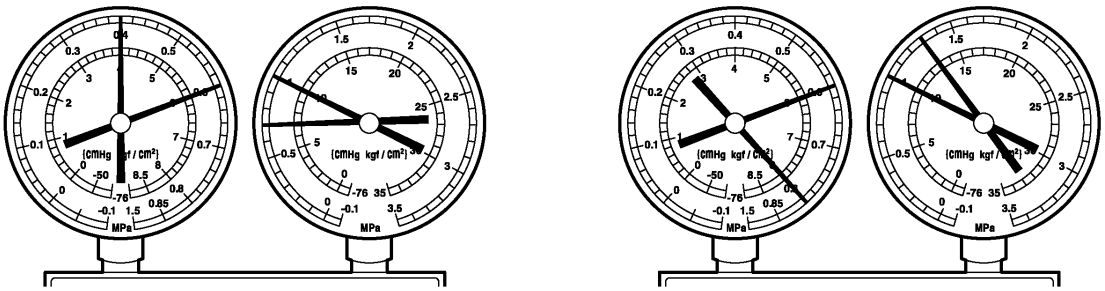
Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
▶Pressure too high on both low and high pressure sides ▶Frost or large amount of dew on piping on low pressure side	Trouble in expansion valve	▶Excessive refrigerant in low pressure piping ▶Expansion valve opened too wide	Check expansion valve Replace if defective

(9) Insufficient compressor compression

Condition: Does not cool

Single A/C:

Dual A/C:



N

I22615

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
▶Pressure too high on both low and high pressure sides ▶Pressure too low on high pressure side	Internal leak in compressor	▶Low compression ▶Leak from valve or broken sliding parts	Repair or replace compressor

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3. INSPECT IDLE–UP SPEED

(a) Warm up the engine.

(b) Inspect idle–up speed when the following conditions are established.

- ▶ Warm up engine
- ▶ Blower speed control switch at ”HI” position
- ▶ A/C switch ON
- ▶ Temperature control dial at ”COOL” position

Magnetic clutch condition	Idle–up speed
Magnetic clutch not engaged	700 ± 50 rpm
Magnetic clutch engaged	780 ± 50 rpm

If idle speed is not as specified, check the Idle control system.

4. INSPECT FOR LEAKAGE OF REFRIGERANT

(a) Perform under the following conditions:

- ▶ Stop the engine.
- ▶ Secure good ventilation (If not, the gas leak detector may react to volatile gases witch are not refrigerant, such as evaporated gasoline and exhaust gas.)
- ▶ Repeat the test 2 or 3 times.
- ▶ Make sure that there is some refrigerant remaining in the refrigeration system.
  When the compressor is OFF: approx. 392 to 588 kPa (4 to 6 kgf/ cm^2, 57 to 85 psi)

(b) Bring the gas leak detector close to the drain hose before performing the test.

HINT:

- ▶ After the blower motor stopped, leave the cooling unit for more than 15 minutes.
- ▶ Bring the gas leak detector sensor under the drain hose.
- ▶ When bringing the gas leak detector close to the drain hose, make sure that the gas leak detector does not react to the volatile gases.

If such reaction is unavoidable, the vehicle must be lifted up.

(c) If gas leak is not detected on the drain hose, remove the blower motor linear controller from the cooling unit. Then insert the gas leak detector sensor into the unit and perform the test.

(d) Disconnect the connector and leave the pressure switch for approx. 20 minutes. Then bring the gas leak detector close to the pressure switch and perform the test.

(e) Bring the gas leak detector close to the refrigerant lines and perform the test.

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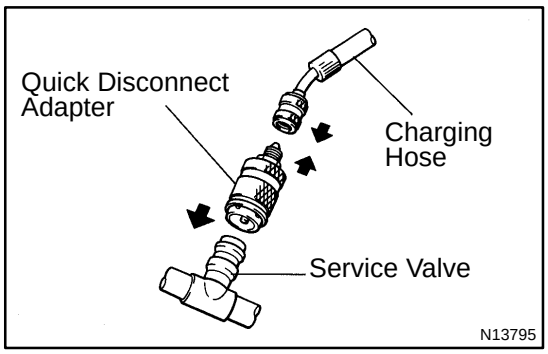
AC1JU–07

EVACUATING



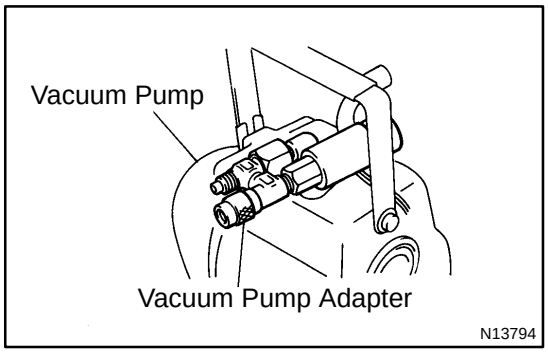
1. CONNECT QUICK DISCONNECT ADAPTER TO CHARGING HOSES

2. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINES

3. SET MANIFOLD GAUGE SET

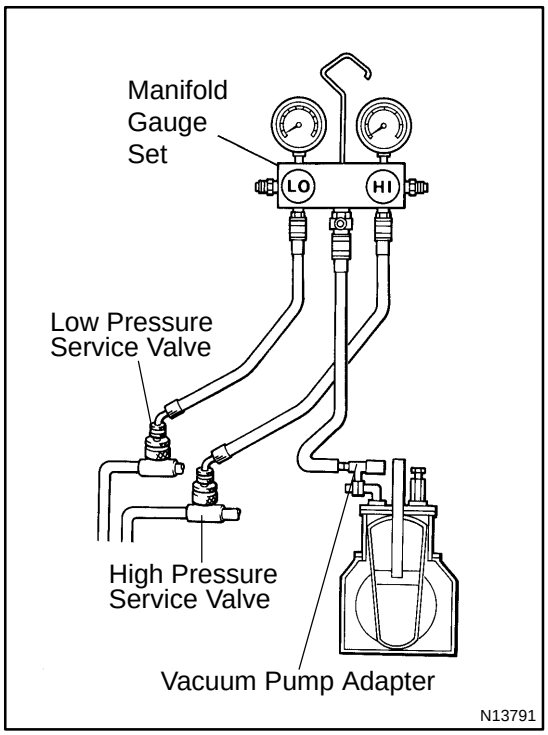
(a) Close both valves of the manifold gauge set.

(b) Connect the quick disconnect adapters to the service valves.



4. EVACUATE AIR FROM REFRIGERATION SYSTEM

(a) Connect the vacuum pump adapter to the vacuum pump.



(b) Connect the center hose of the manifold gauge set to the vacuum pump adapter.

(c) Open both the high and low side valves and run the vacuum pump.

(d) After 10 minutes or more, check that the low pressure gauge indicates 750 mmHg (30 in. Hg) or more.

HINT:

If the reading is 750 mmHg (30 in. Hg) or more, close both valves of the manifold gauge set and stop the vacuum pump. Check the system for leaks and repair if necessary.

(e) Close both the high and low side valves and stop the vacuum pump.

(f) Leave the system in this condition for 5 minutes or more and check that there is no change in gauge indication.

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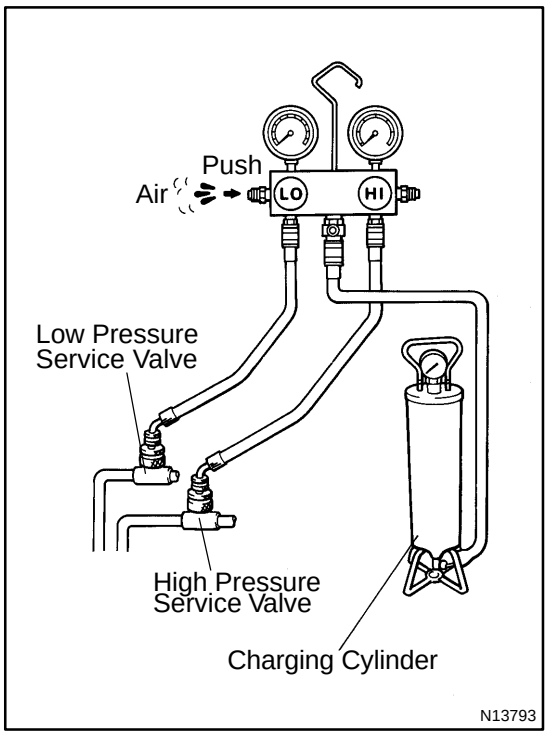
AC1JV–05

CHARGING



1. INSTALL CHARGING CYLINDER

HINT:

When handling the charging cylinder, always follow the directions given in the instruction manual.

(a) Charge the proper amount of refrigerant into the charging cylinder.

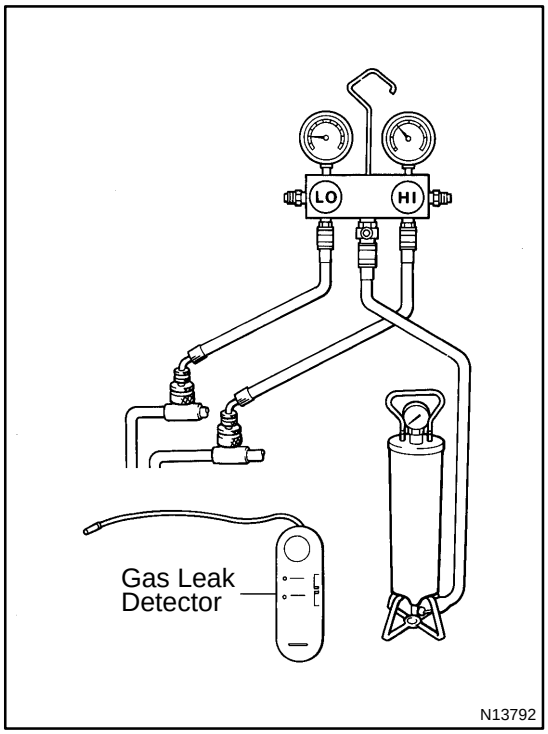
(b) Connect the center hose to the charging cylinder.

CAUTION:

Do not open either the high or low side valve of the manifold gauge set.

(c) Open the valve of the charging cylinder.

(d) Press the valve core on the side of the manifold gauge and expel the air from the center hose.



2. INSPECT REFRIGERATION SYSTEM FOR LEAKS

(a) Open the high pressure side valve and charge refrigerant.

(b) When the low pressure gauge indicates 98 kPa (1 kgf/cm^2, 14 psi), close the high pressure side valve.

(c) Using a gas leak detector, check the system for leakage.

CAUTION:

Use a refrigerant recovery/recycling machine to recover the refrigerant whenever replacing parts.

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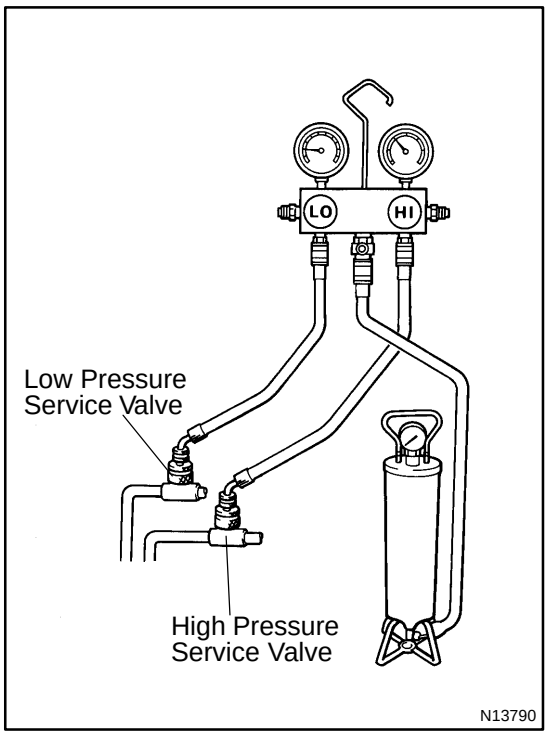


3. CHARGE REFRIGERANT INTO REFRIGERANT SYSTEM

If there is no leak after refrigerant leak check, charge the proper amount of refrigerant into the refrigeration system.

CAUTION:

- **Never run the engine when charging the system through the high pressure side.**
- **Do not open the low pressure side valve when the system is being charged with liquid refrigerant.**

(a) Open the high pressure side valve fully.

(b) Charge specified amount of refrigerant, then close the high pressure side valve.

HINT:

The system is fully charged if bubbles cannot be seen through the sight glass.

(c) Partially charge the refrigeration system with refrigerant.

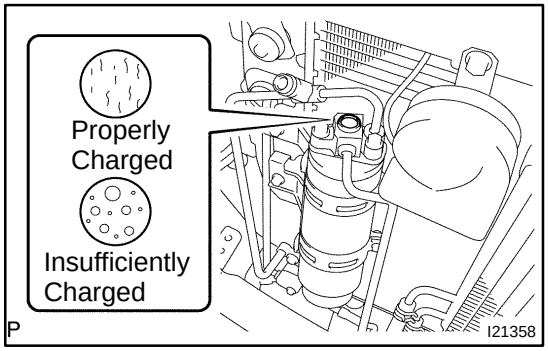
(1) Prepare the vehicle:

- Running engine at 1,500 rpm
- Single A/C:
  Front blower speed control dial at ”HI” position
- Dual A/C:
  Front and rear blower speed set at ”HI” position
- Single A/C:
  Front temperature control dial at ”MAX. COOL” position
- Dual A/C:
  Front temperature control dial at ”MAX. COOL” position
  Rear temperature control set at 18.5˚C (65˚F)
- Air inlet control set at ”RECIRC”
- Fully open doors (Sliding roof: closed)

(2) Open the low pressure side valve.

CAUTION:

Do not open the high pressure side valve.



(d) Charge refrigerant until bubbles disappear and check the pressure on the gauge through the sight glass.

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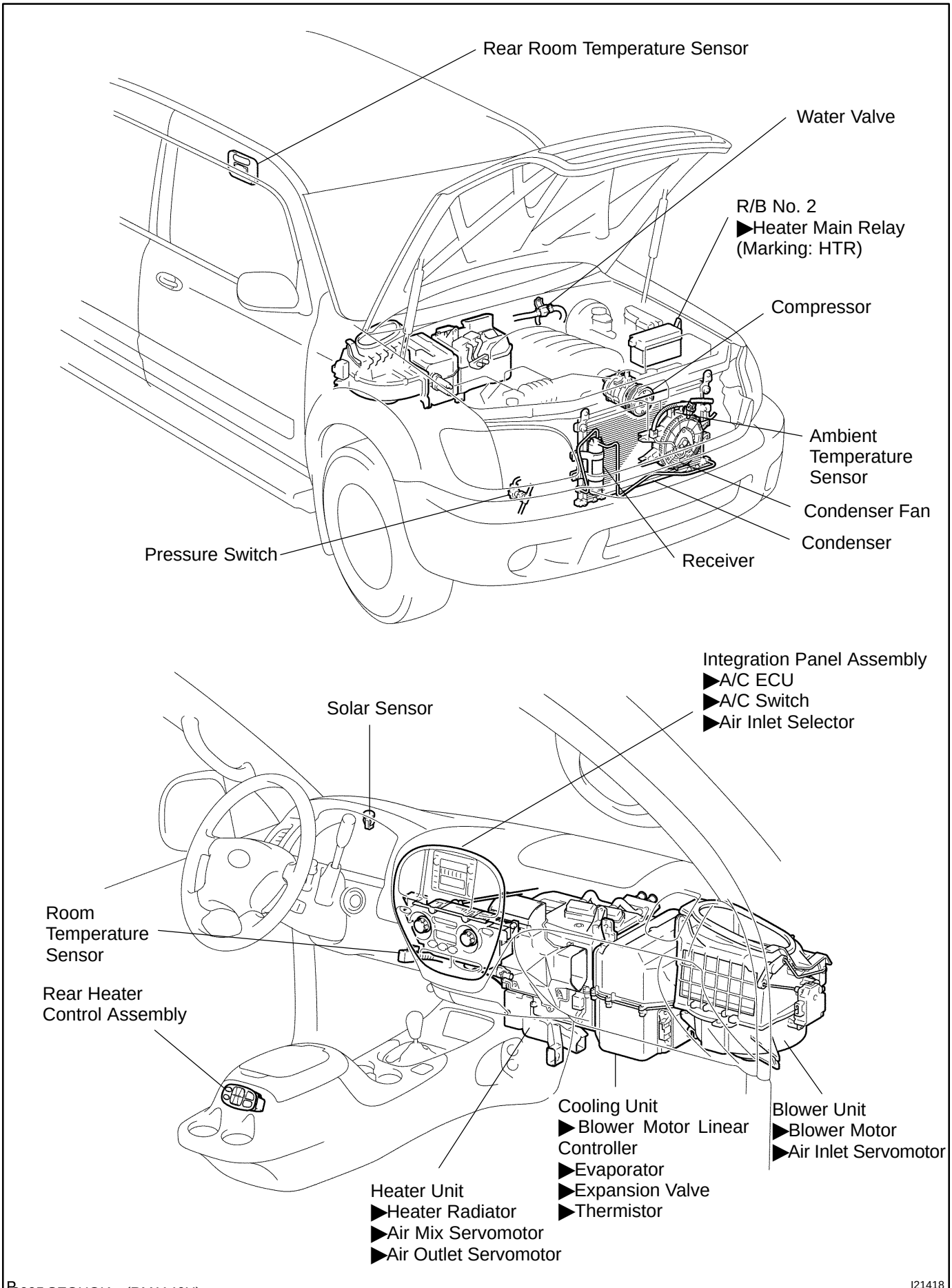
AC1JW–06

LOCATION



I21418

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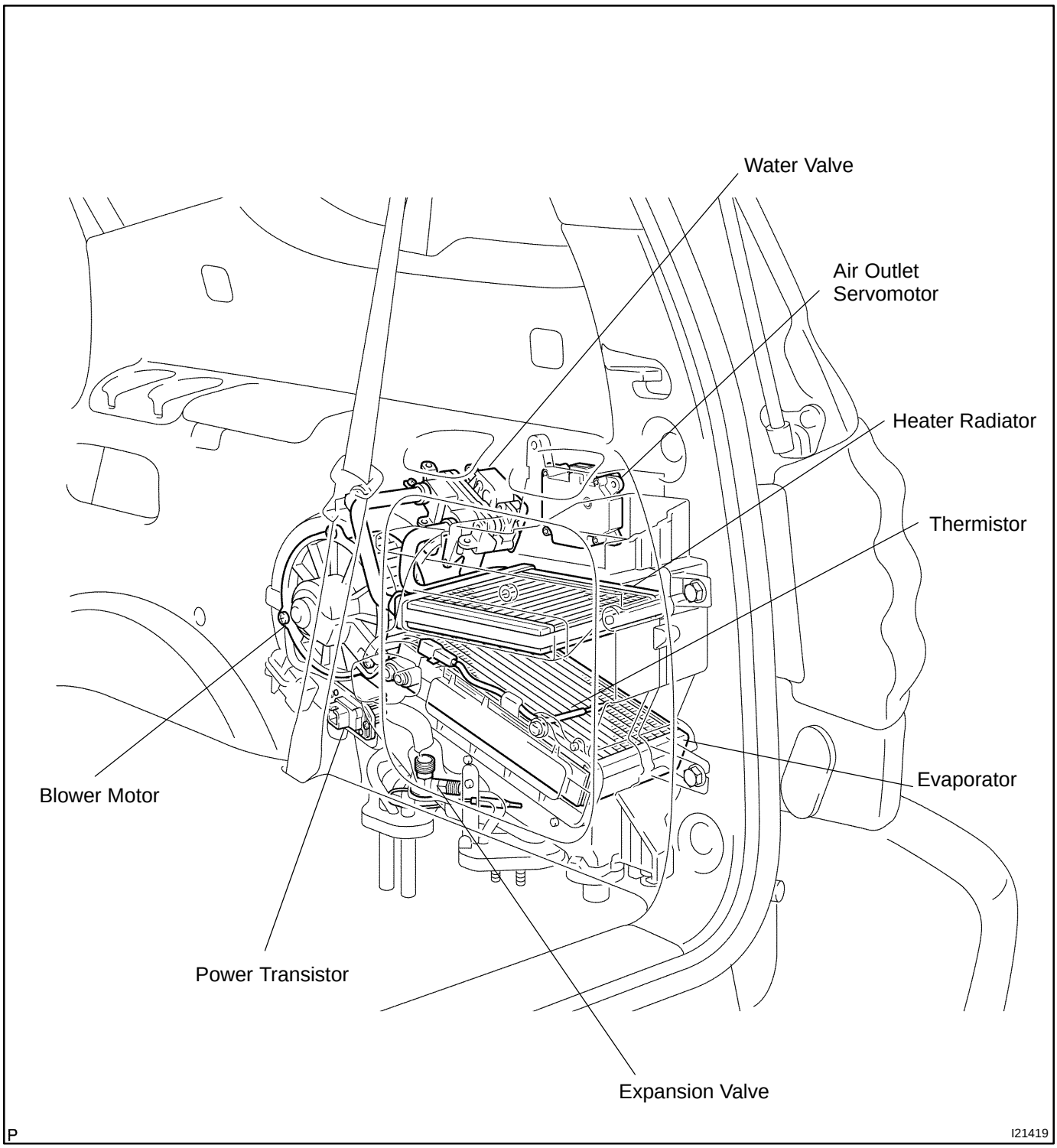
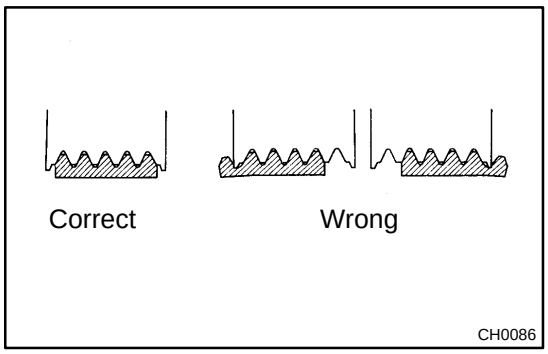

Water Valve
Air Outlet Servomotor
Heater Radiator
Thermistor
Evaporator
Blower Motor
Power Transistor
Expansion Valve
P
I21419

Dardoor.com



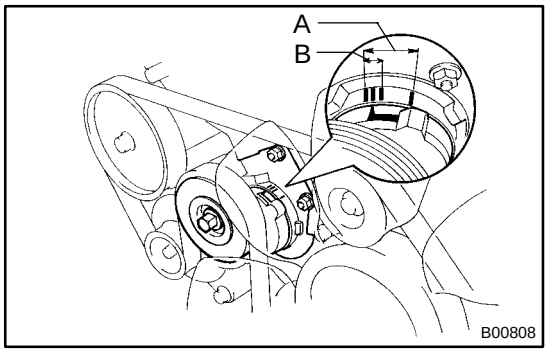
DRIVE BELT

AC1JX–05

ON–VEHICLE INSPECTION

1. INSPECT DRIVE BELT'S INSTALLATION CONDITION

Check that the drive belt fits properly in the ribbed grooves.



2. INSPECT DRIVE BELT TENSION

Check that the tension is within the A range on the auto tensioner scale.

If the tension is not within the A range on the scale, replace the belt with a new one.

HINT:

When replacing the drive belt with a new one, the belt's tension should be within the B range on the belt tensioner scale.

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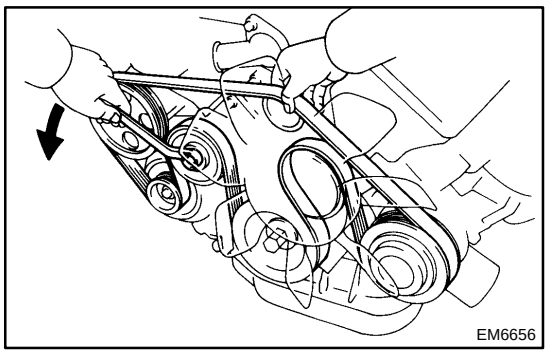
AC1JY–05



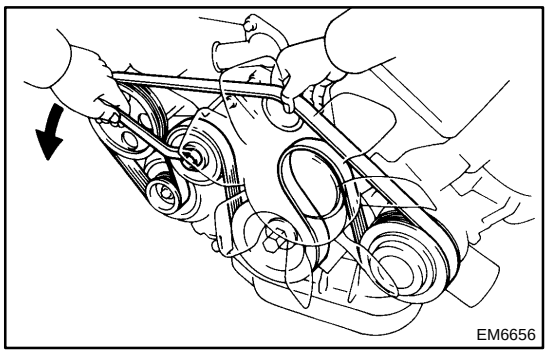
REMOVAL

REMOVE DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and remove the drive belt.

Dardoor.com

AC3GT–02



INSTALLATION

INSTALL DRIVE BELT

Turn the drive belt tensioner counterclockwise then install the drive belt.

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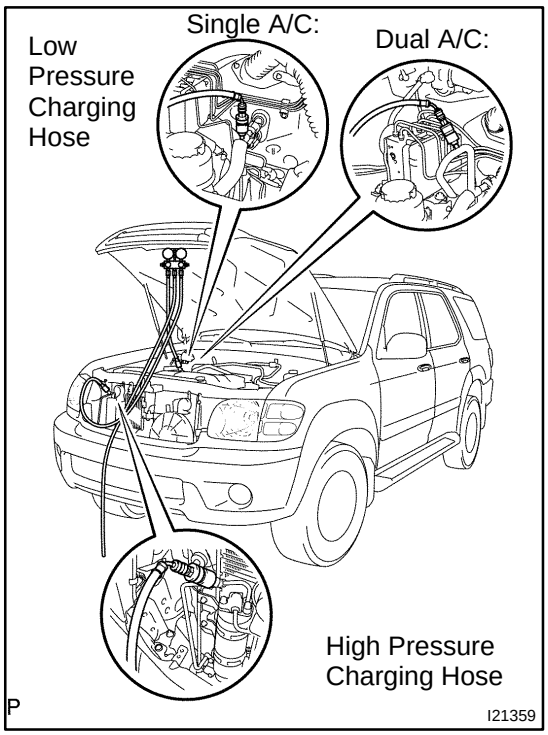


MANIFOLD GAUGE SET

AC1K0–04

SET ON

1. CONNECT CHARGE HOSE TO MANIFOLD GAUGE SET

Tighten the nuts by hand.

CAUTION:

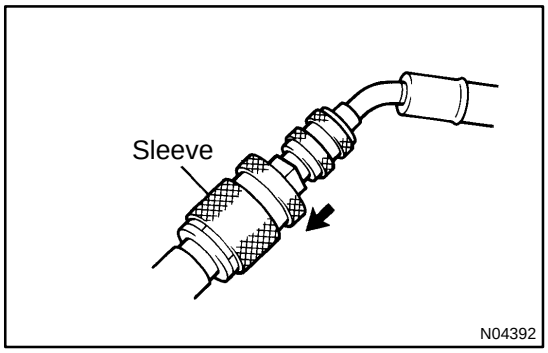
Do not connect the wrong hoses.

2. CONNECT QUICK DISCONNECT ADAPTERS TO CHARGING HOSES

Tighten the nuts by hand.

3. CLOSE BOTH VALVES OF MANIFOLD GAUGE SET

4. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINE



5. CONNECT QUICK DISCONNECT ADAPTERS TO SERVICE VALVES

HINT:

Push the quick disconnect adapter onto the service valve, then slide. Slide the sleeve of the quick disconnect adapter downward to lock it.

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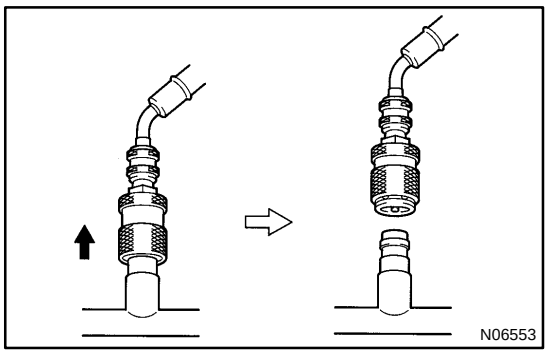
AC1K1–05



SET OFF

1. **CLOSE BOTH VALVES OF MANIFOLD GAUGE SET**
2. **DISCONNECT QUICK DISCONNECT ADAPTERS FROM SERVICE VALVES ON REFRIGERANT LINE**

HINT:

Slide the sleeve of the quick disconnect adapter upward to unlock the adapter and remove it from the service valve.

3. **INSTALL CAPS TO SERVICE VALVES ON REFRIGERANT LINE**

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REFRIGERANT LINE

AC1K2–03

ON–VEHICLE INSPECTION

1. INSPECT HOSE AND TUBE CONNECTIONS FOR LOOSENESS

2. INSPECT HOSES AND TUBES FOR LEAKAGE

Using a gas leak detector, check for leakage of refrigerant.

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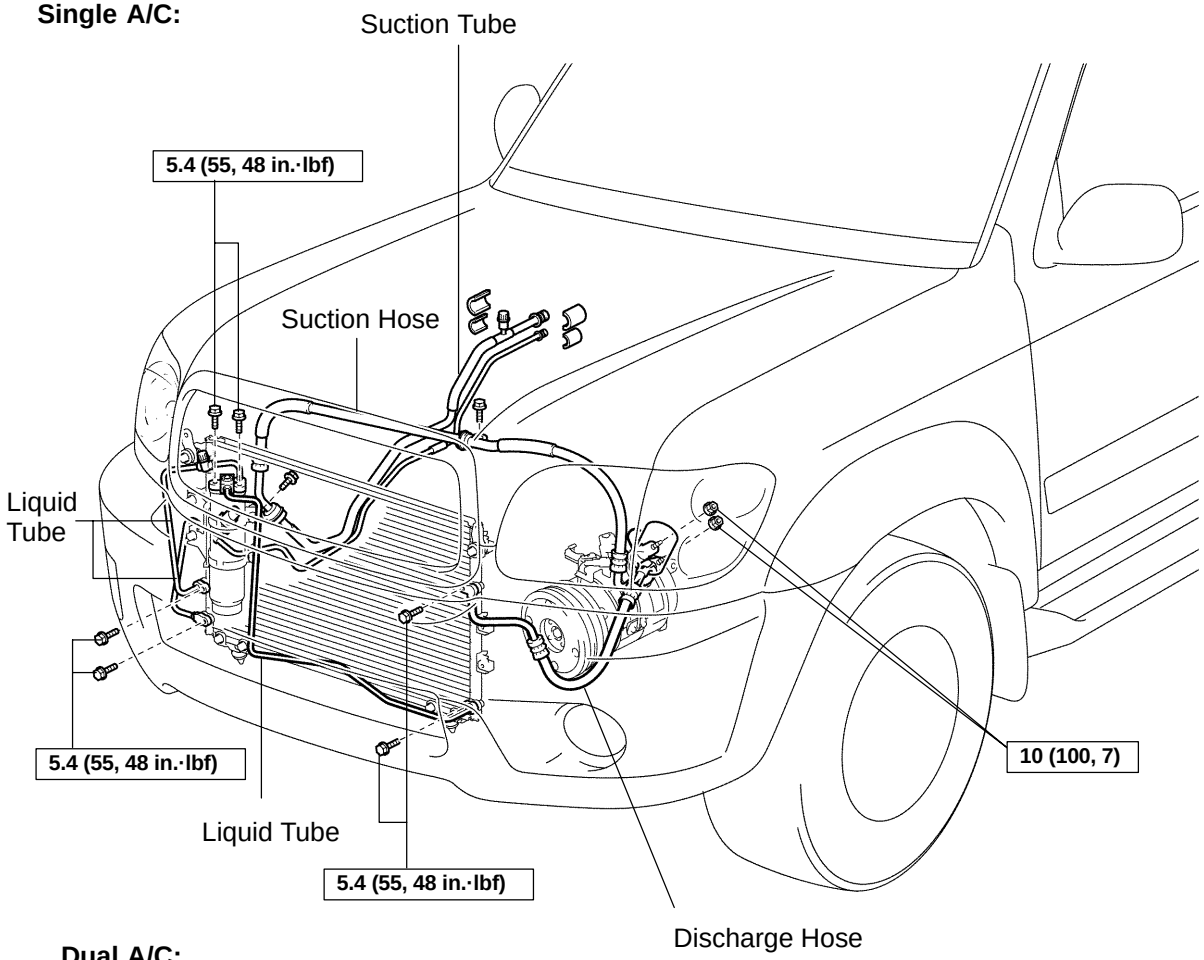
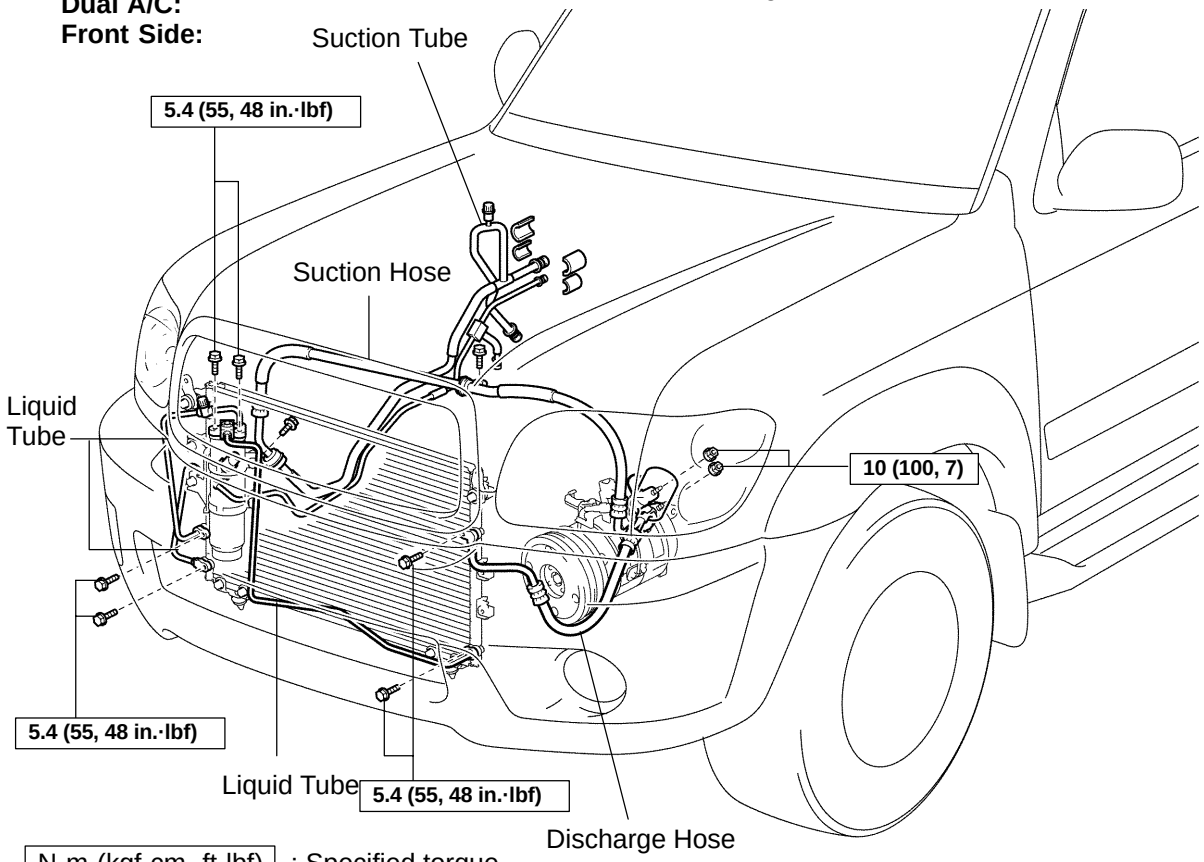
AC3GU–02

LOCATION

Single A/C:



Dual A/C:
Front Side:



N·m (kgf·cm, ft·lbf) : Specified torque

I21436

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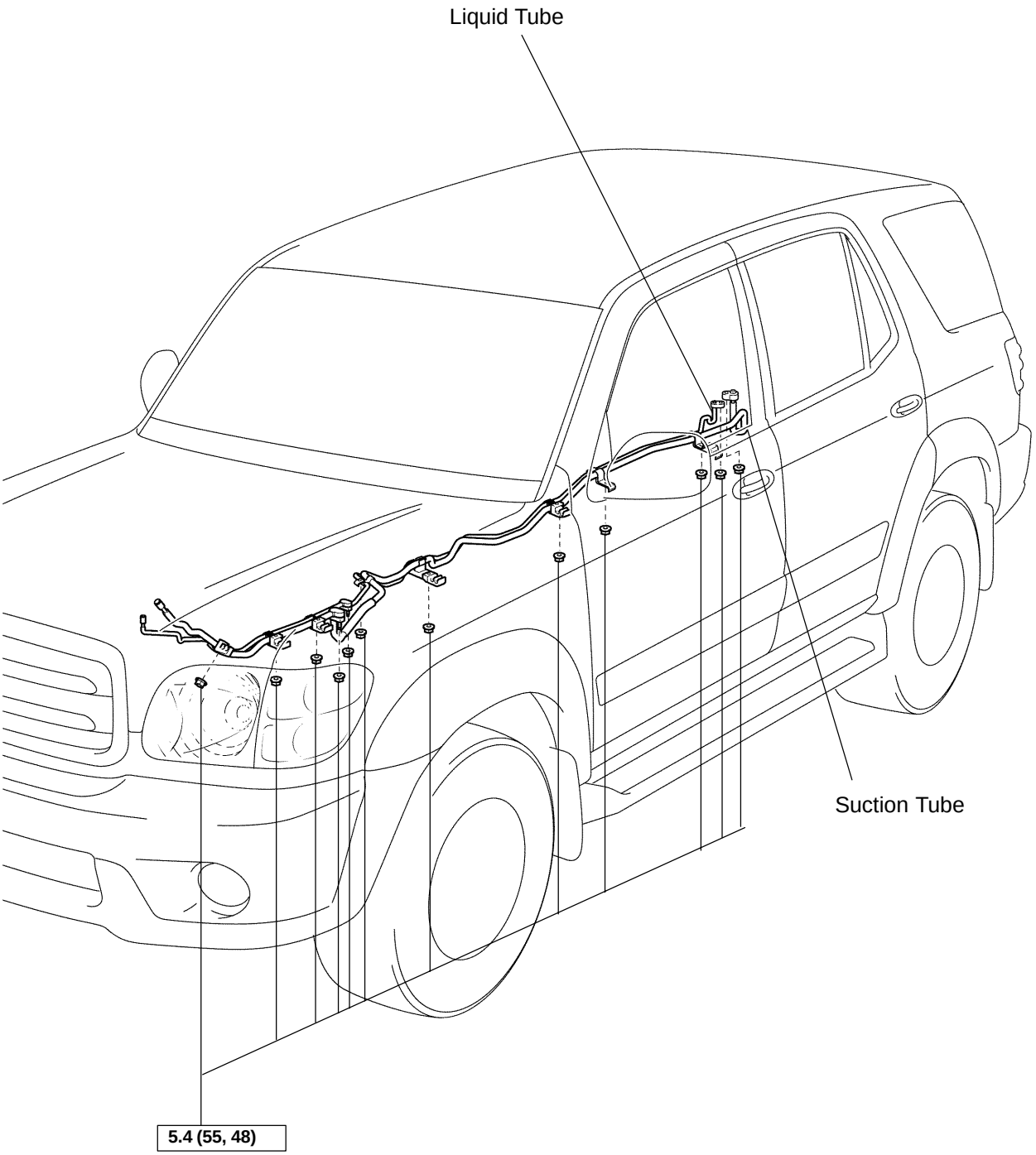
Dual A/C:
Rear Side:



N·m (kgf·cm, in.·lbf) : Specified torque

P

I21437

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AC1K4–04

REPLACEMENT

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

2. REPLACE FAULTY TUBE OR HOSE

NOTICE:

Cap the openings immediately to keep moisture or dirt out of the system.

3. TIGHTEN JOINT OF BOLT OR NUT TO SPECIFIED TORQUE

NOTICE:

Do not exceed specified torque.

Part tightened	N·m	kgf·cm	ft·lbf
Receiver x Liquid tube	5.4	55	48 in.·lbf
Condenser x Discharge hose	5.4	55	48 in.·lbf
Condenser x Liquid tube	5.4	55	48 in.·lbf
Compressor x Discharge hose	10	100	7
Compressor x Suction hose	10	100	7
Liquid and suction tube (Nut)	5.4	55	48 in.·lbf
Liquid and suction tube x Rear A/C unit	5.4	55	48 in.·lbf

4. EVACUATE AIR IN REFRIGERATION SYSTEM AND CHARGE SYSTEM WITH REFRIGERANT

Specified amount:

Single A/C: 750 ± 50 g (26.45 ± 1.76 oz.)

Dual A/C: 1050 ± 50 g (37.03 ± 1.76 oz.)

5. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.

6. INSPECT AIR CONDITIONING OPERATION

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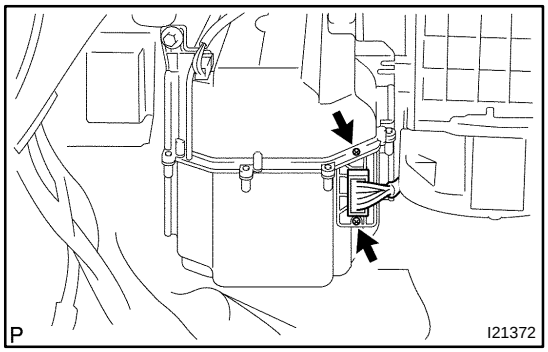
COOLING UNIT

AC3GV–02

ON–VEHICLE INSPECTION

1. INSPECT FOR LEAKAGE OF REFRIGERANT

(a) Remove the console box assembly.
(b) Remove the glove compartment door.
(c) Remove the lower No. 2 finish panel.
(d) Remove the heater to register duct No. 4.
(e) Remove the lower LH finish panel.
(f) Remove the lower cover (See page BO–89).



(g) Remove the blower controller.
  (1) Disconnect the connector.
  (2) Remove the 2 screws and blower motor linear controller.
(h) Using a gas leak detector, check for leakage.

If there is leakage, check the tightening torque at the joints or check the evaporator.

(i) Install the blower motor linear controller with the 2 screws.
(j) Install the lower cover.
(k) Install the lower LH finish panel.
(l) Install the lower No.2 finish panel.
(m) Install the glove compartment door (See page BO–97).

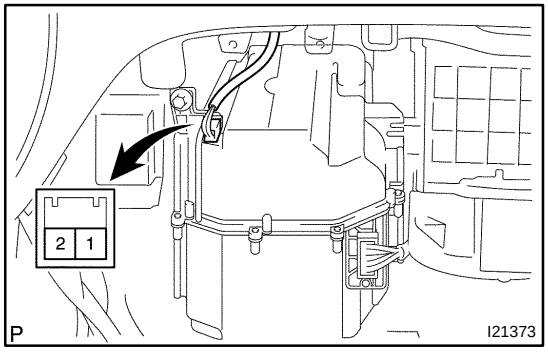
2. INSPECT EXPANSION VALVE

(a) Set the manifold gauge set.
(b) Run the engine.
(c) Check quantity of gas with the sight glass in refrigeration cycle.
  (1) Run the engine at 1,500 rpm for at least 5 minutes.
  (2) Then check that the high pressure reading is 1.37 to 1.57 Mpa (14 to 16 kgm/cm^2, 199 to 228 psi).
(d) Check the expansion valve.

If the expansion valve is faulty, the low pressure reading will drop to 0 kPa (0 kgf/cm^2, 0 psi).

HINT:

When the low pressure reading drops to 0 kPa (0 kgf/cm^2, 0 psi), there is no difference in temperature between the IN and OUT sides of the receiver.



3. INSPECT THERMISTOR RESISTANCE

(a) Disconnect the connector.
(b) Measure the resistance between terminals.
  Standard resistance: 1,500 Ω at 25˚C (77˚F)

If resistance is not as specified, replace the thermistor.

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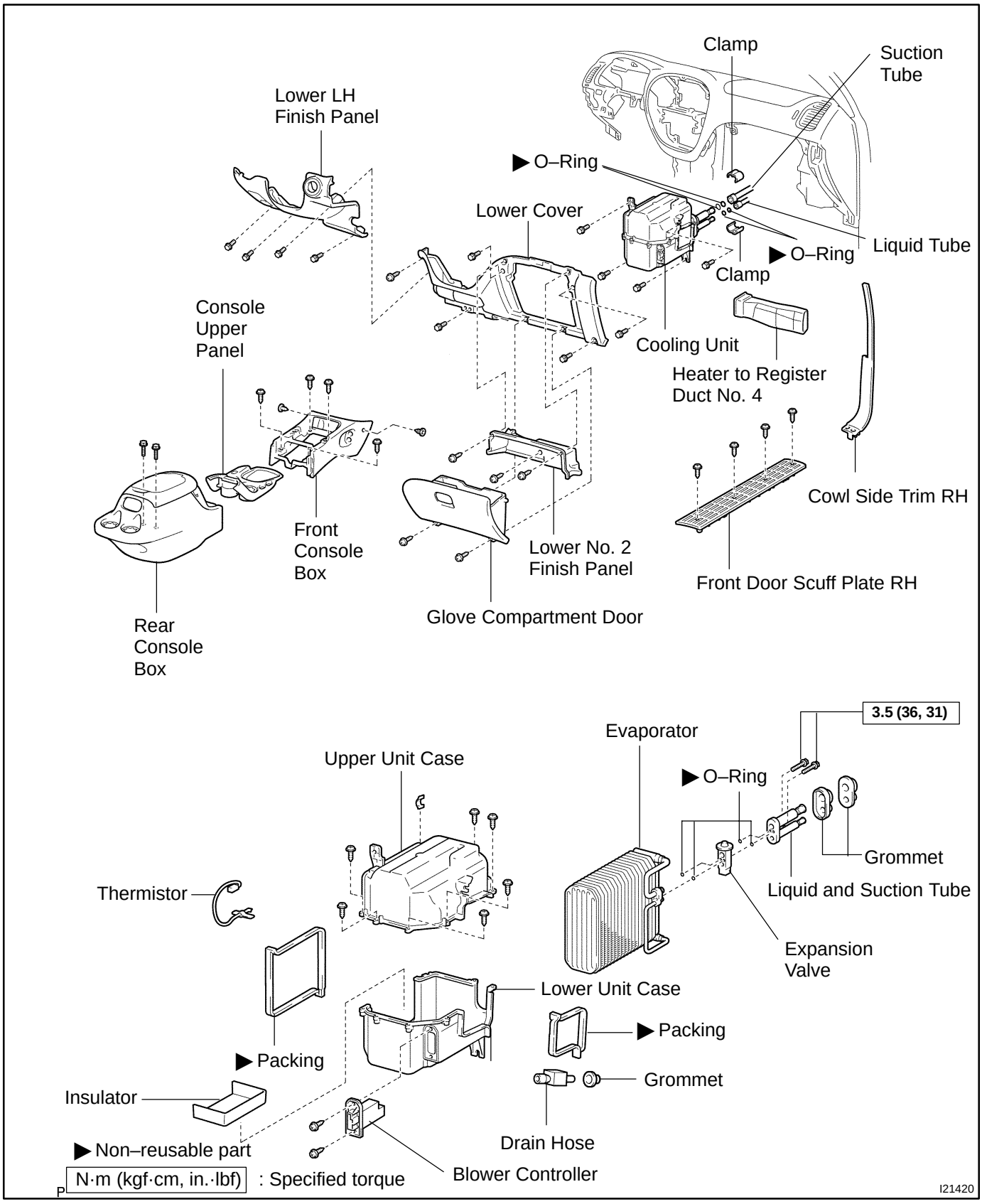
AC3GW–02

COMPONENTS



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AC3GX–02

REMOVAL

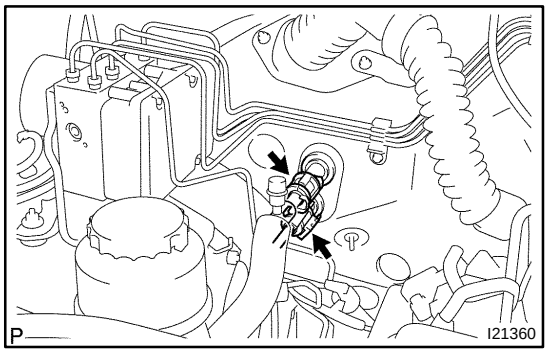
1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, refer to the following:

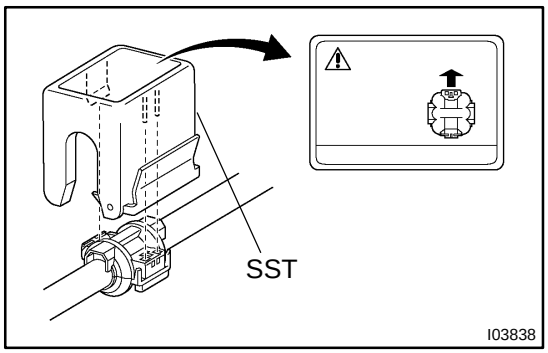
- ▶ Evacuate air from the refrigeration system.
- ▶ Charge the system with refrigerant and inspect for leakage of refrigerant.

Specified amount:
Single A/C: 750 ± 50 g (26.45 ± 1.76 oz.)
Dual A/C: 1050 ± 50 g (37.03 ± 1.76 oz.)



2. DISCONNECT LIQUID AND SUCTION TUBE

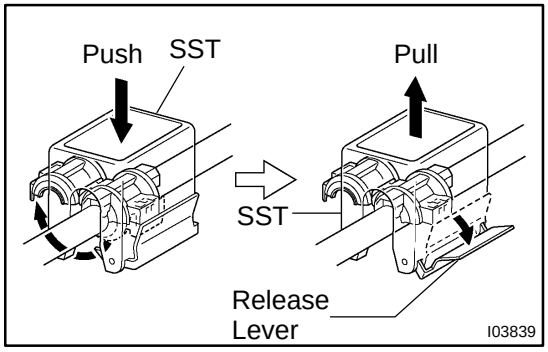
(a) Using SST, remove the 2 piping clamps.
SST 09870–00015 (Suction tube)
09870–00025 (Liquid tube)



(1) Install SST to the piping clamp.

HINT:

Confirm the directions of the piping clamp claw and SST using the illustration on the caution label.



(2) Push down SST and release the clamp lock.

NOTICE:

Be careful not to deform the tubes, when pushing SST.

(3) Pull SST slightly and push the release lever, then remove the piping clamp with SST.
(4) Remove the piping clamp from SST.

(b) Disconnect both tubes.

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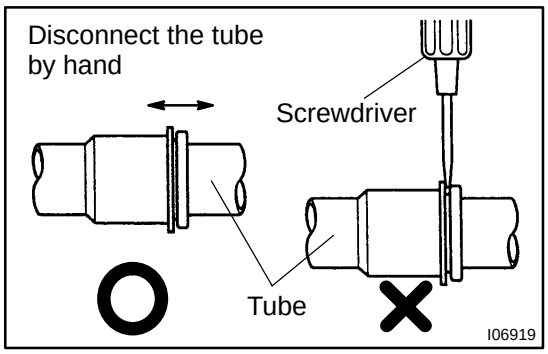
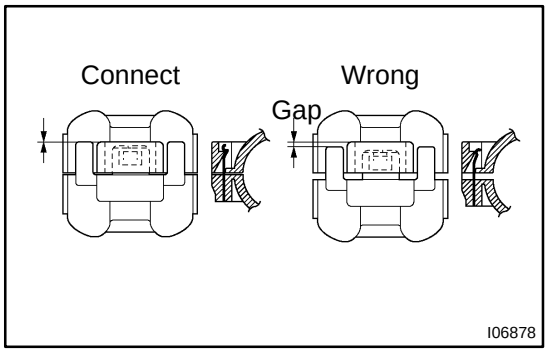


NOTICE:

- **Do not use tools like a screwdriver to remove the tube.**
- **Cap the openings immediately to keep moisture or dirt out of the system.**

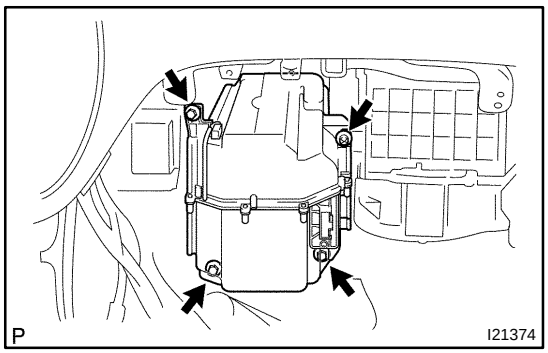


HINT:

At the time of reassembly, refer to the following:

- Lubricate 4 new O–rings with compressor oil and install them to the tubes.
- After connection, check the claw of the piping clamp is securely engaged.

3. **REMOVE CONSOLE UPPER PANEL**
4. **REMOVE REAR CONSOLE BOX**
5. **REMOVE FRONT CONSOLE BOX**
6. **REMOVE GLOVE COMPARTMENT PARTS**
7. **REMOVE LOWER NO. 2 FINISH PANEL**
8. **REMOVE LOWER LH FINISH PANEL**
9. **REMOVE LOWER COVER (See page BO–89)**
10. **REMOVE NO. 4 HEATER TO REGISTER DUCT**



11. **REMOVE COOLING UNIT**

(a) Disconnect the connectors.

(b) Remove the 3 screws and the bolt, then the cooling unit.

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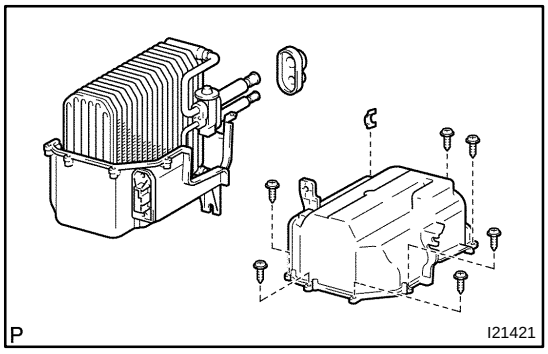
AC3GY–02

DISASSEMBLY

1. REMOVE BLOWER MOTOR LINEAR CONTROLLER

Remove the 2 screws and blower motor linear controller.



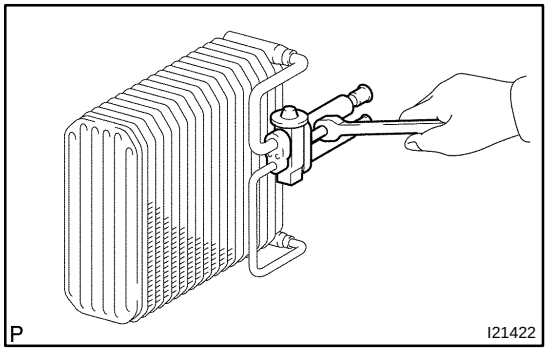
2. SEPARATE UPPER AND LOWER UNIT CASES

(a) Disconnect the connector clamp of the thermistor from the upper unit case.
(b) Using a knife, cut off each packing.
(c) Remove the clip, 6 screws, and grommet.
(d) Separate the upper and lower unit cases, then pull out the thermistor from the evaporator.

3. REMOVE EVAPORATOR FROM LOWER UNIT CASE

HINT:
At the time of reassembly, refer to the following:
If the evaporator is replaced, add compressor oil to the compressor.

Add 40 to 50 cc (1.4 to 1.7 fl.oz.)
Compressor oil: ND–OIL 8 or equivalent



4. REMOVE EXPANSION VALVE

Using a hexagon wrench (5.0 mm (0.20 in.)), remove the 2 bolts and separate the expansion valve, evaporator and tubes.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

HINT:
At the time of reassembly, refer to the following item:
Lubricate 4 new O–rings with compressor oil and install them to the tubes and valve.

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AC3GZ–02

INSPECTION

1. CHECK EVAPORATOR FINS FOR BLOCKAGE

If the fins are clogged, clean them with compressed air.

2. CHECK FOR CRACKS AND SCRATCHES

If necessary, repair or replace damaged parts.

3. INSPECT THERMISTOR RESISTANCE (See page DI–2325)

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AC3H0–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–28).

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AC3H1–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–26).

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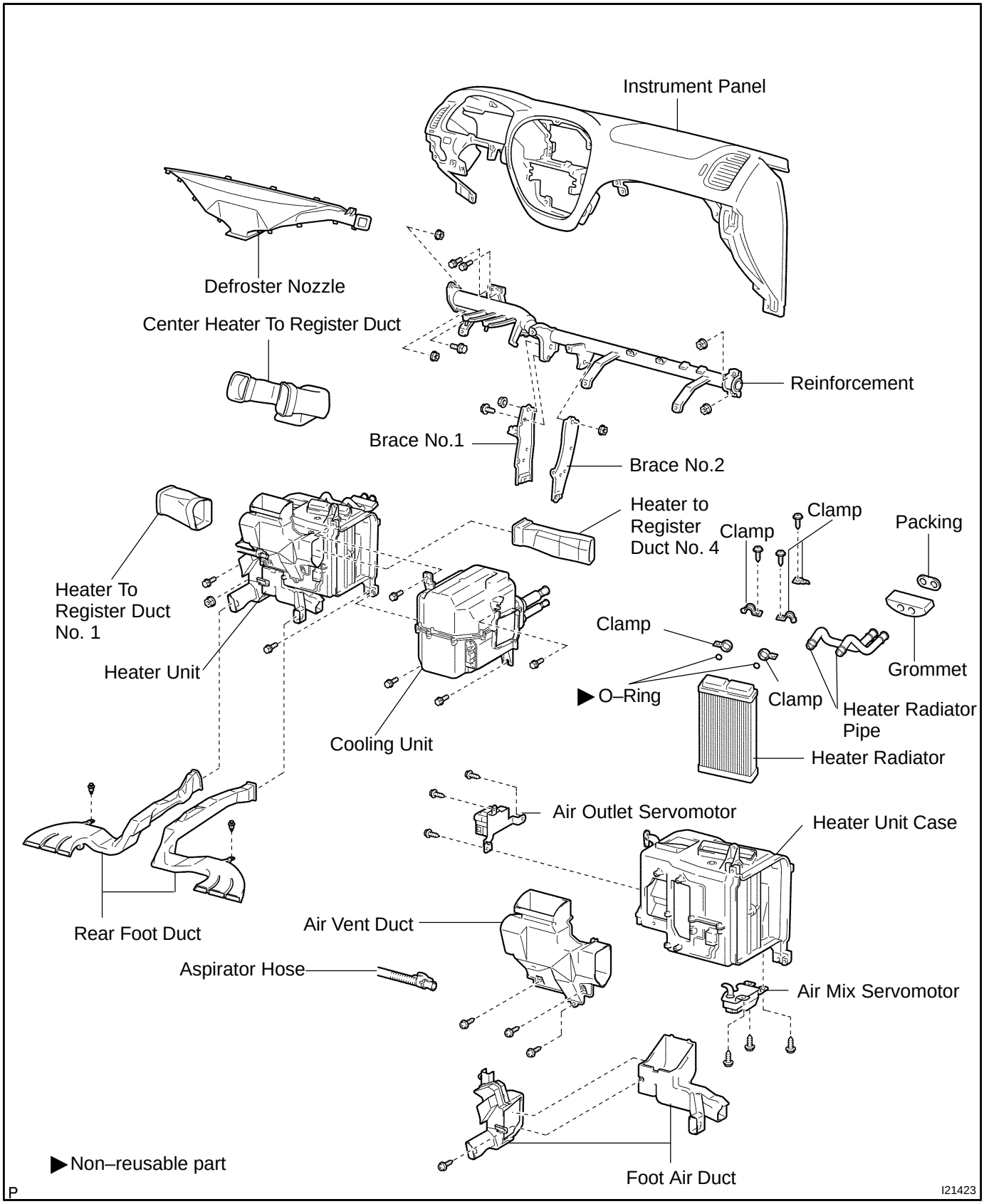
HEATER UNIT

COMPONENTS

AC3H2–02



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AC3H3–02

REMOVAL

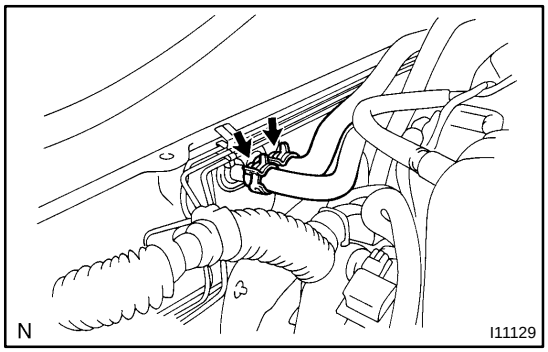
1. REMOVE COOLING UNIT (See page AC–26)

2. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

It is not necessary to drain out all the coolant.

3. DISCONNECT WATER VALVE CONTROL CABLE FROM WATER VALVE (See page AC–79)

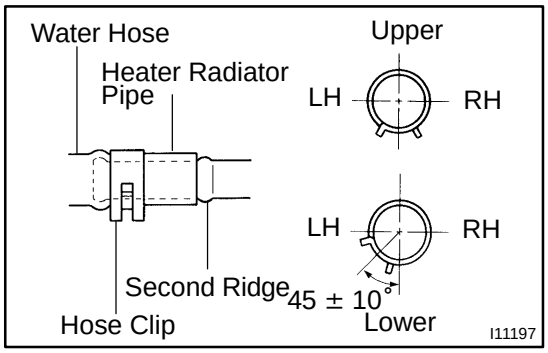


4. DISCONNECT WATER HOSES FROM HEATER RADIATOR PIPES

(a) Using pliers, grip the claws of the clips and slide the clips along the hose.

(b) Disconnect the water hoses.

(c) Remove the grommet.



HINT:

At the time of installation, refer to the following:

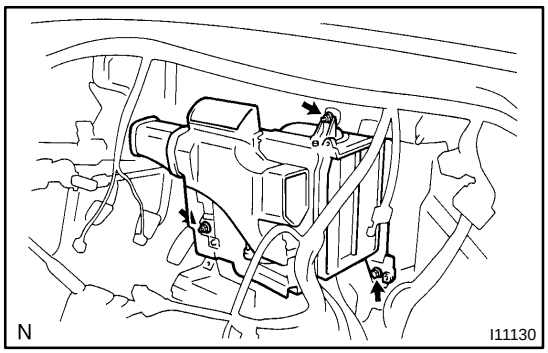
- ▶ Push the water hose onto the heater radiator pipe up to the second ridge on the pipe.
- ▶ Install the hose clip to the position shown in the illustration.

5. REMOVE INSTRUMENT PANEL AND REINFORCEMENT (See page BO–89)

6. REMOVE DEFROSTER NOZZLE AND HEATER TO REGISTER DUCT

7. REMOVE HEATER UNIT

Remove the 3 screws and heater unit.



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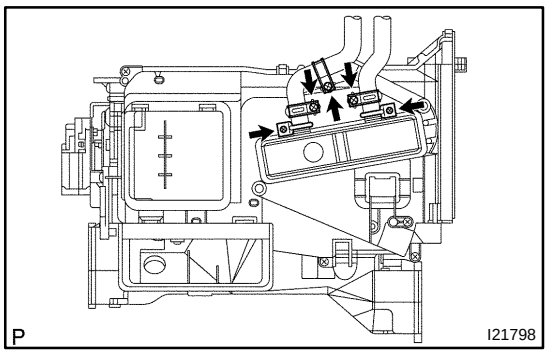
AC3H4–02



DISASSEMBLY

1. REMOVE HEATER RADIATOR

(a) Remove the 3 screws and 3 clamps.

(b) Pull out the heater radiator.

(c) Remove the 2 screws and 2 clips, then disconnect the heater radiator pipes.

2. REMOVE AIR VENT DUCT

Remove the 3 screws and duct.

3. REMOVE AIR OUTLET SERVOMOTOR

Remove the 3 screws and servomotor.

4. REMOVE AIR MIX SERVOMOTOR

Remove the 3 screws and servomotor.

5. REMOVE ASPIRATOR HOSE

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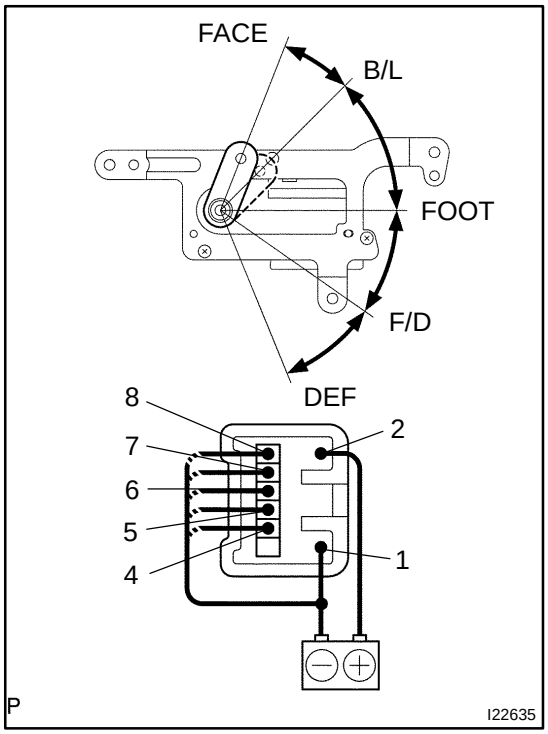
AC3H5–02

INSPECTION

1. INSPECT FINS FOR BLOCKAGE

If the fins are clogged, clean them with compressed air.



2. INSPECT AIR OUTLET SERVOMOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1.

(b) Connect the negative (–) lead from the battery to each terminal and check that the shaft rotates at each position, as shown in the illustration.

Connected terminal	Position
4	DEF
5	F/D
6	FOOT
7	B/L
8	FACE

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AC3H6–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–34).

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AC3H7–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–33).

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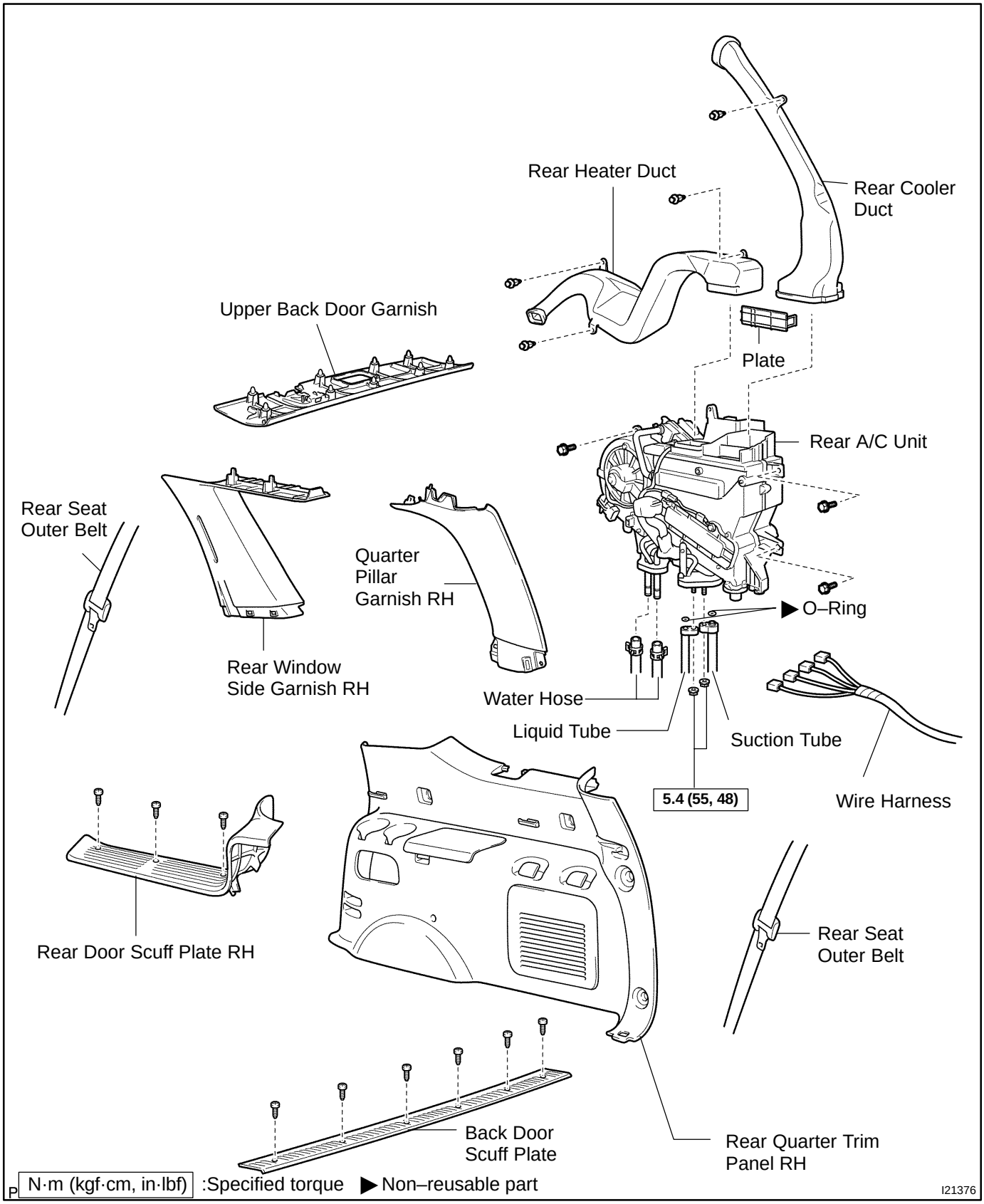
REAR A/C UNIT

COMPONENTS

AC3H8–02



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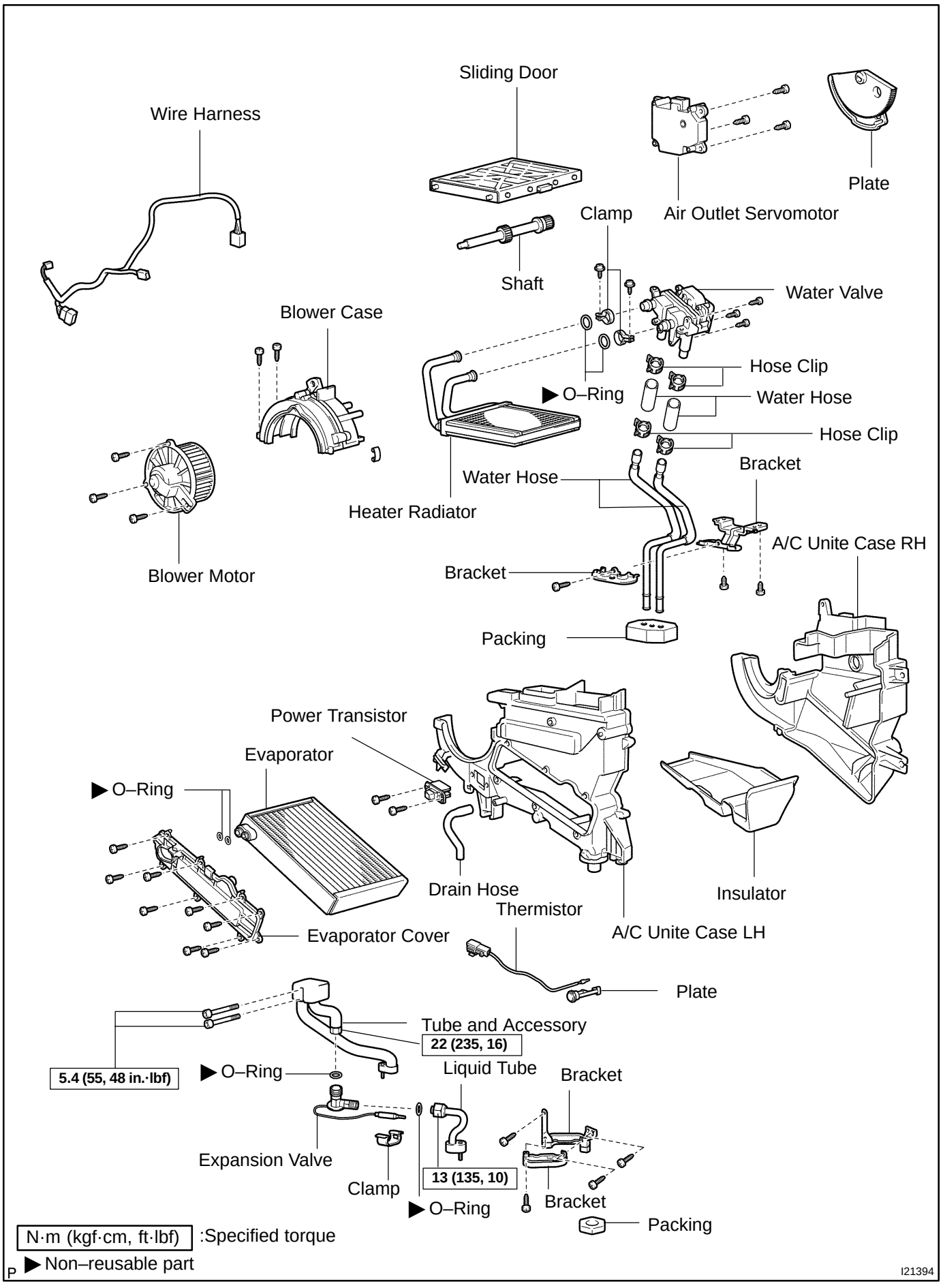
Sliding Door
Wire Harness
Plate
Air Outlet Servomotor
Clamp
Shaft
Water Valve
Blower Case
Hose Clip
▶ O–Ring
Water Hose
Hose Clip
Bracket
Water Hose
Heater Radiator
A/C Unite Case RH
Blower Motor
Bracket
Packing
Power Transistor
Evaporator
▶ O–Ring
Drain Hose
Insulator
Thermistor
A/C Unite Case LH
Evaporator Cover
Plate
Tube and Accessory
22 (235, 16)
5.4 (55, 48 in.·lbf)
▶ O–Ring
Liquid Tube
Bracket
Expansion Valve
Clamp
13 (135, 10)
▶ O–Ring
Bracket
Packing
N·m (kgf·cm, ft·lbf) :Specified torque
▶ Non–reusable part
I21394

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AC3H9–02

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, refer to the following item:

- ▶ Evacuate air from the refrigeration system.
- ▶ Charge the system with refrigerant and inspect for leakage of refrigerant.

Specified amount:

Dual A/C: 1050 ± 50 g (37.03 ± 1.76 oz.)

2. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

It is not necessary to drain out all coolant.

3. REMOVE REAR SEAT OUTER BELT FLOOR ANCHORS

4. REMOVE BACK DOOR SCUFF PLATE

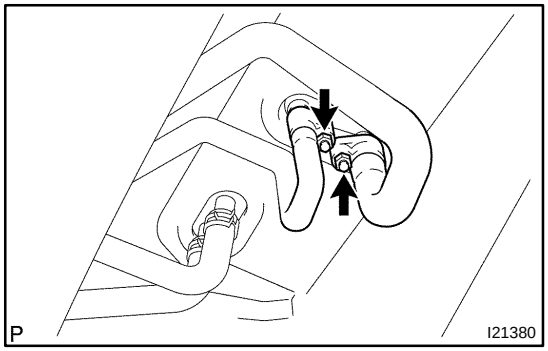
5. REMOVE REAR DOOR SCUFF PLATE RH

6. REMOVE UPPER BACK DOOR GARNISH

7. REMOVE REAR WINDOW SIDE GARNISH RH

8. REMOVE REAR QUARTER TRIM PANEL RH

9. REMOVE QUARTER PILLAR GARNISH RH



10. DISCONNECT LIQUID AND SUCTION TUBES

Remove the 2 bolts and disconnect both tubes.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

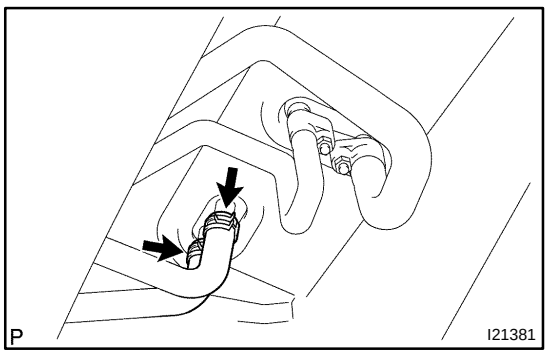
NOTICE:

Cap the openings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, refer to the following:

Lubricate 2 new O–rings with compressor oil and install them to the tubes.



11. DISCONNECT WATER HOSES FROM HEATER PIPES

(a) Grip the claws of the hose clip and slide the hose clip along the hose.

(b) Disconnect the water hoses.

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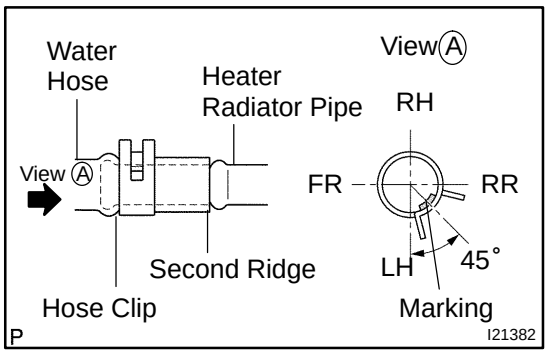
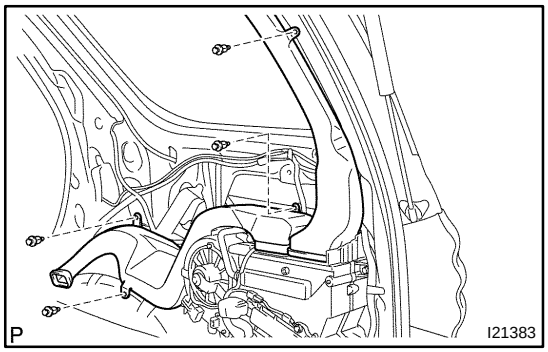


HINT:

At the time of installation, please refer to the following items.

- ▶ Push the water hose onto the heater radiator pipe up to the second ridge on the pipe.
- ▶ Install a hose clip to the position shown in the illustration.

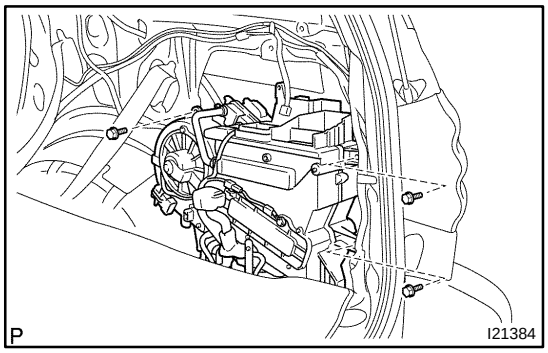


12. REMOVE REAR A/C UNIT

(a) Remove the 3 clips and cover.

(b) Remove the 2 air ducts.

(c) Disconnect the connectors and wire harness clamps.



(d) Remove the 3 bolts and rear A/C unit.

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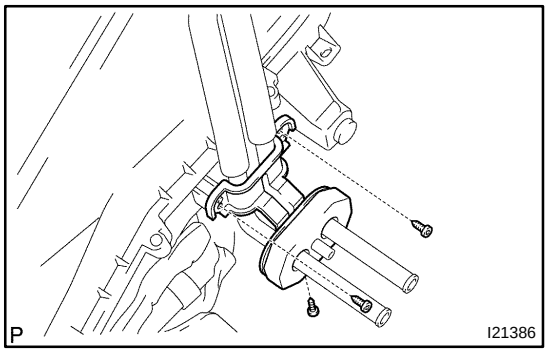
AC3HA–02

DISASSEMBLY

1. REMOVE BLOWER MOTOR

2. REMOVE POWER TRANSISTOR

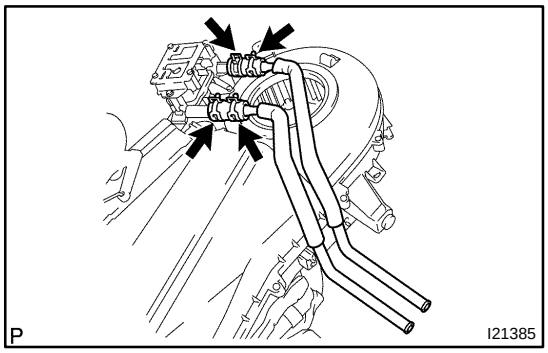
3. REMOVE THERMISTOR



4. REMOVE WATER VALVE

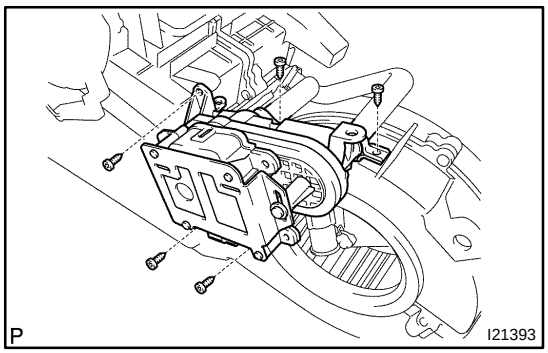
(a) Remove the packing.

(b) Remove the 3 screws and 2 brackets.



(c) Grip the claws of the hose clips and slide the hose clips along the hoses.

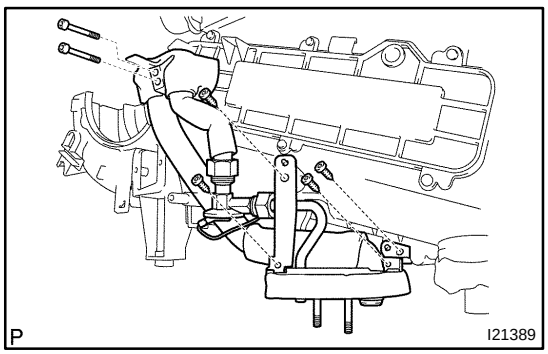
(d) Disconnect the water hoses and pipes.



(e) Remove the 2 screws and 2 clamps.

(f) Remove the 3 screws and water valve.

5. REMOVE DRAIN HOSE



6. REMOVE EXPANSION VALVE

(a) Remove the 4 screws and 2 brackets.

(b) Pry out the packing.

HINT:

At the time of installation, refer to the following:

Do not refuse the packing.

(c) Using a hexagon wrench (5.0mm (0.20 in.)), remove the 2 bolts and expansion valve.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

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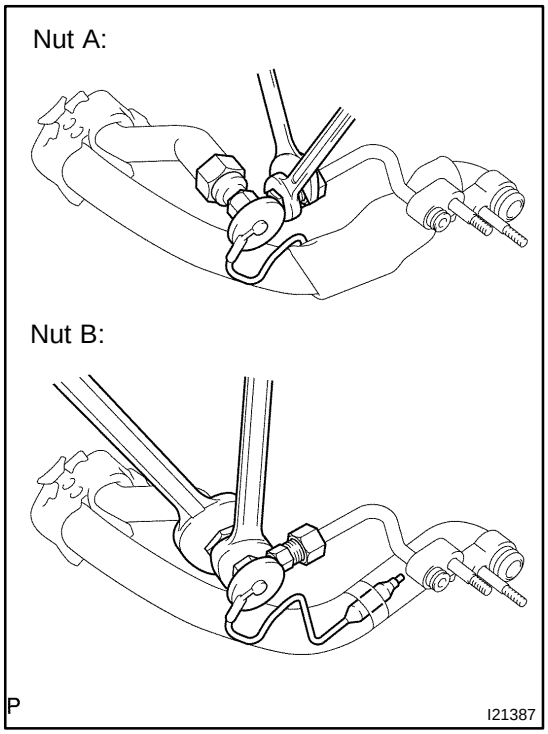
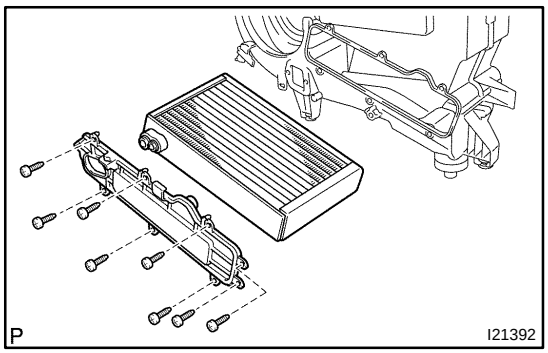
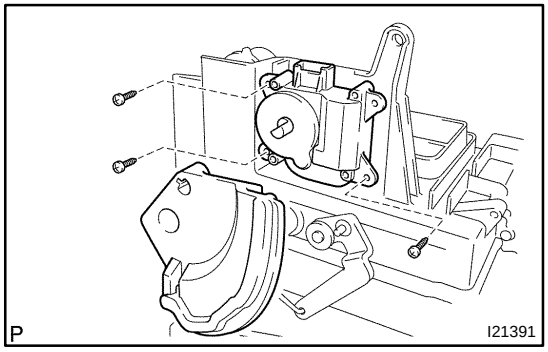
NOTICE:
Cap the openings immediately to keep moisture or dirt out of the system.
HINT:
At the time of installation, refer to the following:
Lubricate 2 new O–rings with compressor oil and install them to the tube and valve.



(d) Remove the holder and disconnect the heat sensing tube.
(e) Loosen the 2 nuts and remove the expansion valve.
Torque:
Nut A: 13 N·m (135 kgf·cm, 10 ft·lbf)
Nut B: 22 N·m (235 kgf·cm, 16 ft·lbf)
HINT:
At the time of installation, refer to the following:
Lubricate 2 new O–rings with compressor oil and install them to the expansion valve.



7. REMOVE EVAPORATOR
(a) Remove the 8 screws and cover.
(b) Pull out the evaporator.



8. REMOVE AIR OUTLET SERVOMOTOR
(a) Using a screwdriver, release the claw and remove the plate.
HINT:
Tape the screwdriver tip before use.
(b) Remove the 3 screws and servomotor.

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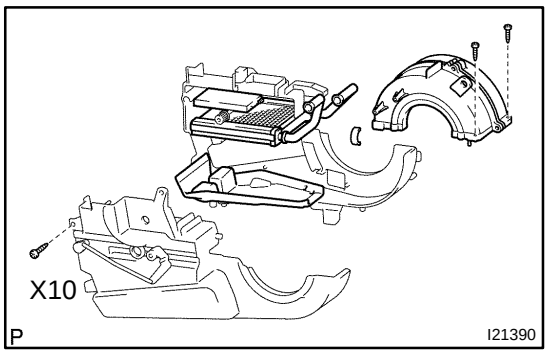

9. SEPARATE REAR A/C UNIT

(a) Remove the 2 screws, clamp and blower case.
(b) Remove the 10 screws and separate the A/C unit.
(c) Remove the sliding door and shaft.
(d) Remove the heater radiator and insulator.

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AC3HB–02

INSPECTION

1. INSPECT EVAPORATOR

(a) Check evaporator fins for blockage.

If the fins are clogged, clean them with compressed air.

NOTICE:

Never use water to clean the evaporator.

(b) Check fitting for cracks or scratches.

If necessary, repair or replace.

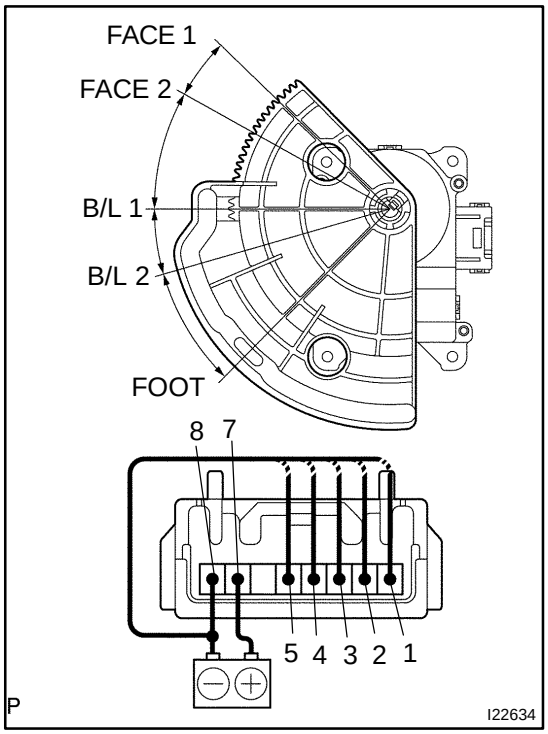
2. INSPECT HEATER RADIATOR

Inspect fins for blockage.

If the fins are clogged, clean them with compressed air.

3. INSPECT WATER VALVE SERVOMOTOR CIRCUIT

(See page DI–2361)



4. INSPECT AIR OUTLET SERVOMOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 7 and the negative (–) lead to terminal 8.

(b) Connect the negative (–) lead from the battery to each terminal and check that the shaft rotates at each position, as shown in the illustration.

Connected terminal	Position
1	FOOT
2	B/L 2
3	B/L 1
4	FACE 2
5	FACE 1

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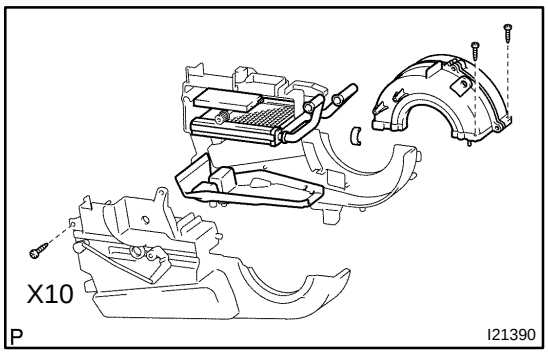
AC3HC–02

REASSEMBLY



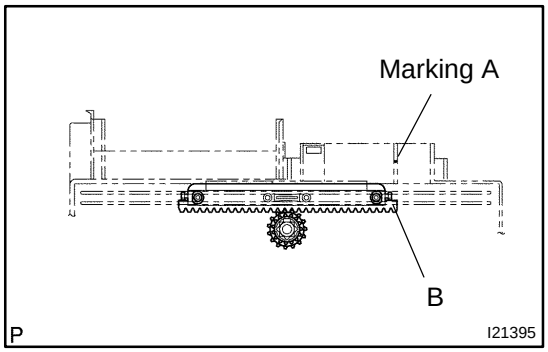
1. ASSEMBLE REAR A/C UNIT

(a) Install the insulator and heater radiator.

(b) Install the shaft and sliding door.

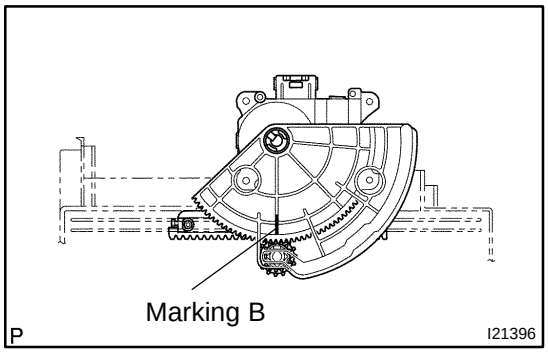
(c) Assemble the A/C unit and install the 10 screws.

(d) Install the blower case, clamp and 2 screws.



2. INSTALL AIR OUTLET SERVOMOTOR

(a) Align marking A on the grid part of the case with the side of sliding door rack B.



(b) Install the servomotor with the 3 screws.

HINT:

The projection on the gear (marking B) shall be positioned vertically.

3. INSTALL EVAPORATOR

4. INSTALL EXPANSION VALVE

5. INSTALL WATER VALVE

6. INSTALL THERMISTOR

7. INSTALL POWER TRANSISTOR

8. INSTALL BLOWER MOTOR

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AC3HD–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–40).

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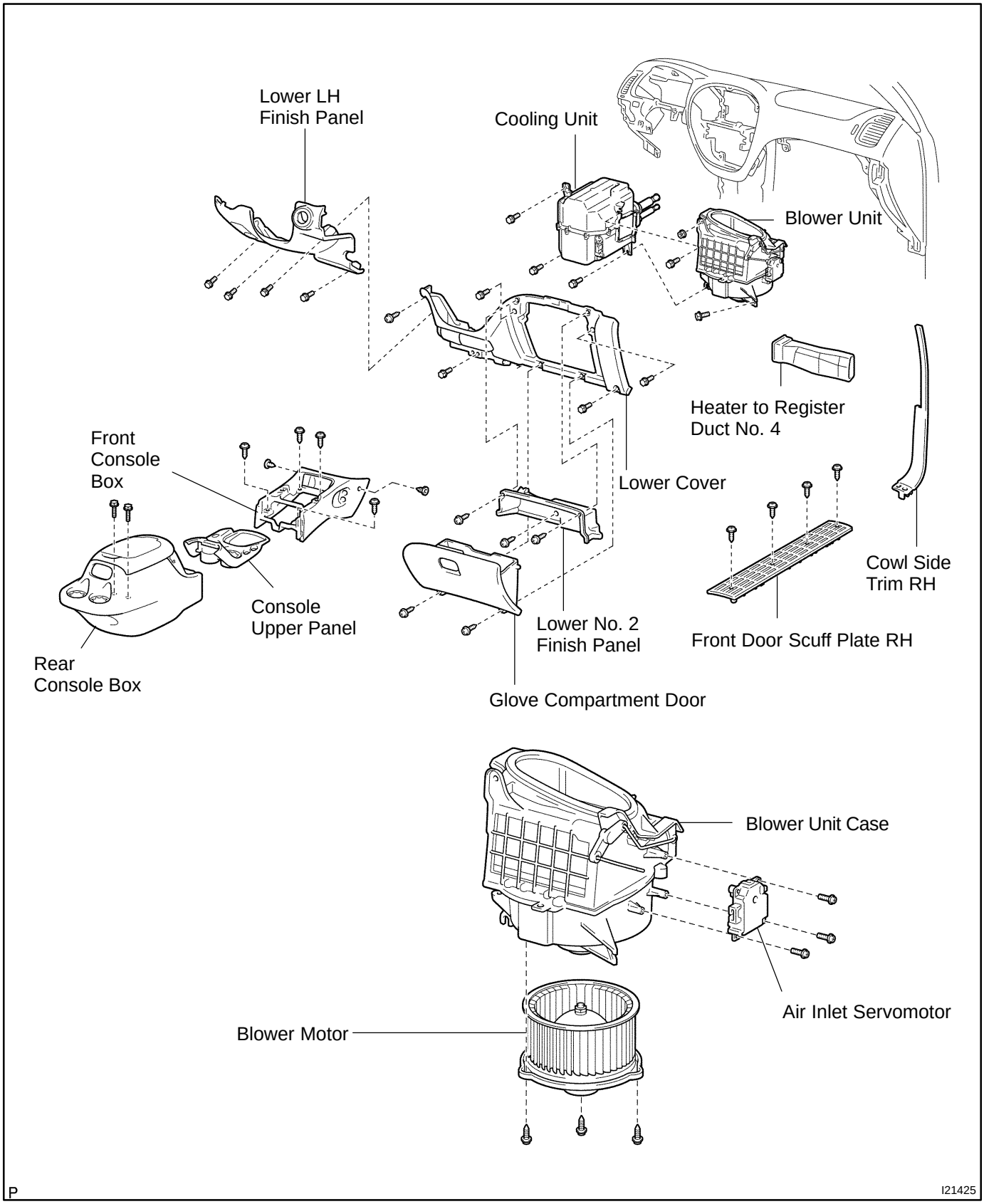
BLOWER UNIT

COMPONENTS

AC1KT–05



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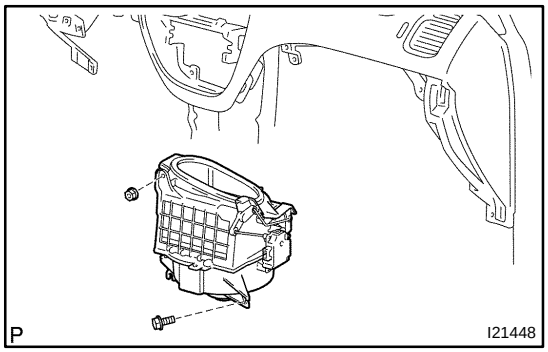
AC1KU–06

REMOVAL

1. REMOVE CONSOLE UPPER PANEL
2. REMOVE REAR CONSOLE BOX
3. REMOVE FRONT CONSOLE BOX
4. REMOVE LOWER LH FINISH PANEL
5. REMOVE GLOVE COMPARTMENT DOOR
6. REMOVE LOWER NO. 2 FINISH PANEL
7. REMOVE LOWER COVER
8. REMOVE COOLING UNIT (See page AC–26)



9. REMOVE BLOWER UNIT

(a) Disconnect the connector from the blower motor.
(b) Disconnect the connector from the air inlet servomotor.
(c) Remove the nut, bolt and blower unit.

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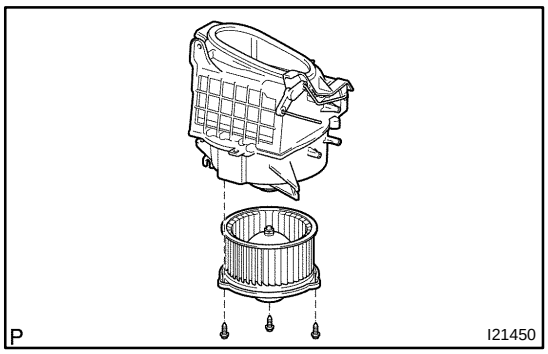
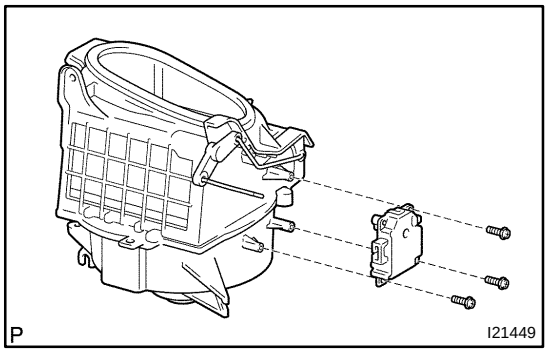
AC3HE–02



DISASSEMBLY

1. REMOVE BLOWER MOTOR

Remove the 3 screws and blower motor.



2. REMOVE AIR INLET SERVOMOTOR

Remove the 3 screws and servomotor.

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AC1KW–04

INSPECTION

INSPECT AIR INLET SERVOMOTOR OPERATION (See page DI–2358)

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AC1KX–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–50).

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AC1KY–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–49).

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COMPRESSOR AND MAGNETIC CLUTCH

AC1KZ–05

ON–VEHICLE INSPECTION

1. SET MANIFOLD GAUGE SET (See page AC–18)

2. START ENGINE

3. INSPECT COMPRESSOR FOR METALLIC SOUND

Check if a metallic sound can be heard from the compressor when the A/C switch is on.

If a metallic sound cannot be heard, replace the compressor assembly.

4. INSPECT REFRIGERANT PRESSURE (See page AC–3)

5. STOP ENGINE

6. INSPECT VISUALLY FOR LEAKAGE OF REFRIGERANT FROM SAFETY SEAL

Using a gas leak detector, check for leakage of refrigerant.

If there is any leakage, replace the compressor assembly.

7. REMOVE MANIFOLD GAUGE SET (See page AC–19)

8. CHECK FOR LEAKAGE OF GREASE FROM CLUTCH BEARING

9. CHECK FOR SIGNS OF OIL ON PRESSURE PLATE

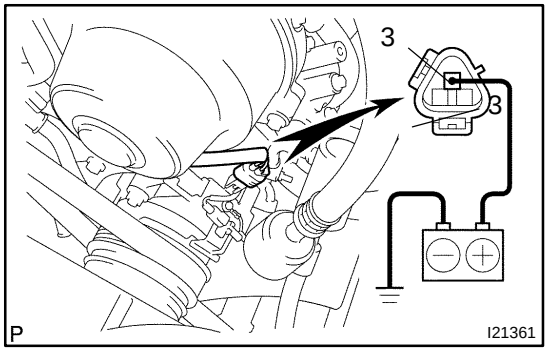
If necessary, repair or replace.

10. INSPECT MAGNETIC CLUTCH BEARING FOR NOISE

(a) Start the engine.

(b) Check if abnormal noise is heard from near the compressor when the A/C switch is OFF.

If abnormal noise is being emitted, replace the magnetic clutch.



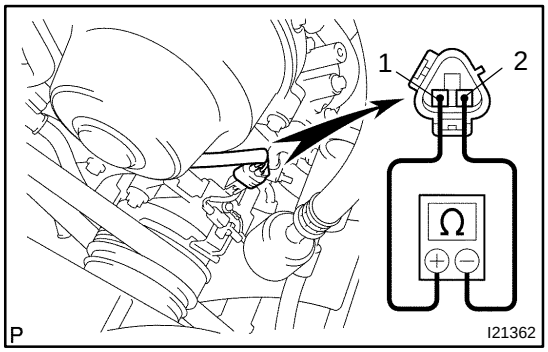
11. INSPECT MAGNETIC CLUTCH OPERATION

(a) Disconnect the connector.

(b) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to body ground.

(c) Check that the magnetic clutch is energized.

If operation is not as specified, replace the magnetic clutch.



12. INSPECT COMPRESSOR LOCK SENSOR RESISTANCE

(a) Disconnect the connector.

(b) Measure the resistance between terminals 1 and 2.

Standard resistance:

165 to 205 Ω at 20˚C (68˚F)

If resistance is not as specified, replace the compressor.

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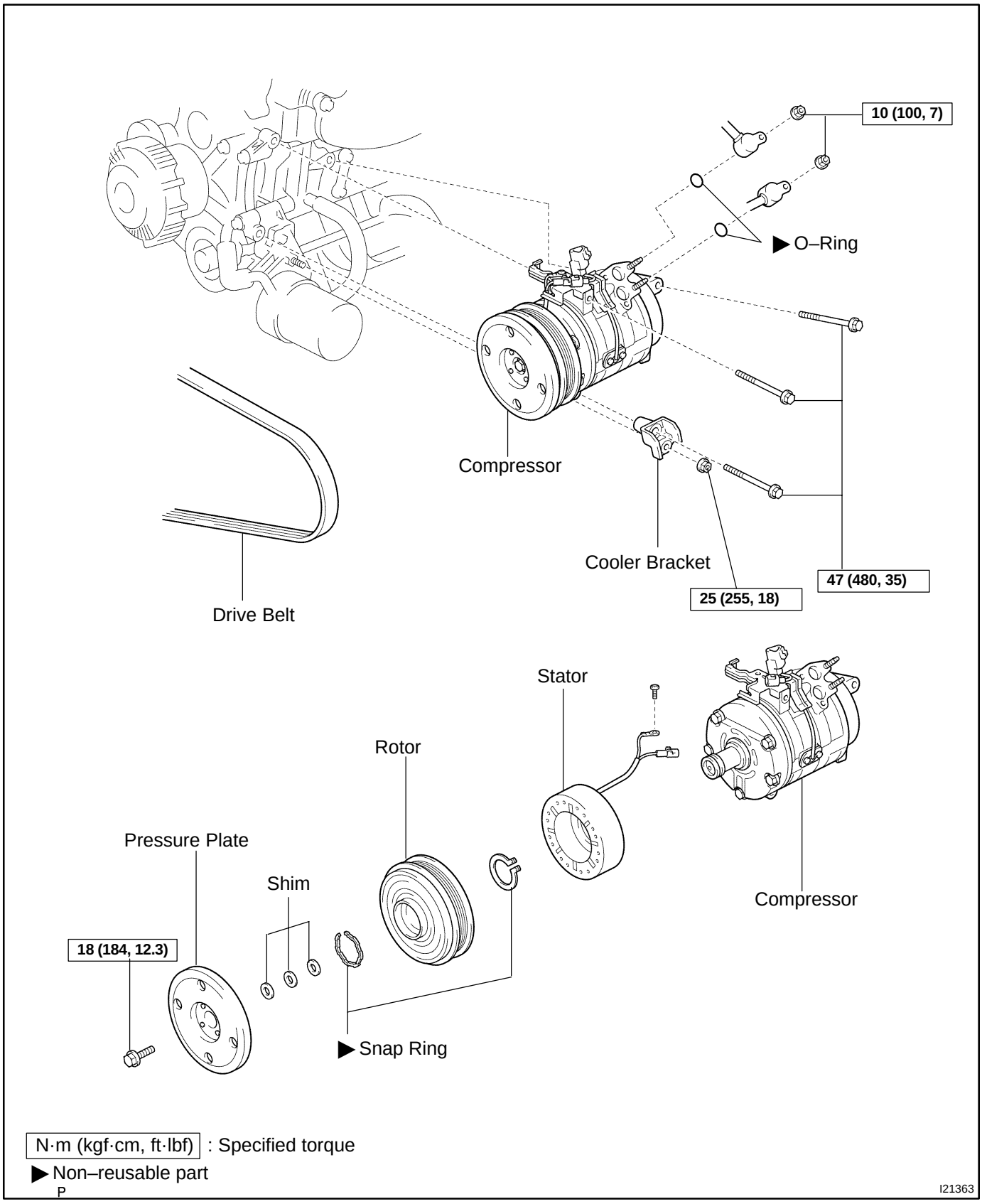
AC1L0–05

COMPONENTS



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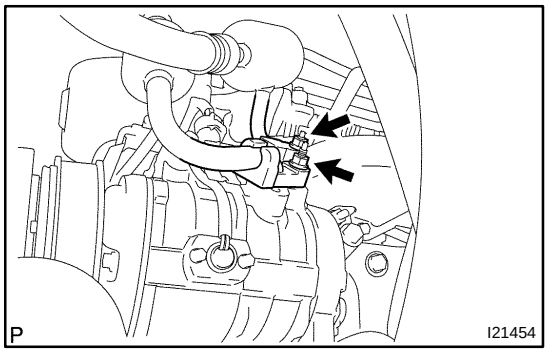
AC1L1–05

REMOVAL

1. **RUN ENGINE AT IDLE SPEED WITH A/C ON FOR APPROX. 10 MINUTES**
2. **STOP ENGINE**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
4. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM**



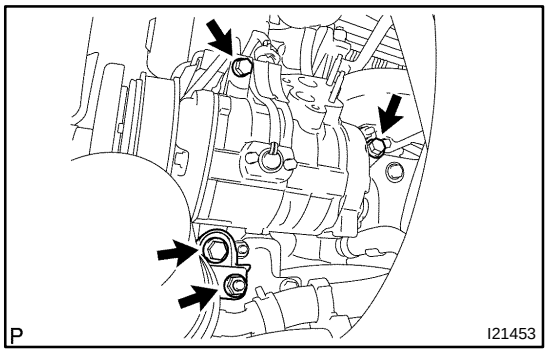
5. **DISCONNECT DISCHARGE AND SUCTION HOSES**

Remove the 2 nuts and disconnect both hoses.

NOTICE:

Cap the openings fitting immediately to keep moisture or dirt out of the system.

6. **REMOVE DRIVE BELT (See page AC–16)**



7. **REMOVE COMPRESSOR**

(a) Disconnect the connector.
(b) Remove the 3 bolts and nut.
(c) Remove the cooler bracket.
(d) Remove the compressor.

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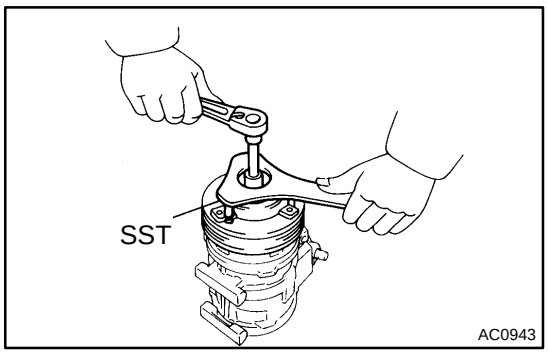
AC1L2–05

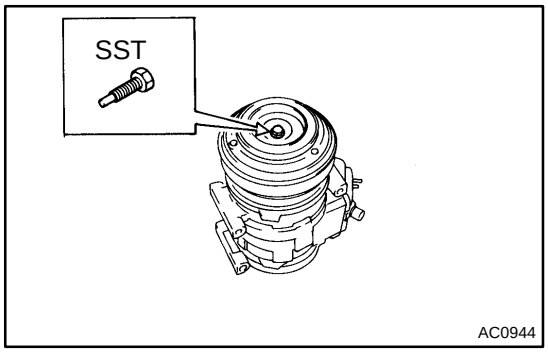
DISASSEMBLY

1. REMOVE PRESSURE PLATE

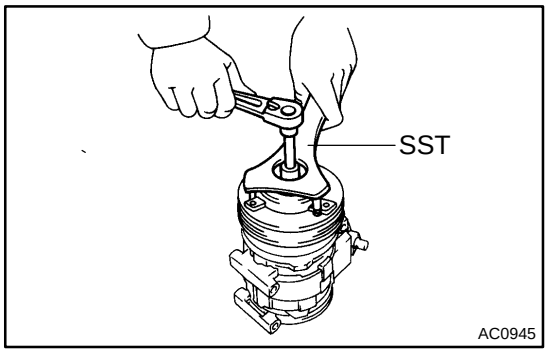
(a) Using SST and a socket wrench, remove the shaft bolt.
SST 07112–76060
Torque: 18 N·m (184 kgf·cm, 12.3 ft·lbf)



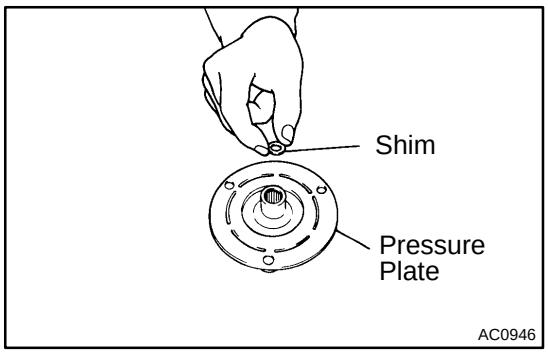
(b) Install SST on the pressure plate.
SST 07112–66040



(c) Using SST and a socket wrench, remove the pressure plate.
SST 07112–66040, 07112–76060,

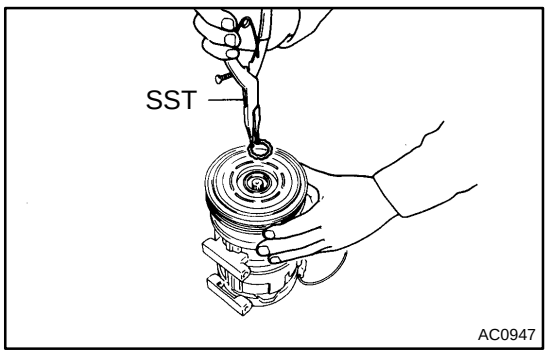


(d) Remove the shims from the pressure plate.



2. REMOVE ROTOR

(a) Using SST, remove the snap ring.
SST 95994–10020



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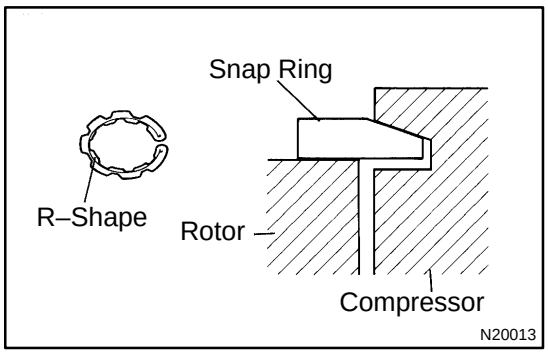
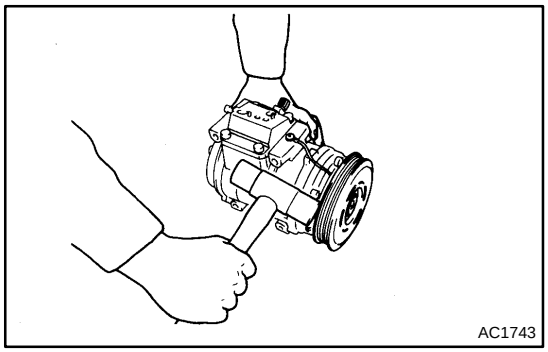
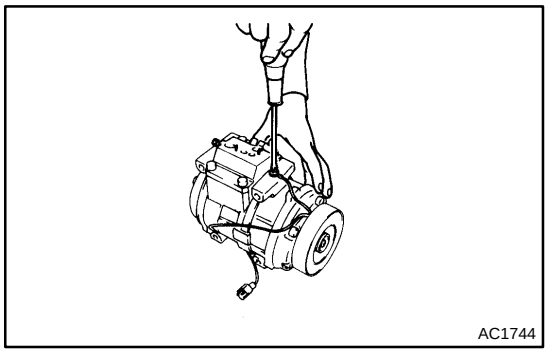


NOTICE:
The snap ring should be installed so that its beveled side faces up.



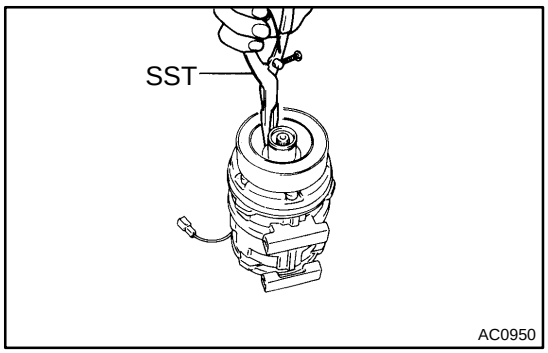
(b) Using a plastic hammer, remove the rotor from the shaft.

NOTICE:
Be careful not to damage the pulley when tapping on the rotor.

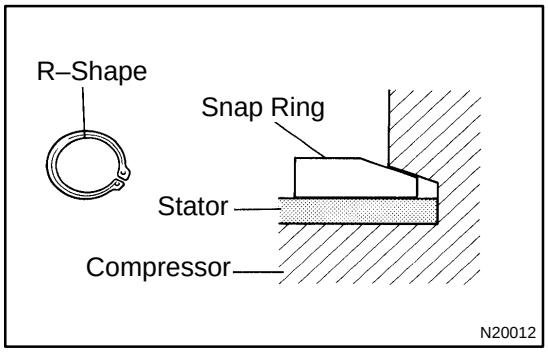


3. REMOVE STATOR

(a) Disconnect the stator lead wire from the compressor housing.



(b) Using SST, remove the snap ring.
SST 95994–10020



NOTICE:
The snap ring should be installed so that its beveled side faces up.

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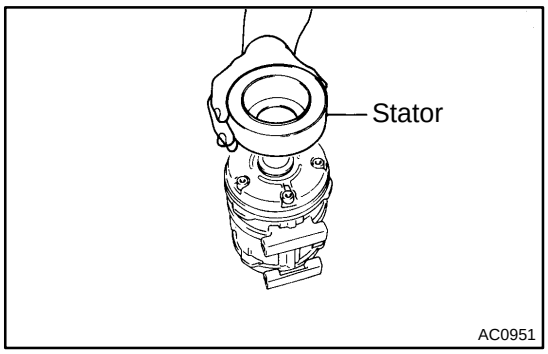

(c) Remove the stator.

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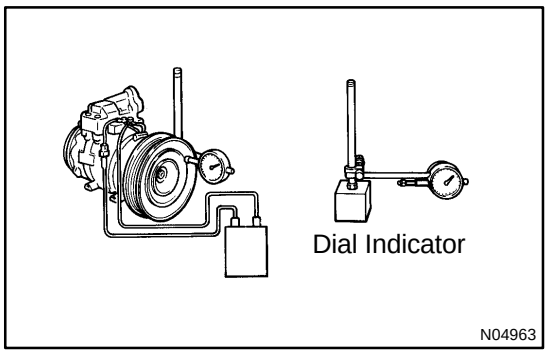
AC1L3–04



REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–57).

AFTER REASSEMBLY, CHECK MAGNETIC CLUTCH CLEARANCE

(a) Set the dial indicator to the pressure plate of the magnetic clutch.

(b) Connect the magnetic clutch lead wire to the positive (+) terminal of the battery.

(c) Check the clearance between the pressure plate and rotor when connecting the negative (–) terminal to the battery.

Standard clearance:
0.35 to 0.50 mm (0.014 to 0.024 in.)

If the clearance is not within the standard range, adjust the clearance using shims to obtain the standard clearance.

Standard thickness:
0.1 mm (0.004 in.)
0.3 mm (0.012 in.)
0.5 mm (0.020in.)

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AC3HF–02

INSTALLATION

1. INSTALL COMPRESSOR

(a) Install the compressor with the cooler bracket with the 3 bolts and nut.

Torque:
Bolt: 47 N·m (480 kgf·cm, 35 in.·lbf)
Nut: 25 N·m (255 kgf·cm, 18 in.·lbf)

(b) Connect the connector.

2. CONNECT DISCHARGE AND SUCTION HOSES

Connect both hoses with the 2 nuts.

Torque: 10 N·m (100 kgf·cm, 7 in.·lbf)

NOTICE:

Hoses should be connected immediately after the caps have been removed.

HINT:

Lubricate 2 new O–rings with compressor oil and install them to the hoses.

3. INSTALL AND CHECK DRIVE BELT (See page AC–17, AC–15)

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

5. EVACUATE AIR FROM REFRIGERATION SYSTEM

6. CHARGE SYSTEM WITH REFRIGERANT

Specified amount:
Single A/C: 750 ± 50g (26.45 ± 1.76 oz.)
Dual A/C: 1050 ± 50g (37.03 ± 1.76 oz.)

7. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.

If there is leakage, check the tightening torque at the joints.

8. PERFORM INITIALIZATION (See page IN–20)

Some systems need initialization when disconnecting the cable from the negative battery terminal.

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RECEIVER

AC3HG–01

ON–VEHICLE INSPECTION

INSPECT FITTINGS FOR LEAKAGE

Using a gas leak detector, check for leakage.
If there is leakage, check the tightening toque at the joints.

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AC3HH–02

REMOVAL

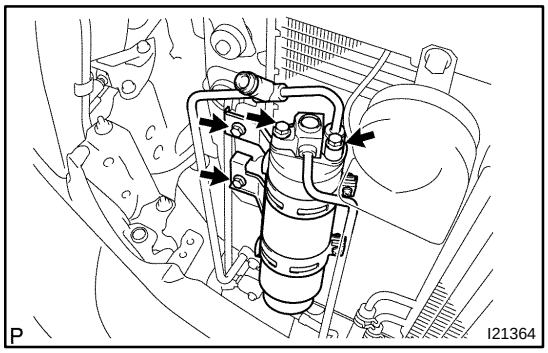
1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of the installation, refer to the following:

- ▶ Evacuate air from the refrigeration system.
- ▶ Charge the system with refrigerant and inspect for leakage of refrigerant.

Specified amount:
Single A/C : 750 ± 50 g (26.45 ± 1.76 oz.)
Dual A/C: 1050 ± 50 g (37.03 ± 1.76 oz.)



2. DISCONNECT 2 LIQUID TUBES FROM RECEIVER

Remove the 2 bolts and disconnect both tubes.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NOTICE:

Cap the openings immediately to keep moisture or dirt out of the system.

HINT:

At the time of the installation, refer to the following:

Lubricate 2 new O–rings with compressor oil and install them to the tubes.

3. REMOVE RECEIVER

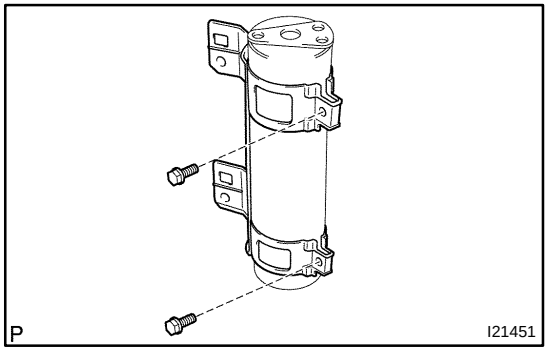
(a) Remove the 2 bolts and receiver.

HINT:

At the time of the installation, refer to the following:

If the receiver is replaced, add compressor oil to the compressor.

Add 20 cc (0.71 fl.oz.)
Compressor oil: ND–OIL 8 or equivalent



(b) Remove the 2 bolts and holder.

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AC3HI–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–63).

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CONDENSER

AC1L5–02

ON–VEHICLE INSPECTION

1. INSPECT CONDENSER FINS FOR BLOCKAGE OR DAMAGE

If the fins are clogged, wash them with water and dry with compressed air.

NOTICE:

Be careful not to damage the fins.

If the fins are bent, straighten them with a screwdriver or pliers.

2. INSPECT CONDENSER AND FITTINGS FOR LEAKAGE

Using a gas leak detector, check for leakage of refrigerant.

If there is leakage, check the tightening torque at the joints.

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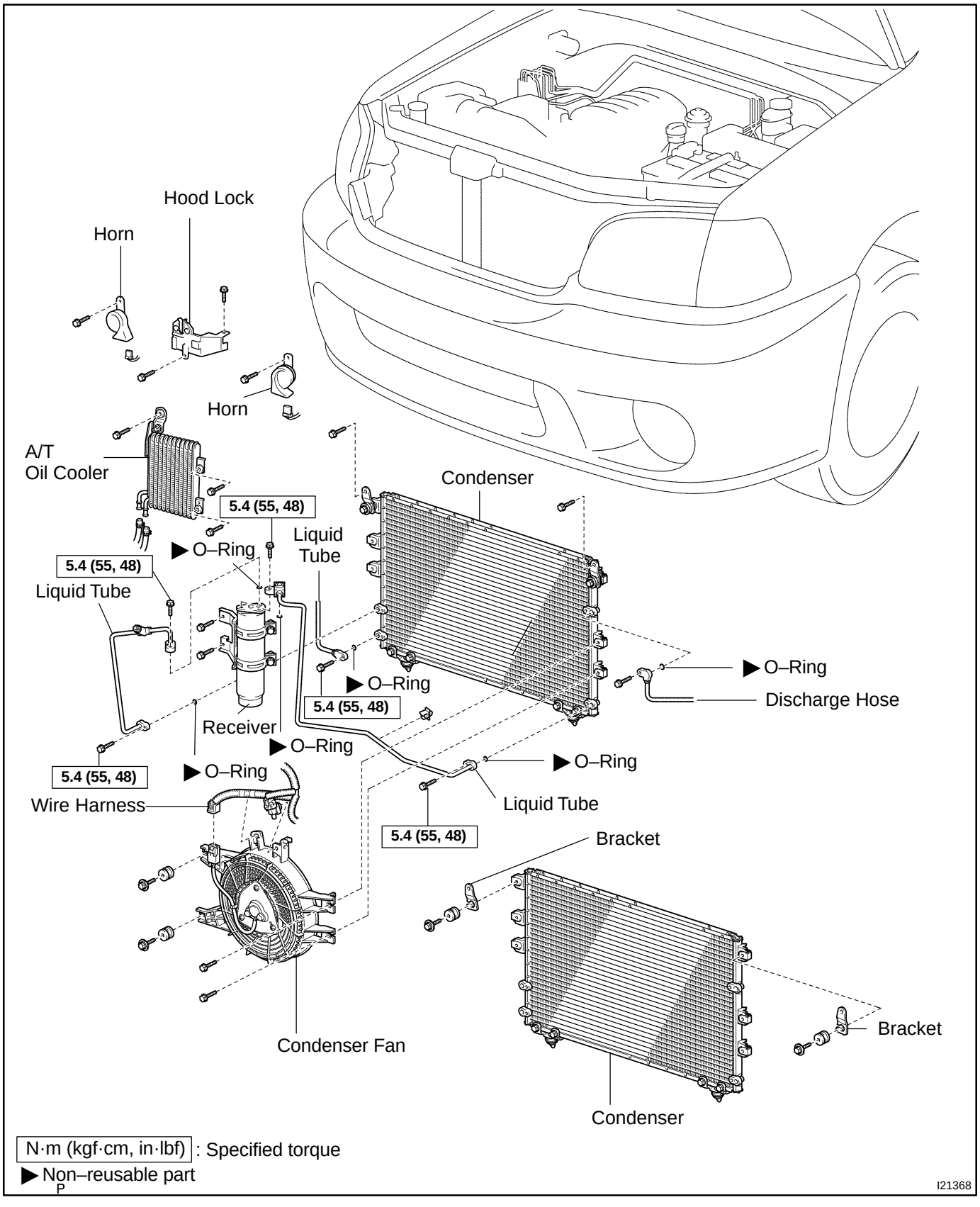
AC1L6–06

COMPONENTS



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AC3HJ–02

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

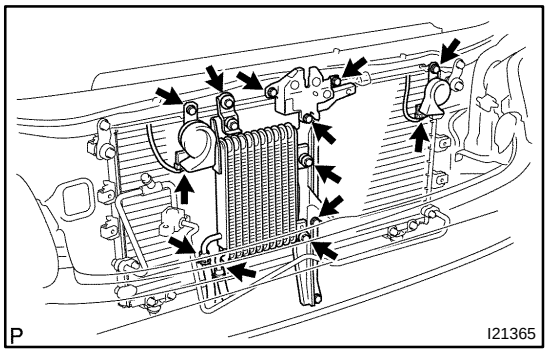
HINT:

At the time of installation, refer to the following:

- ▶ Evacuate air from the refrigeration system.
- ▶ Charge the system with refrigerant and inspect for leakage of refrigerant.

Specified amount:
Single A/C: 750 ± 50 g (26.45 ± 1.76 oz.)
Dual A/C: 1050 ± 50 g (37.03 ± 1.76 oz.)

2. REMOVE CONDENSER FAN (See page AC–98)

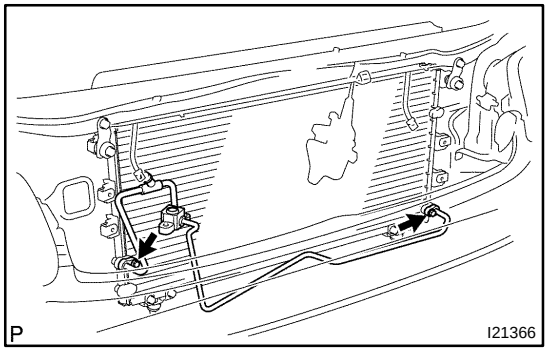


3. REMOVE A/T OIL COOLER

4. REMOVE HORN

5. REMOVE HOOD LOCK

6. REMOVE CENTER BRACE



7. REMOVE RECEIVER AND HOLDER (See page AC–63)

8. DISCONNECT LIQUID TUBE AND DISCHARGE HOSE

Remove the 2 bolts and disconnect both tube and hose.

Torque: 5.4 N·m (5.5 kgf·cm, 48 in·lbf)

NOTICE:

Cap the openings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, refer to the following:

Lubricate 2 new O–rings with compressor oil and install them to the tubes.

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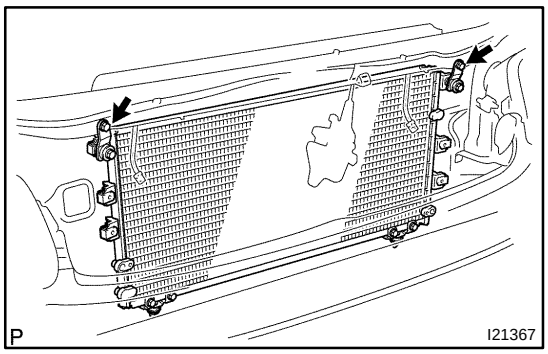

9. REMOVE CONDENSER

(a) Remove the 2 bolts.

(b) Pull the condenser forward and then upward.

HINT:

At the time of installation, refer to the following:

If the condenser is replaced, add compressor oil to the compressor.

Add 40 to 50 cc (1.4 to 1.7 fl.oz.)

Compressor oil: ND–OIL 8 or equivalent

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AC1L8–02

INSTALLATION

Installation is in the reverse order of removal (See page AC–67).

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REAR A/C EVAPORATOR

AC3I8–02

ON–VEHICLE INSPECTION

1. CHECK QUANTITY OF GAS DURING REFRIGERATION CYCLE

2. SET MANIFOLD GAUGE SET (See page AC–18)

3. RUN ENGINE

(a) Rear blower speed set at ”HI” position

(b) A/C switch ON

(c) Rear temperature control set at 18.5˚C (65˚F)

(d) Run the engine at 1,500 rpm for at least 5 minutes.
Then check that the high pressure reading is 1.9 to 2.1 MPa (19 to 21 kgf/cm^2, 270 to 300 psi).

4. CHECK EXPANSION VALVE

If the expansion valve is faulty, the low pressure reading will drop to 0 kPa (0 kgf/cm^2, 0 psi).

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AC3I9–02

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, refer to the following:

- ▶ Evacuate air from the refrigeration system.
- ▶ Charge the system with refrigerant and inspect for leakage of refrigerant.

Specified amount:

Dual A/C: 1050 ± 50 g (37.03 ± 1.76 oz.)

2. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

It is not necessary to drain out all coolant.

3. REMOVE REAR SEAT OUTER BELT FLOOR ANCHORS

4. REMOVE BACKDOOR SCUFF PLATE

5. REMOVE REAR DOOR SCUFF PLATE RH

6. REMOVE UPPER BACK DOOR GARNISH

7. REMOVE REAR WINDOW SIDE GARNISH RH

8. REMOVE REAR QUARTER TRIM PANEL RH

9. REMOVE QUARTER PILLAR GARNISH RH

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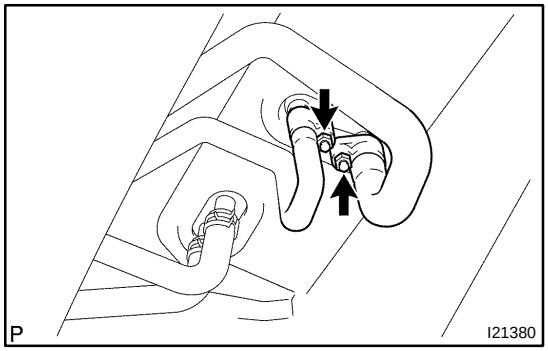


10. DISCONNECT LIQUID AND SUCTION TUBES

Remove the 2 bolts and disconnect both tubes.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

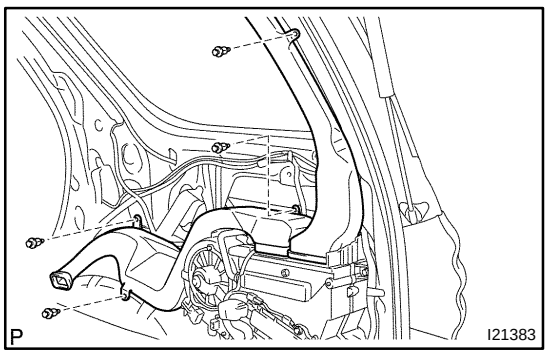
NOTICE:

Cap the openings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, refer to the following:

Lubricate 2 new O–rings with compressor oil and install them to the tubes.

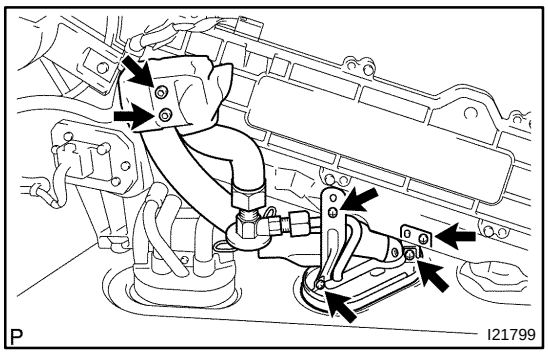


11. REMOVE AIR DUCT

(a) Remove the 3 clips and cover.

(b) Remove the 2 air ducts.

(c) Disconnect the connectors and wire harness clamps.



12. REMOVE EXPANSION VALVE

(a) Remove the 4 screws and 2 brackets.

(b) Pry out the packing.

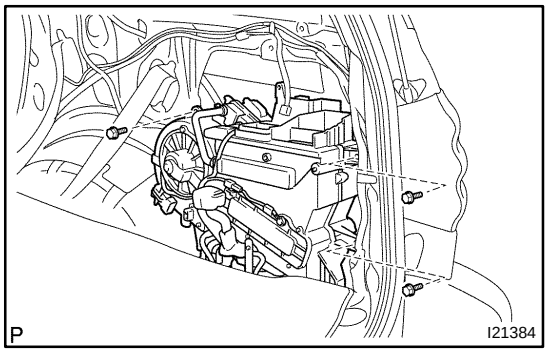
HINT:

At the time of installation, refer to the following item:

Do not refuse the packing.

(c) Using a hexagon wrench (5.0 mm (0.20 in.)), remove the 2 bolts.

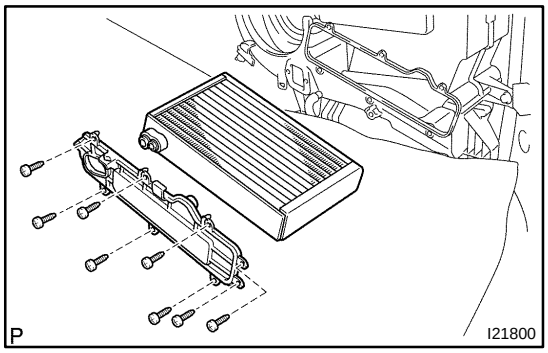
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



(d) Remove the 3 bolts.

(e) Lift the A/C unit until the tube and accessary can be removed.

(f) Remove the tube and accessary.



13. REMOVE EVAPORATOR

(a) Remove the 8 screws and cover.

(b) Pull out the evaporator.

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AC3IA–01

INSTALLATION

Installations is in the reverse order of removal (See page AC–71).

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REAR A/C EXPANSION VALVE

AC3IB–02

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, refer to the following:

- ▶ Evacuate air from the refrigeration system.
- ▶ Charge the system with refrigerant and inspect for leakage of refrigerant.

Specified amount:

Dual A/C: 1050 ± 50 g (37.03 ± 1.76 oz.)

2. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

It is not necessary to drain out all coolant.

3. REMOVE REAR SEAT OUTER BELT FLOOR ANCHORS

4. REMOVE BACKDOOR SCUFF PLATE

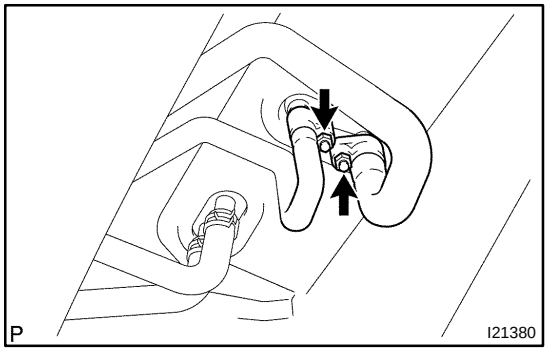
5. REMOVE REAR DOOR SCUFF PLATE RH

6. REMOVE UPPER BACK DOOR GARNISH

7. REMOVE REAR WINDOW SIDE GARNISH RH

8. REMOVE REAR QUARTER TRIM PANEL RH

9. REMOVE QUARTER PILLAR GARNISH RH



10. DISCONNECT LIQUID AND SUCTION TUBES

Remove the 2 bolts and disconnect both tubes.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

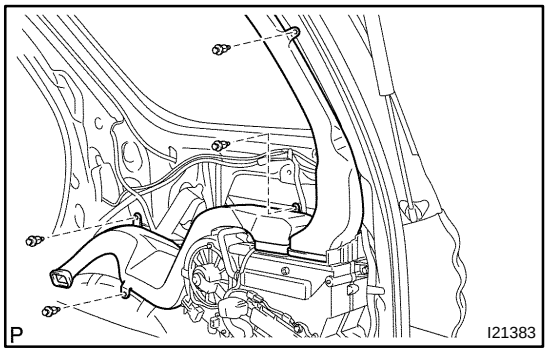
NOTICE:

Cap the openings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, refer to the following:

Lubricate 2 new O–rings with compressor oil and install them to the tubes.



11. REMOVE AIR DUCT

(a) Remove the 3 clips and cover.

(b) Remove the 2 air ducts.

(c) Disconnect the connectors and wire harness clamps.

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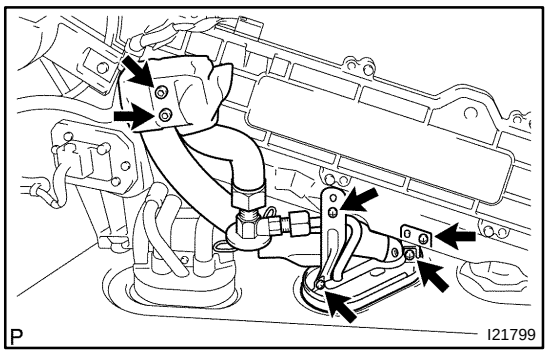


12. REMOVE EXPANSION VALVE

(a) Remove the 4 screws and 2 brackets.

(b) Pry out the packing.

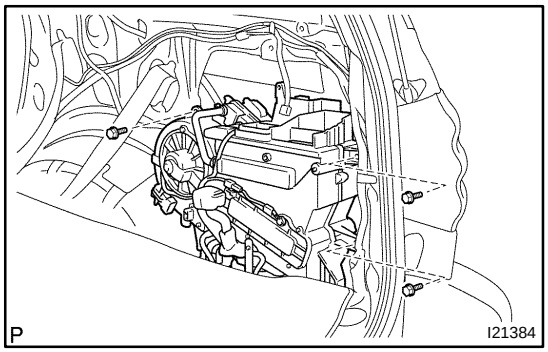
HINT:

At the time of installation, refer to the following:

Do not refuse the packing.

(c) Using a hexagon wrench (5.0 mm (0.20 in.)), remove the 2 bolts.

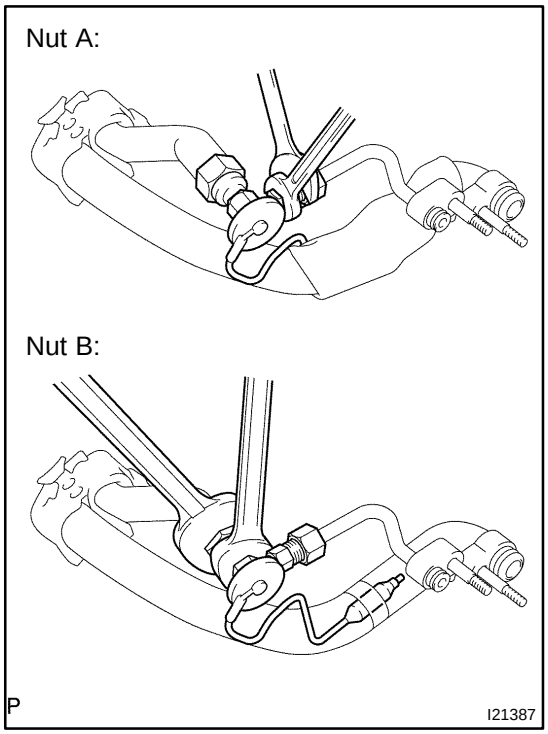
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



(d) Remove the 3 bolts.

(e) Lift the A/C unit until the tube and accessary can be removed.

(f) Remove the tube and accessary.



(g) Remove the holder and disconnect the heat sensing tube.

(h) Loosen the 2 nuts and remove the expansion valve.

Torque:

Nut A: 13 N·m (135 kgf·cm, 10 in.·lbf)

Nut B: 22 N·m (235 kgf·cm, 16 in.·lbf)

HINT:

At the time of installation, refer to the following:

Lubricate 2 new O–rings with compressor oil and install them to the expansion valve.

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AC3IC–01

INSPECTION

INSPECT EVAPORATOR

(a) Check evaporator fins for blockage.

If the fins are clogged, clean them with compressor air.

NOTICE:

Never use water to clean the evaporator.

(b) Check fitting for cracks or scratches.

If necessary, repair or replace.

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AC3ID–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–74).

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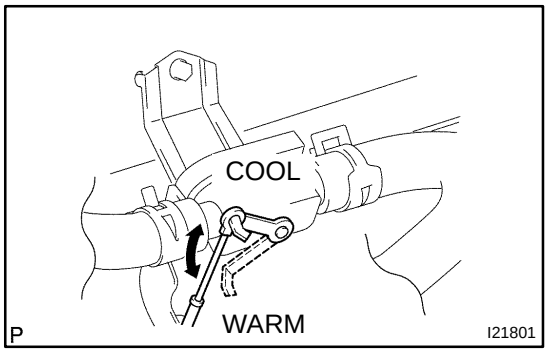
WATER VALVE

AC3HK–02

ON–VEHICLE INSPECTION

1. WARM UP ENGINE

2. DISCONNECT WATER VALVE CONTROL CABLE



3. INSPECT WATER VALVE OPERATION

(a) Check that warm air comes out the vent when the water valve lever is moved to the ”WARM” position.

(b) Check that cool air comes out when the water valve is moved to the ”COOL” position.

If operation is not as specified, replace the water valve.

4. CONNECT WATER VALVE CONTROL CABLE

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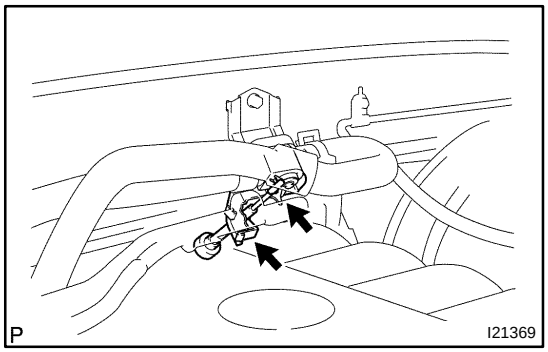
AC3HL–02

REMOVAL

1. DRAIN ENGINE COOLANT FROM RADIATOR

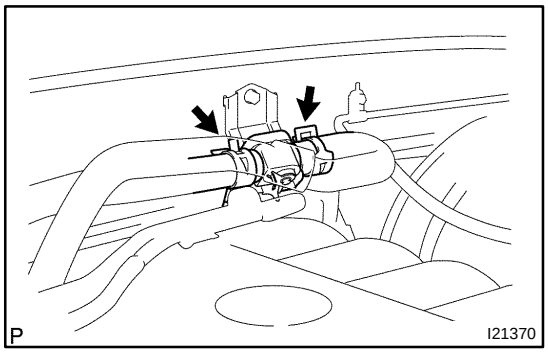
HINT:

It is not necessary to drain out all the coolant.



2. DISCONNECT WATER VALVE CONTROL CABLE FROM WATER VALVE

Disconnect the control cable.



3. DISCONNECT WATER HOSES

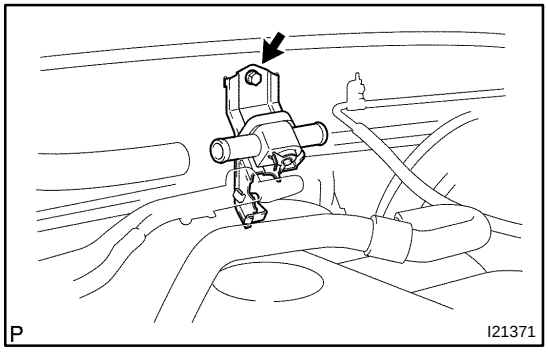
(a) Using pliers, grip the claws of the hose clips and slide the hose clips along the hose.

(b) Disconnect the water hoses.

HINT:

At the time of installation, refer to the following:

- ▶ Heater radiator pipe:
  Push the water hose onto the heater radiator pipe up to the second ridge on the pipe.
- ▶ Water valve:
  Push the water hose onto the water valve pipe till touching the body of the water valve.



4. REMOVE WATER VALVE

Remove the bolt and water valve.

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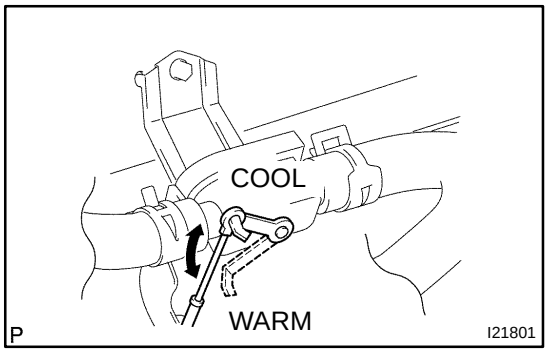
AC3HM–02

INSTALLATION

Installation is in the reverse order of removal (See page AC–79).



1. AFTER INSTALLATION, CHECK WATER VALVE OPERATION

(a) Turn the ignition switch to ON.

(b) Operate temperature control switches to ”MAX. COOL” and ”MAX. WARM”, then check water valve operation, as shown in the illustration.

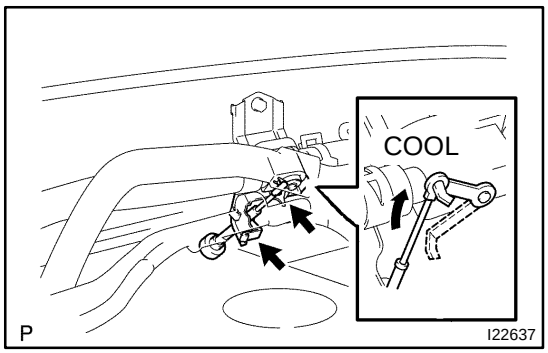
If operation is not as specified, proceed to the next step.

2. ADJUST WATER VALVE CONTROL CABLE

(a) Disconnect the control cable.

(b) Turn the ignition switch to ON.

(c) Set temperature control switches to ”MAX. COOL”.



(d) Set the water valve lever to the ”COOL” position, connect the control cable and lock the clamp.

HINT:

Lock the clamp while lightly pushing the outer cable in the direction shown by the arrow in the illustration.

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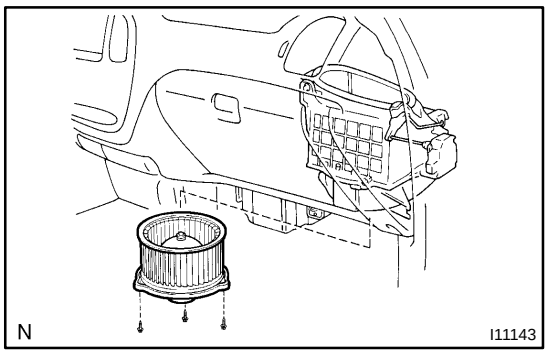


BLOWER MOTOR

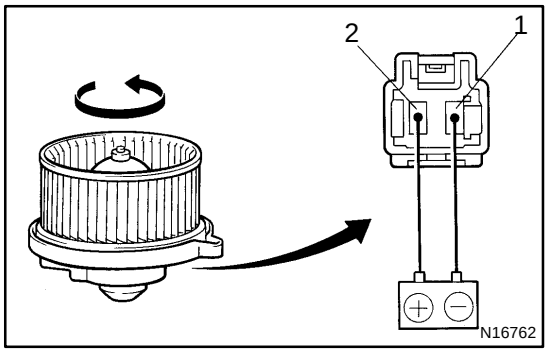
AC3HN–02

INSPECTION

1. REMOVE BLOWER MOTOR

(a) Disconnect the connector.

(b) Remove the 3 screws and motor.



2. INSPECT BLOWER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, then check that the motor operates smoothly.

If operation is not as specified, replace the blower motor.

3. INSTALL BLOWER MOTOR

(a) Install the motor with the 3 screws.

(b) Connect the connector.

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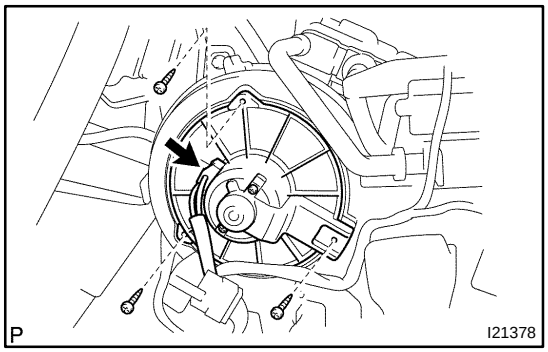
REAR BLOWER MOTOR

AC3HO–02

INSPECTION

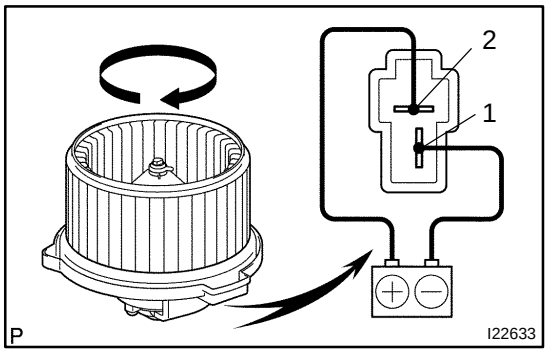
1. **REMOVE REAR SEAT OUTER BELT FLOOR ANCHORS**
2. **REMOVE BACK DOOR SCUFF PLATE**
3. **REMOVE REAR DOOR SCUFF PLATE RH**
4. **REMOVE REAR WINDOW SIDE GARNISH**
5. **REMOVE REAR QUARTER TRIM PANEL RH**



6. **REMOVE BLOWER MOTOR**

(a) Disconnect the blower motor connector.

(b) Remove the 3 screws and blower motor.



7. **INSPECT BLOWER MOTOR OPERATION**

Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, then check that the motor operates smoothly.

If operation is not as specified, replace the blower motor.

8. **INSTALL BLOWER MOTOR**
9. **INSTALL REAR QUARTER TRIM PANEL RH**
10. **INSTALL REAR WINDOW SIDE GARNISH**
11. **INSTALL REAR DOOR SCUFF PLATE RH**
12. **INSTALL BACK DOOR SCUFF PLATE**
13. **INSTALL REAR SEAT OUTER BELT FLOOR ANCHORS**

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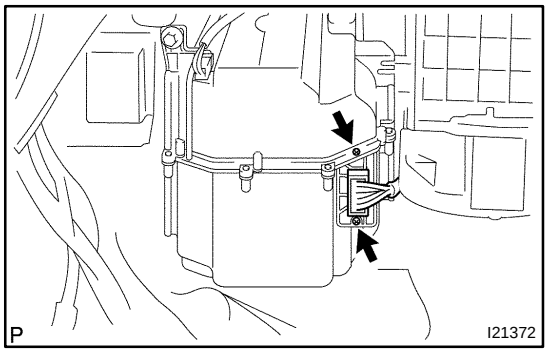
BLOWER MOTOR LINEAR CONTROLLER

AC3HP–02

INSPECTION

1. REMOVE GLOVE COMPARTMENT PARTS
2. REMOVE LOWER NO. 2 FINISH PANEL
3. REMOVE LOWER CENTER COVER
4. REMOVE LOWER LH FINISH PANEL
5. REMOVE NO. 4 HEATER TO REGISTER DUCT



6. REMOVE BLOWER MOTOR LINEAR CONTROLLER
(a) Disconnect the connector.
(b) Remove the 2 screws and blower motor linear controller.
7. INSPECT BLOWER MOTOR LINEAR CONTROLLER **(See page DI–2374)**
8. INSTALL BLOWER MOTOR LINEAR CONTROLLER
(a) Install the blower motor linear controller with the 2 screws.
(b) Connect the connector.
9. INSTALL NO. 4 HEATER TO REGISTER DUCT
10. INSTALL LOWER LH FINISH PANEL
11. INSTALL LOWER CENTER COVER
12. INSTALL LOWER NO. 2 FINISH PANEL
13. INSTALL GLOVE COMPARTMENT PARTS

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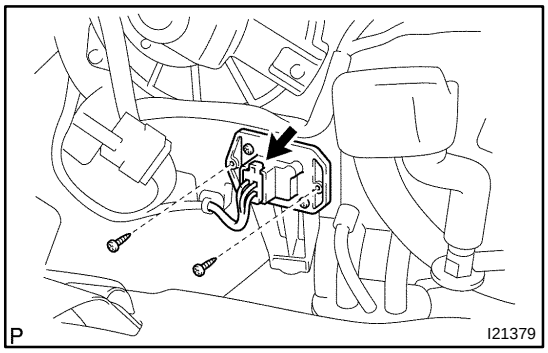
POWER TRANSISTOR (for Rear A/C)

AC3HQ–02

INSPECTION

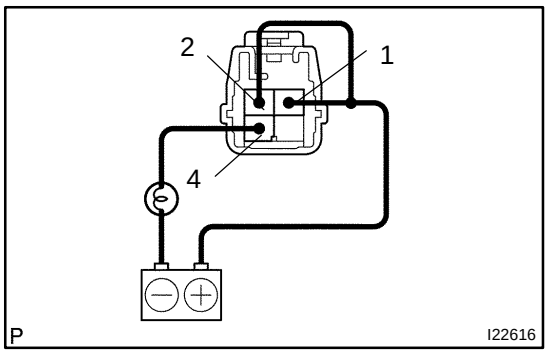
1. REMOVE REAR SEAT OUTER BELT FLOOR ANCHORS
2. REMOVE BACK DOOR SCUFF PLATE
3. REMOVE REAR DOOR SCUFF PLATE RH
4. REMOVE REAR WINDOW SIDE GARNISH
5. REMOVE REAR QUARTER TRIM PANEL RH



6. REMOVE REAR POWER TRANSISTOR

(a) Disconnect the connector.

(b) Remove the 2 screws and the rear power transistor.

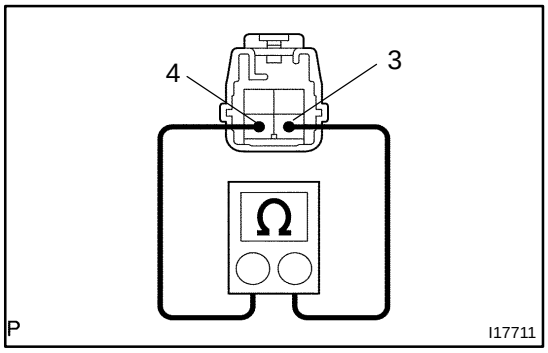


7. INSPECT POWER TRANSISTOR OPERATION

(a) Connect the positive (+) lead to terminal 1 through a 12 V – 3.4 W test bulb and the negative (–) lead to terminal 4.

(b) Check the test bulb lights up when another positive (+) lead is connected to terminal 2 through a 12 V – 3.4 W test bulb.

If operation is not as specified, replace the power transistor.



8. INSPECT POWER TRANSISTOR RESISTANCE

Measure the resistance between terminals 3 and 4.

Standard resistance: 2.0 to 2.4 kΩ

If resistance is not as specified, replace the power transistor.

9. INSTALL REAR POWER TRANSISTOR
10. INSTALL REAR QUARTER TRIM PANEL RH
11. INSTALL REAR WINDOW SIDE GARNISH
12. INSTALL REAR DOOR SCUFF PLATE RH
13. INSTALL BACK DOOR SCUFF PLATE

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14. INSTALL REAR SEAT OUTER BELT FLOOR ANCHORS

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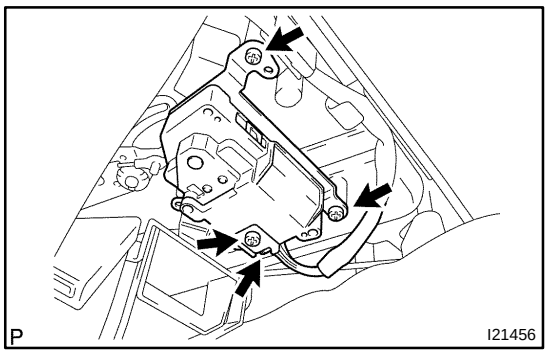

AIR MIX SERVOMOTOR

AC3HR–02

INSPECTION

1. **REMOVE AIR MIX SERVOMOTOR**
(a) Disconnect the connector.
(b) Remove the 3 screws and servomotor.
2. **INSPECT AIR MIX DAMPER POSITION SERVOMOTOR (See page DI–2346)**
3. **INSPECT AIR MIX SERVOMOTOR CIRCUIT (See page DI–2355)**
4. **INSTALL AIR MIX SERVOMOTOR**

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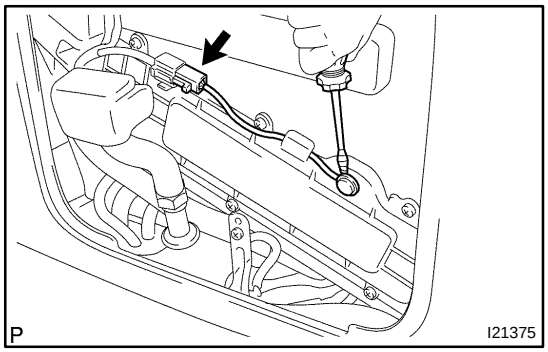
THERMISTOR (for Rear A/C)

AC3HS–02

INSPECTION

1. REMOVE SIDE HEATER COVER



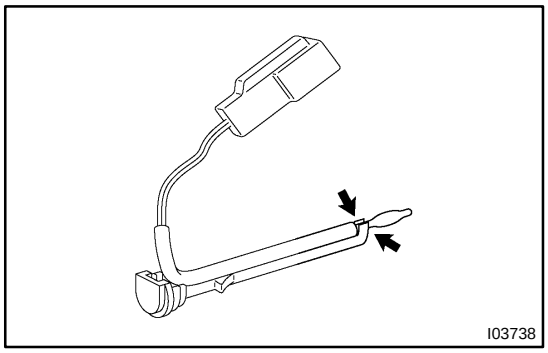
2. REMOVE THERMISTOR

(a) Disconnect the connector and connector clamp.

(b) Using a screwdriver, pull out the sensor.

HINT:

Tape the screwdriver tip before use.



(c) Release the 2 claws and remove the sensor from the bracket plate.

3. INSPECT THERMISTOR (See page DI–2330)

4. INSTALL THERMISTOR

5. INSTALL SIDE HEATER COVER

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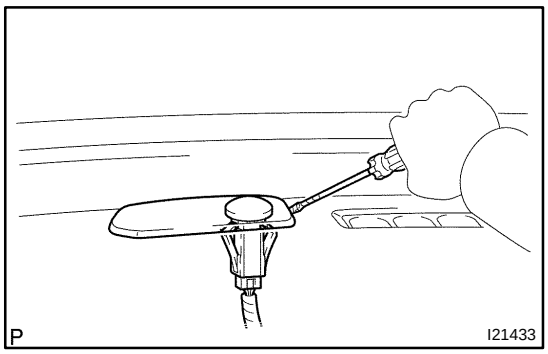

SOLAR SENSOR

AC1LM–07

INSPECTION

1. REMOVE SOLAR SENSOR

Using a screwdriver, pull out the sensor, then disconnect the connector.

HINT:

Tape the screwdriver tip before use.

2. INSPECT SOLAR SENSOR CIRCUIT

(See page DI–2336)

3. INSTALL SOLAR SENSOR

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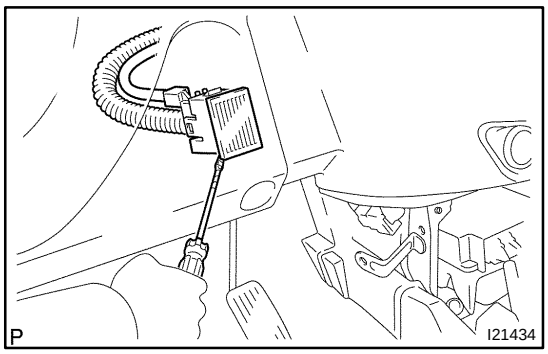

ROOM TEMPERATURE SENSOR

AC3HT–02

INSPECTION

1. REMOVE ROOM TEMPERATURE SENSOR

Using a screwdriver, pull out the sensor, then disconnect the connector and aspirator hose.

HINT:

Tape the screwdriver tip before use.

2. INSPECT ROOM TEMPERATURE SENSOR CIRCUIT (See page DI–2319)

3. INSTALL ROOM TEMPERATURE SENSOR

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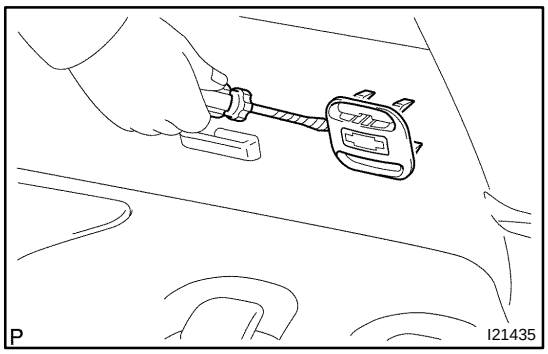

ROOM TEMPERATURE SENSOR (for Rear A/C)

AC1LO–07

INSPECTION

1. REMOVE ROOM TEMPERATURE SENSOR

Using a scrwedriver, pull out the sensor, then disconnect the connector.

2. INSPECT ROOM TEMPERATURE SENSOR CIRCUIT (See page DI–2333)

3. INSTALL ROOM TEMPERATURE SENSOR

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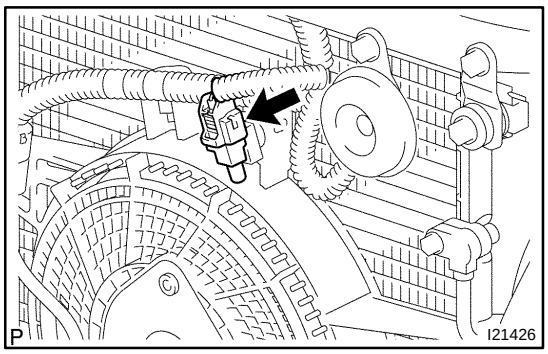

AMBIENT TEMPERATURE SENSOR

AC1LP–07

INSPECTION

1. REMOVE AMBIENT TEMPERATURE SENSOR

(a) Disconnect the connector.

(b) Pull out the sensor.

2. INSPECT AMBIENT TEMPERATURE SENSOR (See page DI–2322)

3. INSTALL AMBIENT TEMPERATURE SENSOR

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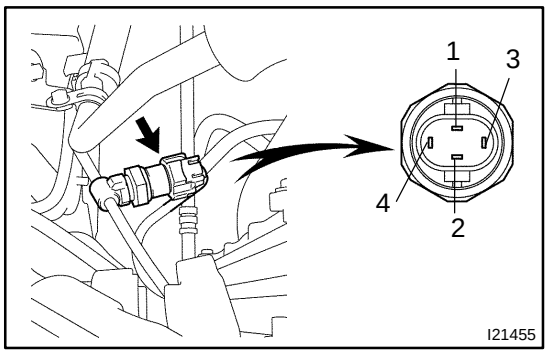
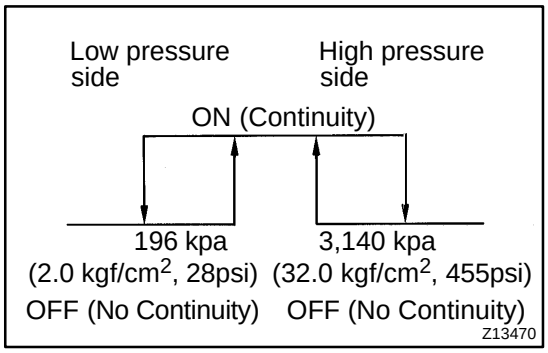


PRESSURE SWITCH

AC1LS–03

ON–VEHICLE INSPECTION

1. **SET MANIFOLD GAUGE SET (See page AC–18)**
2. **DISCONNECT CONNECTOR**
3. **RUN ENGINE AT APPROX. 2,000 rpm**
4. **SET BLOWER SPEED CONTROL SWITCH TO ”HI” POSITION**
5. **SET TEMPERATURE CONTROL LEVER TO ”MAX. COOL” POSITION**
6. **A/C SWITCH ON**

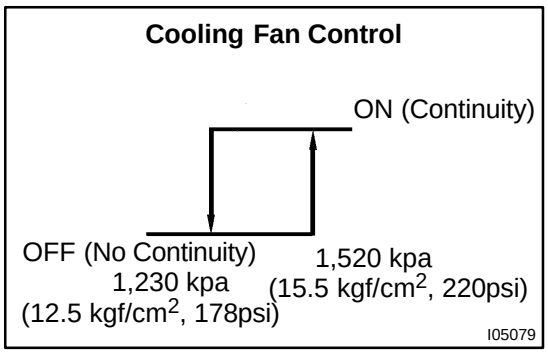


7. **INSPECT PRESSURE SWITCH OPERATION**

(a) Connect the positive (+) lead from the ohmmeter to terminal 4 and the negative (–) lead to terminal 1.

(b) Check continuity between terminals when refrigerant pressure is changed, as shown in the illustration.

If operation is not as specified, replace the pressure switch.



8. **Cooling fan control:**
   INSPECT PRESSURE SWITCH OPERATION
9. **STOP ENGINE AND REMOVE MANIFOLD GAUGE SET**
10. **CONNECT CONNECTOR TO PRESSURE SWITCH**

(a) Connect the positive (+) lead from the ohmmeter to terminal 2 and the negative (–) lead to terminal 3.

(b) Check continuity between terminals when refrigerant pressure is changed, as shown in the illustration.

If operation is not as specified, replace the pressure switch.

11. **STOP ENGINE AND REMOVE MANIFOLD GAUGE SET**
12. **CONNECT CONNECTOR TO PRESSURE SWITCH**

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AC1LT–05

REMOVAL

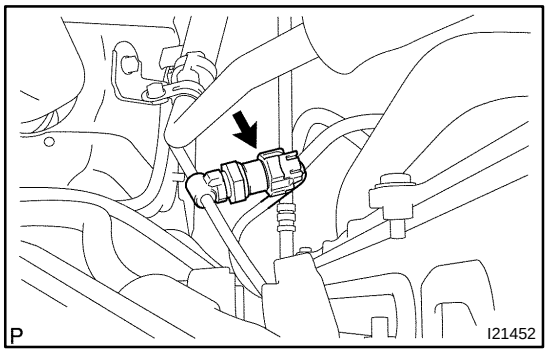
1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, refer to the following:

- Evacuate air from the refrigeration system.
- Charge the system with refrigerant and inspect for leakage of refrigerant.

  Specified amount:
  Single A/C: 750 ± 50 g (26.45 ± 1.76 oz.)
  Dual A/C: 1050 ± 50 g (37.03 ± 1.76 oz.)



2. REMOVE PRESSURE SWITCH FROM LIQUID TUBE

Disconnect the connector and remove the pressure switch.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

HINT:

- Being careful not to deform the tube, lock the switch mounted on the tube with an open end wrench and remove the switch.
- At the time of installation, refer to the following:
  Lubricate a new O–ring with the compressor oil and install it to the switch.

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AC1LU–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–93).

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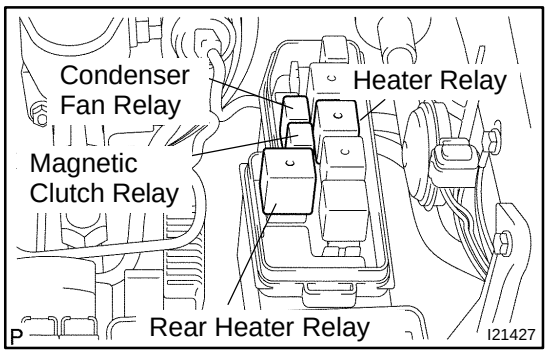


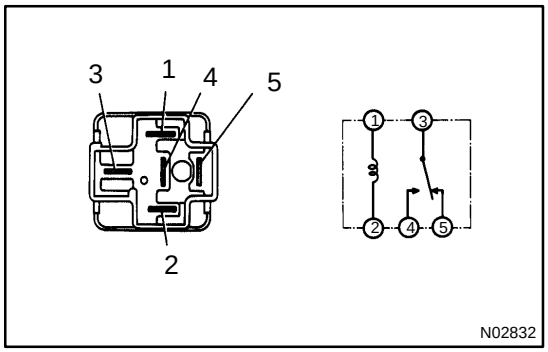
RELAY

AC3HU–02

INSPECTION

1. REMOVE RELAY

(a) Remove the heater relay.
(b) Remove the rear heater relay.
(c) Remove the condenser fan relay.
(d) Remove the magnetic clutch relay.

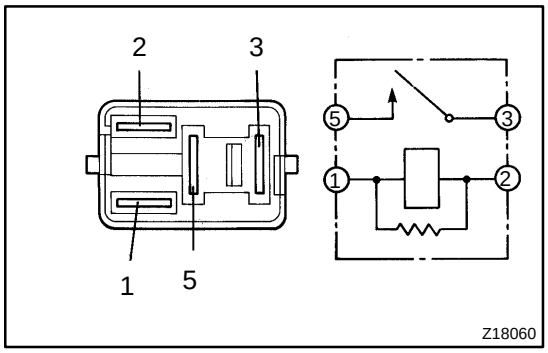


2. INSPECT RELAY

(a) Inspect the heater and rear heater relay for continuity.

Condition	Tester connection	Specified condition
Constant	1 – 2 3 – 4	Continuity
Apply B+ between terminals 3 and 5.	3 – 5	Continuity

If continuity is not as specified, replace the relay.



(b) Inspect the magnetic clutch and condenser fan for relay continuity.

Condition	Tester connection	Specified condition
Constant	1 – 2	Continuity
Apply B+ between terminals 1 and 2.	3 – 5	Continuity

If continuity is not as specified, replace the relay.

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CONDENSER FAN

AC1LZ–05

ON–VEHICLE INSPECTION

1. INSPECT CONDENSER FAN OPERATION

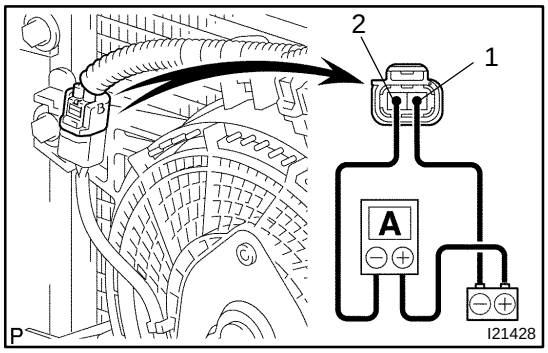
Inspect the fan operation under the following conditions, as shown in the chart.

Test conditions:

- Start engine
- Blower speed control switch position ”HI”
- Temperature control dial at ”COOL” position
- Set manifold gauge set
- A/C switch ON

Condition	Fan operation (Fan speed)
Refrigerant pressure is less than 1,520 kPa (15.5 kgf/cm^2, 220 psi)	OFF
Refrigerant pressure is 1,520 kPa (15.5 kgf/cm^2, 220 psi) or above	Rotate

If operation is not as specified, proceed to the next inspection.



2. INSPECT CONDENSER FAN MOTOR OPERATION

(a) Disconnect the fan connector.

(b) Connect the battery and ammeter.

(c) Check that the fan rotates smoothly, and then check the reading on the ammeter.

Specified amperage: 9.2 to 11.0 A at 20˚C (68˚F)

If operation is not as specified, replace the fan motor.

If operation is as specified, check the pressure switch, cooling fan relays and water temp. switch.

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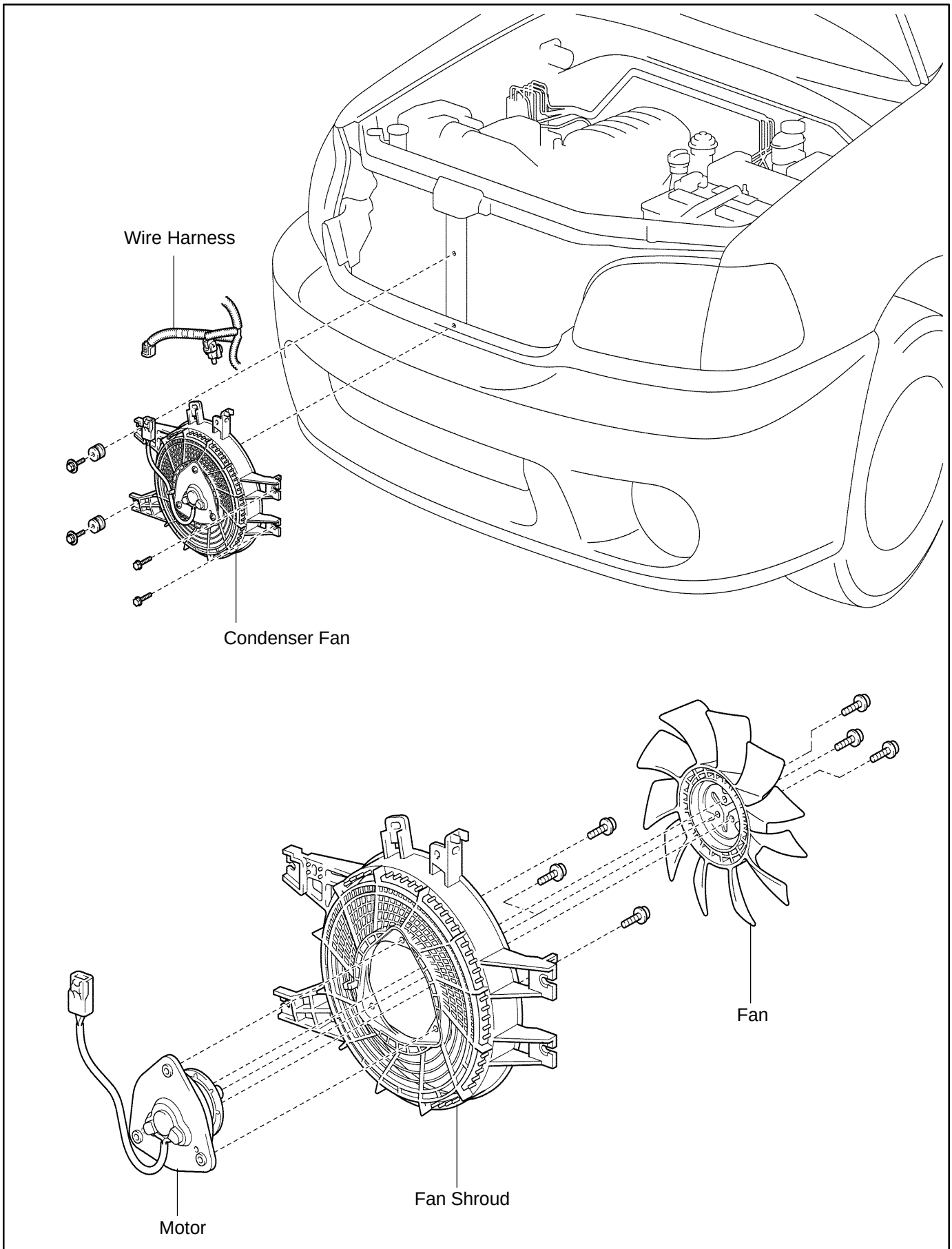
AC1M0–04

COMPONENTS



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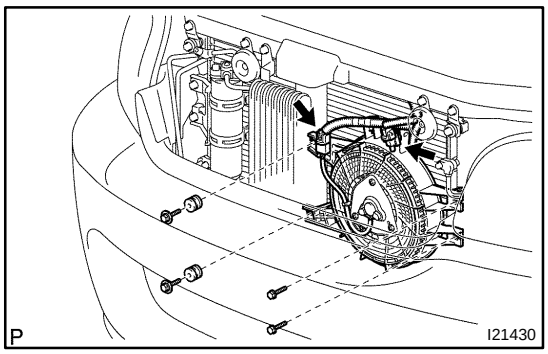
AC1M1–05



REMOVAL

REMOVE CONDENSER FAN

(a) Disconnect the 2 connectors.
(b) Disconnect the wire harness clamp.
(c) Remove the ambient temperature sensor.
(d) Remove the 4 bolts and condenser fan with the fan shroud.

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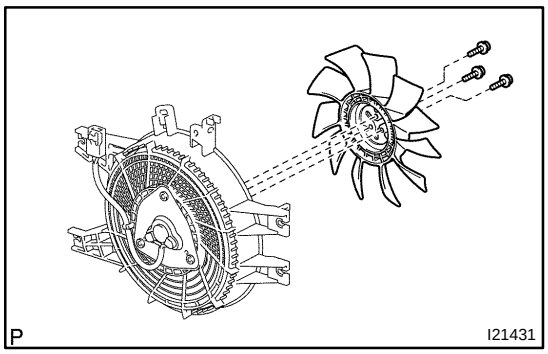
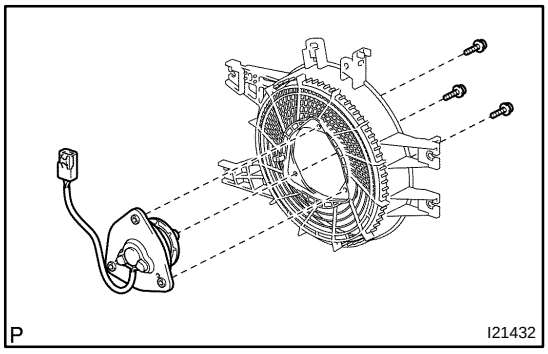
AC3HV–02



DISASSEMBLY

1. REMOVE FAN

Remove the 3 bolts and fan.



2. REMOVE FAN MOTOR FROM FAN SHROUD

Remove the 3 screws and fan motor.

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AC1M3–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–99).

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INSTALLATION

Installation is in the reverse order of removal (See page AC–98).

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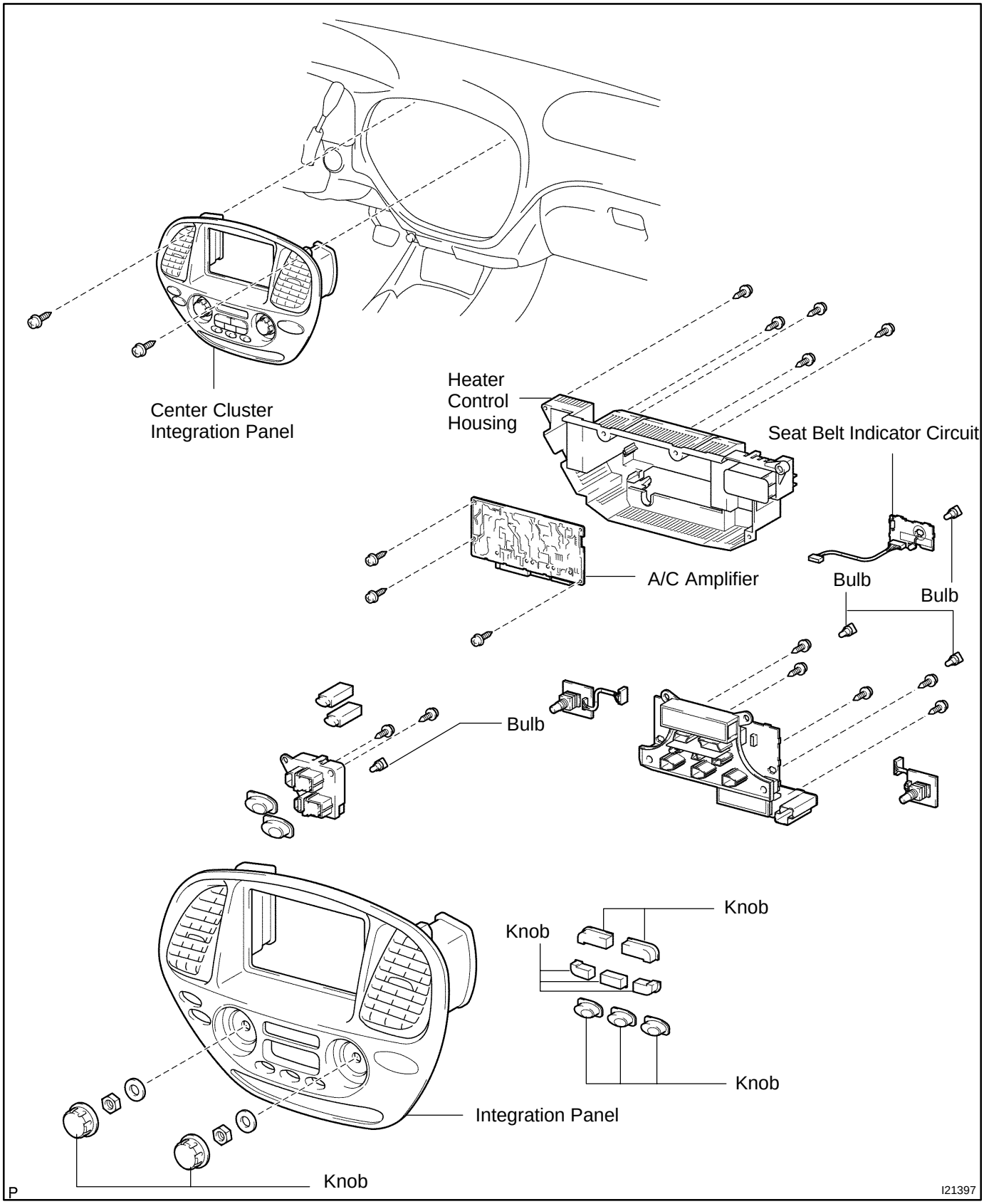
AIR CONDITIONER CONTROL ASSEMBLY (Center Cluster Integration)

AC3I1–03

COMPONENTS



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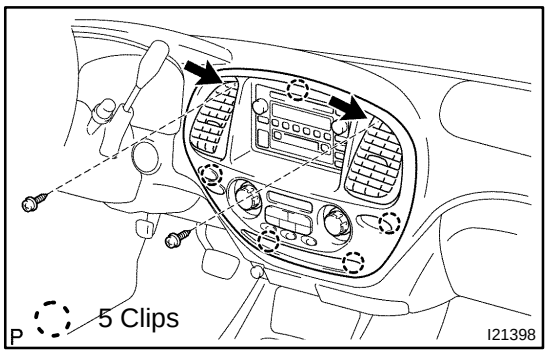
AC3HW–02



REMOVAL

REMOVE CENTER CLUSTER INTEGRATION PANEL

(a) Remove the 2 screws.

(b) Remove the integration control panel by pulling the portions indicated by arrows in the illustration.

(c) Disconnect the connector.

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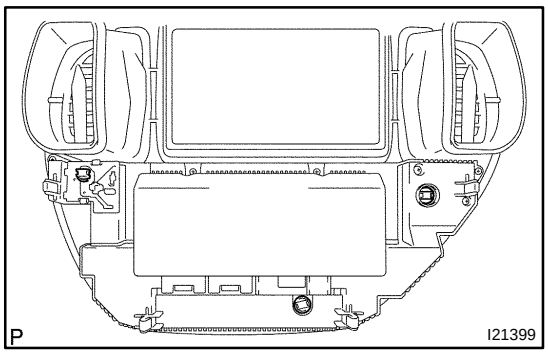
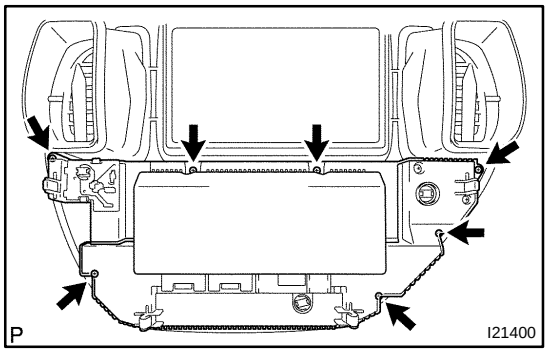
AC3HX–03



DISASSEMBLY

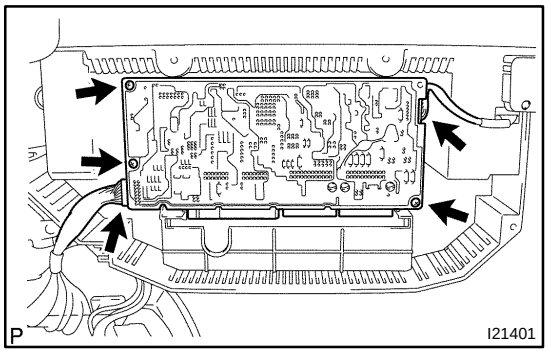
1. REMOVE BULBS

Remove the 3 bulbs.



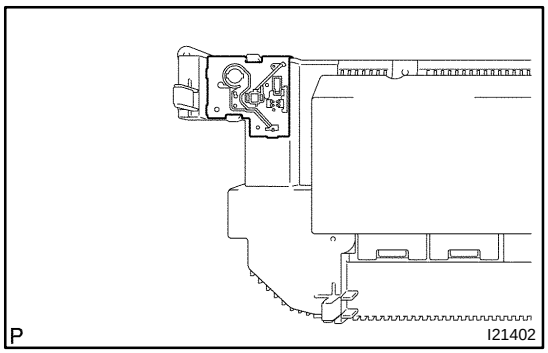
2. REMOVE A/C AMPLIFIER

(a) Remove the 7 screws and heater control housing.

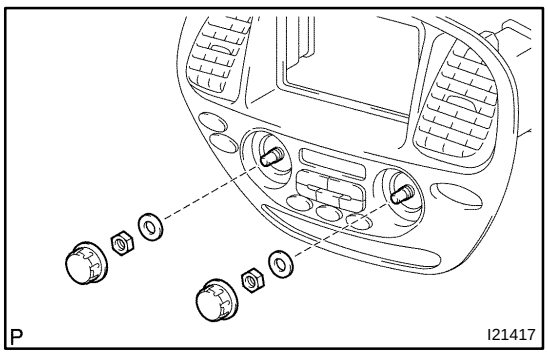


(b) Disconnect the 2 connectors.

(c) Remove the 3 screws and A/C amplifier.



(d) Remove the passenger seat belt indicator circuit.



3. REMOVE INTEGRATION CIRCUIT

(a) Remove the 2 knobs.

(b) Remove the 2 nuts and 2 washers.

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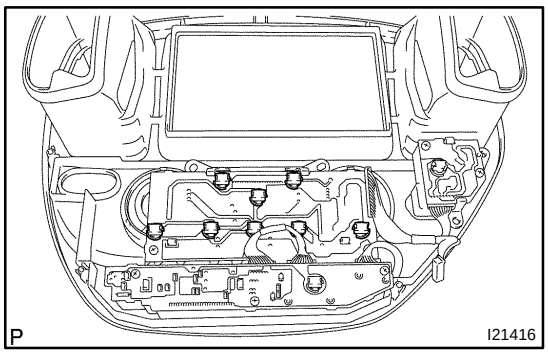
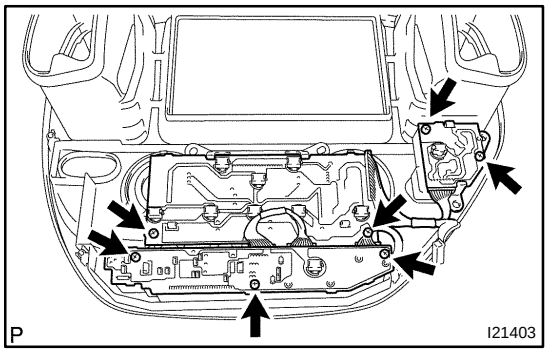


(c) Remove the 8 bulbs.



(d) Remove the 7 screws and integration circuit.

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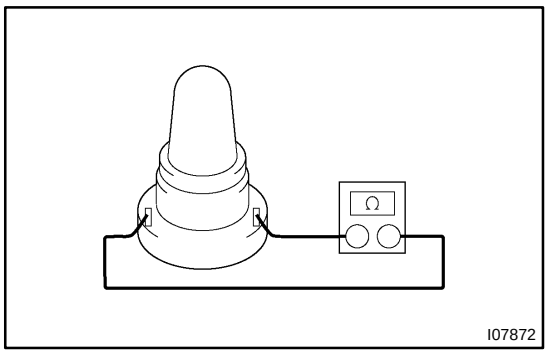
AC3HY–02



INSPECTION

INSPECT BULB

Set the tester as shown in the illustration to check for continuity.

If continuity exists, replace the heater control.

If no continuity exists, replace the bulb.

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AC3HZ–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–111).

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AC3I0–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–110).

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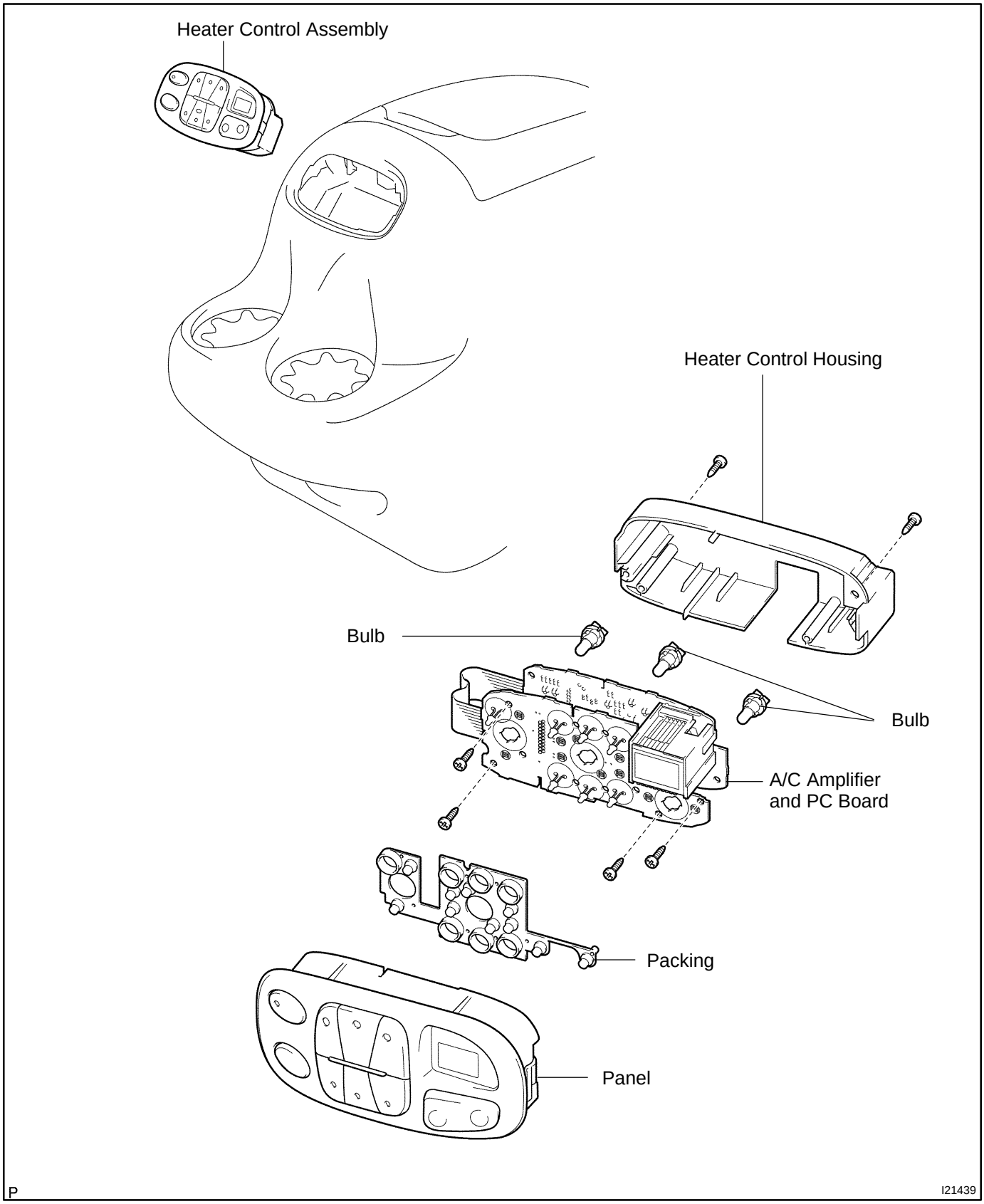
REAR A/C CONTROL ASSEMBLY (for Rear A/C)

AC3I2–02

COMPONENTS



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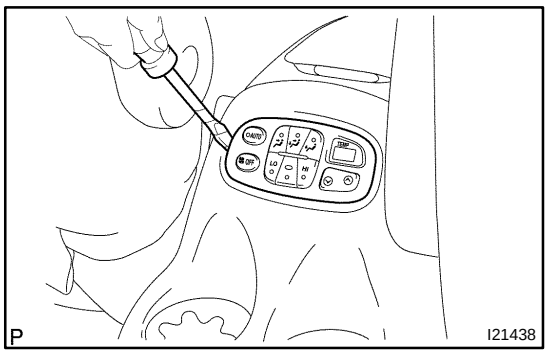
AC3I3–02



REMOVAL

REMOVE HEATER CONTROL ASSEMBLY

Using a screwdriver, release the 2 claws and pull out the control switch assembly, then disconnect the connector.

HINT:

Tape the screwdriver tip before use.

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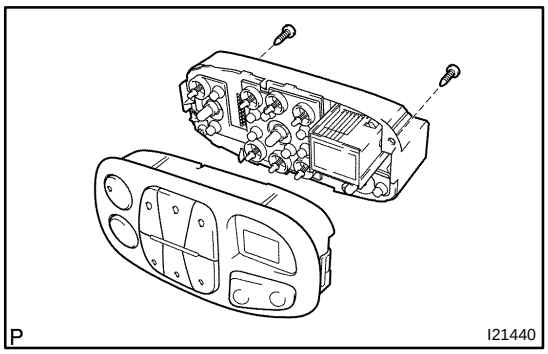
AC3I4–02

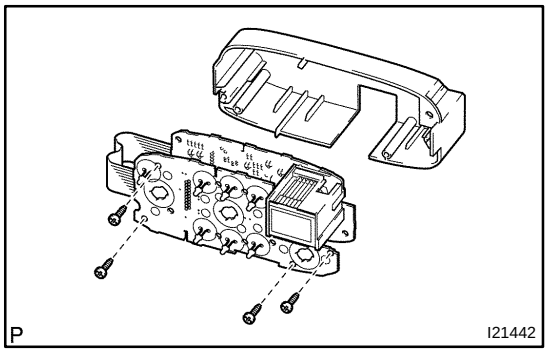
DISASSEMBLY

REMOVE A/C AMPLIFIER

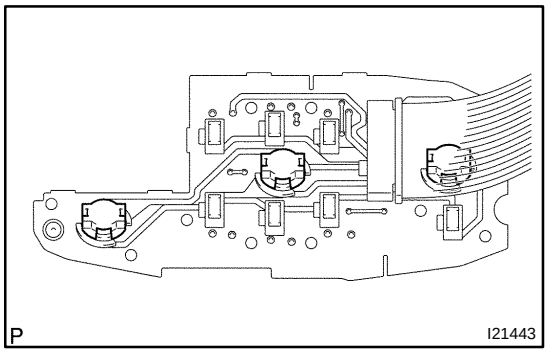
(a) Remove the 2 screws and heater control switch.



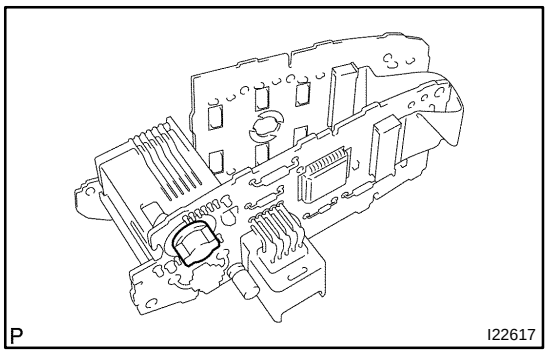
(b) Remove the 4 screws, A/C amplifier and PC board.



(c) Remove the 3 bulbs from the PC board.



(d) Remove the bulb from the A/C amplifier.



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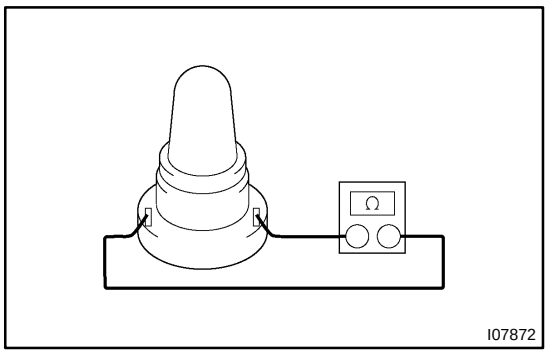
AC3I5–02



INSPECTION

INSPECT BULB

Set the tester as shown in the illustration to check for continuity.
If continuity exists, replace the heater control.
If no continuity exists, replace the bulb.

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AC3I6–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC–111).

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AC3I7–01

INSTALLATION

Installation is in the reverse order of removal (See page AC–110).

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